Europe Economics

The Economic Impact on Swiss Citizens of the Bilaterale I deal with the EU

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Executive Summary

This study has been commissioned from Europe Economics by Stiftung für bürgerliche Politik, in the context of the Swiss referendum on whether Switzerland should take back unilateral control of immigration, possibly at the cost of a set of other Swiss-EU trade agreements grouped in the so-called "Bilaterale I" package. This referendum was scheduled for May 2020 but has now been postponed to September 2020. In this report we have used new models to quantify the impacts of the Bilaterale I accord upon the Swiss economy, and in particular upon the GDP per capita of domestic Swiss citizens. Specifically, the report considers the quantitative impacts of Bilaterale I's trade, aviation and immigration provisions.

The trade provisions of Bilaterale I cover a non-trivial but modest portion of Switzerland's total trade, currently comprising around 14 per cent of total trade but falling at the end of 2020 to around 11 per cent (with the departure of the UK from the EU's Single Market). By 2030 we estimate that around 7 per cent of Swiss goods exports (5 per cent of total exports) will fall under Bilaterale I's trade provisions. We estimate impacts of the trade package upon Swiss GDP using a number of different methods, favouring a slightly higher overall figure than found in certain other studies — our estimate is around 0.1 to 0.2 per cent of GDP.

For aviation, studies suggest impacts so far have been of the order of 0.1 per cent of GDP. Some studies suggest that will rise rapidly in the future, but that will depend upon scenarios such as the evolution of aviation in response to climate change or pandemic disease risks.

The main effects have been those associated with immigration. During the 21st century the Swiss population has risen relatively rapidly, and by 2018 was nearly 20 per cent above its 1999 level. The key driver of this rise has been immigration. Immigration into Switzerland has been much more rapid, in this period, than in most other European countries. The main countries from which immigrants into Switzerland have come are France, Italy, Germany, Portugal, the UK and Spain. Our analysis suggests that the key date at which the Bilaterale I's free movement provisions stated to affect immigration was 2002.

The inflow to Switzerland should not be assumed a one-off effect. It is true that net immigration has fallen back a little over the past five years, but the fundamental forces drawing people into the Swiss economy will very probably persist. Of these, the two most fundamental are as follows.

- Switzerland is a much wealthier economy than the EU, with a GDP per capita of around twice the EU average. As a consequence, immigrants into Switzerland can expect much higher wages than they can secure elsewhere, and if (at some later point in life) they were to fall in need of social protection, the levels of social protection in Switzerland are much higher than those elsewhere and have risen markedly over time whilst social protection payments elsewhere have been steady.
- Switzerland is a recipient of immigration driven by the Eurozone's "people pump" – a mechanism whereby economic shocks that affect low labour market flexibility Eurozone members tend to drive job-seekers out into higher labour market flexibility non-Eurozone members, particularly Switzerland, Norway and the UK.

We have analysed and quantitatively estimated a range of impacts of immigration upon the Swiss economy. We find that some often-discussed impacts of immigration (such as more exposure to foreigners and their ideas, greater social churn, crime, or moving country so as to claim benefits) have less effect in the Swiss case than unquantified discussion typically assumes. In quantitative terms the most material effects lie elsewhere.

- Growth in the Swiss capital stock has not kept pace with growth in the population. In per capita terms, growth in the capital stock fell away after 2002 and eventually stagnated. Because immigrants arrive with relatively little capital, the labour force has risen by more than the capital stock. That means increased pre-tax returns for already-wealthy Swiss capital-holders. Those with wealth become richer before taxes.

- The increase in the labour force with capital increasing by less (because immigrants — partly reflecting their age — have relatively little capital of their own), along with the fact that immigrants, being younger, are at a lower-earning phase of their lives, tends to put downward pressure on average wages. Downwards pressure on wages is more pronounced at lower parts of the income spectrum. We estimate that average wages in Switzerland are likely to be about 3.5 to 3.7 per cent lower, owing to immigration over this period.
- The combination of higher incomes for the already-wealthy and lower wages for lower-paid workers increases inequality, created added pressure for higher taxes and spending, to mitigate the inequality increase. We estimate that immigration has resulted in increases in social protection expenditure of around 2.0 to 2.3 per cent of GDP over this period.
- The combination of immigrants being at lower average productivity than the average Swiss person with less capital and an increased requirement for social spending has led to a reduction in GDP per capita growth, over the 2002 to 2017 period, of 4.4 per cent. Combined with an increase in GDP per capita of around 0.1-0.2 per cent for trade and for aviation, the net GDP per capita impact of Bilaterale I has been a reduction in Swiss GDP per capita growth of around 4.1 per cent over the period.
- This 4.1 per cent reduction is confirmed both by trend analysis and by a synthetic counterfactual model (a form of statistical benchmarking). The synthetic counterfactual model includes comparator countries (Germany and Italy) that were themselves materially affected by the Great Recession (and thus the reduction we find is unlikely to be an effect of the Great Recession) and countries that have had much lower immigration than Switzerland over the period.
- This reduction in GDP per capita has not simply been a consequence of new migrants having lower extra GDP per extra person than the Swiss domestic citizen average GDP per capita. Swiss domestic citizens themselves have lost out, by around 1.3-2.0 per cent of GDP per capita.

We consider how matters might have been different had Switzerland operated a selective immigration policy from 2002 onwards instead of introducing free movement for EEA citizens. In that case, we estimate, GDP would have been around 0.7 per cent higher per capita for domestic Swiss citizens (and 1.5 per cent higher for all Swiss residents including immigrants). So, overall, for this, our preferred counterfactual, the overall impact of the Swiss Bilaterale I package upon domestic Swiss citizens is as follows.

	Estimated cumulative historical effect (2002-2017), per domestic Swiss citizen, by 2017	**Expected future effect**
Trade	0.1 to 0.2% of GDP per domestic Swiss citizen gain	We expect this impact to fall over time, particularly as the UK leaves the EU's Single Market and as non-European trade continues to increase in importance, relative to EU trade, as China, India and the US continue to out-grow Europe.
Aviation	0.1% of GDP per domestic Swiss citizen gain	Some studies project this rising over time into the future, but the amount depends upon scenarios such as the evolution of aviation in response to climate change or pandemic disease risks.
Immigration	0.7% of GDP per domestic Swiss citizen loss	Similar losses are likely to be repeated in the future as the Eurozone continues to act as a "people pump". Indeed, with the UK leaving the EU and imposing restrictions on EU immigration into the UK, one destination for these "people pump" emigrants will be removed, with the potential implication that some of them are diverted to Switzerland.
Overall	0.5% of GDP per domestic Swiss citizen loss	It is plausible that, in the future, impacts on Switzerland will be larger than those we have estimated here for 2002 to 2017.

Thus the claim made in earlier studies that the Bilaterale I accord has been overall positive in terms of GDP per capita is not sustained by our findings in respect of domestic Swiss citizens.

1 Introduction and context

This study has been commissioned from Europe Economics by Stiftung für bürgerliche Politik, in the context of the May 2020 Swiss referendum on whether Switzerland should take back unilateral control of immigration, if necessary at the cost of abrogating the migration pacts it has with the European Union (EU) and possibly at the cost of a set of other Swiss-EU trade agreements grouped in the so-called "Bilaterale I" package. This follows on from a 2014 referendum at which Swiss voters supported imposing quotas on EU immigration.

The aim of this report is to quantify the impacts of the Bilaterale I accord upon the Swiss economy, and in particular upon the GDP per capita of non-immigrants, whom we shall frequently refer to loosely by terms such as "Swiss natives" or "domestic Swiss citizens".[1]

This report considers the quantitative impacts of the trade, aviation and immigration provisions of Bilaterale I. As we shall see, of these, much the most material (and the impact most challenging to estimate) is the impact of immigration.

1.1.1 Addressing a weakness in immigration debates

Policy debates about immigration typically have the following key features. Many empirical economic analyses talk in general terms about the "impacts of immigration", as if they were the same in every country, and focus on the most easily quantifiable aspects of immigration (eg impacts on productivity). They also often take a "global" welfare approach, considering the impact immigration has upon global economic efficiency (as opposed to, say, upon the welfare of citizens living in a country into which immigration occurs). Many such studies conclude that, considered in this global way and focusing on these dimensions, the net benefits of any amount of immigration whatever are positive in these dimensions. If interpreted naively, the implication would be that all countries should operate an "open borders" policy of allowing totally unrestricted immigration from anywhere. Yet no developed country in the world actually operates such a policy. Clearly, therefore, every developed country accepts that there are downsides to immigration that these studies that consider the matter in this way are missing.

This issue creates an important weakness at the heart of the immigration debate. Those that seek to argue for tighter immigration restrictions contend that the harms from these unquantified downsides of immigration are greater than the benefits of whatever the current level of or rules for immigration imply — yet without any systematic basis for quantification. Those that want looser immigration restrictions or more immigration seek, instead, to minimize the importance of these unmeasured downsides or to create a culture in which others, likewise, attach little value to these downsides by characterising concerns about them as "xenophobia", "irrational fears" or "understandable but misplaced concerns". On the upside, the value of Swiss-EU relations is likened to that of the Mona Lisa: although it is not clear how to calculate the Mona Lisa's price, it is seen as being of inestimable value. In this way, debates cease to be about the contingent features of the situation and instead are simply the (often-fierce) asserting of pre-judged general positions.

In this report we attempt to address this problem. We do so by trying to estimate not only the easier-to-quantify upsides and downsides of immigration, but also of harder-to-quantify aspects (both positive and negative), and to relate them to the specifics of the situation of Swiss-EU relations over the past two decades

[1] It is quite standard in this literature to use the term "natives" in this slightly loose way to refer to all non-migrants — eg see A.6, p104 of https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/257235/analysis-of-the-impacts.pdf

and for the decades ahead. We also do not take a "global" approach, but instead focus upon the impacts immigration has upon those that were living in Switzerland before the immigration occurred.

We hope this can make a constructive contribution to the debate on the future of Switzerland's relations with the EU. Nonetheless, we freely acknowledge that it is the nature of such analysis that different people might make different judgement calls about how important certain of the risks and other factors that we identify are. Those that are more pessimistic about the potential downsides of immigration might contend that we have been too optimistic in certain areas, whilst advocates of open borders may well claim that some of the hard-to-quantify upsides are more important than we assess and some downsides less significant. We have sought to take a balanced position that is ambitious in terms of quantifying but realistic in terms of recognising the uncertainties regarding quantitative estimates in such cases.

1.2 Context

1.2.1 The MRA

The Bilaterale I package included a number of trade measures covered by what is referred to as the Mutual Recognition Agreement (MRA). The MRA is an instrument designed to remove technical barriers to the trade of industrial goods between Switzerland and the EU (services are not included in the agreement). It covers the following product categories:

- Machinery
- Personal protective equipment
- Toys
- Medical devices
- Gas appliances and boilers
- Pressure vessels
- Telecommunications terminal equipment
- Equipment and protective systems intended for use in potentially explosive atmospheres
- Electrical equipment and electromagnetic compatibility
- Construction plant and equipment
- Measuring instruments and pre-packages
- Motor vehicles
- Agricultural and forestry tractors
- Good laboratory practice (GLP)
- Medicinal products GMP Inspection and Batch Certification

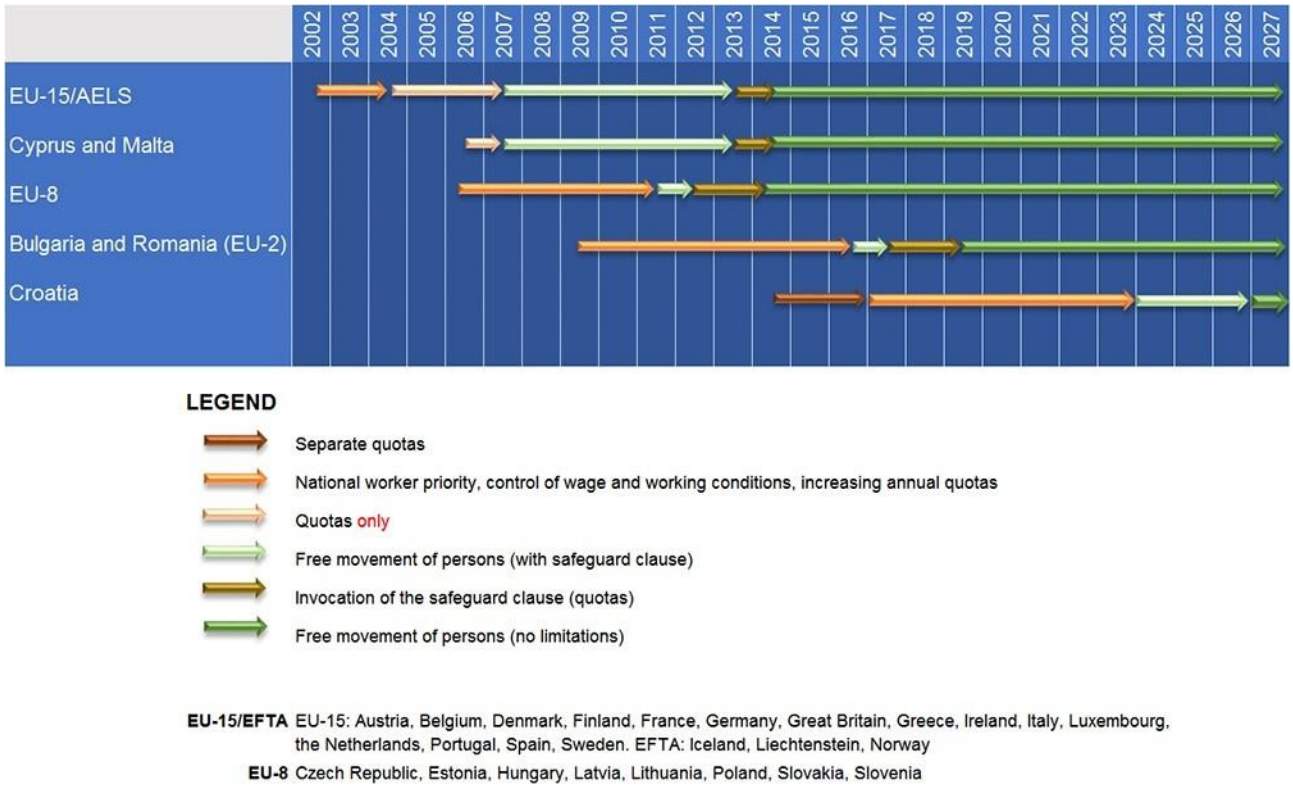
According to the Swiss State Secretary for Economic Affairs (SECO), as of 2015, the total of value Swiss exports to the the EU related to products covered by the MRA was around 30 billion Swiss francs a year. Hälg (2015) estimated coverage at CHF 33 bn, and the Federal Department of Foreign Affairs estimated CHF 29 bn. For this study we use an estimate of CHF 30 bn as of 2015. A study commission to BAK Basel from SECO estimates of the value of products covered by the MRA and imported to Switzerland from the EU in 2014 to be around CHF 41 bn a year, whilst in 2016 Schwab estimated the value at around CHF 44 bn. For this study we use an estimate of CHF 42 bn as of 2015.

1.2.2 The AFMP

The 1999 Agreement on the Free Movement of Persons (AFMP) between Switzerland and the EU gave EU and EFTA citizens the right to live or work in Switzerland, along with the mutual recognition of professional

qualifications, the right to buy property, and some coordination of social insurance systems. Through a series of steps free movement was extended from 2002 onwards, as set out in the following chart.

Figure 1.1: Timeline of the introduction of free movement of persons between Switzerland, the EU and EFTA



Source: https://www.sem.admin.ch/sem/en/home/themen/fza_schweiz-eu-efta.html

1.3 Swiss population and immigration

1.3.1 The Swiss immigration system

Switzerland currently operates a dual system for authorising foreign workers to take up employment.[2] First, as discussed above, nationals of EU (European Union) and EFTA (European Free Trade Association[3]) countries have preferential access to the Swiss labour market, meaning that even a job vacancy cannot be filled by a Swiss worker, applicants from EU and EFTA countries would enjoy priorities over those from third countries. Second, nationals of third countries are authorised to work in Switzerland if they meet certain conditions. For example, candidates from third countries are allowed to work as managers (i.e. in senior management positions), specialists or other qualified personnel (i.e. those with higher education qualifications with technical expertise and relevant experience) when it is in Switzerland's economic interest[4]. In addition, various sources also mention the possibility of obtaining work authorisation in Switzerland for those working

[2] For an overview of the dual approval system, please see: https://www.sem.admin.ch/dam/data/sem/arbeit/drittstaaten/arbeiten-in-ch-e.pdf

[3] The EFTA consists of Iceland, Liechtenstein, Norway and Switzerland.

[4] For further information regarding the conditions to work in Switzerland as a third country national, please see: https://www.ch.ch/en/working-foreign-national-requirements/

in shortages industries.[5] The number of authorisations granted is also restricted and the exact number of permits awarded are determined by the Federal Council each year.[6]

Furthermore, certain regulated professions (e.g. healthcare professionals such as dentists or nurses, and education and social care professionals such as driving instructors or nursery school teachers) also require foreign workers to get their qualifications obtained abroad recognised before they are allowed to work in Switzerland, while some foreign professional qualifications (e.g. for auditors and insurance brokers) are not recognised at all.[7]

Following the "against mass immigration initiative" of 2014, aimed at reducing the number of EU workers arriving in Switzerland, since July 2018 employers are required to advertise vacancies for occupations that have a national unemployment rate of at least 8 per cent amongst Swiss residents first through unemployment centres. From 2020, the threshold on unemployment rate has been reduced to 5 per cent.[8] A year after the launch of the "Swiss first" job registration scheme, the State Secretariat for Economic Affairs (SECO) reported that around 200,000 jobs were advertised through regional unemployment centres.[9]

In addition, in 2019 the Swiss government also announced further proposed measures to assist older unemployed Swiss workers to find employment given the competition they faced from skilled EU workers.[10] These included measures such as the provision of increased funds to people over the age of 50 or career advice to those over 40, assisting them in adopting to the changes in requirements.

1.3.2 Changes in the Swiss population and in levels of immigration over time

Over the 2000s the Swiss population has risen relatively rapidly, and by 2018 was nearly 20 per cent above its 1999 level. That is about the same population rise seen in Norway over the same period (a member of the EEA free movement area), around half as rapid again as the rise in the UK and much more rapid than the rise in Germany.

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[5] For example, see: https://blogs.deloitte.ch/tax/2017/10/swiss-federal-council-releases-work-permit-quotas-for-2018-increased-quotas-for-non-euefta-nationals.html

[6] The numbers are published in the in the Ordinance on Admission, Residence and Employment (AREO). https://www.sem.admin.ch/sem/en/home/themen/arbeit/nicht-eu_efta-angehoerige/grundlagen_zur_arbeitsmarktzulassung.html

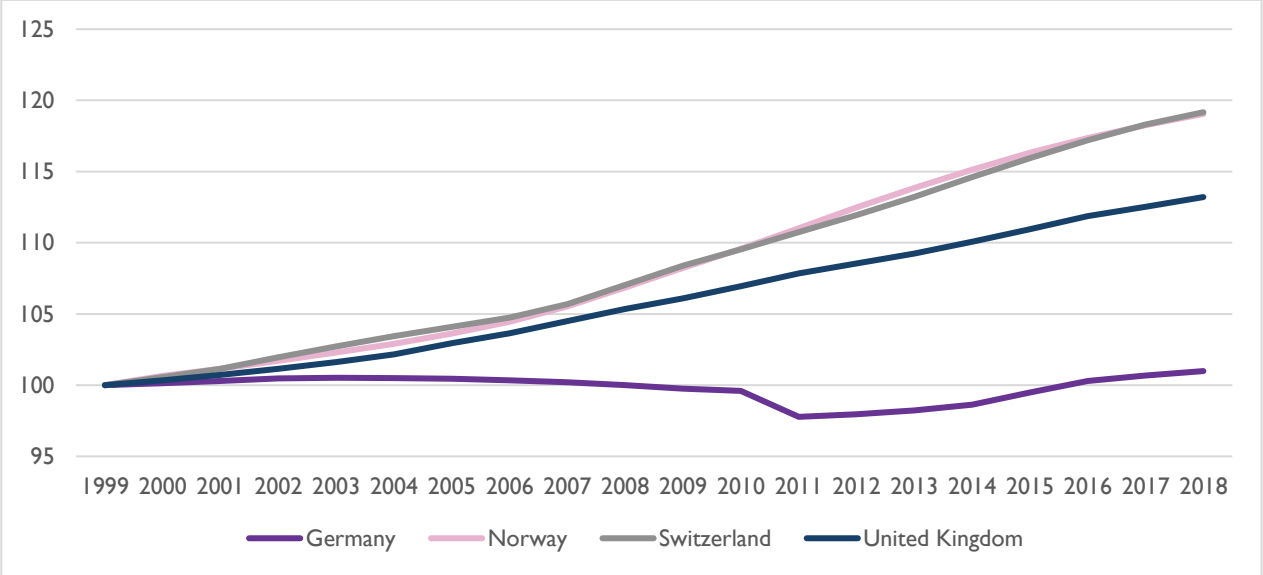
[7] Information on regulated professional activities is available at: https://www.sbfi.admin.ch/sbfi/en/home/education/recognition-of-foreign-qualifications/recognition-procedure-on-establishment/regulated-occupations-and-professions.html

[8] Swissinfo (2019): "'Swiss first' list of jobs extended to unskilled workers", available at: https://www.swissinfo.ch/eng/first-preference-_-swiss-first--list-of-jobs-extended-to-unskilled-workers/45424952

[9] Swissinfo (2019): "'Swiss first' job registration scheme a success, says report", available at: https://www.swissinfo.ch/eng/immigration-vote-_swiss-first--job-registration-scheme-a-success--says-report-/45340572

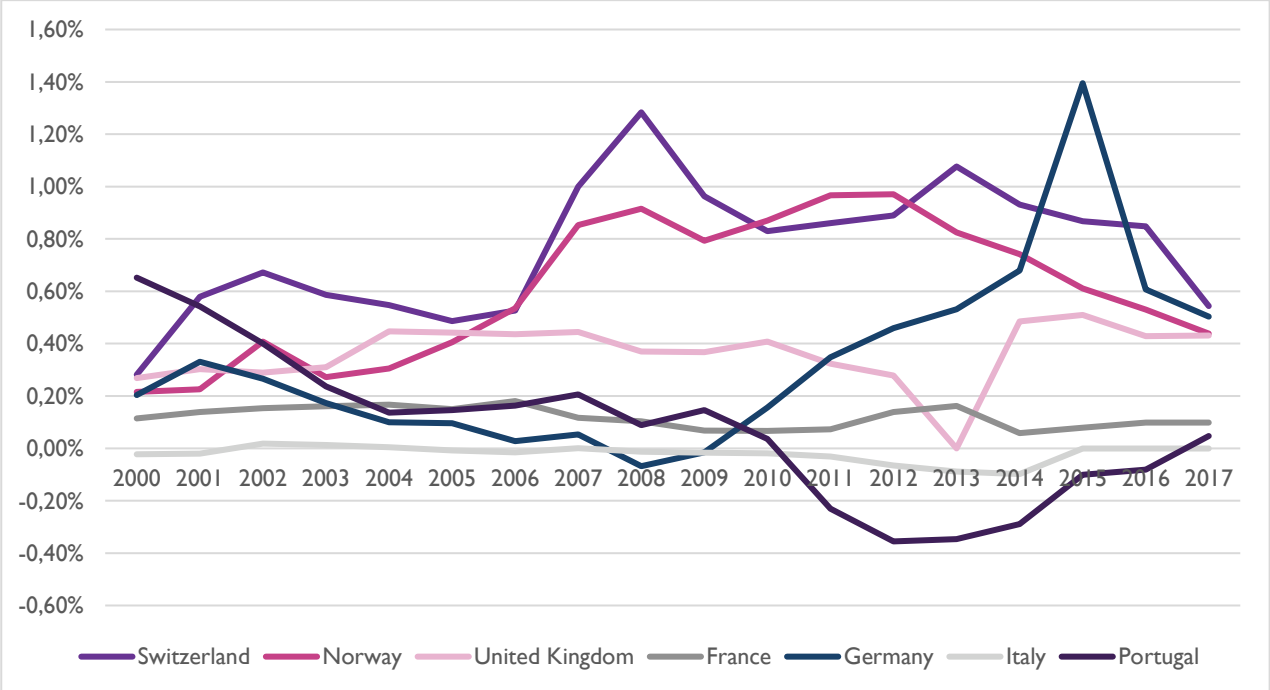
[10] The Local (2019): "Swiss government unveils new measures favouring Switzerland-based workers", available at: https://www.thelocal.ch/20190516/new-measures-aim-to-give-priority-to-swiss-based-workers

Figure 1.2: Population index, various countries (1999=100)



A highly material contributor to this population rise was net immigration. During the period 2000-2017 the Swiss population rose by 1.3m. In that same period net immigration was 1.1m. We can see in the diagram below how net immigration into Switzerland, relative to its population, compared with that in various other European countries in this period.

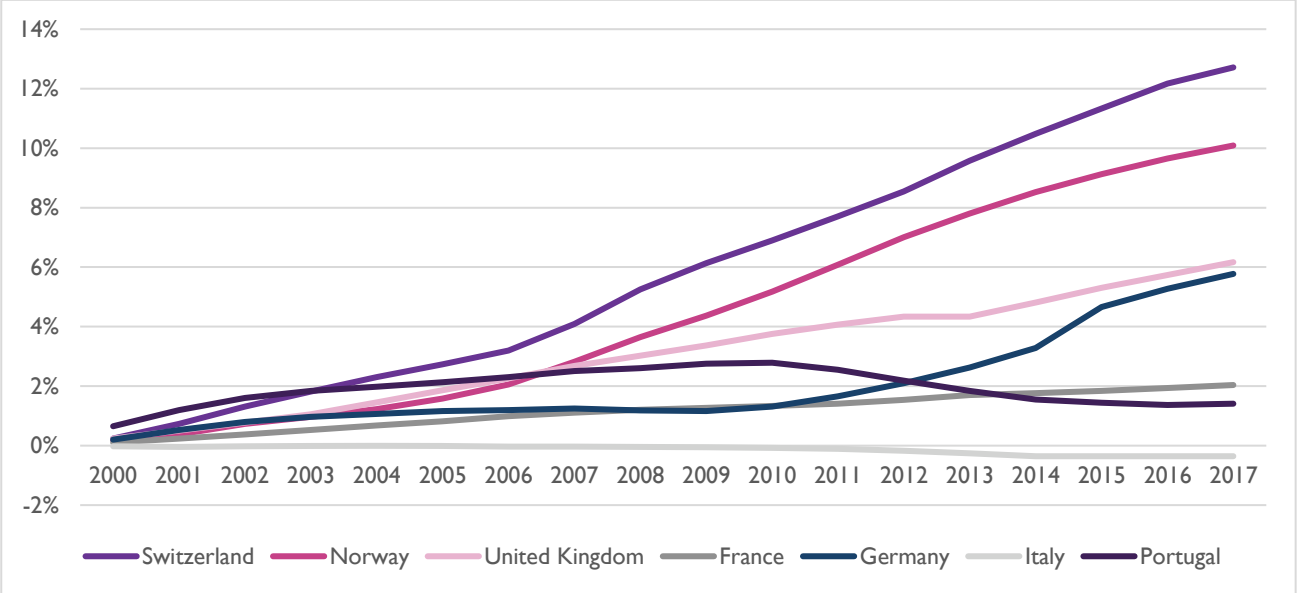
Figure 1.3: Net immigration as % of population, selected countries



We see that over the entire 2000-2009 period Swiss net immigration was higher, relative to its population, than in these other countries. Net immigration into Norway was also quite high in the period, and after 2010 briefly overtook that in Switzerland — though in both countries there was some fall-back over the 2010s. We also see the well-known one-off spike in German immigration in 2015.

Perhaps the clearest picture is obtained if we consider cumulative net immigration as a percentage of each country's 2017 population, as in the graph below.

Figure 1.4: Cumulative Net immigration as % of 2017 population

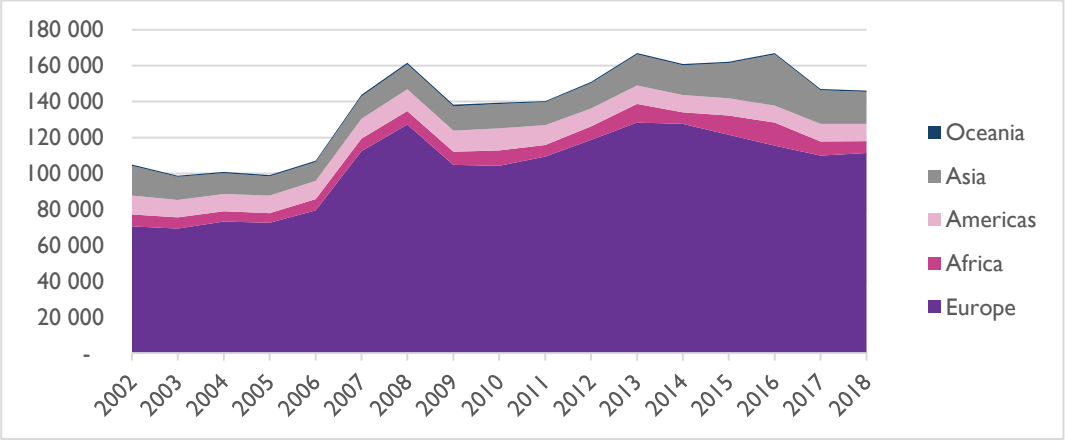


Here we see that Switzerland has comfortably the highest cumulative net immigration over this period of the group — outstripping even Norway and at more than twice the cumulative rate of the UK.[11,12]

1.3.3 Changes in the nature of immigration over time

Immigration to Switzerland is dominated by people originating from other parts of the European continent, the number vastly outnumbering people from elsewhere (see Figure 1.5).

Figure 1.5: Origin of immigrants to Switzerland, by global region 2002-2018



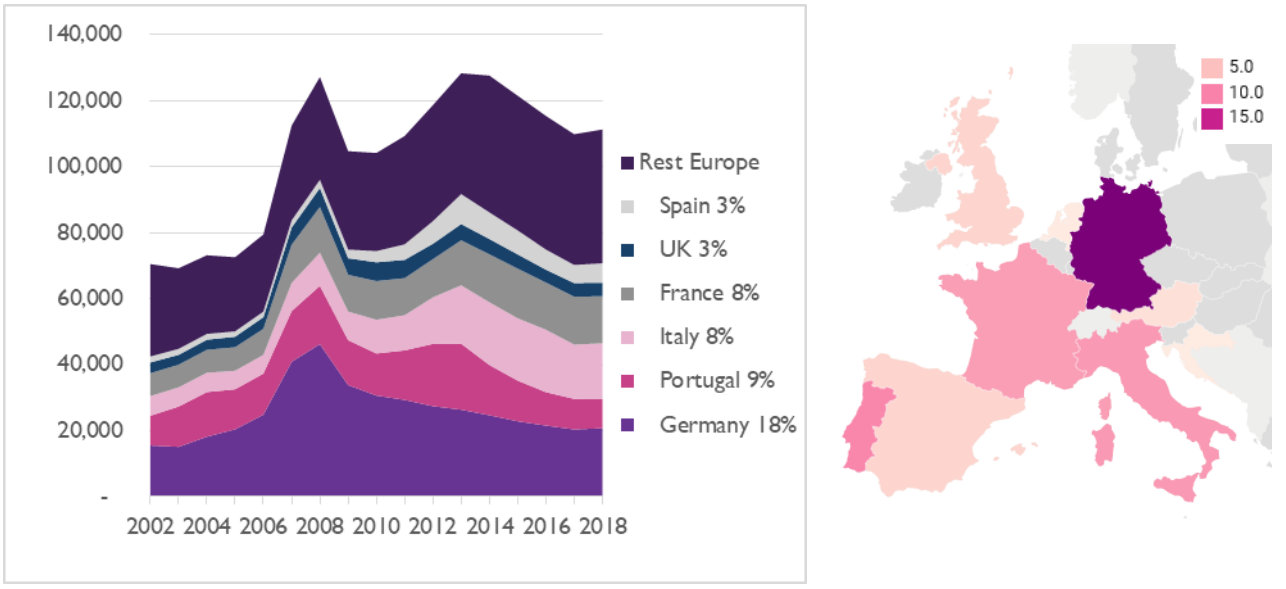
Source: Federal Statistics Office

[11] In this report we shall sometimes talk of "high immigration" or of rates of immigration into Switzerland being "high". When we do so that should be understood by reference to the graphs in this section – as reflecting the fact that Swiss immigration is twice, three times or even more that of immigration into other Western European countries. There is no absolute metric by which any level of immigration can be deemed "high" or "low".

[12] We note that this is not the first time Switzerland has had largescale immigration. Between 1960 and 1973 there was a significant wave of immigration, with the foreign-born share of the population peaking at 16.8 per cent in 1974. In 1970 the Federal Council established a system of overall quotas for immigration – and indeed the system established at that time lasted until 2002, granting an overall quota of work permits each year. Following the oil price shock of 1973 the Swiss economy experienced a 7.3 per cent contraction. With their jobs disappearing, many foreign workers had to leave. Overall, 245,000 foreigners left Switzerland between 1973 and 1976 (http://www.mwpweb.eu/1/80/resources/publication_709_1.pdf).

The large European countries by which Switzerland is surrounded are the sources of the majority of its incoming foreign population. Figure 1.6 shows that Germans number the highest, accounting for 18 per cent of all immigrants to Switzerland over the period 2002-18. They are followed by Portugal (9 per cent), Italy (8 per cent) and France (8 per cent). Spanish and British immigrants account for roughly similar numbers of incoming foreigners each year (3 per cent). The number of immigrants from the rest of Europe and its share of the total has been increasing in recent years. Together, these countries account for 52 per cent of total gross immigration to Switzerland over the period 2002-2018.

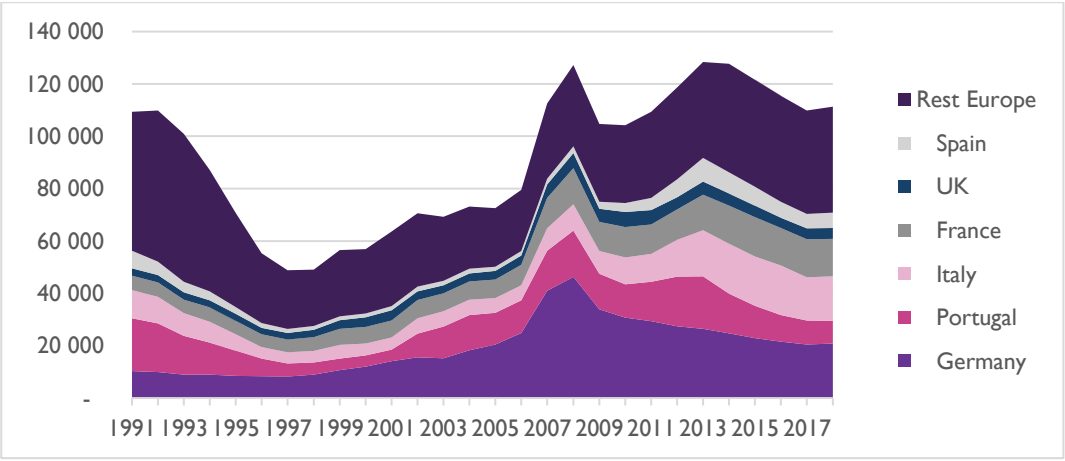
Figure 1.6: Origin of European immigrants to Switzerland and cumulative proportion of total incoming immigrants, 2002-2018



Source: Federal Statistics Office. Map generated by Datawrapper.de

When we observe the evolution of the origins of immigrants to Switzerland over a longer time period, we see that the recent increase in those from the rest of Europe appears to show a return to numbers observed in the past. This is illustrated in Figure 1.7, which displays European immigrants by their country of origin from 1991 to 2018. It also highlights a turning point around the turn of the century: immigrant numbers had been declining prior to 2000, but have returned to and surpassed their previous high points in the data series available.

Figure 1.7 Origin of European immigrants to Switzerland, 1991-2018



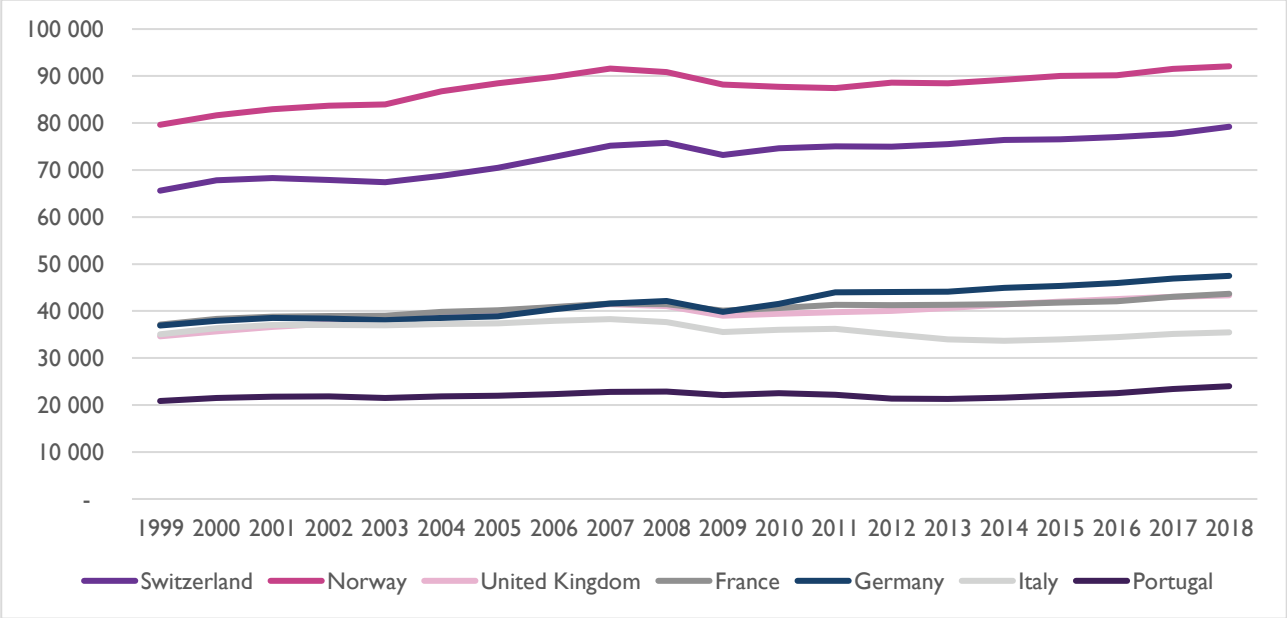
Source: Federal Statistics Office

What is clear from the data is that the immigrants from Germany, Portugal, Italy, France, UK and Spain have consistently been the main sources of immigrants to Switzerland over the period 1991-2018. In this period they have accounted for 47 per cent of the total immigration to Switzerland. These five or six countries are frequently used as comparator countries in the analysis presented below.

1.4 Trends in Swiss GDP

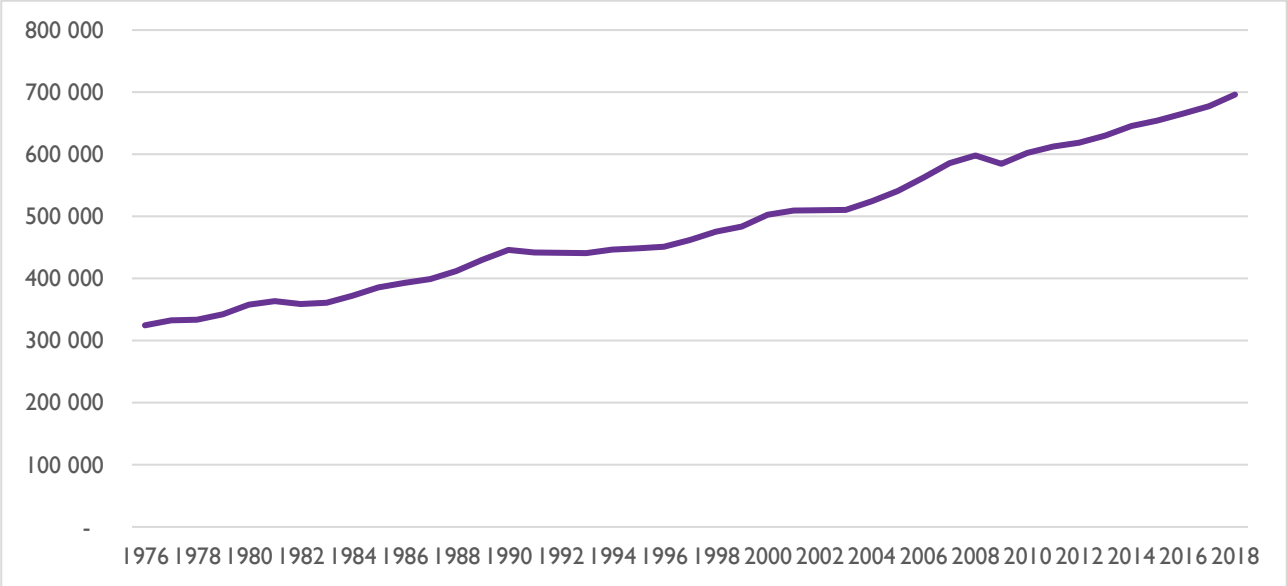
Switzerland is a much richer country than the European average, with a GDP per capita around twice the EU average and around ten times that in the poorest EU Member States. We illustrate that in the graph below (using constant US$ terms for cross-country comparability).

Figure 1.8: GDP per capita, constant 2010 US$, selected countries



We present the evolution of Swiss GDP over time in constant CHF terms in the graph below.

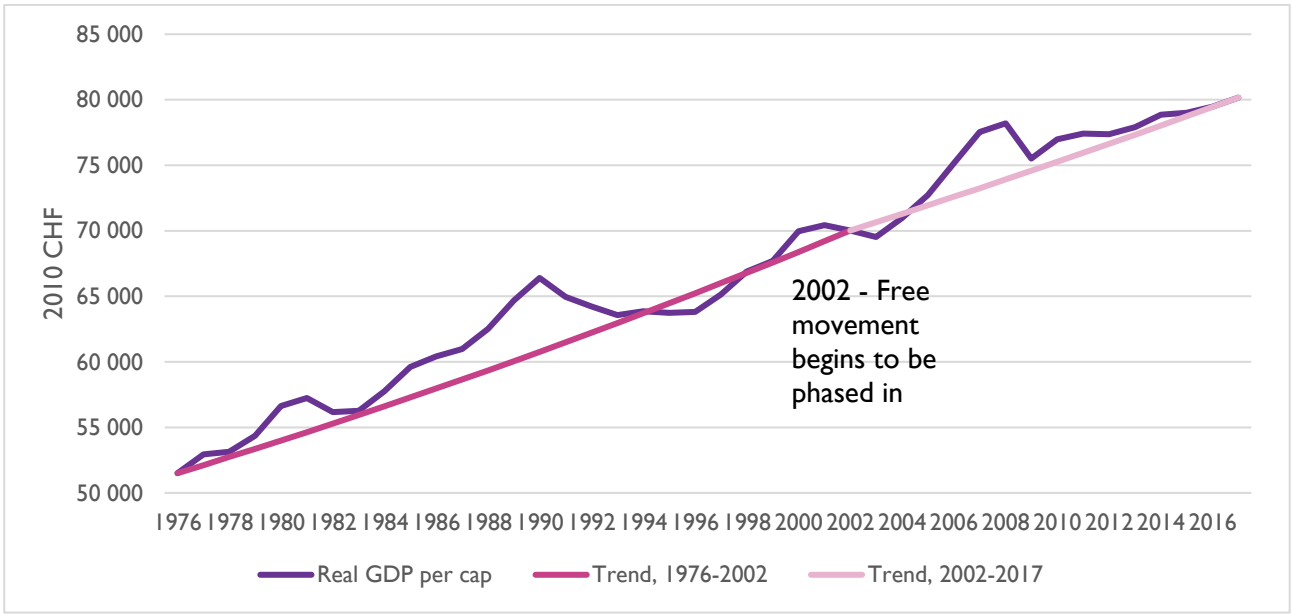
Figure 1.9: Swiss real GDP (2010 CHF)



Given the large rise in the population of Switzerland after 2002, it is perhaps surprising that this graph does not exhibit a more decisive acceleration in GDP growth after that point. Indeed, the trend in GDP growth from 1976 to 2002 was 1.8 per cent and from 2002 to 2017 1.9 per cent — just 0.1 per cent different.

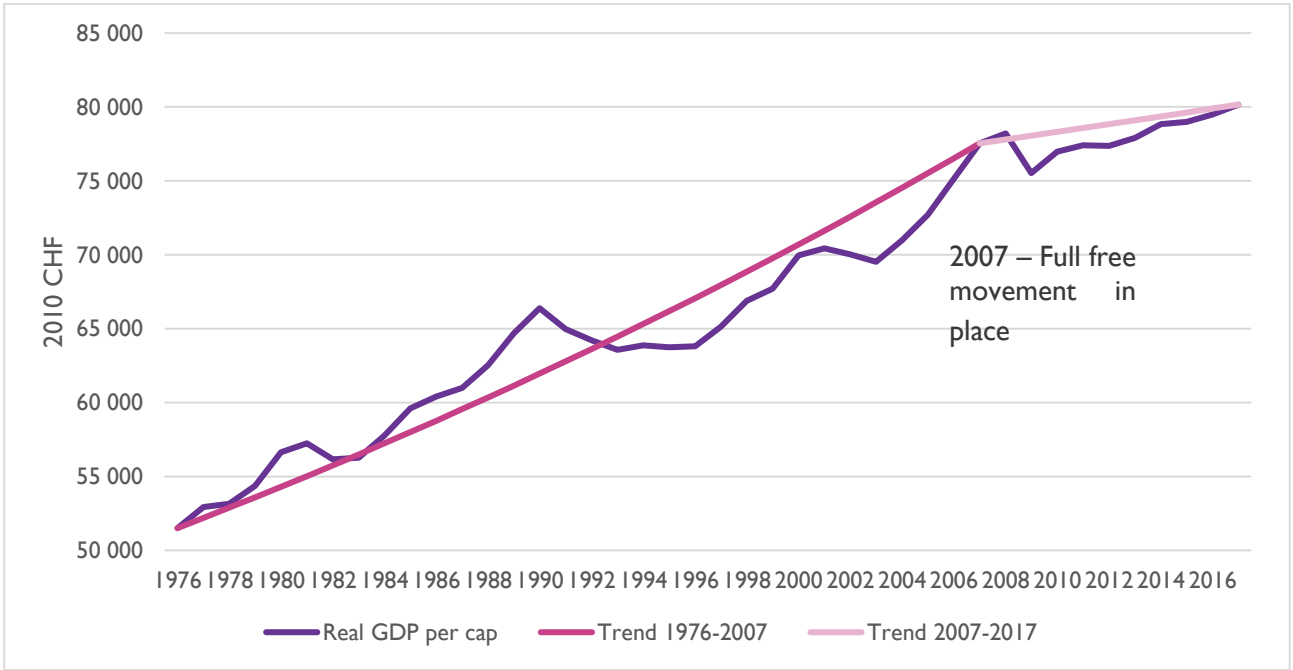
We can understand something of why, if we consider GDP on a per capita basis. Swiss real GDP per capita grew more slowly in the post-2002 period than pre-2002. The 1976-2002 trend was 1.2 per cent per annum. From 2002-2017 that trend was 0.9 per cent per annum. This slower growth meant that by 2017, GDP per capita was 4.1 per cent below its 1976-2002 trend.

Figure 1.10: Swiss real GDP per capita (2010 CHF)



If, instead, we compare the 1976-2007 trend with the trend from 2007 onwards, results are even starker. From 1976 to 2007 GDP per capita grew at 1.3 per cent, but from 2007 to 2017 at only 0.3 per cent per annum. By 2017 that slower growth meant GDP was 9.4 per cent below its 1976-2007 trend.

Figure 1.11: Swiss real GDP per capita (2010 CHF)



1.5 Trends in Swiss investment

Let us consider three measures of investment:

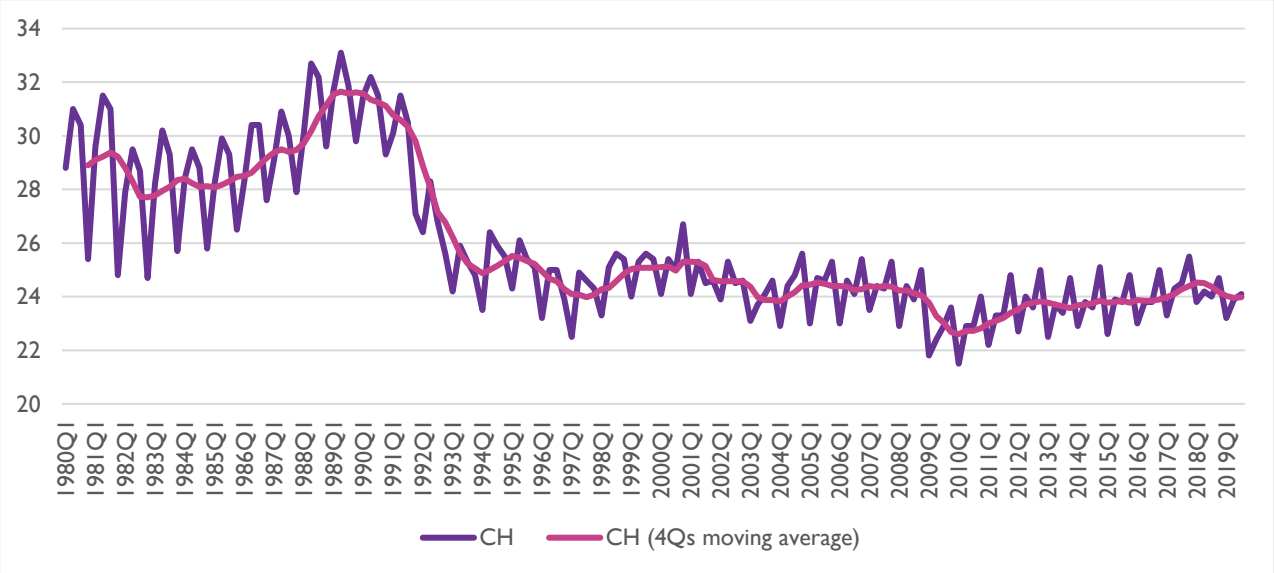
- Investment expressed as percentage of GDP
- Real investment levels
- Real investment per capita.

The investment series is defined as a gross fixed capital formation, it is sourced from Eurostat and is available for Switzerland on a quarterly basis from 1980Q1.

1.5.1 Investment as a percentage of GDP

Swiss investment expressed as a percentage of Swiss GDP is reported in the figure below. Since the investment series displays a clear seasonal pattern we have reported also its four-quarters moving average

Figure 1.12: Investment as a % of GDP in Switzerland

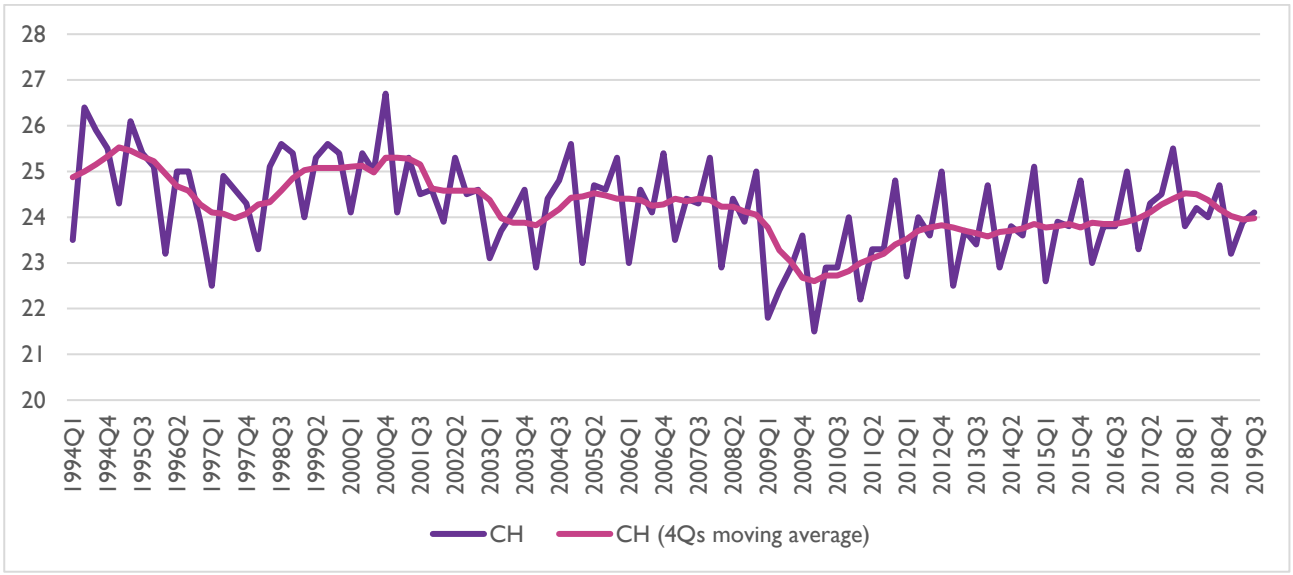


Source: Eurostat and Europe Economics calculations.

We can see that there is clear break in the series around the first half of the 1990s: whilst from 1980 to 1991 investment levels in Switzerland (expressed as a moving average) accounted for more than 28 per cent of GDP (with a peak of around 32 per cent in 1989Q1), since 1994 the levels have decreased significantly and have never exceeded 26 per cent. For this reason we would focus our analysis on the evolution of investments series from 1994 onwards.

The evolution of the series over the period 1994Q1-2019Q3 is depicted in the chart below. We can see that investment has been relatively stable up until around 2008. During 2009 investment decreased sharply, and started picking up again only in 2010. However, investment appears to have stabilised at lower levels than in the pre-2008 period.

Figure 1.131.14: Investment as a % of GDP in Switzerland (from 1994 onwards)

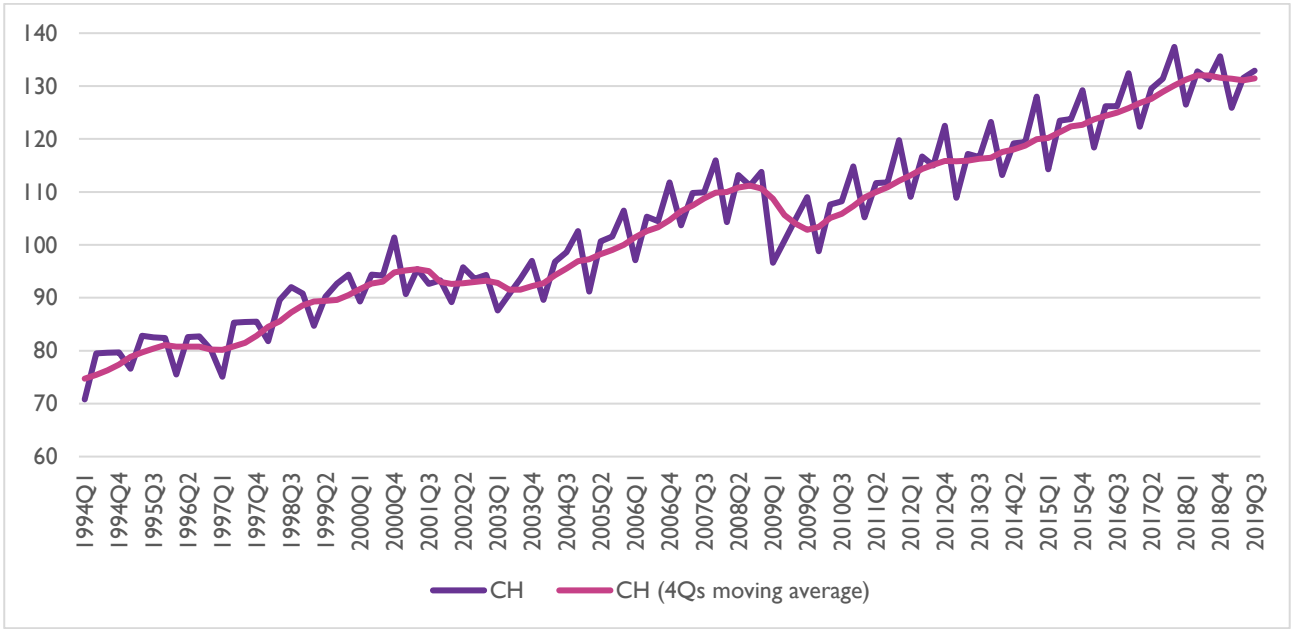


Source: Eurostat and Europe Economics calculations.

1.5.2 Investment levels

The level of investment in real terms[13] in Switzerland from 1994, expressed in terms of the 2005 level (2005 = 100) is depicted in the chart below.

Figure 1.15: Real investment in Switzerland (2005 = 100)



Source: Europe Economics calculations based on Eurostat data.

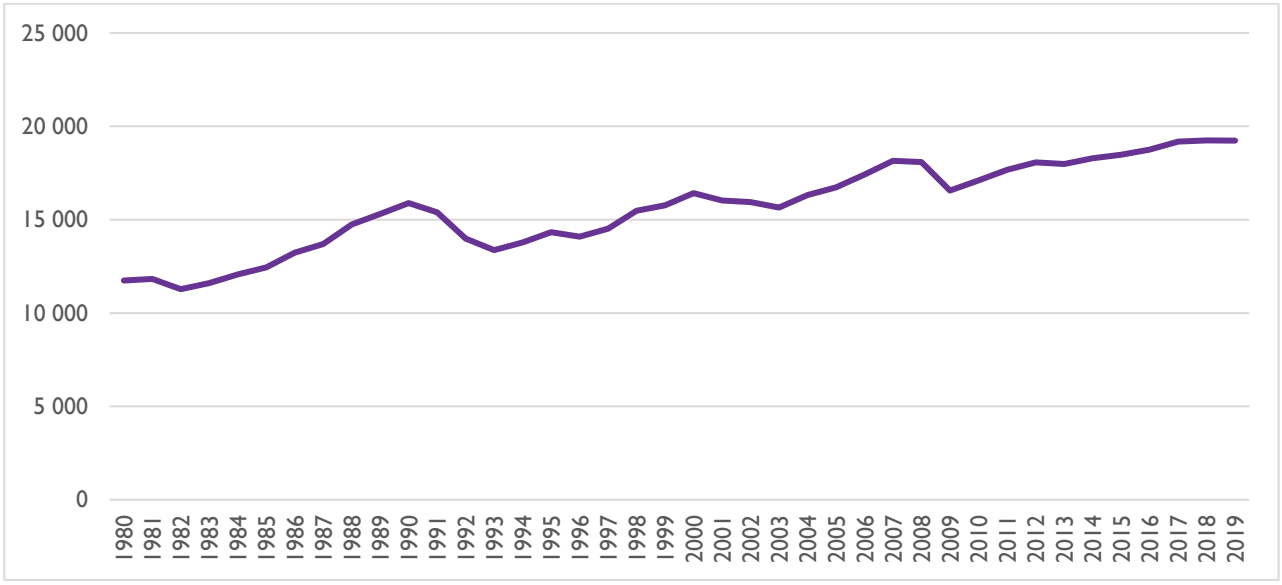
1.5.3 Investment per capita

We define investment per capita as real investment levels divided by the total population in Switzerland. Since population data is available only on an annual basis, we have expressed investment also on an annual basis by

[13] The real investment measure we have used is chain-linked volumes of investment with reference to 2005.

considering average investment over the four annual quarters. The evolution of investment per capita in Switzerland since 1994 is depicted in the chart below.

Figure 1.16: Investment per capita in Switzerland, 2005 CHF

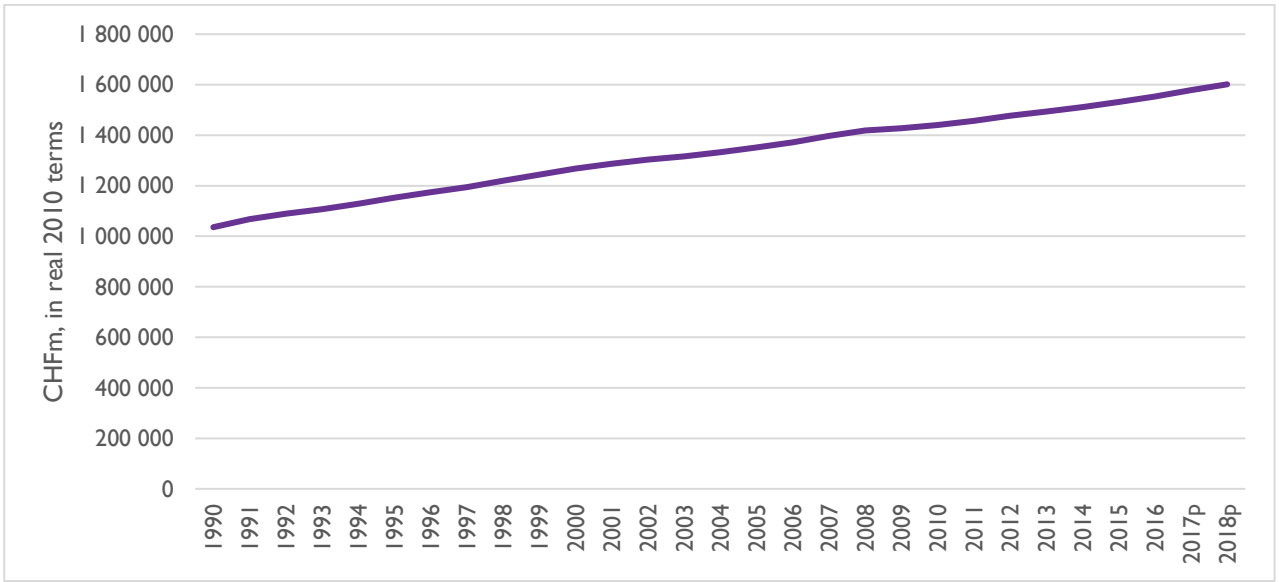


Source: Eurostat and Europe Economics calculations.

1.6 Swiss capital stock

Next we present data on the evolution of the capital stock in Switzerland.

Figure 1.17: Swiss net non-financial capital stock

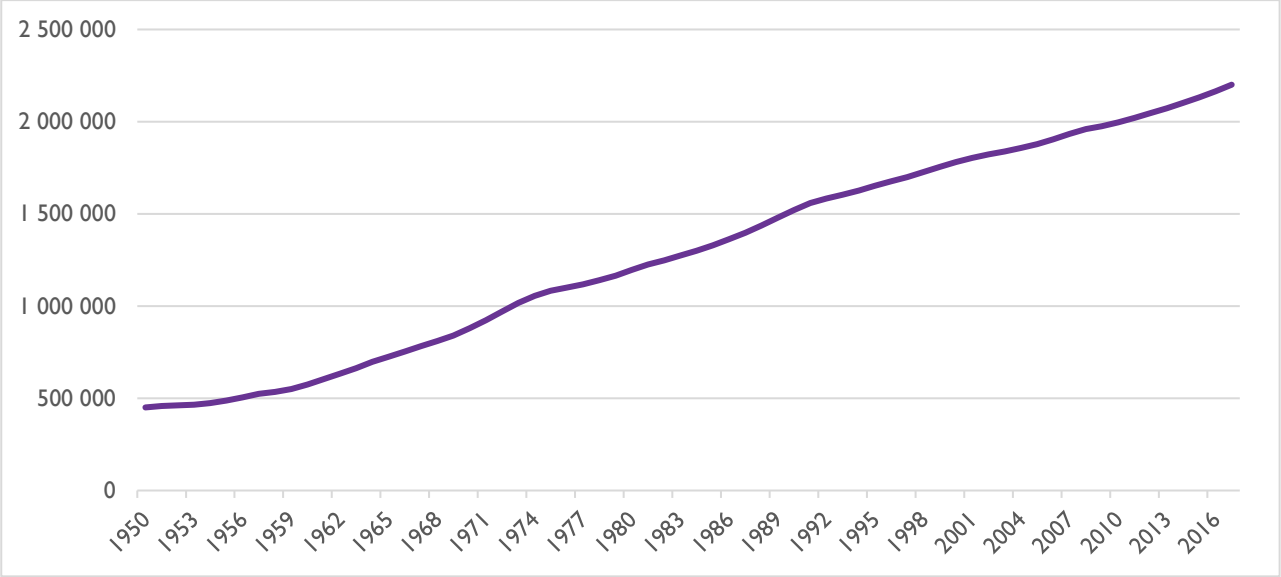


Source: https://www.bfs.admin.ch/bfs/en/home/statistics/catalogues-databases/tables.assetdetail.9767509.html

Average growth in the capital stock was 1.57 per cent over the period 1990 to 2018. We see from the graph that there is no obvious acceleration as the population expands from 2000 onwards. Indeed, if we divide the period into the period up to 2002 and the period from 2002-2017 (a division we refer to frequently throughout this report) we see that from 1990 to 2002 the growth rate was 1.93 per cent but from 2002 to 2017 just 1.28 per cent. In other words, far from growth in the capital stock accelerating during the period of population expansion, its rate of growth slowed.

One option for securing an expansion in the capital stock might have been additional international investment. It is of interest, therefore, to consider whether the picture is changed if we report figures in US dollar terms. We see in the following diagram that this leaves the story unchanged.

Figure 1.18: Swiss capital stock at constant national prices in 2011 US Dollars

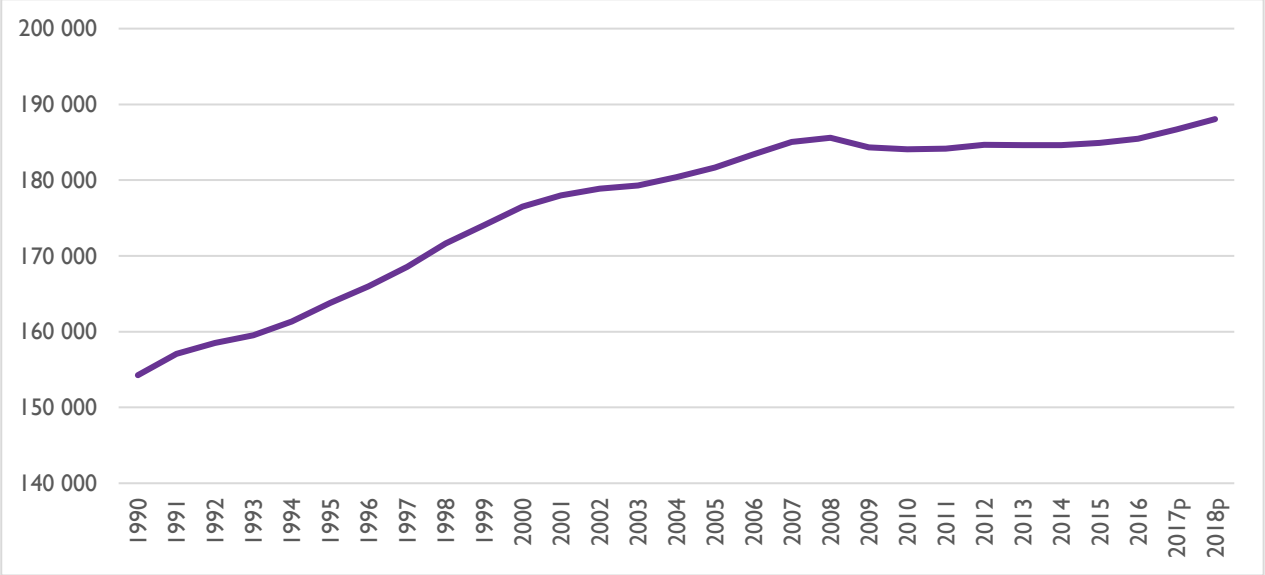


Source: https://fred.stlouisfed.org/series/RKNANPCHA666NRUG

Average annual growth in the US dollar-denominated capital stock from 1976 to 2017 was 1.7 per cent. Average annual growth from 1976 to 2002 was 1.96 per cent, and from 2002 to 2017 was 1.27 per cent.

On a per capita basis the picture is especially stark, as we see below.

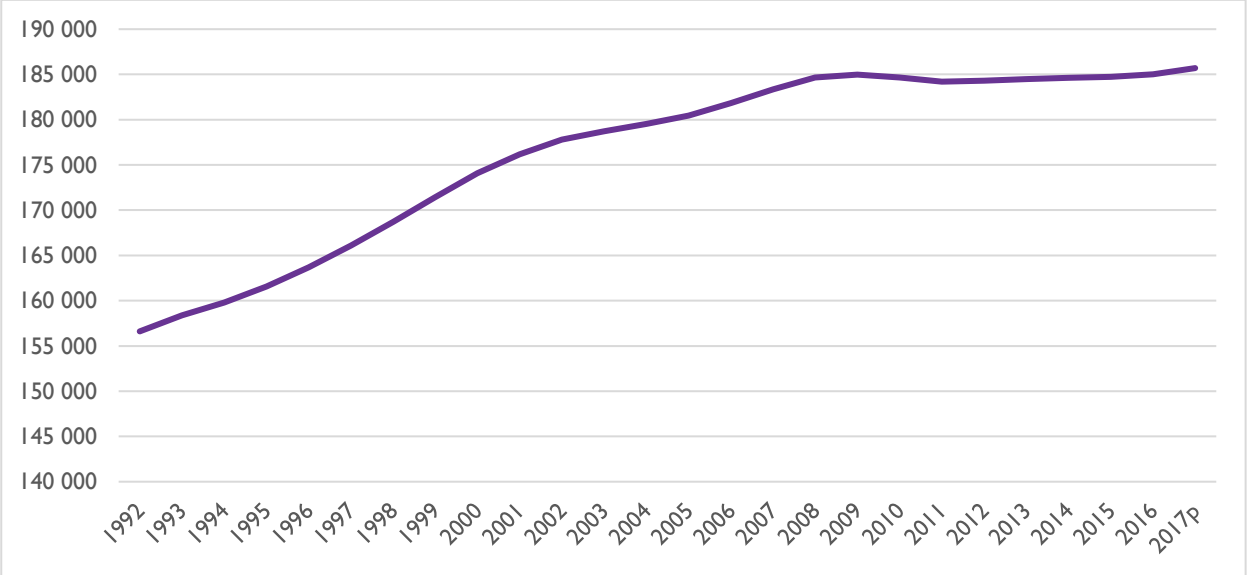
Figure 1.19: Swiss non-financial capital stock per capita (2010 CHF)



Up to 2002 the capital stock per person grew at 1.24 per cent per annum. Between 2002 and 2017 that dropped to just 0.29 per cent per annum.

If we reproduce the graph above on a trailing 3 year average basis, the results are particularly visible.

Figure 1.20: Swiss non-financial capital stock per capita (2010 CHF), 3 year trailing average



We can see two quite clear kinks in the series: one visible flattening at 2002/03 and a total stagnation at 2008/09.[14] See Section 2.4 for a discussion of why this might have happened.

1.7 Social protection levels in Switzerland

Social protection levels in Switzerland are higher, in real terms, than those in the main countries from which immigrants come to Switzerland. So as well as higher wages in work, immigrants have stronger protection if, in due course, as life progresses, they become sick, unemployed or otherwise in need of social support.[15]

[14] It is also plausible that there is actually only one kink, at 2002/03, then a bump upwards from the new trend in 2007/08 that is then reversed in 2009/10.

[15] It is perhaps worth emphasizing that this graph is not about so-called "benefits shopping" — moving country for the purpose of claiming benefits payments. The point being made is simply that as well as higher salaries, Switzerland offers its citizens higher levels of social protection (in real terms) than those provided in the main European countries from which people emigrate to Switzerland.

Figure 1.21: Social protection per capita, 2015 euros (Switzerland and Top 5 origin countries of immigrants 2000-2017)

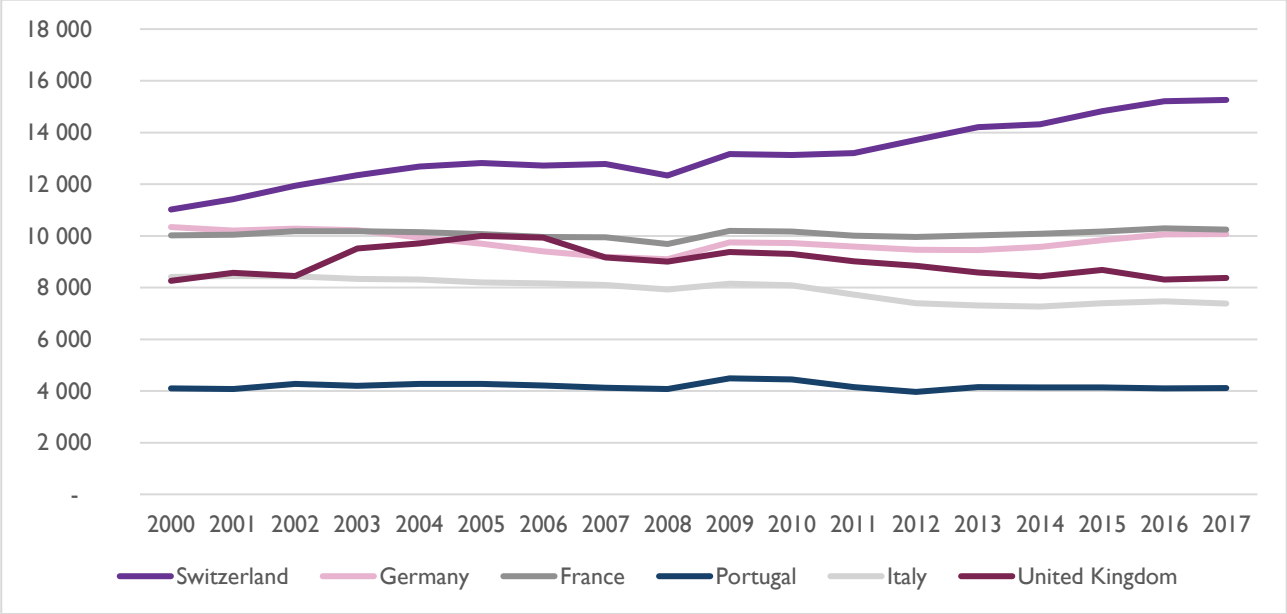
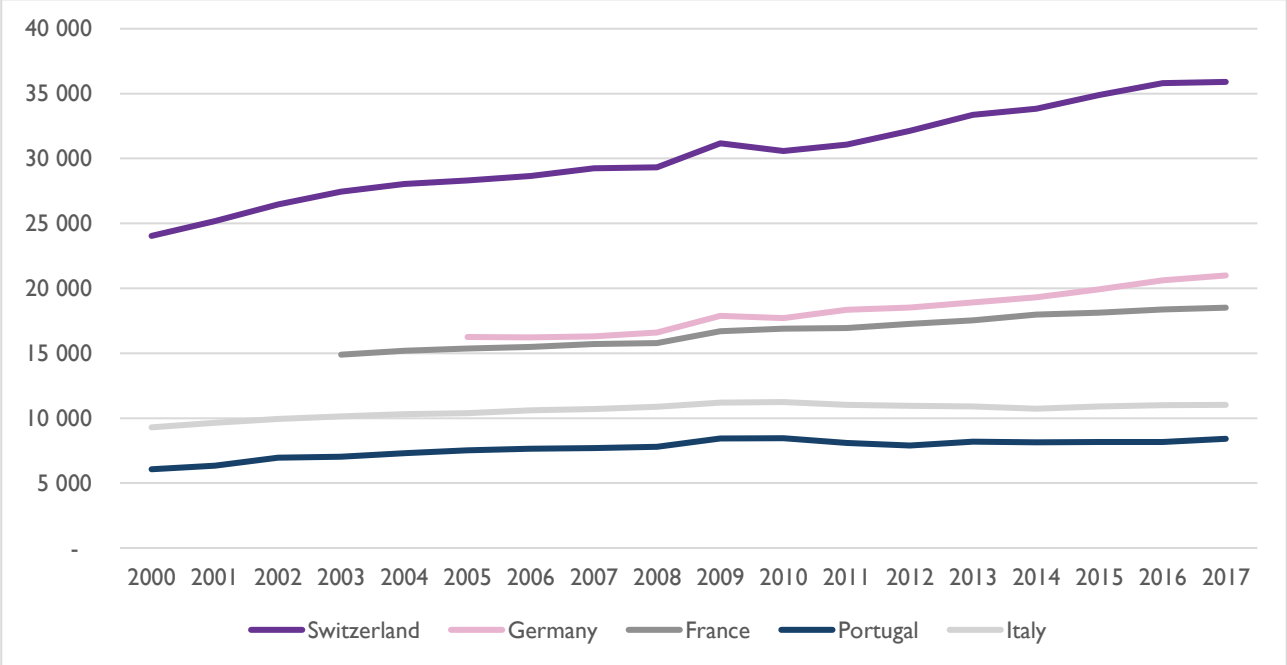


Figure 1.22: Social protection expenditure per economically inactive member of the population

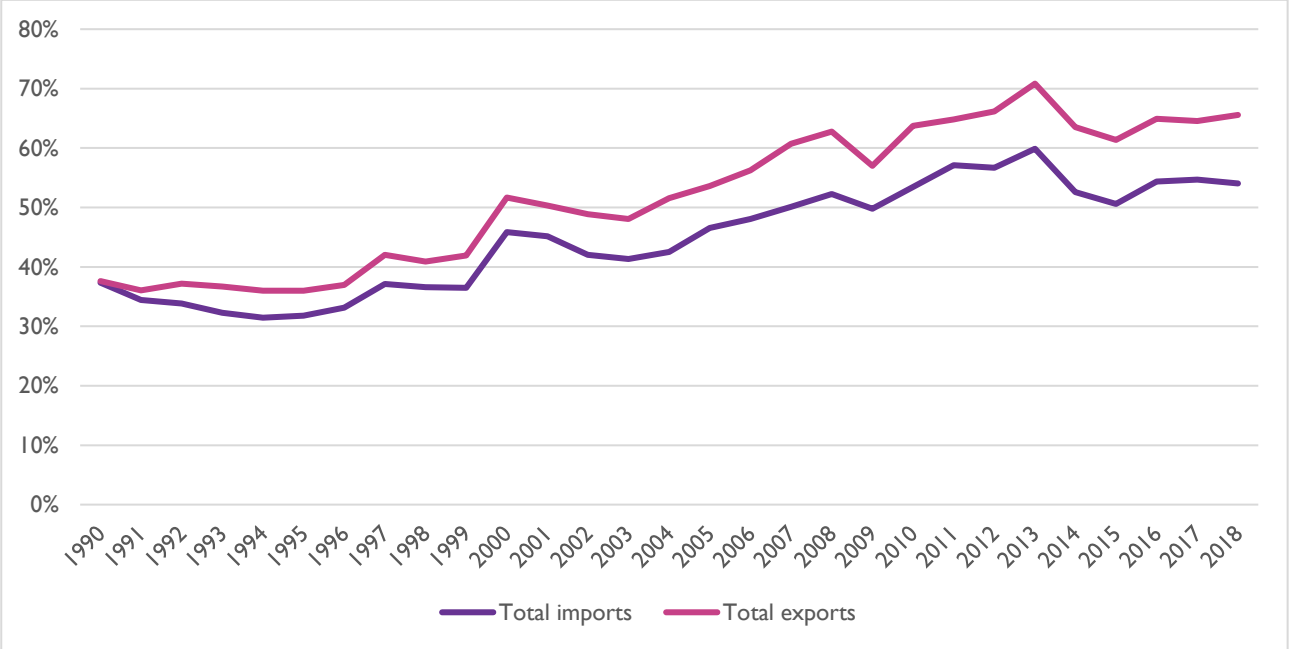


1.8 Trends in Swiss trade

1.8.1 Total Swiss trade

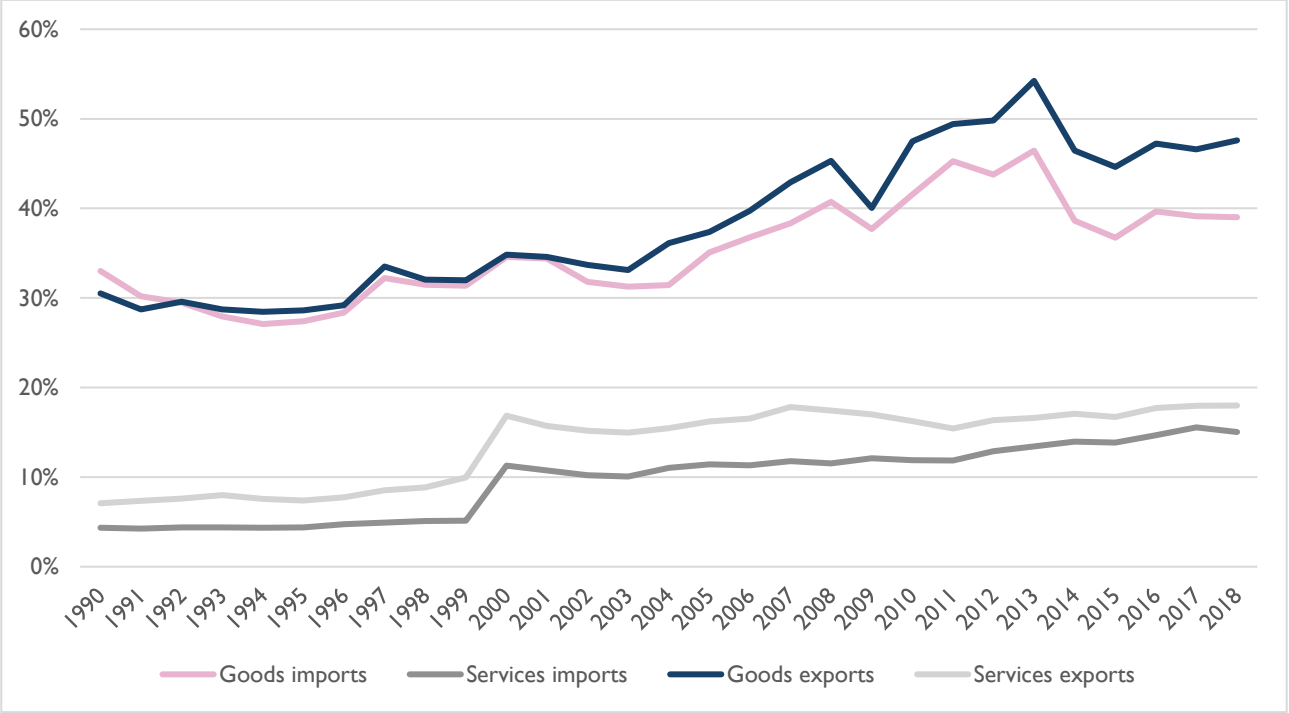
Trade has increased relative to GDP over recent decades, with exports increasing more rapidly than imports, resulting in Switzerland consistently running a material trade surplus.

Figure 1.23: Total Swiss trade as a % of GDP



Trade is dominated by goods trade, but services have increased in importance in the past 20 years.

Figure 1.24: Trade in goods and services as a % of GDP



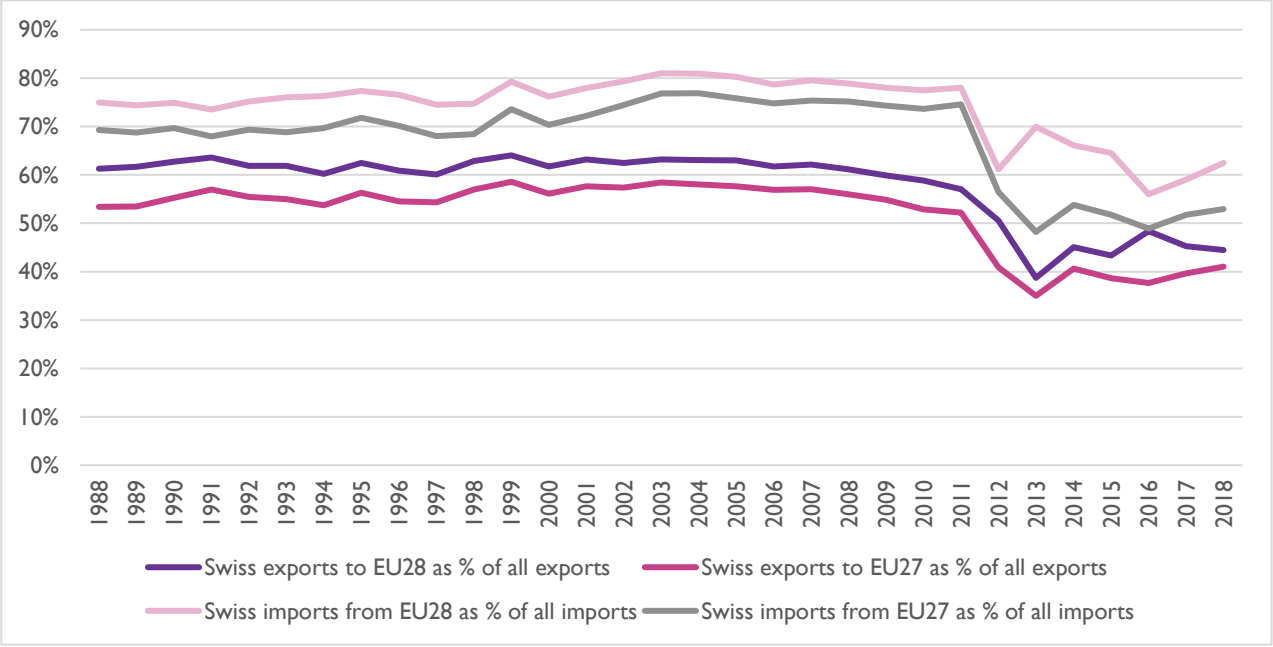
1.8.2 Goods exports by destination

The main driver of the rise in Swiss trade, relative to GDP, has been an increase in trade with non-EU countries, as we see in the graph below. We also see there that, whilst Switzerland exports more goods worldwide than it imports, from the EU it imports more than it exports.

Figure 1.25: Breakdown of Swiss goods trade as a % of GDP between EU and non-EU trade partners

Of Swiss goods exports, about 63 per cent was to what are now the EU28 countries in 2005. That figure had fallen to 44 per cent in 2018, and by the end of 2020, with the departure of the UK from the EU Single Market, that figure will probably have fallen below 40 per cent. For goods imports, the equivalent figures were 80 per cent coming from the EU28 in 2005, that falling to 62 per cent in 2018, and likely to fall below 50 per cent with UK departure from the Single Market. By 2030, if the trend of the 2002-onwards period is maintained, goods exports to the EU27 will be below 30 per cent of Swiss exports, and goods imports from the EU27 will be below 40 per cent of total Swiss imports. The fall is for various reasons, but the most important is that the rest of the world (China, India, etc) is growing faster than the EU economies and will continue to do so for much of the next 15 years.

Figure 1.26: Trends in Swiss trade with the EU relative to trade with the world as a whole



1.9 Characteristics of immigrants

For our purposes, we shall focus upon two key characteristics of immigrants:

- Their age
- Their qualifications

As we shall see, immigrants into Switzerland tend to be relatively young (averaging about 30) and on average less well-educated than the average Swiss worker (though that latter gap has narrowed over time).

For completeness, we also consider the crime rates of the main countries of origin of Swiss immigrants, demonstrating that they are only a little higher, on average, than in Switzerland — suggesting that this is unlikely to be a sufficiently significant factor to be economically relevant.

1.9.1 Age

Any analysis into the long-term impact of immigrants on outcomes such as public finances, crime rates, and growth must account for two basic characteristics of the immigrant population:

1. Immigrants tend to arrive in a country at a later stage in their lives.
2. Immigrants (like everyone else) age over time.

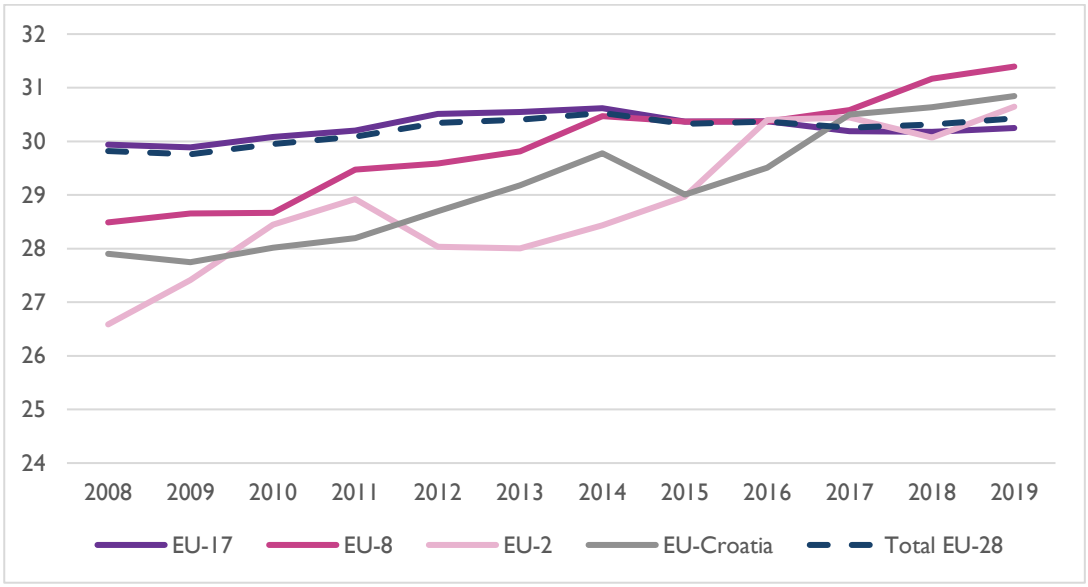
On the first point, the majority of people entering a country tends to comprise those travelling for work-related reasons. With this objective in mind, many immigrants are likely to be of working age (between 18 and 65 years of age) and will therefore bring with them a level of training that they have obtained elsewhere. On the other hand, some immigrants may arrive later in life because they are seeking a place to retire after their working life. The balance of these two types of immigrants — those who come for work and to retire — will affect the relative earnings and net fiscal contributions of immigrants.

The age profile of immigrants at the point of entry into Switzerland paints a picture of the former: immigrants from EU countries are typically around 30 years old. As shown in Figure 1.27, the age at which immigrants arrive in Switzerland has risen slightly over the period of 2008-2019.[16]

However, the broad pattern remains fairly stable overall, with the average immigrant being aged about 30.

[16] Interestingly, we see a convergence in the age profile over time when this average is broken down by immigrants arriving from different EU countries. In 2008, immigrants arriving from EU-2 countries (Bulgaria and Romania) were in their mid-twenties, and those from EU-8 (Estonia, Hungary, Lithuania, Latvia, Poland, Czechia, Slovakia, Slovenia) were typically in their late-twenties. The EU-28 average hovered below 30. By 2019, the average immigrant arriving from all country groups had exceeded 30.

Figure 1.27: Average age at the time of immigration into the permanent foreign resident population in Switzerland, 2008-2019

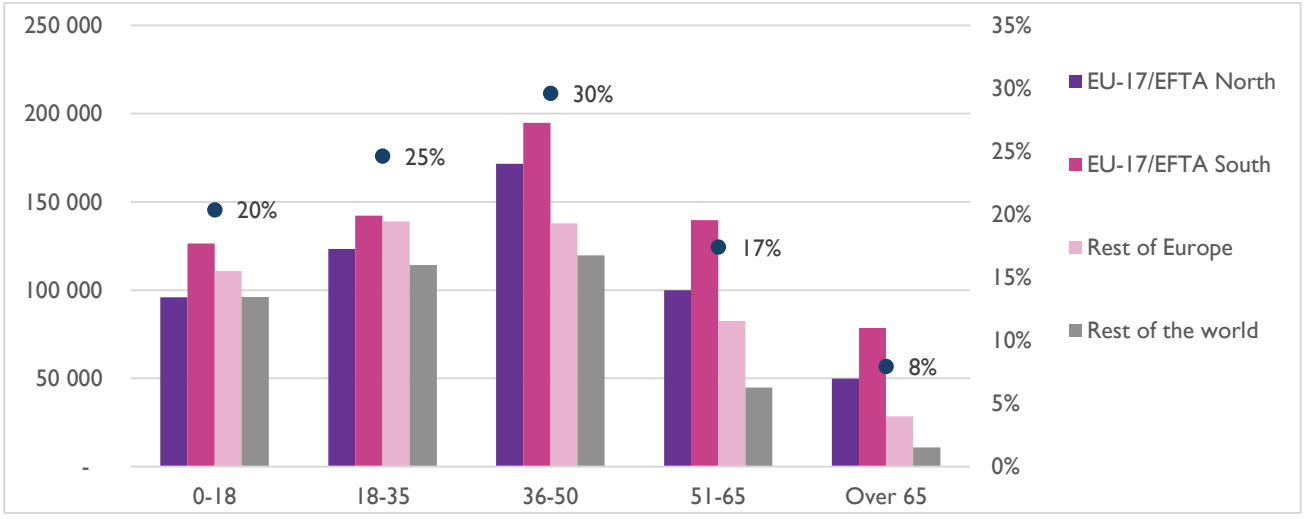


Source: Federal Statistics Office

A gradually ageing immigrant population may reflect a larger proportion of immigrants arriving for retirement purposes in the non-earning stage of their lives. Combining this with the second point to consider, that immigrants age over time, implies that the immigrant age profile can affect the longevity of impacts identified at any point in time. For example, observing that the average foreigner earns income from both employment and investment and therefore contributes to tax receipts in one year is an impact that may not last into the future, since foreigners naturally age and eventually retire from employment.

Figure 1.28 illustrates that the majority of foreigners living in Switzerland in 2018 are in the working-age categories 18-35 and 36-50, with their respective shares of the total number of foreigners of 25 and 30 per cent. In each age category, the largest number originate in EU-17 South countries, followed by those from EU-17 North countries in all but the youngest two categories. Immigrants from the rest of the world generally comprise the smallest shares in each age-category, but their number is similar to that of EU-17 North immigrants in the two youngest age categories.

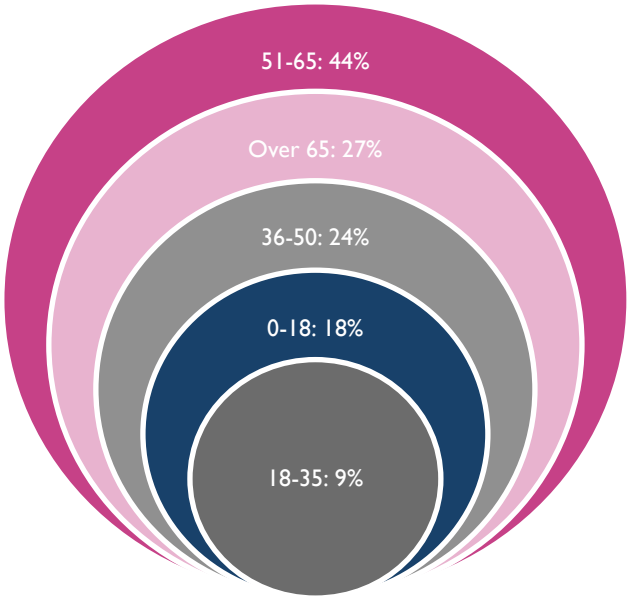
Figure 1.28: Age profile of foreigners living in Switzerland and % of total number of foreigners, 2018



Source: Federal Statistics Office

We can also identify the rate at which the number of immigrants in each age category has changed over time. Figure 1.29 shows that older age categories have risen (from a low base) over the period 2010-2018. The number of foreigners in the 51-65 age bracket has increased 44 per cent, while the number of non-working has increased by over a quarter. In contrast, the working-age immigrant population in the brackets 18-35 and 36-50 has increased by 9 and 24 per cent, respectively. In due course this may mean that immigrants contribute less to limiting the rise in the dependency ratio in Switzerland than is sometimes assumed.

Figure 1.29: Rate of growth of foreign population 2010-2018, by age group

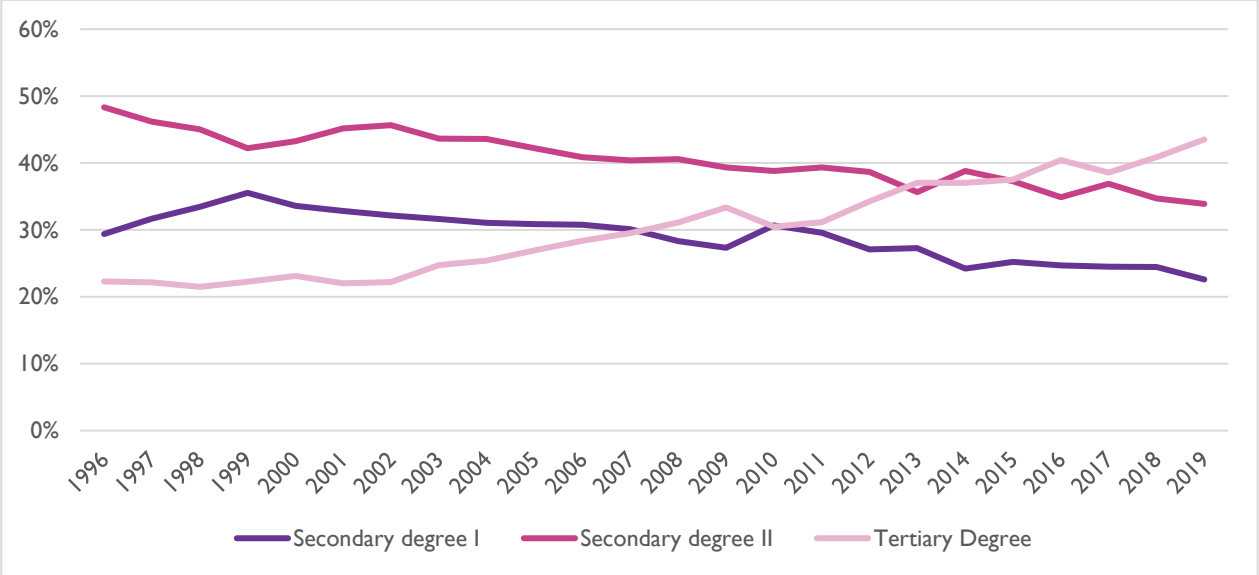


1.9.2 Qualifications and salaries

We start our analysis by providing empirical evidence related to the education level of foreigners. The Swiss Federal Statistical Office provides a breakdown of education level separately for Swiss nationals and foreigners who are full-time employed. In the charts below we show the percentage composition of full-time employed foreigners and Swiss nationals according three different education levels: secondary level I, secondary level II, and tertiary degree.[17]

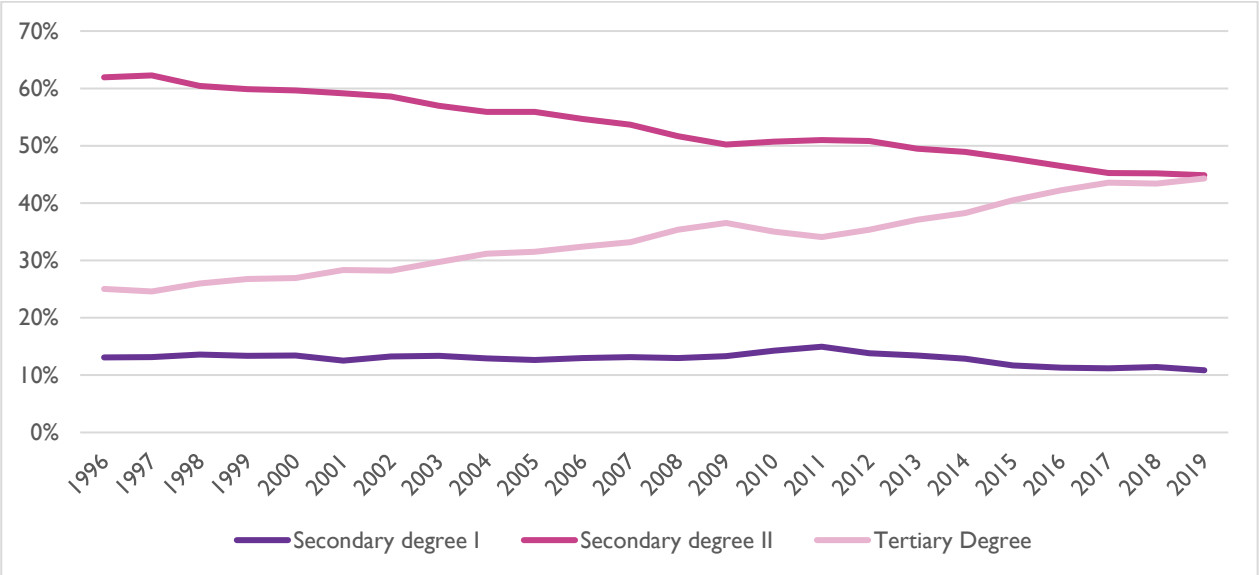
[17] Secondary level I refers to the second part of compulsory education in Switzerland, lasting 3 years on average, following the completion of primary education. Secondary level II (or upper secondary education) is comprised of two major components: first, it could cover general education leading to the award of the Baccalaureate; and second, could lead to a Diploma or Certificate awarded through vocational education and training. Tertiary education takes place at three types of higher education institutions universities and institutes of technology; universities of applied sciences; and universities of teacher education. All institutions may award bachelor and master degrees while a doctorate may only be awarded by universities and institutes of technology. For further details on the education system is Switzerland, please see: https://www.bfs.admin.ch/bfs/en/home/statistics/education-science.html

Figure 1.30: Composition of full-time employed foreigners according to their education degree



Source: Swiss Federal Statistical Office and Europe Economic calculations.

Figure 1.31: Composition of full-time employed Swiss nationals according to their education degree



Source: Swiss Federal Statistical Office and Europe Economic calculations.

As of 2019:

- The prevalence of highly-skilled workers (Tertiary degree) amongst Swiss nationals and foreigners is broadly the same (around 44 per cent).
- The prevalence of medium-skilled workers (Secondary degree II) is higher amongst Swiss nationals compared to foreigners (around 44 per cent versus 34 per cent).
- The prevalence of low-skilled workers (Secondary degree I) is higher amongst foreigners compared to Swiss nationals (around 23 per cent versus 11 per cent).

We can see how the qualification level of foreigners living in Switzerland, relative to Swiss nationals, has changed over time.

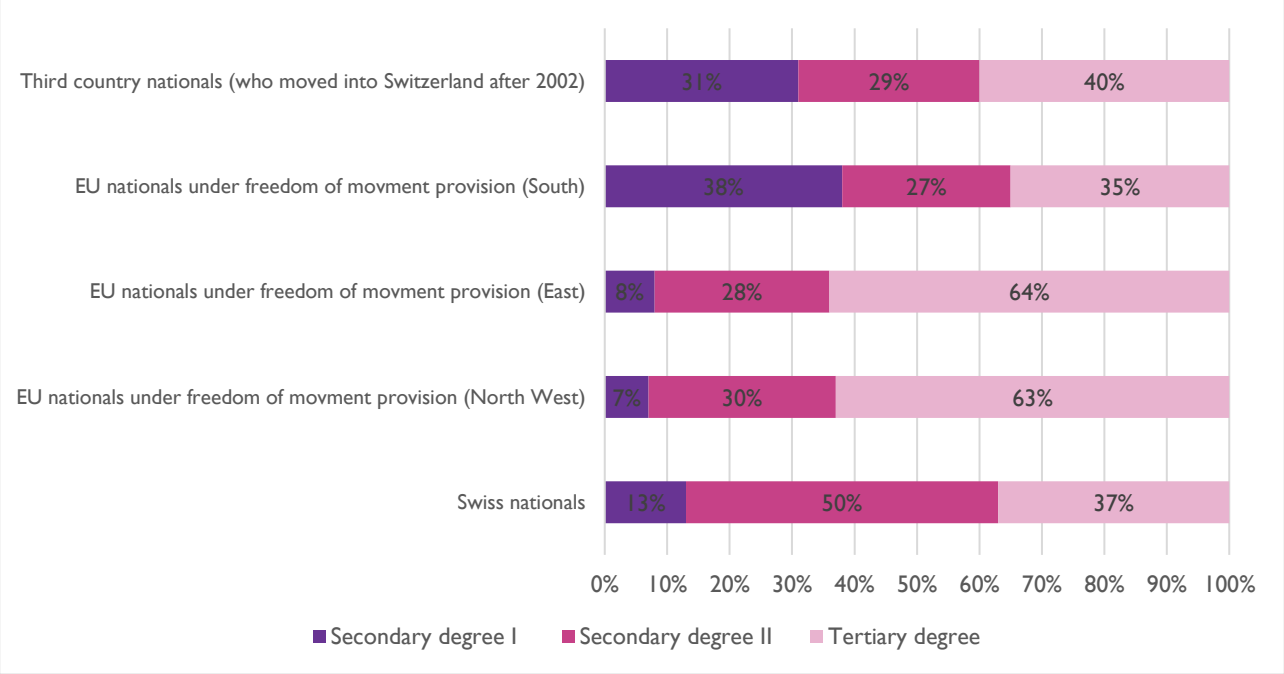
- The percentage of the full-time employed who have a tertiary degree has increased amongst both foreigners and Swiss nationals.
- The percentage of full-time employed with secondary level II degree has decreased amongst both foreigners and Swiss nationals.

- The percentage of full-time employed with secondary level I degree has decreased amongst foreigners and has remained relatively constant amongst Swiss nationals.

In plainer terms: throughout the past 20 and more years, immigrants into Switzerland have on average been of a lower education than the average Swiss worker, but the gap has narrowed and as of now the average foreigner in Switzerland is about as likely as the average Swiss worker to be highly educated, with the educational gap now consisting of a higher proportion of Swiss with medium levels of education and a higher proportion of foreigners with low levels of education.

The Swiss Labour Statistics dataset provides education level data at a more granular level by distinguishing between Swiss nationals, EU/EFTA nationals (from north Europe, east Europe and south Europe) who moved into Switzerland under the freedom of movement provision, and third-country nationals. The following chart shows the qualifications of permanent resident in Switzerland, as of 2018, according to their geographical origin.

Figure 1.32: Composition of permanent residents from different geographical regions according to level of education



Source: Report of the Observatory on the Free Movement of Persons Agreement Switzerland-EU. Effects of the free movement of people on Labor market and social security.

We note the following:

- Swiss nationals have the highest prevalence of level II (vocational) secondary degree qualification.
- The prevalence of tertiary degree qualifications amongst EU nationals from north western and Eastern Europe is higher than that of Swiss nationals. EU nationals from north western and eastern regions are also less likely to have only level I secondary qualifications compared to Swiss nationals.
- The prevalence of tertiary degree qualifications angst southern European and third country nationals is comparable to that of Swiss nationals, however both groups have a materially lower prevalence of vocational training qualifications, and a materially higher prevalence of level I secondary qualifications.

We now provide evidence on the median wage earned by foreigners and Swiss nationals. We note that this is not exactly the same as data on newly-arrived immigrants versus domestic citizens. For example, this will include the evolution of the salaries of immigrants that arrived pre-2002. It is also likely that because the average immigrant is of age 30, and thus well below the typical age of peak lifetime earnings, over time the wages of immigrants will tend to catch up to those of the average domestic worker. On the other hand,

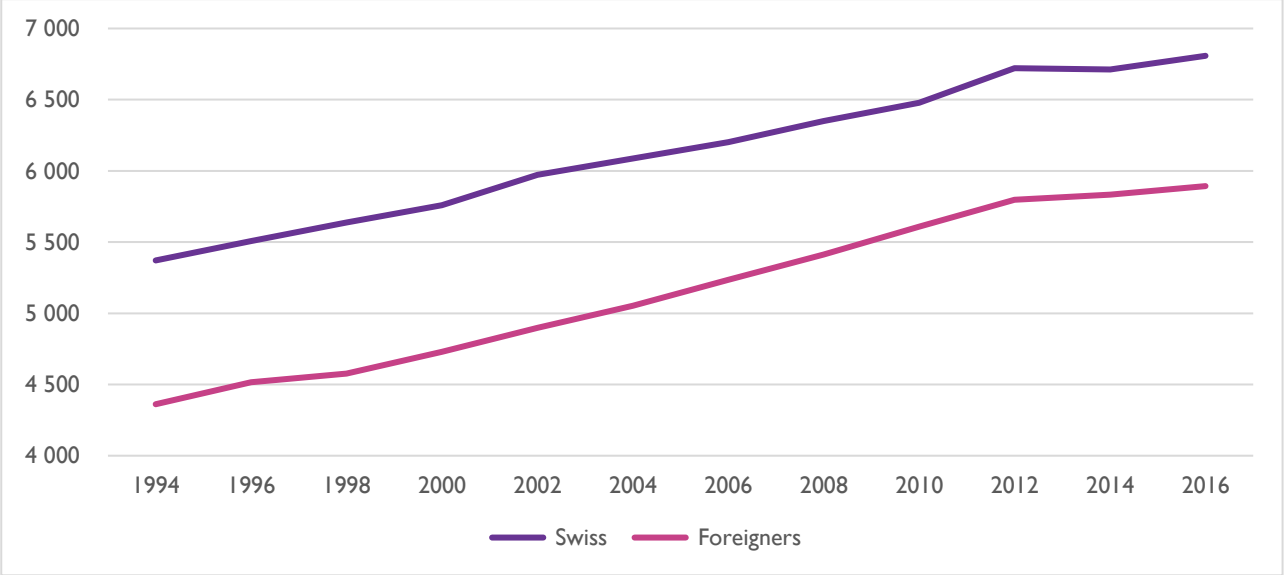
there is interest not merely in what the opening salaries are of immigrants but also in how they evolve through time, relative to domestic citizens. So we shall treat these data as our relevant proxy indicator.

This data available from the Swiss Federal Statistical Office website, and is available on a biannual basis. Unfortunately there is a discontinuity in the definition used in the data collection. More specifically, values from 2008 present a different definition compared to the past for:

- Public sector coverage: The statistic has been expanded and it considers public sector wages for sub-national level employees. Up until 2008 the statistic contained only public sector wages for federal level employees; and
- Job segmentation: The focus of the job segmentation changed whilst keeping the same segment structure (i.e. 4 different groups). The focus now is on the ranks instead of the qualification level required.

In order to overcome this inconsistency we have exploited the presence of two overlapping data point on both time series (i.e. 2008 and 2010 median wages), we take the ratio between the 2008 value from the second set (the 2008-2016 time series) and the 2008 value of the first set (the 1994-2010 series). We proceeded analogously on the 2010 values. We then average the two ratios and apply such newly formed ratio to the 1994-2010 series. The same methodological approach has been followed to create a single series 1994-2016. In this way we developed a fairly consistent time series that allows us to have a view of how the median wages have evolved between 1994 and 2016. This is reported in the chart below.

Figure 1.33: Evolution of the median wage (CHF) of Swiss nationals and foreigners (1994-2016)



Source: Swiss Federal Statistical Office and Europe Economic calculations.

On these figures, we estimate that as of 2002 the average foreign worker had a salary about 82 per cent of that of the average Swiss worker, by 2010 that had risen to about 87 per cent, and from 2010 onwards that has been stable at about 87 per cent.

However, as above, these are data for foreigners as a whole. The Observatoriumsbericht report[18] provides information on differentials between the salaries of Swiss nationals and newly arrived immigrants in 2002, 2008 and 2016, at 17.7, 19.8 and 17.7 per cent. We also note that in that report's model virtually all of the effect is explicable by standard control variables such as age, length of service, training etc.. That suggests that the wage differential is mainly a reflection of standard indicators of the productivity of workers (as opposed to, say, the immigrant workers having markedly higher productivity for a given level of training, qualification

[18] See Table 2.5, p73 of: https://www.seco.admin.ch/dam/seco/de/dokumente/Publikationen_Dienstleistungen/Publikationen_Formulare/Arbeit/Personenfreizuegigkeit_Arbeitsbeziehungen/Studien%20und%20Berichte/Observatoriumsberichte/15_observatoriumsbericht_zum_fza.pdf.download.pdf/15_Observatoriumsbericht_zum_FZA_de.pdf

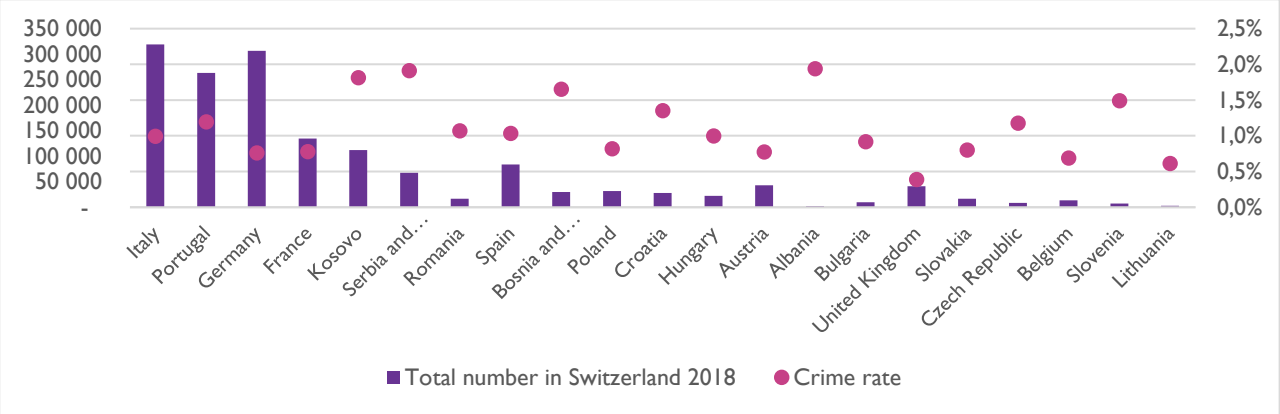
etc. or immigrant workers having lower wages because of systematic labour market prejudice against foreign labour).[19]

1.9.3 Crime rates

Crime committed by a person's nationality is well-documented in Switzerland. The 2018 police crime statistics (PKS) published by the Federal Statistical Office show that the crime rate among immigrants from Europe ranges from slightly lower than the rate of crime among Swiss nationals (0.6 per cent) to more than three times the Swiss rate. This is illustrated in Figure 1.34, below, which shows the crime rate of each ex-pat community living in Switzerland in 2018 alongside the size of that community.

It is clear that the crime rate as measured here is generally higher amongst foreigners originating from the EU-8 set of countries (Hungary: 1%; Poland: 0.82%; Czechia: 1.18%; Slovakia: 0.8%; Slovenia: 1.49%).[20] However, the rate in all cases in Switzerland is not exceptionally high, and does not exceed 2 per cent among communities of any European nationality. It is also clear that the crime rate amongst the main immigrant groups in Switzerland (from Italy, Portugal, Germany, and France) is only marginally above the Swiss average.

Figure 1.34: Crime rate by nationality of European countries, 2018



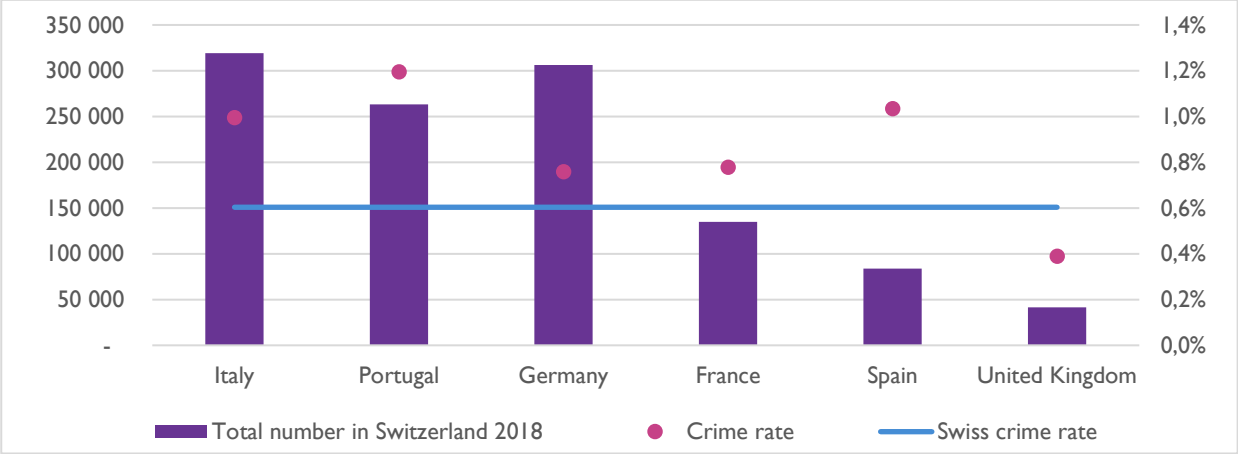
Source: Police crime statistics (PKS) and Federal Statistics Office. 2018. Crime rate: the number of accused persons of the permanent resident population (PRP) by nationality over the total number of each nationality in the PRP.

To illustrate that latter point, we consider specifically the crime rates of the main countries of origin of Swiss immigrants in Figure 1.35, demonstrating that they are only a little higher, on average, than in Switzerland — suggesting that this is unlikely to be a sufficiently significant factor to be economically relevant.

[19] The report also gives differentials for short-term stayers (immigrants who arrive, work for a short time, then leave – such as seasonal staff). For these staff the wage differentials were (as one might expect) much higher, at 51.4 per cent in 2002 falling to 32.7 per cent in 2016.

[20] It is perhaps of interest to note that this higher crime rate amongst immigrants into Switzerland is by no means a standard feature of immigration. In the UK, for example, the evidence is that immigrants from eastern and central Europe contributed to a *lower* crime rate in the UK after 2004. The Migration Advisory Committee suggested that this is because crime is more prevalent amongst individuals who are young, poor, and have little education, while EU-8 immigrants have both higher employment rates and higher levels of educational attainment than the average UK-born. For details, see Migration Advisory Committee (2018) "EEA migration in the UK: Final report" [online].

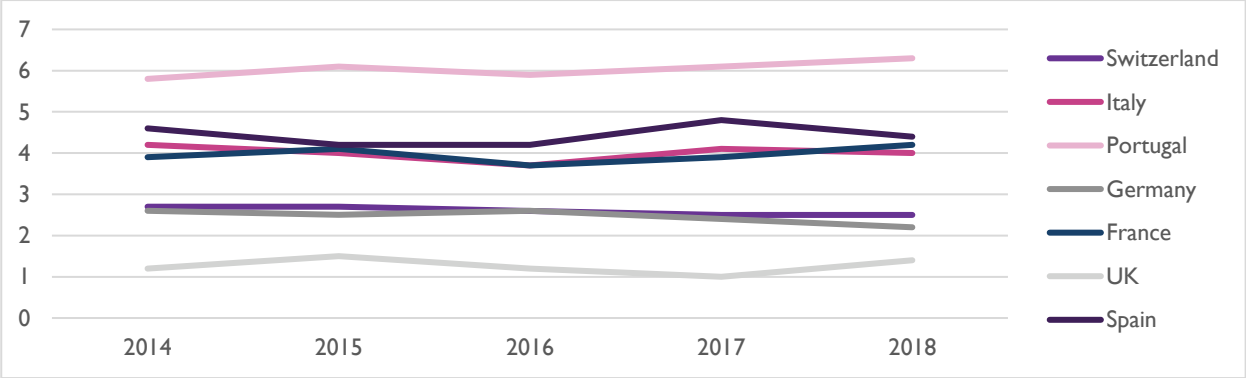
Figure 1.35: Crime rate among nationalities of top immigrant origin countries and the Swiss rate, 2018



Source: Police crime statistics (PKS) and Federal Statistics Office. 2018. Crime rate: the number of accused persons of the permanent resident population (PRP) by nationality over the total number of each nationality in the PRP.

Nor is there evidence that these rates have changed over time: the conviction rate for a felony or misdemeanour under the Swiss Criminal Code (SCC) between 2014 and 2018 has remained stable for these countries (see Figure 1.36).

Figure 1.36: Conviction rate per 1,000 residents living in Switzerland, Swiss nationals and permit B/C holders



Source: Federal Statistical Office, Criminal conviction statistics (CCS), Population and Household Statistics (STATPOP).

1.10 The counterfactual — how might immigration into Switzerland have differed if the AFMP had not been introduced?

The most commonly-studied economic effects of relatively "loose" immigration controls, such as free movement between Switzerland and the EU, are those associated with an increase in the available labour supply. The underlying assumption is that if immigration is subject to less tight controls, firms will have a wider pool of workers to choose from, increasing the quality and range of labour available and potentially reducing its costs (at least for a given level of output — a caveat we shall explore below).

That is the assumption we shall make in various of the scenarios below as well, but before we explore them in detail it is worth pausing to observe that the validity of this assumption is perhaps less obvious that it might initially appear. There are at least two ways in which that might be so.

The first way is this: it could be that with controlled immigration the appetite of certain categories of immigrants to come to the country is higher. For example, it might be that high-skilled immigrants might prefer to locate into a country in which immigration was more tightly controlled than into a country where it was less tightly controlled. We could think of various reasons for that. Perhaps it could be as simple as that

higher immigration is associated with higher house prices and higher-skilled immigrants, being likely to purchase their own homes, therefore require more accumulated capital in advance, or higher salaries once they have immigrated, for immigrating to be attractive. Perhaps higher-skilled immigrants value being marked out as important by being invited as immigrants when others are refused entry. Perhaps they found some quirk of the character of the country appealing, which might be diluted with looser immigration.

Whatever the reason, if it is indeed the case that higher-skilled immigrants find immigrating less appealing when immigration controls are looser, that could in turn have the consequence that, since their appetite to immigrate is lower when immigration rules are "looser", firms need to pay higher wages to attract higher-skilled immigrants under "looser" immigration control regimes than they would under "tighter" immigration controls.

A second way the assumption that might be wrong is this: it could be that looser restrictions on immigration from some jurisdictions have the de facto effect of resulting in tougher restrictions on immigration from other jurisdictions. For example, it might be that if restrictions on immigration from the EU are looser then restrictions on immigration from the US, India, Japan, China, Brazil and Australia become tighter than they would otherwise have been

Again, one can think of many reasons why this might follow. But the key point is that if indeed immigration from these jurisdictions is subject to tighter controls as a consequence of looser controls on immigration from the EU, it is by no means automatic that looser controls on EU immigration implies an increase in the availability of labour.

1.10.1 How has free movement affected immigration into Switzerland?

The bilateral Agreement on the free movement of persons (AFMP) between Switzerland and the EU came into force in 2002. However free movement between Switzerland (albeit with safeguard clauses) and a selected number of EU/EFTA countries[21] took full effect only in 2007.

First we report simply how net immigration evolved over the period, both in terms of absolute numbers and in terms of percentage of the Swiss population.

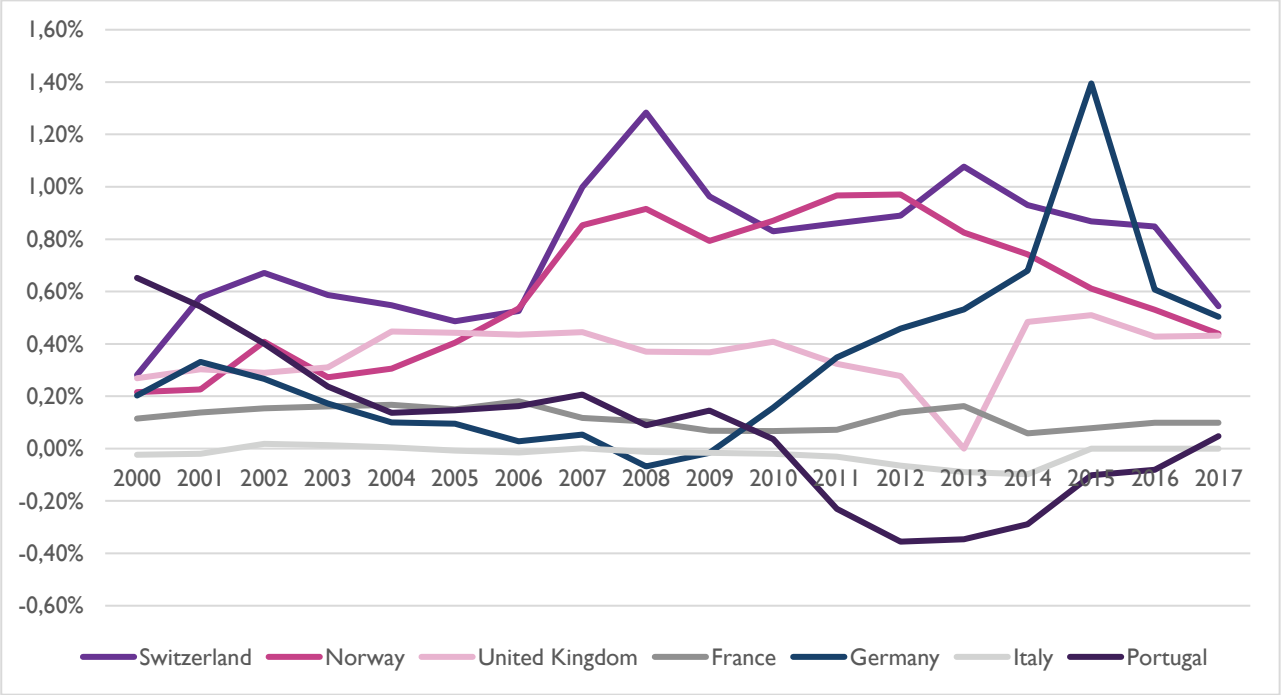
Figure 1.37: Net immigration into Switzerland, 2000-onwards

[21] These are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, Iceland, Lichtenstein, Norway and the UK.

We see that immigration has risen markedly, both in absolute terms and as a percentage of the Swiss population, over the period as a whole, with a particularly marked spike in 2008 — the year following the full implementation of free movement but also the first year of the Great Recession.

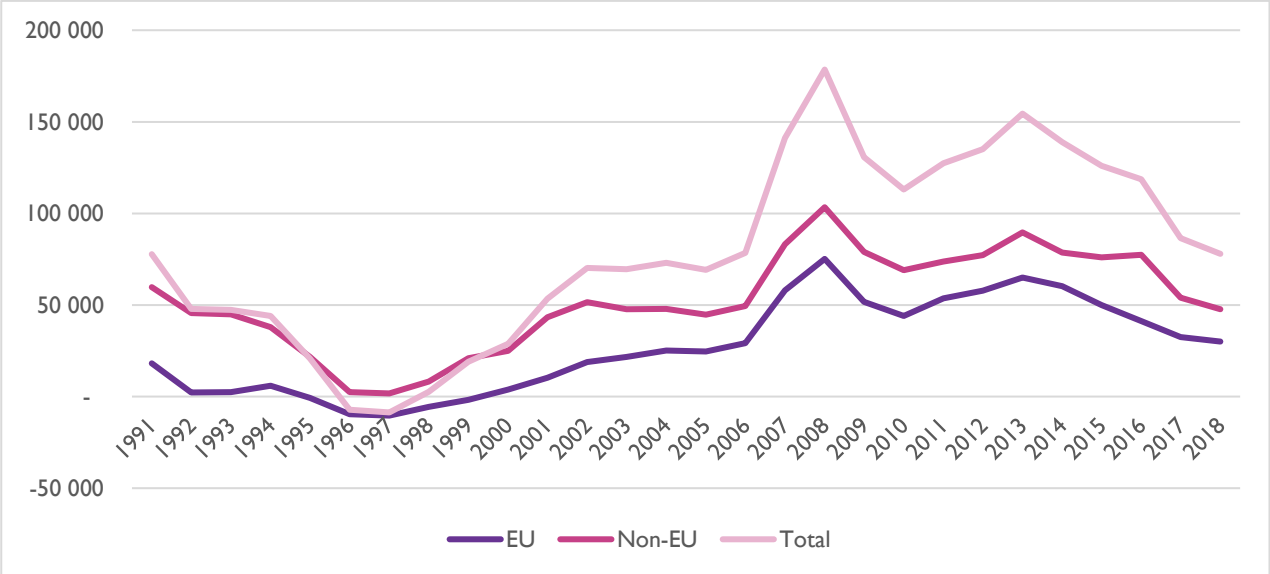
In the next chart we demonstrate that this level of immigration is indeed higher than for other European countries. For almost the entire 2002-onwards period, net immigration into Switzerland was higher than in other major countries, and in many periods markedly so.

Figure 1.38: Net immigration as a % of domestic population each year, Switzerland and selected countries



In order to provide a more detailed picture of how the freedom of movement provision might have impacted the patterns of immigration in general, and EU immigration. First we give the general breakdown.

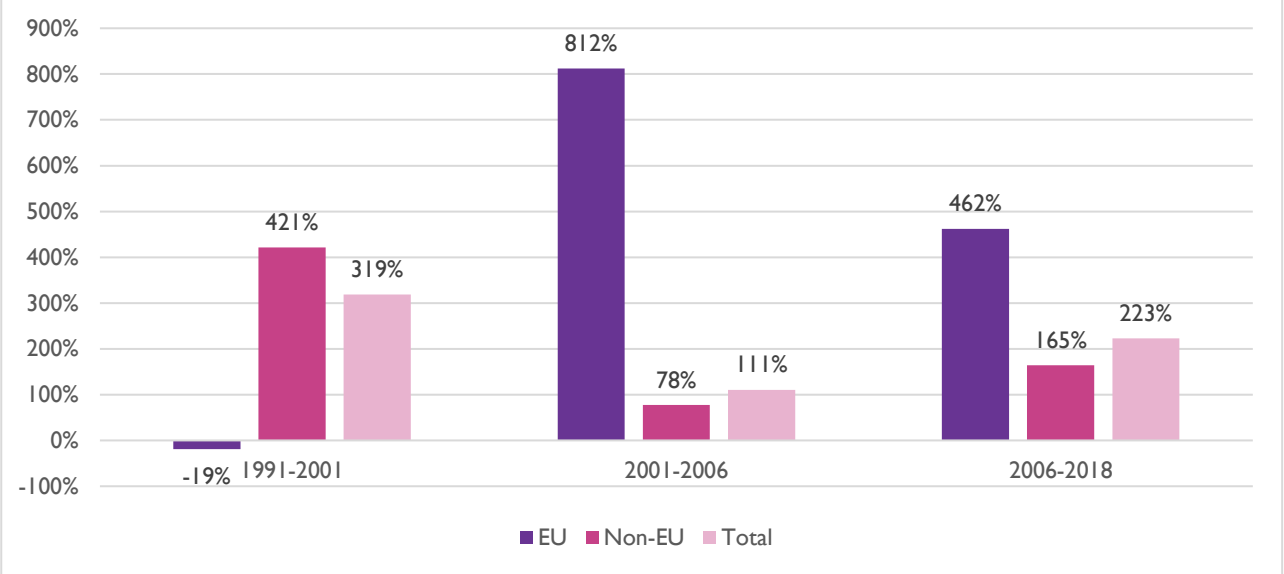
Figure 1.39: Annual flow of net immigration in Switzerland



Source: Swiss Federal Statistical Office and Europe Economic calculations.

Next we report the percentage change the cumulative number of EU versus non-EU immigrants over three separate periods: the period 1996-2001 (before the enforcement of the free movement provision), the period 2001-2006 (the period in which the free movement provision was gradually phased in), and the period 2006-2018 (the period in which the free movement provision took full effect). This information is reported in the figure below.

Figure 1.40: Percentage change in the cumulative number immigrants over three periods: 1991-2001, 2001-2006, and 2006-2018



Source: Swiss Federal Statistical Office and Europe Economics calculations.

We can see from the chart above that, whilst prior to 2002 the increase in net immigration was driven primarily by non-EU citizens (in fact over the 1991-2001 period there was a net reduction in the number of EU-immigrants locating in Switzerland), from 2002 onwards we see the large increase in EU immigrants. This is sustained — indeed, greatly extended — from 2007 onwards (ie on a 2006 base, as per the diagram). It thus appears clear that there was a highly material impact of free movement provisions both upon the volume of immigration into Switzerland (which rose markedly) and upon its composition (a much larger proportion of immigration came to be from the EU).

1.10.2 Two problems regarding the counterfactual

It seems clear from the above analysis that there was *some* impact of the AFMP on Swiss immigration. However, there are two significant problems in assessing how large those impacts were. The first is that, as we saw in the chart above, for the EU15 plus Malta and Cyprus, free movement commenced fully only from 2007, with the safeguard clause applied in 2013, and free movement without limitations recommencing in 2014. Since that period, 2007 to 2013, corresponds closely with the Great Recession and then the main phases of the Eurozone Crisis, disentangling the macroeconomic impacts of free movement from the macroeconomic impacts of the Great Recession and Eurozone crisis is especially challenging.

Even if we could disentangle them, it could be challenging to interpret them. Suppose, for example, that it turned out that the most important contribution of free movement was to provide a boost to aggregate economic growth (GDP not GDP per capita) just as the economy was suffering a downturn, in the Great Recession. Imagine this provided some form of buffer that prevented what would otherwise have been a larger fall in asset prices and more unemployment in Switzerland at the time. Accepting, for the sake of the discussion, that we could prove this were true, despite all the challenges of attribution, what would that imply? That free movement provided a once-in-a-lifetime insurance policy that will never need to be called upon again, unless we are expecting a worldwide banking collapse again some time soon? Or should we

imagine that, since it provided a buffer in that scenario, it should be assumed to provide an analogous, albeit different, buffer in some other yet-to-be-encountered scenario?

But if its effect were indeed as specific as this, why could it not have been duplicated by a policy at the time? Why couldn't immigration quotas have been set higher from 2008 to 2010? Indeed, if that was precisely when immigration was most needed, is it not plausible that if immigration were more contained at other times, there might have been more effect of setting quotas higher in just that period (since immigrants that had not made the quota threshold in earlier years, or feared they might not make it in later years, would take the opportunity of the temporarily elevated quotas to come in)?

That leads us directly to the second significant problem regarding the counterfactual here: the alternative to free movement is clearly not "no immigration", so what is it? If it assumed to be quotas, at what level and how should we assume they varied through time?

We could make assumptions such as that the policy implemented would have included some combination of

- National worker priority
- An aggregate maximum annual threshold
- Mix preferences

and that the above would have varied through time.

An alternative, more simplistic assumption, would be something like that immigration would have been three quarters of its actual level at all times.

We recognise that our results will depend importantly on the assumptions we make about what policy would have been pursued in the absence of free movement, and different readers might have different views as to what the most appropriate counterfactual is. In our quantification sections our approach will be as follows.

- First we will estimate impacts for immigration as a whole.
- Then we will state what one quarter of that impact would have been (a crude "One quarter less" counterfactual).
- Then we shall discuss how results might have changed had the counterfactual, more realistically, involved quotas that could be varied over time and that favoured higher-income or higher-capital immigrants and immigrants in sectors where there were labour shortages.

1.10.3 Industries with worker shortages in Switzerland

A Swiss skills shortage index[22] study is published on an annual basis which looks at the occupations experiencing the greatest skills shortage as well as the greatest oversupply of skilled staff across Switzerland.[23] The study published in 2019[24] found a 22 per cent increase in overall skills shortage across Switzerland between 2016 and 2019, meaning that while the number of jobs advertised has increased, the number of people looking for work has decreased.

Looking at skills shortage across occupations, the study published in 2019 reports engineering (e.g. structural and electronic engineers), technical (e.g. heating or air conditioning technicians) and fiduciary (e.g. auditors and tax consultants) occupations as those with the highest skills shortage. At the other end of the spectrum occupations relating to hygiene, cleaning or personal care, or commercial and administrative professions were identified as having the highest oversupply of skilled staff.

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[22] In the context of the study skills shortage refers to situations where there are more job seekers than vacancies available in a given occupation.

[23] The study looks at 32 occupations overall and ranks these depending on whether they are characterised by a skills shortage or oversupply.

[24] Swiss skills shortage index 2019, available at: https://ssi.springprofessional.ch/wp-content/uploads/2019/11/Swiss-Skills-Shortage-Index-2019.pdf

With respect to the geographical distribution of occupations experiencing skills shortages, in general German-speaking Switzerland appears to be more affected by the skills shortage than the French-speaking part of the country. In terms of the occupations with highest skills shortages, the two areas do show some similarity: in 2019 the three occupations affected most by skills shortages were identified as engineering, IT and fiduciary jobs in the German-speaking part of the country and as technical, fiduciary and medicine and pharmaceutical occupations in French-speaking Switzerland.

One could imagine an immigration policy that, instead of allowing free entry into Switzerland of any European immigrant worker regardless of industry, targeted workers with skills in shortage (where "skills" might include language skills — eg at present perhaps a preference for workers who speak German provided they locate into German-speaking areas of Switzerland).

2 Main economic impacts of immigration

2.1 General points of theory

There is no universal relationship between immigration and wages or GDP. In some countries at some times, immigration will depress wages; in other cases elevate wages; and in other cases leave wages unchanged. Some countries are natural candidates for gaining economically from high immigration — if they can attract it. Easy cases include

- poor, low-skill countries;
- countries with low population densities that would gain from significant population growth; and
- countries with declining or ageing domestic populations but legacy government debts to service.

Italy and Germany are two oft-quoted potential examples of the latter case. Whereas a rising population means that legacy debts (and related commitments such as unfunded pension promises) are spread over an ever-increasing population, so reducing the burden of servicing past debts, a falling population means that historic liabilities must be repaid by an ever-falling number of people. Immigration can in such cases be a mechanism for avoiding these consequences of population fall.

Countries less likely to gain economically from high immigration include

- those that are already crowded;
- countries that have a comparative advantage based on cultural idiosyncrasies; and
- high-income, high-skill, high-capital countries with stable or growing domestic populations.

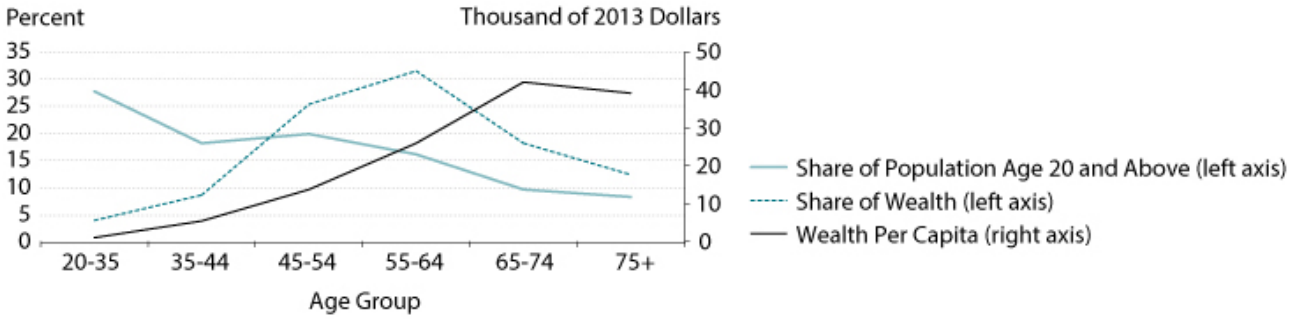
Much of this current section consists in exploring this last case. In Section 3 we explore various points related to the first two.

2.1.1 Capital and immigration

In standard growth theory[25] it is assumed that the norm for immigrants is to have less capital than domestic citizens. Given that, as we have seen, the immigrant population into Switzerland averages an age of about 30, this is very likely to have been true of immigration into Switzerland over the past 20 years. In developed countries, there is a standard profile of the accumulation of wealth over time, as reflected in the following figure below for the US, in which the wealth per capita of the 20-35 age group is nugatory.

[25] eg see *Economic Growth*, Barro, R.J. & Sala-i-Martin, X., 2nd Edition, especially Chapter 9.

Figure 2.1: US population and wealth by age group, 2010[26]



SOURCE: Survey of Consumer Finances and U.S. Census Bureau.

Furthermore, one not-atypical migration pattern is for immigrants to secure a job abroad, "make their fortune" and return home. So even when immigrants do, in due course, come to acquire capital, some of them will depart with it.

For one-off injections of immigrants, a reduction in the ratio of capital to labour in the economy will not endure indefinitely. Instead, the newly-arrived immigrants will tend to acquire capital as they age. (We set out a model in which this occurs in Section 6.3.3.) Eventually, the capital to labour ratio would be restored (or nearly so). But in a setting in which there is a constant inflow of immigrants with little to no capital, there is a constant bearing down on the capital to labour ratio. Indeed, as we have seen in Section 1.6 that is precisely what happened in Switzerland: as immigration expanded the population rapidly, growth in the capital stock did not keep pace, and eventually stagnated altogether in per capita terms.

In standard growth models, immigrants of equivalent labour productivity, but with less capital, will raise returns to capital but cut returns to labour (wages).

Standard growth theory assumes a production function with labour and capital as complements (eg a Cobb-Douglas form: $K^{a}L^{(1-a)}$). Increased labour availability or quality (at a given price) raises returns to capital, but diminishing marginal returns mean that, for a given capital stock, salaries are lower.

For domestic citizens in aggregate, as a first round effect gains to capital exceed losses to labour. But this increases pre-transfers inequality.

For our models in what follows below, we shall assume that some increase in inequality per se is acceptable, but that an absolute fall in the income of poorer people is not. So transfers must increase in response to immigration, even for immigrants of equivalent productivity.

These transfers have two negative effects on domestic citizens:

- They transfer to both poorer domestic citizens and to poorer immigrants.
- They create deadweight losses.

Whether impacts on domestic citizens are net negative or net positive will depend upon the balancing of the boost to returns to capital (from labour being cheaper and more abundant) versus the cuts to salaries, the need to make transfers to immigrants along with poorer domestic citizens, and the deadweight costs of taxation.

2.1.2 Immigration and wages

With totally unlimited flows of trade, with unlimited flows of identical capital, labour and commodities, with identical technology internationally, and with no network or congestion effects and no other spillovers, Samuelson's Factor Price Equalisation Theorem would apply: the prices of identical factors of production

[26] https://research.stlouisfed.org/publications/economic-synopses/2017/02/24/aging-and-wealth-inequality/

(specifically here wages and the cost of capital) will be equalized across countries as a result of international trade in commodities. In that case, wages would be identical in different countries regardless of immigration — driven to equality by trade in commodities alone — so immigration would not affect wages, regardless of its scale. In the actual world, however, wages and the cost of capital differ markedly between countries. So in the real world the conditions of the Factor Price Equalisation Theorem clearly do not apply and instead it is relevant to ask what impact immigration might have upon wages.

Sometimes the expected impacts of immigration upon wages are expressed naively via the intuition that more supply of something (in this case labour) will reduce its price. By itself, this point is easily countered with the observation that immigrants are not only workers but also consumers, so they increase the demand for labour as well as its supply. But this observation is not the end of the matter, for it does not tell us by how much they boost demand relative to supply.

Even if demand for output were unchanged, it would not automatically follow that immigration should necessarily be expected to lead to lower wages for workers as a result of increased competition. Work is typically conducted in firms, which are by their nature teams. In teams, the contributions of different team members are often complements rather than substitutes. For example, if a marketing department is more successful in attracting business, increasing utilisation, that may increase the efficiency of production staff.

So if immigration allows firms to attract higher-quality staff at the same cost, that could enhance the productivity of other staff members, including in particular other native Swiss staff members. In principle that higher productivity may raise salary rates by more than enough to compensate for any falls in salary from increased competition. Productivity may also rise as migration allows workers with different niche skills to relocate to economies where those skills can most productively be deployed, relative to others.[27]

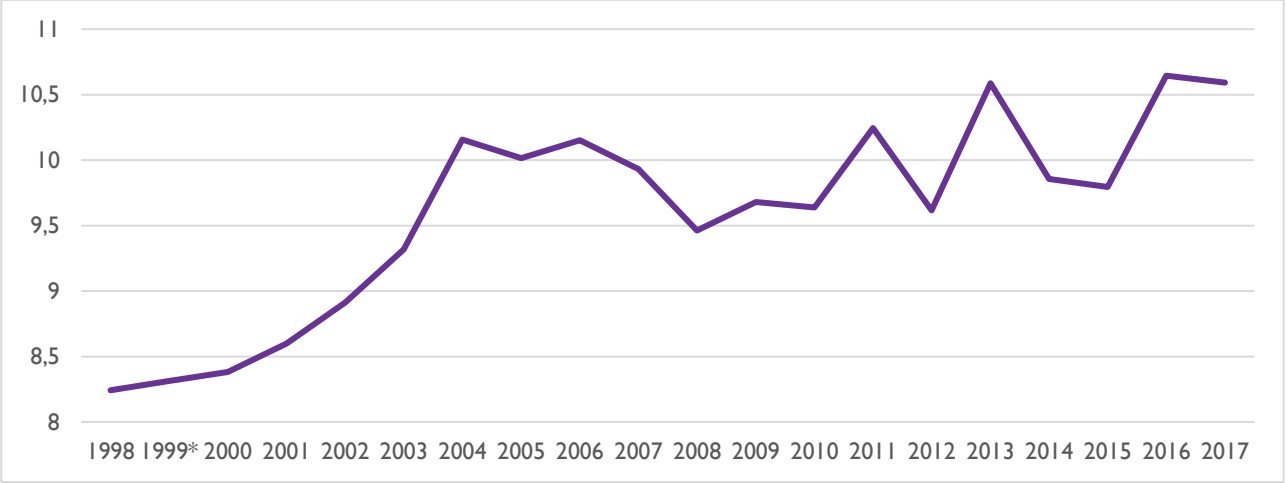
The processes here are likely to be contingent upon the specifics of the situation. Theory does not give us any general rule that says salaries for native workers must fall or must rise as a consequence of increased availability of immigrant labour via the mechanisms discussed in this subsection (even assuming that free movement did in fact lead to increased availability of immigrant labour, which is not as obvious as it might at first seem, as we have discussed above). Results will differ for different countries, at different times, and for different levels and natures of immigration. Indeed, as we shall see in Section 2.2, empirical studies find quite importantly different results in different countries.

2.1.3 Deadweight costs of taxation and transfers

In Switzerland there is clear evidence of social transfers increasing over the period. We have seen above that social protection expenditures rose markedly in Switzerland over this period whilst being static in lower-immigration comparator countries such as France or Germany. But it is also true even simply in terms of income transfers (setting aside other expenditures), as we see in the graph below.

[27] This process is often likened to the effect of comparative advantage in trade leading to products being produced where it is relatively most efficient to do so.

Figure 2.2: Transfers to income deciles 1 to 4 (% of national income)



Source: Office of Federal Statistics
Notes: * Figure for 1999 interpolated.

The process of taxing higher-income groups and providing transfers to lower-income groups creates economic distortions called "deadweight costs". Such distortions arise partly from the taxes themselves, partly from the administrative costs of managing the process, and partly from the damage to incentives for recipients of transfers.

A not-uncommon figure for deadweight costs is around 50 per cent of the value of transfers. This might be made up roughly as

- ~30% from the distortions of the taxes.
- ~20% from the costs of administration and distortions of incentives for recipients.

In what follows later we assume these deadweight costs.

2.2 Empirical results for impacts on wages

2.2.1 Increased labour will tend to mean cheaper products

If, as a consequence of immigration being subject to less tight controls, firms have a wider pool of workers to choose from, that may increase the quality and range of labour available and potentially reduce its costs (at least for a given level of output). That increased quality and enhanced competition for labour will mean (other things being equal) that firms are able to produce a given level of output at lower cost, through some combination of higher productivity and lower wages.

As we discussed above, even in cases in which salaries rose, that was as a consequence of enhanced productivity. So that implies that average unit labour costs will fall even in the case in which salaries rise — since output will in that case have risen by even more.

Those lower unit labour costs will tend to result in lower prices, as cost reductions are passed on to consumers via competition.

2.2.2 Increased labour often means lower salaries for lower-paid workers

In many empirical studies around the world certain groups of workers see salary falls associated with immigration. The two main categories of workers seeing their salaries fall are:

- Previous cohorts of immigrants;

- Lower-skilled domestic workers.

Gerfin and Kaiser (2010)[28] investigate the effects of Swiss immigration inflows between 2002 and 2008 have on wages in Switzerland. In particular, the study first applies a skill-cell approach in order to determine the elasticities of substitution between different workers' types in the Swiss context, and then applies such elasticities, together with the actual inflows of migrants in the period 2002-2008, to simulate how domestic wages have been affected over such period. One key finding of the study is that Swiss workers and immigrant workers are imperfect substitutes. As to the quantification of the impacts of immigration on real weekly wages of natives and already-settled immigrants, the main results are shown in the following table.

Table 2.1: Real weekly wages for native and already settled immigrants in Switzerland in 2002 and 2008 (CHF)

	Native				Already settled immigrants			
	2002	2008	Diff	% Diff	2002	2008	Diff	% Diff
Low education	1,024	962	-62	-6.1%	1,036	991	-45	-4.3%
Middle education	1,342	1,288	-54	-4.0%	1,197	1,196	-1	-0.1%
High education	1,990	1,895	-95	-4.8%	1,879	1,913	34	1.8%

As we see in the above table, this study finds losses to Swiss native workers in all groups, and the largest in the lowest-educated group.[29] Taking this estimate and multiplying it for the number of weeks in a year (365/7), we estimate the value in yearly wages that has been lost over the seven years by native low-skilled workers. Assuming that the loss had been constant during the period, we obtain that the average yearly loss in annual wage faced by a low-education Swiss native worker due to immigration influxes amounts to up to CHF 462.[30]

Box: Empirical studies of the impacts of immigration on wages in other countries

In some countries in which immigration levels are relatively high by European standards, similar results to those in Switzerland have been found, at least regarding lower-paid workers. The Migration Observatory at the University of Oxford summarises the situation with respect to the UK as follows:[31] "*Empirical research on the labour market effects of immigration in the UK suggests that immigration has relatively small effects on average wages, with negative effects on low-paid workers and positive effects on high-paid workers.*"

- Whilst Dustmann et al (2013)[32] find that most workers have wage rises, they estimate wage falls for the lower paid. Each percentage point increase in the ratio of migrants to non-migrants is associated with a 0.6 per cent fall in wages for workers at the 5th earnings percentile and a 0.5 per cent fall for those at the 10th percentile. Manacorda et al (2011) find that new immigration tends to depress the wages of previous cohorts of already-settled immigrants.[33]

[28] Gerfin and Kaiser (2010), "The Effects of Immigration on Wages: An Application of the Structural Skill-Cell Approach", at: http://staff.vwi.unibe.ch/gerfin/downloads/immigration_and_wages.pdf

[29] One perhaps counter-intuitive feature of the above table should be explained. What happens to the "Average" worker over time reflects not only what happens to each category of worker, but also how the mix of workers of the different categories. Over time there is a material shift in the proportion of workers falling into each category. The proportion of workers at higher education levels rises over the period. So even though, for example, wages within each of the three Native worker categories drops in the 4.0-6.1 per cent range, the average Native worker wage falls only 0.2 per cent.

[30] We note that the authors of this study describe their results as best considered as upper bound values.

[31] https://migrationobservatory.ox.ac.uk/resources/briefings/the-labour-market-effects-of-immigration/

[32] Dustmann, C., T.Frattini, and I. P. Preston (2013) "The Effect of Immigration along the Distribution of Wages." Review of Economic Studies, 80(1), pp145-173. https://www.ucl.ac.uk/~uctpb21/Cpapers/Review%20of%20Economic%20Studies-2013-Dustmann-145-73.pdf

[33] Manacorda, M., A. Manning and J. Wadsworth (2011) "The Impact of Immigration on the Structure of Male Wages: Theory and Evidence from Britain", Journal of the European Economic Association, 10, pp120-51.

- Nickell and Saleheen (2015)[34], two Bank of England researchers, study the impact of immigration as a supply-side shock on average wages in the UK and compare across occupations to proxy for the level of skill. They also categorise immigrants by occupation rather than education level, because many well-educated immigrants to developed countries work in low-skill occupations. They find that the ratio of immigrants to natives in a given region has a negative and statistically significant effect on the average occupational wage of that region. The largest effect is found in low-skilled services occupations, where a 10 percentage point increase in the share of immigrants employed implies a 1.88 per cent fall in the category's pay. Moreover, the origin of migrants appears to have no effect on the economy as a whole.
- The UK's Migration Advisory Committee estimated in 2018 that a rise in EU immigration equivalent to one percent of the UK-born working-age population is associated with a short-term 0.8 per cent decrease in UK-born wages at the 5th and 10th percentiles (versus a 0.6 per cent *increase* for those at the 90th percentile, ie high earners). The aggregate short-term effect of all EU migration between 1993 and 2017 on UK-born worker wages was estimated as being a 4.9 per cent fall for those at the 10th percentile of earning, a 1.6 per cent drop at the 25th percentile, a 1.6 per cent increase at the 50th percentile, and a 4.4 per cent increase at the 90th percentile.

In other countries, assessed effects have been different — perhaps partly reflecting differences in the character of immigration in countries where pressures are less. For example, in Denmark net immigration averaged just 0.3 per cent of the population for the period from 2000 on (equivalent to around 19,000 net immigration per year in the Swiss context, roughly a third of the Swiss level). Fodge and Peri (2015)[35] analyse the effects of immigration on native unskilled workers' wages in Denmark over the period 1991-2008. Indeed, the study shows that an increase in the amount of immigrants of 1 percentage point of the employment implies an increase in the Danish low-skilled workers' wages by 1 to 1.8 per cent. The researchers also investigate the mobility of the native unskilled workers among working categories, and find the explanation of such increase. Indeed they describe a situation in which, thanks to the immigration influx, many new workers arrive and are employed in more manual-intensive job categories, while native unskilled workers tend to move to more complex jobs. As a result of this increase in the skill-level of their work, for these Danish unskilled workers the tendency has been for immigration to lead to an increase in their wages.

Another countries in which immigration has been extensively studied is the US. In that case levels of immigration are relatively high by European norms, but in the context of much lower population density. Longhi et al. (2004)[36] apply meta-analytic techniques to a sample of 18 papers, using 348 statistics of the percentage variation in the native workers' wages due to a 1 per cent increase in the ratio of immigrants over native workers. Of the analysed descriptive statistics, 234 considered the American scenario, with the results being that US studies of that period tended to find near-negligible impacts of immigration on wages.

2.3 Impacts on social transfers

In most developed countries, governments run deficits in most years. Even when the national debt to GDP falls over time, that is often because the economy is growing more rapidly than the national debt, rather than because the national debt is falling. A rising national debt means that the average citizen of a country is "taking

[34] Nickell and Saleheen (2015), "The impact of immigration on occupational wages: evidence from Britain", at: https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2015/the-impact-of-immigration-on-occupational-wages-evidence-from-britain.pdf?la=en&hash=16F94BC8B55F06967E1F36249E90ECE9B597BA9C

[35] Fodge and Peri (2015), "Immigrants' Effect on Native Workers: New Analysis on Longitudinal Data", at: https://www.econstor.eu/bitstream/10419/110686/1/dp8961.pdf

[36] Longhi et al. (2004), "A Meta-Analytic Assessment of the Effect of Immigration on Wages", at: https://researchcommons.waikato.ac.nz/bitstream/handle/10289/824/PSC-dp-47.pdf?sequence=1

more out than she or he puts in" — i.e. more is "received" in public expenditure payments than is" paid" via taxes and other government revenue contributions.

Looked at over many decades, Switzerland has been something of an exception to this rule. Between 1990 and 2018 it ran a deficit in 14 years and a surplus in 15. However, Swiss debt to GDP was 41 per cent in 2018, down from 58 per cent in 1998 and 59 per cent in 2002 and 2004. Over the long-run the average Swiss citizen has been very close to balanced, overall, "putting in" about the same as she or he "takes out". Nonetheless, the debt to GDP ratio was quite stable over the decade to 2018, lying in the range 41-44 per cent of GDP for the whole period. So for the past decade, the average person living in Switzerland has "taken out more than she or he put in".

Thus, there is still a legacy national debt of around two fifths of the size of the economy. As we have seen, in some economies (Italy and Germany being two well-known examples) it is argued that the interaction of demographics and the fiscal balance provides a strong rationale for encouraging immigration: immigrants help to spread the burden of repaying legacy debts.

Of course, that depends upon immigrants not themselves adding to fiscal burdens by creating or requiring additional expenditure. There are two ways they might do that. First of all, there are their general effects upon the economy, which we have described above in Section 2.1 and will explore in more detail in Section 6. Second, there are their own requirements and contributions as individuals and families.

The net fiscal budgetary effect of immigrants at any given time may depend on the level of skill they bring with them and their age. Immigrants tend to be those with the 'get up and go' spirit in their origin country and to be of an age (around 30) when their public expenditure requirements are relatively low. These factors will tend to make immigrants more likely than the average person of their origin country to contribute positively to the host country's budget. Conversely, an influx of immigrants could strain public transport and other public infrastructure, requiring more maintenance and costly investment as a result. Immigrant workers in very rich countries may also have salaries below the national average and include a higher proportion of lower-paid workers (though perhaps a higher proportion of working rather than unemployed or economically inactive citizens). These factors will tend to make immigrants in rich countries less likely than the average domestic citizen of those countries to contribute positively to the host country's budget.

There are two main types of research into the net fiscal contribution of immigrants. Static / short term approaches analyse the fiscal contribution in a past period. They only account for an immigrant's net contribution in a given time period, so they tend to neglect the pensions or other payouts receivable in a future period to which immigrants' current contributions entitle them. Dynamic / long term approaches account for the long term and future (projected) impact. For example, 'net transfer models' quantify net budgetary balances using the static approach and then extend them into the future using assumptions on the evolution of the immigrant population (such as ageing and returning to origin countries) as well as changes in immigration policy (they often assume no change, which may be unrealistic if existing fiscal policy is unsustainable). Neither approach tends to consider indirect fiscal effects that occur through immigrants' impact on other members of the population. These impacts are difficult to quantify but can include impacts on productivity (and hence labour tax contributions), education (e.g. avoiding costs of training less-educated native workers), and housing (more demand and more tax receipts from construction wages).

Three important studies have investigated the fiscal effects of immigration in Switzerland. Ramel & Sheldon (2012) and Ramel (2013) investigate study the "new immigration" period after the mid-1990s characterised by a majority of high-skill immigration and compare what immigrants pay in taxes (and social contributions) with what they cost the state (such as social insurance) in the long term by projecting the ageing of immigrants over time.[37] Whilst the short-term impact is found to be positive, they find that the most highly skilled

[37] Ramel (2013) "The Fiscal Effects of the New Immigration in Switzerland" [online]; Ramel & Sheldon (2012) "Fiskalbilanz der Neuen Immigration in die Schweiz" [online].

immigrants stay in Switzerland for a shorter period of time on average and that this positive effect will not persist in the long-run because immigrants will age over time (and therefore be less likely to be net contributors). Revisiting the data, Sheldon (2015) estimates that the current fiscal surplus of CHF 15,000 earned by the Swiss state from immigrants will shrink to zero in about 40 years, all else equal.[38]

2.3.1 Our investigations into previous results

An important result of Ramel & Sheldon (2012) is that the budgetary balance of immigrants varies in the origin of immigrants: the average immigrant household from EU17 North / EFTA contributes positively in the long-run but immigrants from the rest of Europe have a long-term net negative impact (see Table 2.2, below). Overall, their results suggest that a continuous rate of immigration can lead to a negative long term budgetary balance of immigrants (CHF -405 per month), even if the balance is initially positive upon the arrival of immigrants (CHF 729 per month). In comparison, Ramel (2013) calculated the average monthly fiscal balance of the permanent Swiss resident population aged 18 and older during the period 2003-2009 at CHF -50.[39]

Table 2.2: Swiss budgetary balances for an average immigrant household by origin

Origin	Monthly budgetary balance (CHF) Short-term (immigrants 2003-9)	Monthly budgetary balance (CHF) Long-term (equilibrium population)
EU17 North / EFTA	1,754	544
EU17 South	424	-515
Rest of Europe	-937	-1,448
Rest of World	611	398
Total	**729**	**-405**

Source: Ramel & Sheldon (2012).

We have used Ramel's (2013) data to examine these results more carefully. Table 2.3, below, shows the net monthly fiscal contributions of immigrants weighted by number in each of the four age categories (18-35, 36-50, 51-65, over 65) for which net contributions were calculated by Ramel and Sheldon (2012) and Ramel (2013). When the results are weighted in such a way, the mean long-term net contribution, weighted by the number of immigrants from each of the four origin regions, becomes more negative: CHF -679 per month. This is driven by the large number of immigrants originating from the rest of Europe and the relatively large shares of considerably net-negative contributors in the age and gender combinations.

Table 2.3: Net monthly fiscal contributions of immigrants weighted by number in each of the four age categories

Origin	Weighted average long-term net contribution	Number of immigrants in Switzerland over the projected period
EU-17/EFTA North	529	738,809
EU-17/EFTA South	-639	704,979
Rest of Europe	-1,935	834,367
Rest of the world	-289	326,609
Weighted average of all immigrants' net contribution	**-679**	

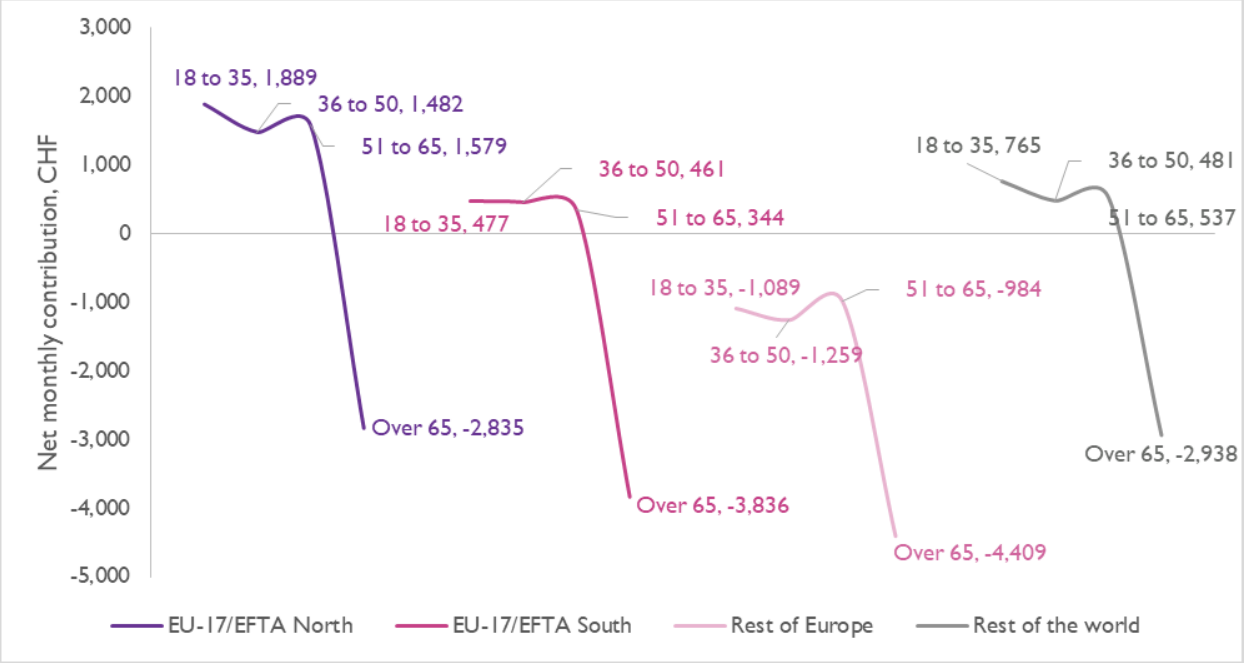
Source: Europe Economics' calculations based on Ramel (2013) data.

The above results do not show how an immigrant's net contribution changes over the lifetime, which can vary considerably between immigrants. This is illustrated in Figure 2.3, below. Clearly, the typical immigrants from EU-17 North and South and the rest of the world are net contributors in the working period of their

[38] Sheldon (2015), "The Economic Impact of the Free Movement Agreement in Switzerland" [online].
[39] Ramel (2013) "The Fiscal Effects of the New Immigration in Switzerland" [online].

lives (18 to 35, 36 to 50, and 51 to 65), before becoming negative in the later stages of life whilst those from the rest of Europe are more likely to be net recipients over their entire lifetimes.

Figure 2.3: Estimated net contribution over an immigrant's lifetime, by origin region



Source: Europe Economics' calculations based on Ramel (2013) data.

2.3.2 Estimating the current fiscal position of immigrants and Swiss citizens

The figures presented above, although illustrative, are not necessarily reflective of the position of immigrants and Swiss natives today. This is because they refer to a long term equilibrium population based on the composition of the population in the period 2003-2009. Using data on the number of arriving immigrants and the number of Swiss nationals in the resident population by age in 2018, we can estimate the current average net contributions. We find that, on average, an immigrant over the age of 18 arriving in 2018 was a net contributor of CHF 323 per month, while the average Swiss citizen of the same age group received CHF 21 per month.[40]

Table 2.4: Weighted average contributions by age category and the average contribution in 2018, CHF

Age	Swiss citizens	Arriving immigrants
18 to 35	833	568
36 to 50	1,196	285
51 to 65	1,265	415
Over 65	-3,265	-3,503
Average 2018 contribution	**-21.33**	**322.60**

Source: Europe Economics' calculations based on Ramel (2013) data.

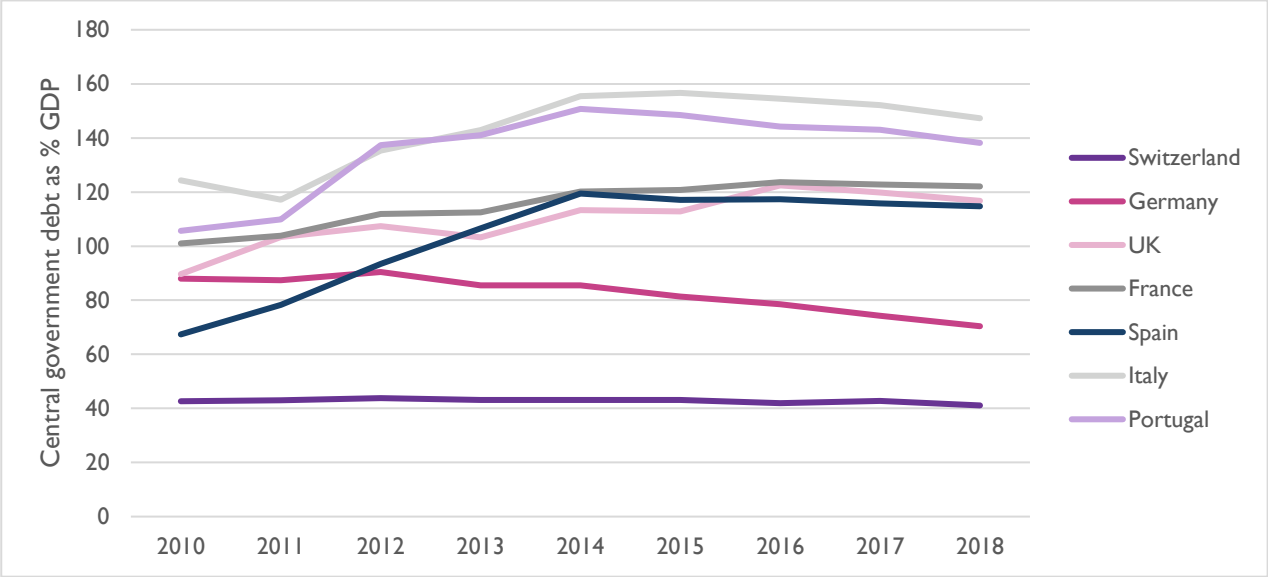
On first sight, these estimates appear to suggest that immigrants are subsidising fiscal transfers to Swiss citizens — the sort of mechanism we discussed above with respect to immigration into Italy and Germany. But they may also reflect the fact, noted earlier in the report, that immigrants are generally younger than the population on average. Furthermore, in recent years immigrants have been more highly-educated than in past

[40] These are calculated using data on the ages of Swiss citizens from the STAT-TAB database ("Demographic balance by age by Demographic component, Citizenship (category), Sex, Age and Year") published by the Federal Statistical Office and

periods — a characteristic of the "new immigration" period. As their human capital has risen, so too has their earnings, implying that larger tax receipts will be collected from them by the Swiss state.

Furthermore, to reiterate a point made above, in a country maintaining a constant debt/GDP ratio but with expending GDP implies that the average citizen is receiving more in state benefits than s/he contributes. By international standards, the Swiss debt to GDP ratio has remained stable for a number of years (see Figure 2.4, below).

Figure 2.4: Government debt to GDP ratio, selected countries, 2010-2018



Source: OECD, General government debt, https://data.oecd.org/gga/general-government-debt.htm

The aforementioned previous studies are comprehensive and undoubtedly shed light on the fiscal contributions of Swiss natives and foreigners in Switzerland. However, there are a number of limitations to this research that must be considered. Firstly, budgetary balances by foreigner category are assumed constant at their average value for the period 2000-5, therefore the calculations of the net contributions require that fiscal policy remained unchanged over the period 2000-2009. Bruchez (2019) notes that this was not a particularly contentious assumption at the time but due to data revisions and hindsight it is now clear that the period was in deficit, whilst the period preceding and following were in surplus.[41] Consequently, appearing to be in a cyclical downturn at the time, the results calculated are likely to be worse than if they were calculated during a boom (when tax receipts rise and unemployment benefits fall).

Secondly, although they account for a wide variety of social security expenditure (OASI, disability, unemployment and supplementary benefits etc.), the researchers do not consider OASI pensions paid abroad. As of 2017, 32.3% of foreign workers and Swiss expatriates received their OASI pensions abroad. [42] This is only 13.1 per cent of the total OASI expenditure, as a person's receipt of their full entitlement is based on continued residence in Switzerland, but this is a non-negligible proportion of the total and the majority of recipients are foreign workers. Italians, Germans, Spanish, and French account for the majority of the 675,000 workers in receipt of those receiving OASI abroad. This implies that the assumption that an immigrant's contribution becomes zero upon their departure from Switzerland is not always correct. Accounting for this would probably reduce the average long-term net contribution.

Thirdly, the researchers assume that some public expenditure does not increase with population size because it finances public goods at fixed costs. Expenditure on some public services, such as police and the justice

[41] Bruchez (2019) "Impact of immigration on public finances in Switzerland".

[42] RTS (2017). Environ un tiers des retraités touchent leurs rentes AVS à l'étranger. https://www.rts.ch/info/suisse/8724413-environ-un-tiers-des-retraites-touchent-leurs-rentes-avs-a-l-etranger.html

system, is unlikely to be independent of population size and immigration. Swiss police crime statistics from 2018 show that significant numbers of immigrants are involved in crime, and our analysis shows that European immigrants generally have a higher crime rate than Swiss nationals. Evidence suggests too that crime in Switzerland amongst young people from the Balkans is higher than among young Swiss, but also higher than young people in their country of origin,[43] suggesting that the act of migration, rather than nationality *per se*, could be a factor in these crime rates. Nonetheless, as we have seen above in Section 1.9.3, differentials in crime rates between domestic Swiss citizens and the crime rates of immigrants from the main origin countries are sufficiently low that crime is unlikely to be a material factor.

In Section 3.2 we shall set out various ways in which immigration could have an impact on public infrastructure and the efficiency of its use. We shall see that there are some potentially non-trivial impacts, but in the case of Switzerland they are not sufficiently certain for us to incorporate them into our GDP modelling at this stage. Instead, for our models we use the previous detailed analysis of the net fiscal contributions of immigrants set out in this section and developed further by us. That data accounts for differences in the relative balances of immigrants by origin and age group, whilst also accounting for a range of receipts and expenditure. We have shown that the results of such analyses may be sensitive to the period in question (i.e. dependent on the composition of immigrants arriving, and the health of the broader economy), and that accounting for social transfers to people outside Swiss borders may increase the level of net expenditure.

Our conclusion is that the correct assumption is that immigrants into Switzerland tend to have a lower requirement for benefits in the short-term than domestic workers, but that over time their requirements increase (as they age and have children) and eventually their needs may even exceed that of the average native Swiss citizen. Reflecting this analysis, in our models of GDP below we shall include cases in which immigrants begin with lower social expenditure requirements than domestic citizens and converge closer to Swiss norms as they age.

2.4 Impacts on and of investment

By increasing the pool of available labour, looser immigration restrictions make it relatively more attractive for Swiss firms to use labour instead of capital. One consequence of this, over time, is that it makes it relatively less attractive for firms to invest in new capital, since firms can expect to have cheaper, good-quality labour available. A well-known version of this effect is seen in the comparison between the capital-intensive wine-growing industry in Australia (where labour supply has been restricted) versus the labour-intensive wine-growing industry in California (where cheap immigrant labour has typically been available).[44]

When firms invest in capital, that increases the productivity of existing workers, since capital and labour are complementary. That productivity increase is reflected in higher salaries for those existing workers. So since investment in capital is deterred (in favour of the increased use of labour) by increasing the pool of available labour, immigration will (through this mechanism) tend to result in slower future wage rises for existing workers.

In the Appendix to this report, we present econometric analysis suggesting that investment did indeed fall, relative to its previous path, by around 5 per cent at around the time of the introduction of the first parts of free movement in 2002 and again in the late 2000s.

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[43] Killias, M., Maljevic, A., and Lucia, S. (2010). Imported violence? Juvenile delinquency among Balkan youths in Switzerland and in Bosnia-Herzegovina, *Eur J Crim Policy Res*, **16**, 183–189.

[44] This example is discussed by Dustmann in his response to Q175 here: https://books.google.co.uk/books?id=J-8p7sStJisC&pg=PA117&lpg=PA117&dq=dustmann+california+australia+wine&source=bl&ots=eE-Fhudsdb&sig=ACfU3U23IJidqVuUn2oq5iH7-fLXQH824Q&hl=en&sa=X&ved=2ahUKEwje5obq2_TnAhWFqHEKHULIDh8Q6AEwAHoECAsQAQ#v=onepage&q=dustmann%20california%20australia%20wine&f=false.

Table 2.5: Summary of the evolution of investment in the late 2000s

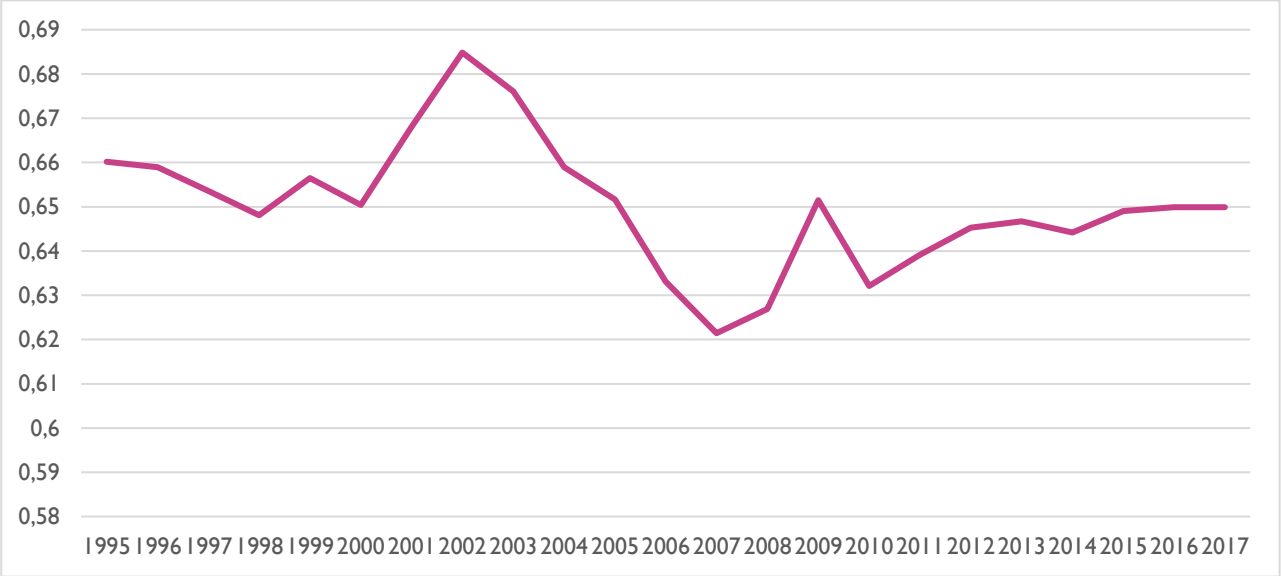
	Situation in 2008Q4	Changes from 2009Q1	Situation in 2019Q3
Investment as a % of GDP	Around **25%** of GDP after having experienced a slightly declining trend	Drop of around **1.0%-1.5%**	Around **24%** of GDP after having experienced a recovery since 2009Q1
Real investment level	Index is around **114** after having experienced an increasing trend	Drop in index value of around **4%-6%**	Index is around **133** after having experienced a recovery since 2009Q1
Real investment per capita	Index is around **15** after having experienced an increasing trend	Drop in index value of around **5%-6%**	Index is around **15.5** having experienced a recovery since 2009Q1. The rate of increase post-2009Q1 appears to be lower compared to the pre-crisis period.

Source: Eurostat and Europe Economic calculations.

It is highly problematic to disentangle changes in investment over this latter period from changes associated with the Great Recession. Let us use a rough modelling assumption that higher immigration has been associated with a 5-10 per cent fall in investment, with the lower bound implying that there was no impact on investment from 2007 onwards (just the 5 per cent fall post-2002) and the upper bound attributing the whole post-2008 fall to immigration.

The labour share in GDP has evolved as per the following graph.

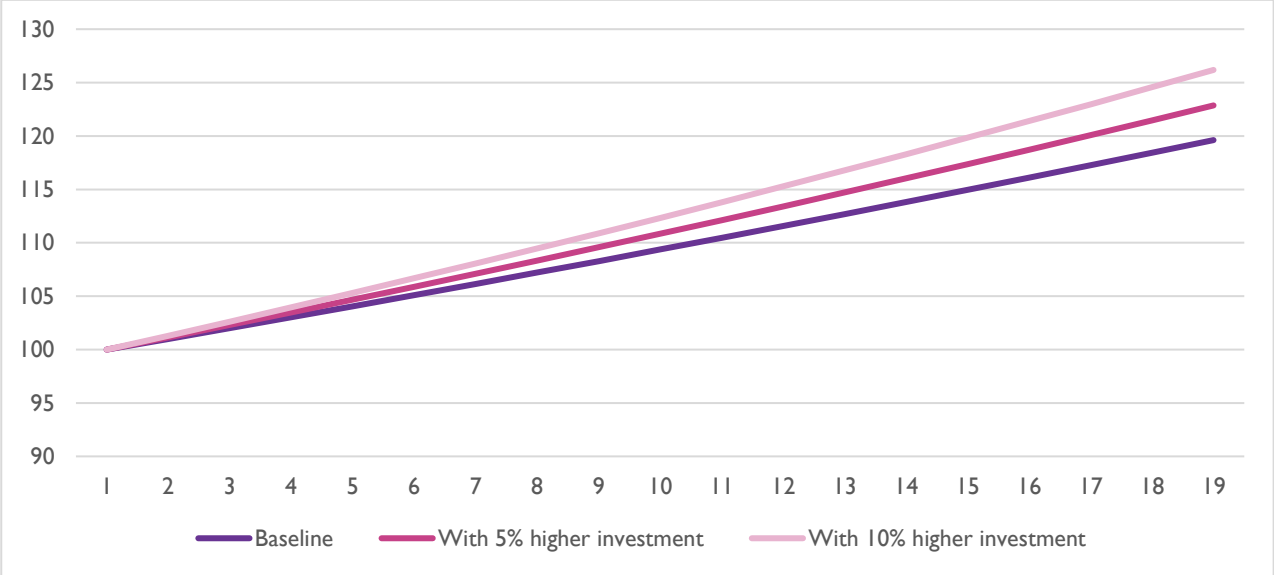
Figure 2.5: Labour share of GDP, Switzerland (%)



There appears to have been a tendency for the share to fall over time, which was reversed at some point in the latter part of the 2000s. Let us assume that, absent immigration, the share would have settled at 62 per cent.

Let us also assume a Cobb-Douglas form to the production function of GDP, $K^aL^{(1-a)}$, where L and K are the total labour force and the stock of capital, respectively, and a is the labour share of GDP. In a Cobb-Douglas setting, with competitive labour and product markets, the wage, w, is given as $w = (1-a)(K/L)^a$. If we also assume a depreciation rate for the capital stock (we use 5.4 per cent, calibrating to the change between 2016 and 2017), we can use this relationship to estimate the effects of reduced investment upon wages. We set out the simulation for how wages evolve in the diagram below.

Figure 2.6: wages under various investment scenarios



Suppose that in the baseline case, wages would have grown 1 per cent each year. If investment had been 5 per cent higher, wages would have grown 1.15 per cent per year, so after ten years wages are 1.5 per cent lower in the baseline case than the 5 per cent higher investment case, and 2.6 per cent lower after 18 years. If investment had been 10 per cent higher, wages would have grown 1.3 per cent per year, so after ten years wages are 2.9 per cent lower in the baseline case than the 10 per cent higher investment case, and 5.2 per cent lower after 18 years.

2.5 Macroeconomic stability impacts

In previous sections we have considered the aggregate impacts immigration into Switzerland has had upon the economy over time, affecting dimensions such as wages, social protection payments, investment and GDP.

2.5.1 Housing prices

A relatively sudden increase in the demand for real estate emanating from the arrival of immigrants could lead to inefficiencies in the housing market or to a change in prices faced by the original population. Immigration can increase the demand for housing and hence prices through its contribution to population growth. On one side, construction wages (and therefore tax receipts) could be higher without immigration, but on the other side this would increase housing costs for natives. In a country in which new land availability is limited, the effect of increased population from immigration is likely to be amplified.

To provide a rough sense of scale here we can consider the following thought experiment. Suppose that around one in ten existing houses is traded each year. Net immigration (which averaged 0.6 per cent of the Swiss population over this period) will add to the stock of those seeking a property. So instead of one tenth of people seeking a house, it will be 10.6 per cent, or 6 per cent higher demand. Let us assume unit elasticity of demand with respect to prices. That then implies that prices will rise by 6/106 = 5.7 per cent per year, setting aside any additional housebuilding to mitigate the effect.

This question has been studied empirically. Degen and Fischer (2017) found that almost two thirds of the rise in the price of single-family homes in Switzerland in 2001-6 was due to immigration, where an immigration rate increase of 1 per cent increases the price of these homes by 2.7 per cent.[45] The Migration Advisory

[45] Degen and Fischer (2017) quoted in Bruchez (2019) "Impact of immigration on public finances in Switzerland" [online].

Committee (2018) finds similar results for the UK, but it stresses that the true impact of immigration on real estate prices will depend on housing and land-use policy in the host country.[46] For instance, increases in housing supply (which may be made cheaper to achieve with foreign construction workers) may mitigate the upward pressure on house prices.

Over the 2000 to 2018 period, house prices in Switzerland rose by around 70 per cent. Extending the Degen and Fischer estimate to the whole period, attributing two thirds of that to immigration gives around a 50 per cent total impact.

This effect can be seen as both a pro and a con. From the point of view of pre-existing homeowners in Switzerland, who have completed their final property purchase, a rise in prices is an increase in their wealth. From the point of view of younger Swiss people, seeking to enter the housing market or trade up, or from the point of view of those that rent (perhaps especially lower-income Swiss people) this is a negative impact since it increases their costs.

2.5.2 Increased house prices lead to lower internal labour mobility and hence lower macroeconomic flexibility in response to shocks

Higher house prices are a well-known factor reducing internal labour mobility in response to economic shocks. High housing costs make it more difficult for workers to relocate to find jobs. This tends to lead to higher peak unemployment.

Labour mobility accounts for about 25 per cent of economic shocks.[47] Labour mobility drops in a ratio of roughly 0.1-0.2 : 1 with changes in house prices. As discussed above, Swiss house prices rose 70 per cent in real terms. Taking our figure of two thirds of that being attributable to immigration, immigration would then be associated with lost mobility of 5-10 per cent, or lost responsiveness to economic shocks of around 0.5-2.5 per cent. Around 57 per cent of non-labour-mobility-mitigated economic shocks are unemployment.[48] Let us assume there is an extra 1 per cent of shocks absorbed via unemployment (1 per cent is very roughly 57 per cent of 0.5-2.5 per cent). So around 1/43 extra rise in unemployment at peak in economic shocks. If we assume frictional unemployment of 3 per cent, then if unemployment was 4.8 per cent (so 1.8 per cent of unemployment shock) it would be roughly 0.05 per cent higher, at 4.85 per cent.

2.5.3 The problem of being an immigration safety valve for the euro

Switzerland, along with other non-Eurozone members of the EU's free movement area, functions as a "safety valve" for the Eurozone. The relatively high labour mobility into Switzerland, Norway, and the UK that we have described in earlier sections tells us something profound about the way the European Economic Area works, economically. To make a currency union, like the euro or the dollar, work the economy must have the right balance of symmetry in the shocks it experiences, fiscal transfers (benefits, regional grants, tax differences and so on) to allow any asymmetries in shocks to be countered, and labour mobility to allow populations to re-distribute to remove any remaining effects of asymmetric shocks after the fiscal transfers have done their work.

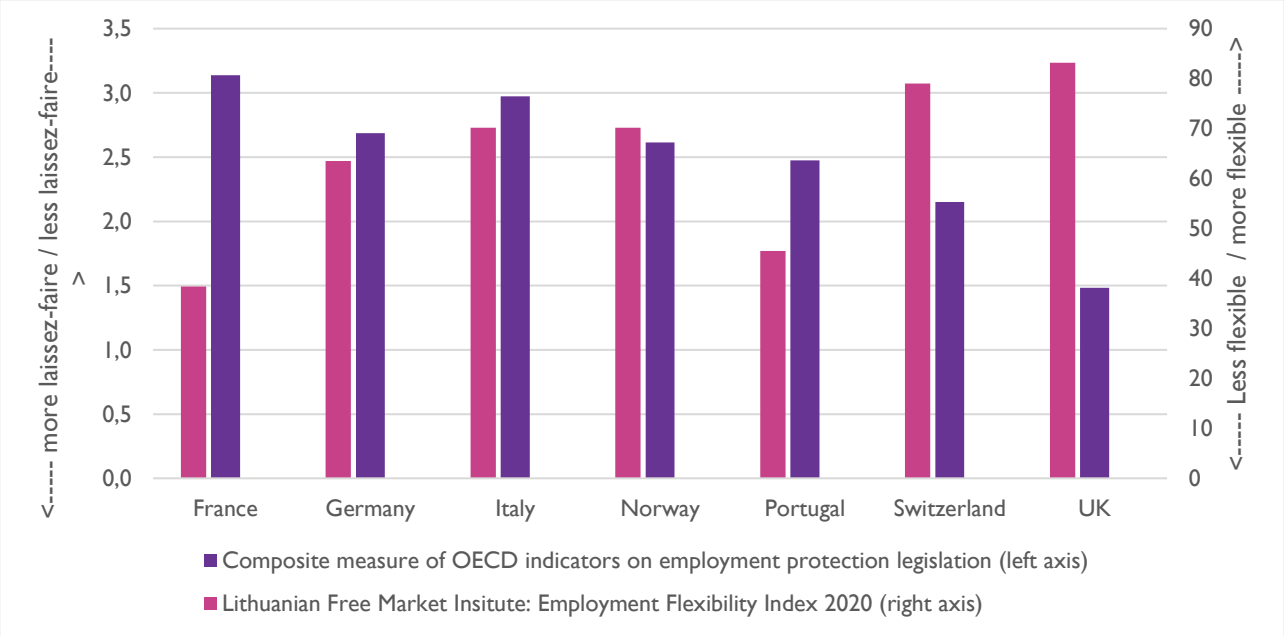
The creation of the euro has restricted the macroeconomic mechanisms available to mitigate asymmetric economic shocks within the Eurozone (shocks that lead to some regions being harmed but benefit other regions or at least leave them relatively unaffected). Such shocks no longer lead to a Member State's national currency depreciating, relative to other Eurozone country currencies. There are no interest rate cuts

[46] Migration Advisory Committee (2018) "EEA migration in the UK: Final report" [online].
[47] https://ec.europa.eu/economy_finance/publications/qr_euro_area/2015/pdf/qrea1_section_2_en.pdf p23
[48] *ibid.*

specifically boosting investment in more economically depressed countries. And with the Eurozone sovereign debt crisis, we have seen that fiscal policy has also become significantly curtailed.

Absent these mechanisms, economic shocks can also be mitigated through labour mobility. In the US the well-known mechanism is that people move from depressed states to boom states. But in the Eurozone, labour market flexibility is relatively low by international standards, so it is difficult to secure employment by moving from depressed Eurozone Member States to Member States doing better, economically. However, the Eurozone is in a free movement area with several non-Eurozone member states with much higher labour market flexibility, where securing a job is easier.

Figure 2.7: Comparison of labour market flexibility indicators



Notes: OECD composite measure based on 2013 figures (latest available), as a simple average of the four OECD metrics: Protection of permanent workers against individual and collective dismissals; Protection of permanent workers against (individual) dismissal; Specific requirements for collective dismissal; and Regulation on temporary forms of employment.

In the graph above we see that by the darker, purple metric, where higher figures indicate more inflexibility, the UK and Switzerland are lower than these other countries, whilst by the positive flexibility metric, Norway, Switzerland and the UK are the three highest.[49]

[49] It is perhaps of interest to note that Norway's composite inflexibility metric is relatively high here — comparable with Germany's. We can obtain more insight as to why, if we break down the composite metric between Regulations affecting temporary employment and the rest. We do that in the graph below.

So instead of population movements from economically depressed areas of the Eurozone to economically stronger areas, these economic shocks are mitigated by net population movements out of the Eurozone and into Switzerland, Norway and the UK. And, of course, low labour market flexibility tends to mean that, once a job has been secured in Switzerland, Norway or the UK, it is relatively difficult to move back to Italy, France, Germany or Portugal.

In this way, the Eurozone acts as a "people pump", with each new economic shock tending to drive more people out to these high-flexibility non-Eurozone members. That is a fundamental feature of this economic architecture: a low-macroeconomic-policy-mitigation zone with low labour market flexibility attached to higher-labour-market-flexibility neighbours in a free movement area. As such, we should expect it to continue into the future. In other words, the question of the impacts of immigration from the EU (and Eurozone in particular) into Switzerland, in the context of free movement, is not simply one of what impacts there were in the past.

Rather, these movements are a symptom of key tensions within the Eurozone. There are, have been and will in the future be more asymmetric shocks. Until the Eurozone has a proper system of fiscal transfers, its citizens will respond to economic downturns by moving to Switzerland. That means that Switzerland has macroeconomic (and, to some extent, social) instability imposed upon it, via immigration, that reflects the economic weaknesses of the Eurozone to which it is attached. Indeed, with the UK leaving the EU and imposing restrictions on EU immigration into the UK, one destination for these "people pump" emigrants will be removed, with the potential implication that some of them are diverted to Switzerland. So immigration into Switzerland from the EU could be larger in a future EU recession than it was over this historic period.

There are potential upsides as well as downsides to this. As noted above, because Switzerland experienced its largest inflows of population in the 2008 to 2013 period, that will have tended to increase aggregate GDP growth (even if not necessarily GDP per capita growth) at a time when GDP might otherwise have fallen, exacerbating financial instability. Such sudden inflows create a number of other costs, which we have explored in other sections of this report, but have potential upsides as well. However, as we have also noted it is not clear that a similar effect, if its net impact is considered desirable, could not have been achieved (indeed, might have been amplified) by the use of temporarily elevated quotas.

With this breakdown, we see that Norway is even less restrictive than Switzerland regarding permanent workers, but is much more restrictive than other countries regarding temporary workers. Germany, by contrast, is the second-most-restrictive country regarding permanent workers, but much more flexible regarding temporary workers.

3 Secondary impacts of immigration

3.1 Cultural and lifestyle impacts

3.1.1 Increased exposure to new cultures and new working methods

One of the most obvious and often-appealed-to potential benefits of immigration is that it exposes domestic citizens and businesses to new cultures and new working methods. However, it is rare for any attempt to be made to quantify this benefit specifically.

One way to think about the gain here is to consider how many years of foreign travel (holidays and business trips) Swiss citizens would need to engage in to be equally as exposed to foreigners as they are by having those foreigners as immigrants.

As we have seen above, from 2002 to 2017, net immigration into Switzerland has been 1,000,000. Multiplying that number of (new since 2002) immigrants in the country by 365, we obtain the average number of days in a year in which the average Swiss person interact with one of these immigrants within Swiss borders.

One metric by which we might assess the cultural exposure value of this is by imagining that this same interaction with foreigners were achieved, instead, by travelling abroad or hosting foreigners during their holidays and business trips. The question then is how much the required travel by Swiss people and the required foreigners' holidays and business trips in Switzerland compares to the travel they undertake anyway. "Swiss tourism in figures 2018 - Structure and industry data" report,[50] gives the total number of overnight trips abroad that the Swiss population undertook during 2017, covering both tourist visits and business travel. The report also gives the share of trips abroad that lasted 5 days or more (65 per cent), and that lasted only 1 night, that is 2 days (7 per cent). Assuming that the average trip lasting 5 days or more actually lasts 7 days and that the remaining share of overnight trips abroad (28 per cent) — ie those of more than 1 night but fewer than 4 nights — lasted 3.5 days, we can compute the total number of days in a year in which a Swiss has the chance to interact with a person from a different country by travelling abroad for business or leisure.

The report from the previous year[51] also provides us with insights on the number of overnight stays in Switzerland at hotels or health establishments made by foreigners in 2017. Let us assume that the length of each overnight trip to Switzerland that a foreigner engages in follows the same distribution as the foreign travels that Swiss engage in. This simply implies that 65 per cent of foreigners' trips to Switzerland lasted for 7 days, 28 per cent for 3.5 days, and 7 per cent for 2 days only. Thus, we can estimate the number of days in which a Swiss has the chance to interact with a person from a different country thanks to her travelling abroad for business or leisure. Summing this to the figure previously calculated, we obtain the number of days in a year in which a Swiss can interact with a foreigner by travelling abroad or by hosting her temporarily in her own country.

Comparing the two calculations, we find that the average annual number of interactions available with one of the foreigners in Switzerland that has arrived since 2002 each year is equivalent to 2 years of interactions with foreigners via Swiss travel abroad and foreigners visiting Switzerland.

We note that this calculation is rather crude. When people are abroad on holiday they are in a very different mode, in terms of what they gain from exposure to foreign cultures, from when they are abroad on business.

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[50] Swiss Federation of Tourism (2019): "Swiss tourism in figures 2018 - Structure and industry data", at: https://www.stv-fst.ch/sites/default/files/2019-07/STiZ_2018_EN_Web.pdf

[51] https://www.stv-fst.ch/sites/default/files/2018-07/stiz_en.pdf

And each of the above (business and leisure travel) is a different mode from normal day-to-day interactions with foreigners in one's own country. Furthermore, we are also assuming linearity of value — that each additional interaction adds as much as the previous one. This is by no means obvious. For example, it could be that some minimum scale of interactions is required before value starts being added (so each new interaction adds more than the average), that value becomes exhausted at some point (we learn all we can, and further interactions teach us nothing of value) or that value is subject to diminishing returns (we learn a great deal from early interactions but as interactions increase the value of novelty declines).

Perhaps a more serious drawback, however, is that the above reasoning neglects the ways that other modes than travel grant us exposure to other cultures. We trade, buying products from other countries, becoming exposed to their foods and clothes, the quality of their products and the reputation for reliability, imaginativeness and other features. We watch television, YouTube and other media in which foreigners and their cultures are represented. We read books set elsewhere. We interact with foreigners on social media. We have a plethora of other ways of exposing ourselves to other cultures without either going abroad or having those from abroad come to live with us.

We should therefore probably treat the above calculation as very much an upper bound estimate.

3.1.2 Costs of adjusting life habits

If an individual emigrates — say from Zurich to New York — she might in principle gain in terms of a higher salary or greater access to a diverse range of products to consume or other lifestyle aspects. But the process of relocating also involves a wide range of costs. She has to re-learn what shops she likes, what gym is located most conveniently for her daily routine, which cinema has the popcorn she enjoys, which bars are friendly and which exiting, which park is nicest for dog-walking, and so on. This cost of adaptation could be sufficiently high to outweigh gains from higher salaries or more diverse consumption opportunities.

In exactly the same way, even in the case that very high levels of immigration (say, associated with an open borders policy) led to greater wealth or more diverse consumption, there could be a cost if immigration overturned the world domestic citizens knew — changing their shops and sports facilities and amateur dramatics societies and religious communities and other social opportunities around them in ways that forced them to change. Local consumers would need to re-learn what shops they like, what gym they prefer, which restaurant has their preferred meal and so on, and this re-learning carries a cost. Not all change is sufficiently cheaply undertaken that it is worth doing even if there are material gains in the end.

Below we present a theoretical framework which can be used to assess the likely scale of these adaptation costs in one dimension, shopping, along with some indicative figures for the case of Switzerland. We consider a model of search and adaptation costs which describes the costs locals face when the shops and the available products in their area change. When consumers find themselves in a new, changed environment, they would face certain costs associated even with the most common, every day activities — such as grocery shopping. Our simple theoretical model considers a range of these costs, including:

- Search costs incurred by activities such as going to the new shops, exploring the product range they offer and deciding which shops and products the consumer likes and therefore will purchase.
- Switching costs, for example in the form of higher or lower expenditure on items such as food and beverages, where certain products become unavailable and consumers need to switch to alternative products.
- Additional search and learning costs of finding the alternative products consumers will switch to.

To provide an illustration regarding the scale of costs consumers might be facing under different circumstances, consider a town with 20 shops on its high street. Assume that consumers are familiar with all current shops and the products they sell, however when shop change or products become otherwise unavailable, they would be facing some (or all) of the search, switching, and additional search and learning

costs outlined above. Also assume consumers do their shopping once a week. We consider the different costs potentially incurred by consumers during a period of one year, under the following scenarios:

- The first two scenarios consider the two ends of the spectrum of changes, where either none of the shops or products on the high street change (scenario 1) or all of them do (scenario 2), every year during the period examined.
- The third scenario assumes that over time 9 per cent of shops and products change, due to some natural shutting and opening of shops, and changes in product variety, which is not linked to immigration.
- The fourth scenario assumes that due to a large one-off influx of immigrants 50 per cent of the shops and products on the high street change every year.
- The final (fifth) scenario assumes that, in addition to the 5 per cent change in shops and products under scenario 3, a constant flow of immigrants changes a further 2 per cent of the high streets' shops and products, leading to an overall change of 11 per cent.

Our use of 9 per cent in the third scenario and 11 per cent in the third scenario come from the following. In the UK around 10 per cent of high street shops change each year[52], whilst immigration is around 1 per cent of the population each year. Crudely, we deduct that 1 per cent from our 10 per cent figure to give a no-immigration shop churn figure of 9 per cent. In Switzerland, immigration runs at about twice the UK level, or 2 per cent of the population each year. So we shall assume a scenario of 11 per cent shop churn with Swiss levels of immigration.

The table below summarises our indicative monetary estimates for three types of costs involved under each of the five scenarios above, for the average Swiss household on an annual basis. To estimate the search, as well as the additional search and learning costs, we made some assumptions regarding how long it might take to search each shop (for the case of search costs we used assumed search times of 30 minutes and 2 hours) and to explore and learn about the products the consumer will buy when some items become unavailable (for the case of additional search and learning costs we used assumed search times of 10, 30 and 60 minutes). Then, using the average (gross) hourly wage in Switzerland, we estimated the monetary value of these search costs. In the case of switching costs, we considered the changes to the monthly expenditure on food and non-alcoholic beverages for the average Swiss household, associated with potential price increases and decreases of 5 and 10 per cent.[53]

[52] https://www.bbc.co.uk/news/business-49349703. In Switzerland in major population centres the turnover is up to 7 per cent (https://www.cbre.ch/-/media/cbre/countryswitzerland/documents/research/major-reports/cbre-switzerland-retail-report_2019-20.pdf), though figures may be higher in smaller towns. We use the 10 per cent figure here. That has the effect of making our results conservative relative to the costs expressed — i.e. we are likely to understate the effect relative to other costs. [*In Phase 2 we will change this to use the Swiss figure.*]

[53] Please note that in this hypothetical example we assume that price changes occur solely due to the effects of immigration. Therefore, our estimates do not consider price fluctuations associated with any other factors.

Table 3.1: Search, switching and learning costs under different scenarios (on an annual basis, in CHF)

Level of immigration	No immigration			One-off immigration	Constant immigration
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Assumptions					
% of shops changing	*0*	*100*	*9*	*50*	*11*
% of products changing	*0*	*100*	*9*	*50*	*11*
Search costs					
30-minute search	0	375	34	188	42
2-hour search	0	1,500	135	750	165
Switching costs					
5% price increase	0	390	35	195	43
10% price increase	0	780	70	390	86
5% price decrease	0	-390	-35	-195	-43
10% price decrease	0	-780	-70	-390	-86
Further search / learning costs					
10-minute search	0	125	11	63	14
30-minute search	0	375	34	188	42
60-minute search	0	750	68	375	84

Source: Europe Economics calculations based on Swiss Federal Statistical Office data.

The most relevant measure of the impact of sustained large-scale immigration here is given by the difference between search costs in the "Constant immigration" case and those in the most realistic of our "No immigration" scenarios: Scenario 3. Let us assume that, of the additionally-changed 2 per cent of shops, in 1 per cent the same product is available and in the other 1 per cent it is not. Furthermore, of the 1 per cent of shops in which the new product is available, let us assume that products range from being 5 per cent more expensive to 5 per cent cheaper. Moreover, let us assume that when we cannot find the product we wanted, we need to spend 60 minutes considering alternatives to decide upon our preferred other option.

Then the impacts of immigration would be as follows.

Figure 3.1: Annual costs of additional shopping adaptation

	No immigration	Swiss immigration	Impact
Search costs (30 minutes)	34	42	8
Switching costs (+/-5% on prices)	+/-35	+/-43	+/-8
Further search / learning costs (60 minutes)	68	84	15
Impact (50:50)			0 to 15

Taking this as an annual cost borne once per household in Switzerland, on average, this implies (given that there are 3.8m households in Switzerland) an aggregate annual cost of up to CHF57m.

3.1.3 Loss of cultural aspects that contribute to comparative advantage

Another potential impact of immigration is a general smoothing out or elimination of the cultural differences that distinguish one country from another. It is not certain that this should be the expected impact of immigration. In principle one could imagine that if people are free to move anywhere in the world, those most alike each other in various ways or those that share specific tastes might gather together in clusters, so

that the consequence of immigration would then be more geographical differences in culture and tastes, not less. But probably the more natural assumption is that immigration tends to smooth out differences.

Countries differ in their wealth and have differing comparative advantages in production. Some of that such differences be to do with geography. Some may be the result of the historical evolution of capital investment. But it is plausible that a non-trivial part of such differences is a reflection of culture. For example, suppose the Swiss have an international reputation for precision, punctuality, and discretion. Such cultural traits might very well be natural for a country with a comparative advantage in private banking or other aspects of financial services.

If immigration has the consequence that cultures become more similar, we might imagine that that tends to drive convergence in levels of wealth. If a country begins with above-average levels of wealth, such convergence may seem unattractive. Now it could be that convergence might be "convergence up" to a common level for countries higher than that of any of the initial countries. But even in that case it is plausible that those individual citizens that were gainers in the greater-divergence scenario might lose out in the converged scenario.

To understand how much is at stake here, let us compare Swiss GDP per capita with that in the EU28 countries with which free movement gives it open borders. In 2017 Swiss GDP per capita was around $80,000 and EU28 GDP per capita was around $37,000. There were 8.5m Swiss and 513.5m EU28 residents. So if Switzerland and the EU28 had a GDP per capita equal to their combined average, that would be around $38,000 or less than half the current Swiss level.

Note that the data exhibits no current evidence of this effect's being realised at this stage, so we are at most placing a number upon a conceptualised risk. Note also that in principle this risk is associated with any level of or increase in immigration — if all immigration smooths out difference, any immigration smooths out difference.

3.2 Public services and infrastructure impacts

3.2.1 Security administration costs

Immigration creates some brute administrative costs of processing immigration applications. To get a sense of scale of these we have explored the following.

- Costs of cooperation with Schengen[54]
  - Average processing costs (across asylum seekers and Schengen visas): CHF104
  - Requests from Schengen partners for visa applications: 597,498
  - Requests to Schengen partners for visa applications: 98,391
  - These numbers * average processing cost = CHF72,135,443

[54] There is evidence from the 2018 report of the State Secretariat for Migration (SEM) that the number of asylum seekers is higher as a result of cooperation with the EU: Switzerland agreed to accept up to 1500 asylum seekers (900 from Italy and 600 from Greece) as part of the first EU Relocation Programme. However, it is by no means obvious that Swiss treatment of asylum-seekers need differ simply as a consequence of its introducing quotas or other immigration controls. We view changing the treatment of asylum-seekers as a separate policy, not intrinsically intertwined with the treatment of immigrants, and as such outside our scope here.

3.2.2 Costs of congested infrastructure

Traffic congestion

A study[55] looking at the external costs and benefits of transport estimated traffic delay costs to be around CHF1,137m and CHF1,293m in 2010 and 2015, respectively. In turn, the overall congestion-related costs (which include other costs such as congestion-related climate or environmental costs) were estimated to be around CHF1,767m and CHF1,888m for the same two years.

At the same time, a review[56] looking at the impact of traffic growth and congestion in England considered that congestion on roads in England could cost £23-24 bn each year by 2025. Of this cost, up to £5 bn might be attributed to the impact of immigrants on traffic growth.

Given that immigrants since 2000 make up 2.1 times as high a share of the population in Switzerland as in the UK, and assuming that their travel habits and impact on traffic congestion is similar, this may suggest that of the CHF1,293m of Swiss francs of delay costs in 2015, CHF564m could have been due to immigration.

A study by Schwab (2020) investigated the costs associated with infrastructure and public services. In particular, it looked at increases in spending associated with rail and road transport, public works and government services focusing on the period since 2002.

In terms of rail, the study found an increase in federal subsidies for passenger and freight rail infrastructure (from CHF683m a year before 2002 to an average investment of CHF1459 bn between 2002 and 2015) amounting to a total additional spending of CHF24.3 bn over the period from 2002 to 2019. This increase in rail infrastructure expenditure was also associated with the overcrowding of the current network.[57] Further, it notes the federal government's plans to spend an additional CHF12.9 bn by 2035.[58] At the same time, it also investigated investments in rolling stock by the Swiss National Railway (Schweizerische Bundesbahnen, SBB). Based on forecasts of the Swiss population, the SBB increased annual investment in trains from CHF300m to CHF400m[59] which was increased to CHF1 bn after 2014 (SBB, 2017).

With regards to road traffic and infrastructure, Schwab notes that since Bilaterale I came into force the country faced additional costs stemming from increased road wear (in particular by heavy goods vehicles above 40 metric tonnes), as well as population and traffic growth. The associated additional annual costs was around CHF440m for investment in road infrastructure and CHF920 in the maintenance of the network. Therefore, between 2002 and 2019 the additional costs amount to CHF23.2 bn for investment and maintenance combined.

In addition, the study also considered the additional costs relating to public works (such as schools or hospitals) and general administration, finding a cumulative additional spend since 2002 of CHF9.8 bn and CHF73.6 bn respectively.

The table below summarises these impacts and estimates the total additional costs across these areas to be CHF139.4 bn between 2002 and 2019.

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[55] Federal Office of Development (2018): "Staukosten Schweiz 2015". Available at: https://www.are.admin.ch/are/fr/home/media-et-publications/publications/transports/staukosten-schweiz-2015-schlussbericht.html

[56] Migration Watch (2011): "The Impact of Immigration on Traffic Growth and Congestion in England". Available at: https://www.migrationwatchuk.org/press-release/277/the-impact-of-immigration-on-traffic-growth-and-congestion-in-england-

[57] For example, see an article exploring the overcrowding at the Basel SBB station: https://telebasel.ch/2018/11/21/ueberfuellter-bahnhof-sbb-wird-gefaehrlich/?channel=105100

[58] See https://www.uvek.admin.ch/uvek/de/home/verkehr/investitionen/Ausbauschritt2035.html

[59] Source: Bosshard (2000), quoted in Schwab (2020)

Table 3.2: Summary of costs of various infrastructure expenditure

Area of additional spending	Additional cost between 2002-2019 (CHF bn, nominal)
Investment in rail infrastructure (by federal government)	24.3
Investment in rolling stock (by SBB)	8.5
Investment in road network (by federal government, cantons, municipalities)	23.2
Other public works (by federal government, cantons, municipalities)	9.8
General administration expenses (by federal government, cantons, municipalities)	73.6
Total investment	**139.4**

School classes congestion

Another of the ways in which immigration might contribute to increasing the costs of congested infrastructure is the increase in average class sizes in schools. Below we consider the case of class sizes in public institutions for primary school I (grades 1 and 2), primary school II (grades 3 to 8) and secondary school I.

In 2018 the number of new migrants in Switzerland between the ages of 0 and 14, and 14 and 19 was 18,728 and 8,461, respectively. Assuming that half of them would attend an institution of compulsory education (either primary school I, II or secondary school II) would translate into about 13,600 additional students in the education system. Assuming that the distribution among immigrant students follows the same pattern as among Swiss native and foreign students already in the system, of them 2,560 would be attending primary school I, 7,356 primary school II and 3,685 secondary school I.

Using data reported by the Swiss Federal Statistical Office on the average class size for all three types of institutions, we could the number of classes for all of Switzerland by school type. These computed values would then allow us to calculate the average number of students in each class under a scenario where the number of immigrants attending school in Switzerland is zero. This calculation is shown in the final row of the table below, under the assumption that the number of classes do not change when overall less students are enrolled in the compulsory education system. The estimated decrease in class size where there is no immigration is 0.3 student per class across all three types of institutions.

Table 3.3: Comparison of class sizes with and without immigration

	Primary school I - grades 1 &2	Primary school II - grades 3-8	Secondary school I	Total
Total	171,859	494,049	247,472	913,380
Native	169,300	486,693	243,787	899,780
Immigrant	2,559	7,356	3,685	13,600
Percentage of total	0.19	0.54	0.27	
Average class size with immigration	18.6	19.2	18.6	
Implied number of classes with immigration	9,240	25,732	13,305	
Average class size with immigration	**18.6**	**19.2**	**18.6**	
Average class size without immigration	**18.3**	**18.9**	**18.3**	

3.2.3 Costs of implementing infrastructure programmes under time pressure

In circumstances where a sudden influx of migrants arrives into a country, this could create a need to expand existing infrastructure rapidly to accommodate the extra demand from the newly arrived immigrants. In turn,

if these infrastructure programmes need to be delivered rapidly to better serve both the native and newly arrived population, these may lead to inefficient capital programmes as well as budget overruns.

By way of illustration how time pressured infrastructure expansion can lead to inefficient capital programmes, we consider budget over-runs on time-pressured projects around the world, such as infrastructure projects for the Olympic games.

A study[60] looking at the costs and cost overruns for the Olympic Games between 1960 and 2016 found an average budget overrun of 156 per cent in real terms, with almost half of the games having cost overruns of over 100 per cent. In terms of Summer Olympic Games, the largest cost overrun was reported for the 1976 Montreal Games at 720 per cent with the lowest figure found for the 2008 Beijing Games.[61]

Of course, over-runs occur in some public sector infrastructure projects even when they are not completed under time pressure. But when time pressures are not a strong, over-runs have been much lower. For example, studies looking at cost overruns for transportation projects have found overrun around the order of magnitude of 20 per cent for roads, 34 per cent for large bridges and tunnels, 45 per cent for rail[62] and 90 per cent for megadams. Indeed, in the view of the authors of the Olympics over-run analysis, a possible reason for the high budget overruns characterising the Olympic Games could precisely be that 1the fixed deadline by which the required infrastructure needs to be built removes the trade-off between costs and schedule which exists for other types of projects. Infrastructure required urgently for immigrants could face a similar problem (albeit perhaps intermediate between standard infrastructure over-runs and the admittedly extreme case of the Olympics).

[60] Flyvberg et al (2016): "The Oxford Olympics Study 2016: Cost and Cost Overrun at the Games", available at: https://eureka.sbs.ox.ac.uk/6195/1/2016-20.pdf

[61] With regards to the very low figure reported for Beijing, the authors considered the lack of reliability in economic and data reporting by China, however concluded that there was no reason to exclude the figure from the study's calculations.

[62] Flyvbjerg et al (2002): " Underestimating costs in public works projects: Error or lie?"

4 Trade impacts of Bilaterale I

4.1 Shares of Swiss trade covered by Bilaterale I under the MRA

As set out in Section 1.2.1, the Bilaterale I package included a number of trade measures covered by what is referred to as the Mutual Recognition Agreement (MRA), designed to remove technical barriers to the trade of industrial goods between Switzerland and the EU (services are not included in the agreement). Only a minority of goods trade with the EU is covered by the MRA. Specifically, of EU trade, around 26 per cent falls under the MRA (27 per cent of imports; 25 per cent of exports), constituting around 14 per cent of total Swiss trade with the world (17 per cent of imports; 11 per cent of exports). With the departure of the UK from the Single Market, that will fall to around 11 per cent of total Swiss trade (14 per cent of imports; 10 per cent of exports).

We saw in Section 1.3 that trade with the EU is a declining proportion of all Swiss trade. By 2030, as trade with the EU continues to decline relative to trade with the rest of the world, these measures covered by Bilaterale I will be around 10 per cent of goods imports and around 7 per cent of goods exports.

Swiss goods exports are currently about 45 per cent of GDP. Let's suppose that by 2030 they will be 50 per cent of GDP. Then the 7 per cent or so of those exports that are to EU countries under the Bilaterale I MRA will be around 3.5 per cent of GDP. Given that total exports (including not only goods but also services) will be around 70 per cent of GDP by 2030, that means around 5 per cent of exports will be covered by the MRA.

4.2 Estimates of the impact that the MRA has had upon Swiss trade

KOF (2015) conducted an econometric analysis finding that the MRA has increased the likelihood of products being traded. Specifically, products covered by the MRA are 5.2 percent more likely to be imported and 4.4 percent more likely to be exported.

They also assess impacts on trade volumes. For the products covered by the MRA, they estimate that imports from the EU have almost doubled, and the export volume to the EU has increased by 9 per cent.

4.3 How exports don't and do affect GDP

Imagine an absurdity: suppose all goods trade with the EU covered by the Bilaterale I arrangements were to cease. It wouldn't follow automatically that, in that case, GDP would be 3.5 per cent lower. Most obviously, imports would be disrupted, also. At a first iteration, if imports and exports fall by the same amount, GDP is unchanged (though of course there are other more complex negative impacts that we shall explore in a moment).

Even if exports to EU countries were impaired without any corresponding harm to imports (say if, post-Bilaterale I, the EU raised tariffs on Swiss exports but the Swiss did not raise any tariffs on EU exports to Switzerland), the Swiss Franc would tend to depreciate against the euro so imports to Switzerland would become more expensive (making them fall) and exports to EU countries would become cheaper.

Thus, in themselves, those 3.5 per cent of GDP of goods exports to EU countries covered by the Bilaterale I arrangements don't per se add anything like 3.5 per cent to GDP – if indeed they add anything at all. Their main value lies in supporting imports (along with related items such as external investment, tourism, and

remittances), and the main value of those is not extra GDP (and certainly not extra jobs) but, rather, extra utility (enjoyment, use value, usefulness) for consumers.

However, they are associated with extra GDP in more subtle ways. Because Switzerland trades at all (and trade with EU countries is part of that), domestic Swiss businesses face additional competitive threats, making them more efficient and making their products cheaper, higher quality and more innovative. Because Switzerland is part of the market for some products, firms can exploit more economies of scale, making products cheaper for Swiss consumers. Because Swiss firms see what is possible from foreign imports, they are driven on to do better themselves.

These benefits are important and will have an impact on GDP. It is true that much of those sorts of gains arise from Switzerland being exposed to trade at all, rather than its being exposed to trade with EU countries per se. And it is also possible that some such gains reach a maximum beyond which they cannot go further — that, for example, at some point a market is as close to perfectly competitive as human technology allows, so being exposed to even more trade won't add anything further.

But, even so, trade with the EU under the Bilaterale I arrangements is a non-trivial proportion of total Swiss trade and by 2030, 7 per cent will still be non-trivial. So even though the direct GDP gains from trade with EU countries are likely to be small, and even though the main benefits aren't GDP at all, it would not be unreasonable to roughly estimate that that 3.5 per cent of GDP of exports affected by the Bilaterale I MRA might be associated with roughly 3.5 per cent extra GDP.

Obviously, ending the Bilaterale I MRA would not mean ceasing all that trade, however. So the next question is, if we assume that trade covered by the MRA is worth about 3.5 per cent of Swiss GDP, how much GDP might be lost if the MRA were to end?

4.4 How much Swiss GDP would potentially be at risk in terminating the Bilaterale I agreement?

4.4.1 Realised benefits

SECO (2014) estimates costs savings associated with the MRA of between CHF 200m to CHF 500m per annum, or 0.03-0.07 per cent of Swiss GDP.

4.4.2 Previous estimates

BAK Basel (2015) uses its own macroeconomic model to estimate the impacts associated with Bilateral Agreements I based on two scenarios: the reference scenario where Bilateral Agreements I are maintained and an 'elimination' scenario where Bilateral I is discontinued. It considers the impacts between 2018 and 2035.

The study makes the following assumptions:

- Net migration balance: based on a high scenario (data from Swiss Federal Statistical Office) of 80,000 people per year which is reduced to 60,000 people per year by 2035
- Population growth: between 2018 to 2030 population growth reduces from 1.2 per cent to 1.0 per cent, while between 2031 and 2035 it falls back to 0.7 per cent
- Labour force (FTE) growth: the same trend applies as to the population growth variable above – figures for between 2018 and 2030 are between 0.9 and 0.6 per cent with the figures for between 2031 and 2035 reducing from 0.6 to 0.5 per cent
- Resulting in the growth rate of GDP dropping from 1.8 to 1.6 per cent between 2018 and 2030 with a further reduction to 1.4 per cent by 2035
- Inflation assumed to be around 2 per cent for the entire period.

- Similarly, unemployment is assumed to be around 3 per cent for the entire period.

The study finds a 7.1 per cent reduction in GDP by 2035. The estimated loss in GDP per capita on an annual basis is CHF 3,400, corresponding to a cumulative loss of around CHF 36,000 per person over the time period concerned (i.e. between 2018 and 2035).

In addition, the study also considers the impacts of Bilateral Agreements on seven individual sectors. The estimated impacts suggest that:

- The biggest impact relates to the loss of free movement of people (with potential cumulative losses of CHF 258 billion or 39 per cent of the overall impact);
- Followed by losses from aviation (with potential losses of CHF 117 billion or 19 per cent of the overall impact);
- Increased technical barriers[63] to trade and exclusion from EU Research Framework Programmes (with potential losses of CHF 44 billion or 7 per cent of the overall impact each);
- Losses from the elimination of the agreement on public procurement (with potential losses of CHF 17 billion or 3 per cent of the overall impact);
- Losses from the elimination of the agreement on land transport (with potential losses of CHF 10 billion or 2 per cent of the overall impact); and
- The lowest impact relates to the loss of the agreement on agriculture[64] (with potential losses of around CHF 2 billion, corresponding to less than 1 per cent of the overall impact).

Further, the study also estimates that 22 per cent of the overall impact (around CHF 140 billion) is the so-called 'systematic impact' which corresponds to the losses associated with the interaction of these individual impacts. Overall, the estimated cumulative effect is around CHF 630 billion by 2035.

The study also explores the effects on these sectors in isolation (i.e. without taking account of the removal of other agreements). For example, with regards to the MRA, the study assumed that this would mean that as well as the EU erecting trade barriers, Switzerland would raise its own barriers to the EU. On this basis, the authors as modelled the cumulative impact of the removal of MRA to be CHF 11 bn by 2035.[65] Since the simulations covers the period 2017-2035, this amounts to an average of CHF 611 million per annum, or around 0.09 per cent of GDP.

Ecoplan (2015) models international trade flows and their impact on the Swiss economy in a multi-country general equilibrium model (i.e. the model is micro-founded) which also incorporates imperfect competition, product variety and firm heterogeneity in the trade flow models.[66]

The study makes the following assumptions regarding the "ceased Bilateral I" scenario, based on which the effects associated with the discontinuation of the Bilateral Agreements I are calculated:

- Bilateral Agreements II remain in force.
- Potential future bilateral agreements are not considered.
- There are no further changes to Swiss and EU policies (such as retaliation measures).

The model's assumptions regarding the future development of Swiss population and the quotas in place once the agreement is discontinued are the following:

- The quota system reduces net migration by 25 per cent (similarly to KOF (2015)) – meaning that net migration from EU / EFTA states is reduced by 25 per cent between 2018 and 2035. This quota also applies to cross-border commuters.

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[63] These are the impacts related to the Mutual Recognition Agreement (MRA).

[64] Nonetheless, the study highlights that these impacts are still significant for the individual areas affected.

[65] See BAK Basel (2015), Figure 5-2 on p36.

[66] This is based on Melitz (2003). For further details, see Melitz (2003): "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity".

- The scenario with no restrictions on living and working population is based on the population scenario A-06-2015 (high migration balance) of the Federal Statistical Office.
- The family reunification rate for the quota-restricted EU / EFTA labour migration is 0.3 per person in employment.
- In turn, these assumptions imply that under the "ceased Bilateral 1" scenario the permanent resident population would be 3.3 per cent lower and the labour supply would be 4.6 per cent lower by 2035.

Overall, the study finds that the discontinuation of Bilateral Agreements 1 reduces Swiss GDP by 4.9 per cent by 2035, with a per capita GDP reduction of CHF 1,900. Therefore, the reported impacts are somewhat lower than those found by BAK Basel.

Similarly to BAK Basel, the study also examined the isolated impacts of the agreement on seven individual sectors (free movement of people, technical barriers, public procurement, agriculture, land transport, aviation and research cooperation) and finds that these impacts are of lower order of magnitude than the effects reported by BAK Basel.

With regards to the removal of the MRA, this would mean the EU unilaterally erects trade barriers. On this basis, they modelled the cumulative impact of the removal of MRA to be CHF 2.59 bn by 2035.[67] Since the simulations covers the period 2017-2035, this amounts to an average of CHF 144m per annum, or around 0.02 per cent of GDP.

It is relevant to note that these estimates were based on scenarios in which the UK continued to be a member of the EU. As noted above, removing the UK eliminates around 10-15 per cent of the total effect of the MRA.

4.4.3 Eaton-Kortum trade analysis method

In the Eaton-Kortum trade model, real income, for given technology, is (1-trade share in GDP)$^{(-1/theta)}$, where theta is a parameter reflecting how much comparative advantage there is in the world. Eaton-Kortum recommend a value of 4 for theta.

As discussed above:
- by 2030, total Swiss exports will be around 70 per cent of GDP
- by 2030, about 5 per cent of trade will be covered by the MRA, and
- exports covered by the MRA are estimated as having been boosted by around 9 per cent.

From the above, that means the GDP impact of the MRA, by 2030, can be estimated as the ratio of the Eaton-Kortum value for a trade share of 70 per cent of GDP and a trade share of 70 per cent minus about 9 per cent of 5 per cent.[68] That implies a loss of 0.2 per cent of GDP.

4.4.4 Direct scenarios method

If trading with EU countries affected by the Bilaterale I MRA (note, we are referring specifically to the trade itself, not the Bilaterale I deal's amplification of that trade) is worth perhaps around 3.5 per cent of GDP, what proportion of that is it reasonable to believe could possibly be lost if the Bilaterale I deal were terminated? Obviously the answer is not 3.5 per cent of GDP, since not all trade with the EU would cease if the Bilaterale I MRA ended. But how much would it be?

The average trade-weighted tariff applied by the EU is 1 per cent. WTO tariffs average 4.4 per cent. So, imagine the following thought-experiment. Suppose Switzerland imposed no tariffs on imports from the EU and imposed an extra Switzerland-wide tax (i.e. raised general taxes such as income tax or sales taxes) to

[67] Ecoplan (2015), Figure 5-8 on p63.
[68] More strictly, 0.09/1.09 x 5 per cent.

offset tariffs imposed by the EU[69] (so Swiss importers or consumers of imports have no change in the prices they pay; instead the general Swiss taxpayer pays money to the firms in the EU that export to Switzerland). Then if exports to the EU would be 3.5 per cent of GDP that would cost between 0.035 per cent and 0.15 per cent of GDP (since 3.5 per cent x 1 per cent = 0.035 per cent and 5 per cent x 4.4 per cent = 0.15 per cent).

But what of non-tariff barriers? Some of the most extreme non-tariff barriers imposed by the EU on friendly countries (ie excluding cases such as military conflict where it imposes trade embargoes or otherwise seeks specifically to curtail trade) are those imposed on US car exports to the EU. The US auto sector pays 10 per cent tariffs[70] and about 25 per cent tariff-equivalent after taking account of non-tariff barriers. Let's imagine a near-total breakdown in diplomatic relations with the EU post-Brexit, with all Swiss sectors ending up facing as severe tariffs and non-tariff barriers as US auto exporters. That would be 25 per cent tariff equivalents on that whole 3.5 per cent of exports. Under a merely disastrous breakdown in relations impacts might be around half that, or 12.5 per cent tariff-equivalent barriers. So to offset that, the Swiss government would need to impose taxes equivalent to 0.4375 per cent of GDP.[71] Let's imagine those taxes created significant additional distortions (deadweight losses), making their total negative one third as much again as their scale, so GDP was actually 0.58 per cent lower.[72]

We would not regard such extreme scenario estimates as a genuine forecasts, but they do suggest to us that the figures in previous estimates, with upper bounds of below 0.1 per cent of GDP, might understate potential losses, and that an upper bound more in line with the Eaton-Kortum method estimate of 0.2 per cent could be more appropriate. However, we should also note that this is before we consider whether there might be any partially-offsetting gains (eg increased flexibility for Switzerland to set its own regulations on products affected by Bilaterale I).[73]

4.5 Conclusion

As we see in the table below, the estimates of this section, although obtained via a range of different methods, produce a quite narrow range of results.

Table 4.1: Impacts of MRA (% of GDP)

Realised benefits	Eaton-Kortum method	Direct scenarios	Literature estimates
0.03-0.07%	0.2%	Tariff-only scenarios: 0.04-0.15% Catastrophe scenario: 0.58%	0.02-0.09%

[69] Such a policy might well be forbidden by WTO rules. But that does not affect our thought-experiment here.

[70] Source: https://trade.ec.europa.eu/doclib/docs/2015/january/tradoc_152998.1%20Trade%20in%20goods%20and%20customs%20tariffs.pdf

[71] 3.5% x 12.5% = 0.4375%

[72] 0.4375 x 1⅓ = 0.58

[73] There are other kinds of effects one could imagine here, playing out in either direction. Perhaps some non-EU firms export to Switzerland simply because they already manufacture products designed specifically for the EU market (i.e. products with EU certifications) and it is straightforward to sell those same products in Switzerland. Perhaps under an extreme scenario in which Bilateral Agreement I breaks down and there is full retaliation (and Switzerland ceases to recognise EU certifications), some foreign firms might find the opportunity costs of manufacturing products specifically designed for the Swiss market too high. So there is the possibility that a deterioration in Swiss-EU trade relationship results in Switzerland trading less also with non-EU countries.
Conversely, perhaps, absent the Swiss-EU relationship, the Swiss would agree more comprehensive FTAs with non-EU countries or maybe choose to restrict non-EU trade less via its general WTO MFN restrictions?

Although counterfactual analysis is always challenging, it seems reasonable, from the above to conclude that the impacts of foregoing the MRA for the Swiss economy would be a loss of GDP lying in the range 0.1-0.2 per cent per annum.

The point of this discussion is not that the Bilaterale I package is not in itself economically valuable. Gains of 0.1 to 0.2 per cent of GDP are in themselves potentially very much worthwhile if they can be secured without offsetting downsides. But given the rather modest proportion of Swiss trade that is encompassed by the Bilaterale I measures — around 5 per cent of exports by 2030 — one should expect proportionately modest GDP impacts to be associated with them.

5 Impacts of Bilateral Agreements I on aviation

5.1.1 Impacts estimated by BAK Basel (2015)

BAK Basel (2015) examines the impacts of the aviation agreement that allows Swiss airlines to offer flights to the same destinations as European airlines, as well ensures equality among airlines regarding both the frequency and time slots of these flights. Furthermore, the agreements also allow Switzerland to be part of the Single European Sky (SES) and the European Aviation Safety Agency (EASA).

The study explains that before the agreement entered into force Switzerland used to rely on bilateral agreements with individual countries (some going back to the 1940s or 1950s). In turn, these bilateral agreements, for example, limited the range of airports Swiss carriers could offer flights to and did not allow Swiss airlines to originate or terminate flights outside Switzerland without continuing the service to or from their own country. Furthermore, the study states that the EASA membership provides benefits to Swiss aircraft manufacturers (e.g. Pilatus) and to maintenance and aviation services companies (e.g. Jet Aviation) as products and services sold by these companies are automatically recognised throughout Europe. In addition, some of the agreements whereby third countries (such as the USA or Canada) also recognise these products and services are based on the Swiss EASA membership as well.

The alternative scenario explored by the paper assumes that once the agreement is discontinued, the current arrangements will not be replaced by new ones, and therefore air traffic is going to be governed by the 'old' bilateral agreements Switzerland had in place with third countries before the agreement entered into force.

The key impacts stemming from the discontinuation of the agreement are three-fold:

- A decrease in the accessibility of Swiss cities through lost flights connections and lower frequency flights linking Swiss cities to the continental transport network.
- Revenue losses incurred by Swiss airlines (Swiss and EasyJet Switzerland) stemming from lost flights. Airports and associated companies (e.g. those providing catering or aviation supplies) will also suffer revenue losses.
- Competitive disadvantage for Swiss manufacturers and maintenance companies through increased EASA certification costs. Further, some of the maintenance and repair services may no longer be offered once Switzerland ceases to be a member of the EASA.

The study quantifies these impacts using its own BAK Basel accessibility model, which searches for the fastest alternative route available in absence of these flights to determine the new connectivity index for Swiss cities. The report finds that on average Swiss cities' connectivity drops by 2.2 percentage points. Regarding the geographical distribution of the changes to the accessibility index, the study reports that cities located in more central regions (such as Bern or Zurich) experience greater reductions in connectivity compared to cities in border regions (such as Geneva or Basel) as these would be able switch to foreign airports more easily.

The model's calculations are also based on the following assumptions:

- Airlines from other countries do not offer the routes previously offered by Swiss airlines.
- The routes between France and Switzerland that were previously operated by Swiss airlines would not be operated at all.

- Basel / Mulhouse Airport is treated as a Swiss airport, and any switching effects from Zurich, Geneva, Bern or Basel (Swiss side) to Mulhouse (French side) are not taken into account.
- Swiss is treated as a purely Swiss airline. It receives no additional rights (or duties) due to its membership in the Lufthansa Group.
- Other airlines based in Switzerland (including EasyJet Switzerland) are also treated as purely Swiss airlines.

Overall, the study concludes that this leads to a 1.3 per cent reduction in GDP by 2035. Nonetheless, the report is also of the view that the over the medium-term the impact of reduction in connectivity may be reduced by around 1.1 per cent which would result in a 0.6 per cent reduction in GDP over the period examined (i.e. between 2018 and 2035).

In addition, the report also mentions effects associated with the discontinuation of the agreement which may not be quantifiable. This include, for example, making Switzerland less accessible for tourists or making it more difficult for Swiss travellers to fly directly to destinations such as the Greek islands or certain Spanish and Italian cities. Furthermore, the impacts resulting from not being able to have a say in the decisions regarding European flight safety (through the loss of the EASA membership) may again only be measured qualitatively.

Based on the simulation results from the BAK Basel macroeconomic model, the study finds that in the first five years following the discontinuation of the agreement, real GDP is reduced by 0.2 percentage point every year, however when the counter-effects set it from 2023 onwards, loss of accessibility is reduced (also due to some of the model assumptions) and level of real GDP in 2035 will be approximately 0.67 percentage points lower than it would have been with the agreement still in place.

5.1.2 Impacts estimated by Ecoplan (2015)

Ecoplan (2015) also highlights similar impacts associated with the air transport agreement. In particular, the study notes that while retrospective analysis of the benefits of the agreement is difficult, it is likely to have benefitted airlines (e.g. through new passenger routes between Switzerland and the EU), airports (e.g. through providing a wider choice of routes to both EU and Swiss carriers), manufacturers and maintenance companies (e.g. benefitting from the EASA membership in terms of certification, etc.) and passengers (e.g. through lower prices and an increased choice of flights).

Similarly to BAK Basel, Ecoplan assumes that when the air transport agreement ceases to exist, Switzerland will revert to the bilateral agreements it had in place with third countries before the agreement came into force. In addition to the impacts described by BAK Basel, the study also highlights two further effects stemming from the loss of the agreement, namely that Swiss citizens would no longer be eligible to apply for jobs at the EASA and that Swiss licenses for aviation, maintenance or air traffic controller would no longer be recognised by EU member states and therefore would need to be validated separately.

With respect to the magnitude of the impact estimated by the study, assuming a 20 per cent reduction in the direct flights between Europe and Switzerland, the study calculates this effect to be CHF 440 million for 2014, or around 0.1 per cent of GDP.

5.2 Discussion and conclusion

Previous studies have found that, by 2014, the aviation elements of Bilaterale I had enhanced Swiss GDP by around 0.1 per cent. Some suggest a potential rise in the future to around 0.67 by 2035. In our view this expansion would appear to be highly dependent upon scenarios both for the aviation sector itself and for what would happen between the EU and Switzerland in the event that the Bilaterale I package were to be terminated.

As to the future evolution of aviation, there are at least three factors that might lead one to be cautious regarding scenarios for rapid expansion.

- First, aviation is coming under pressure in climate change policy. A very recent example is that in February 2020 the third runway expansion of Heathrow was ruled to be in conflict with the UK government's climate change obligations under the Paris Agreement.[74]
- Second, expansion in other technologies could compete with aviation. That includes not only alternative transport systems (such as high-speed trains or driverless cars) but also alternative to travel such as video conferencing.
- Third, increased concerns about pandemic diseases could lead to more caution regarding aviation policy.

We do not suggest that the above entirely rule out further expansion, but they do suggest some caution is warranted.

At least as important is alternative policy scenarios regarding the relationship between Switzerland and the EU. It is extraordinarily unlikely that any restrictions on aviation as a consequence of the termination of Bilaterale I would last until 2035. If there are indeed material gains to be made through more comprehensive aviation accords, that would appear to be ample time to agree them.

Accordingly, we believe a more appropriate impact to assume from a suspension of the aviation elements of Bilaterale I would be no more than twice the impact seen so far. So our overall range for this is 0.1 to 0.2 per cent of GDP.[75]

[74] https://www.telegraph.co.uk/business/2020/02/28/heathrow-court-ruling-leaves-third-runway-limbo/

[75] It could be argued that another factor here, liable to offset some of the net positive trade impacts associated with Bilaterale I, is the cost of the New Railway Link through the Alps (or Neue Eisenbahn-Alpentransversale, NEAT in German), a north-south rail link across the Swiss Alps which comprises the Gotthard Base Tunnel (completed and opened in 2016), and the Ceneri and Gotthard Base Tunnels. The construction of the NEAT is sometimes regarded as imposed by the Bilaterale Agreement, particularly since its main use is for the transportation of goods into Switzerland (rather than out from Switzerland). A study by Schwab (2020) explored the transport infrastructure costs associated with the NEAT. Based on information from the Federal Department of the Environment, Transport, Energy and Communication the study estimates the total costs of the NEAT to be CHF23 bn. At the same time it also notes that the contribution of foreign heavy goods vehicles to these costs is limited (through the performance-related heavy goods vehicle levy) and in turn only two thirds of the sum from the levy (CHF5 bn since 2002) may be spent on rail infrastructure (CHF3.33 bn since 2002).

6 Quantitative models of GDP impacts of immigration into Switzerland

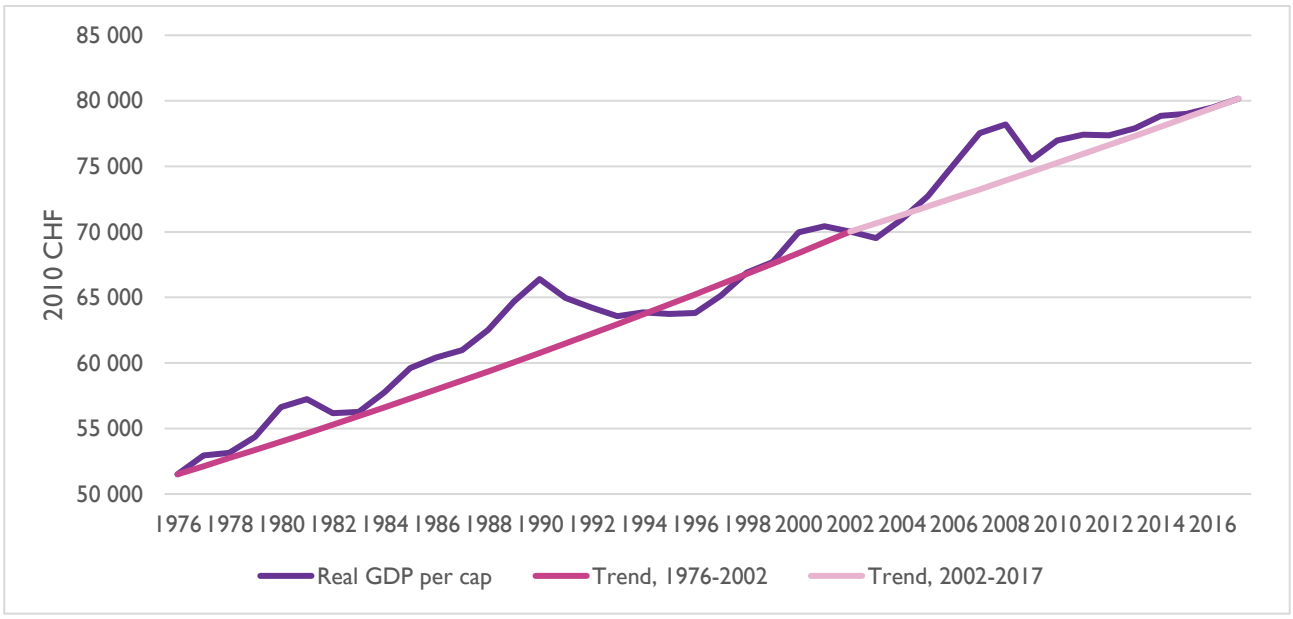
Building on the analysis in Section 2, in this section we attempt to model the impacts of Bilaterale I, and of immigration in particular, on Swiss GDP per capita and then upon the GDP per capita of those people who were living in Switzerland prior to 2002 ("Swiss natives").

6.1 Simple trend analysis

6.1.1 Change in trend GDP

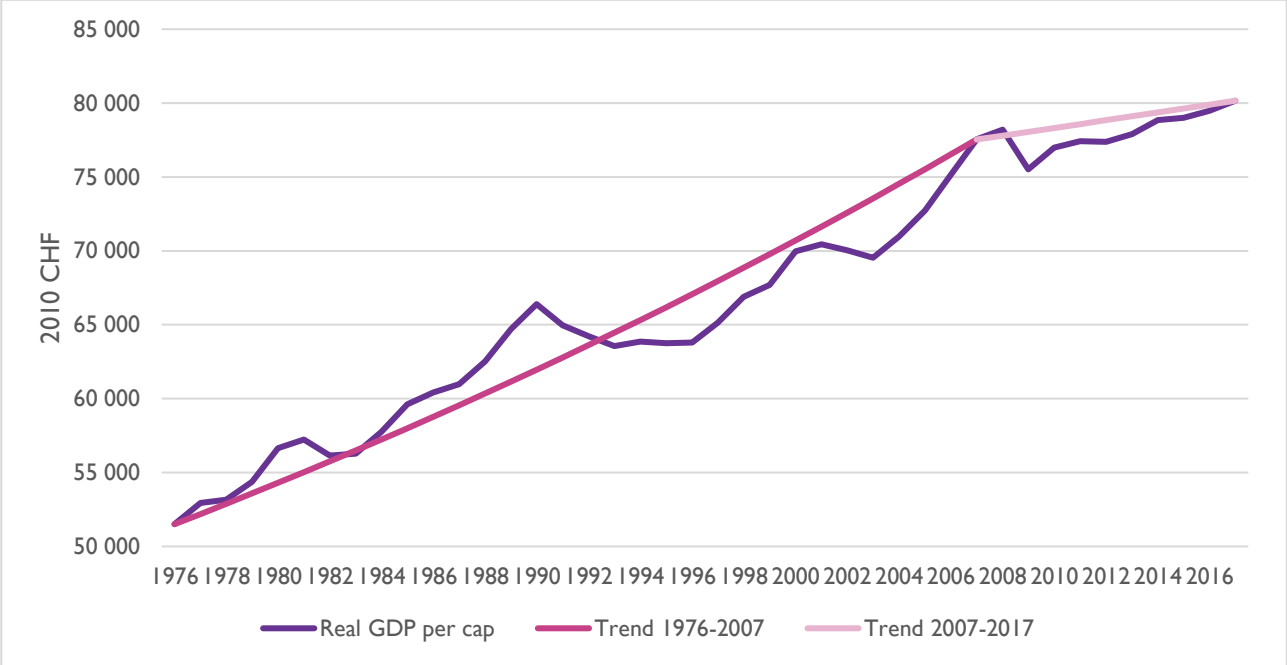
We saw in Section 1.3 that Swiss real GDP per capita grew more slowly in the post-2002 period than pre-2002. The 1976-2002 trend was 1.2 per cent per annum. From 2002-2017 that trend was 0.9 per cent per annum. This slower growth meant that by 2017, GDP per capita was 4.1 per cent below its 1976-2002 trend.

Figure 6.1: Swiss real GDP per capita (2010 CHF)



Free movement came into effect gradually over the 2002 to 2007 period. If we compare the 1976-2007 trend with the trend from 2007 onwards, results are starker. From 1976 to 2007 GDP per capita grew at 1.3 per cent, but from 2007 to 2017 at only 0.3 per cent per annum. By 2017 that slower growth meant GDP was 9.4 per cent below its 1976-2007 trend.

Figure 6.2: Swiss real GDP per capita (2010 CHF)



We have conducted break tests on the GDP per capita series. We find breaks in 1982, 1991, 1997, 2003 and 2009. The 1982, 1991 and 2009 breaks correspond with well-known international recessions. The 1997 break is a period of marked acceleration in growth. That leaves 2003 as a relevant date for the Swiss series, corresponding to the advent of free movement.

We interpret these data as indicating that the 2002 beginning of the phasing in of free movement is a more relevant date for Switzerland than the 2007 completion of free movement. That is perhaps connected to the fact that the main countries of origin of immigrants, as we explained in Section 1.3.3, have been Germany, Portugal, Italy, France, UK and Spain — all countries for which free movement started to be phased in from 2002 (as we can see in Figure 1.1).

6.1.2 Is a better reference date 2007 or 2002?

Given that Swiss-EU free movement came into full effect only from 2007 onwards, it is arguable that the most relevant measure is the change in trend GDP per capita for the 2007-onwards period versus the trend GDP per capita for the period up to 2007. By that reasoning, we would focus on the fall of 9.4 per cent in 2017 GDP per capita, relative to its 1976-2017 trend.

However, the periods from 2002 to 2017 and from 2007 to 2017 cover a significant number of years in which there were a wide range of economic developments. Some of these might have been expected to boost Swiss GDP growth (eg we saw in Section 4 that the Bilaterale I MRA might have boosted GDP by 0.1-0.2 per cent). Others might have been expected to diminish such growth (eg the consequences of the Great Recession, even if they were felt more lightly in Switzerland than elsewhere in a direct sense, could have affected Swiss exports). So whilst it is natural to associate lower GDP per capita growth in Switzerland with the large rise in the population over this period, given that they occur at the same time, it is by no means straightforward to determine how much of the drop in GDP per capita growth should be attributed to that source — or indeed whether GDP per capita growth would have accelerated absent the rapid immigration.

It is worth noting that Switzerland is by no means the only country to experience slower GDP per capita growth over this period, and that such a slowdown is not restricted only to high-immigration countries. If we consider France, for example (which we saw in Section 1.3 had relatively little net immigration in this period), real GDP per capita growth from 1976 to 2002 was 1.9 per cent and that fell to 0.7 per cent from

2002 to 2017; and was 1.8 per cent from 1976 to 2007 falling to 0.3 per cent from 2007 to 2017 — larger falls than in Switzerland. Now it is certainly arguable that France experienced one-off gains in the 1976-2002 period that Switzerland did not (eg perhaps from the development of the EU Single Market) and experienced economic problems in 2007 to 2017 that Switzerland did not (a much larger contraction in the Great Recession; more extensive austerity measures; much more exposure to the Eurozone crisis). But we should acknowledge, nonetheless, that the Swiss experience of a slowdown in GDP per capita growth over the post-2002 period is by no means unique nor shared only with other high-immigration countries.

In our view the use of a 1976-2007 trend baseline faces the problem that, as we can see in Figure 6.2, 2007 is at or close to a local or cyclical peak. It therefore seems especially plausible that the evolution after 2007 is affected by shorter-term as well as more fundamental factors. In 2002, by contrast, as we see in Figure 6.1, Swiss GDP per capita is closer to a natural trend-point.[76]

6.2 Synthetic counterfactual analysis

Synthetic counterfactual modelling (SCM) is a technique used in policy evaluation to study the impact of a treatment (such a policy intervention) on a unit (such as a country) where a suitable control cannot be observed directly. One way to think of the creation of a "synthetic" control is as a formal way to weight comparators to create a benchmark. In comparator analysis one often considers relevant benchmarks. So, for example, one might compare the evolution of Swiss GDP with that of its neighbours, using Germany or Italy or France (or all three) as benchmarks. But how confident can we be that these are actually the best benchmarks and how can we be sure how to weight them? In standard comparator analysis we might, for example, say "We would expect Swiss growth to lie between that of Italy and Germany", but, if so, where between them? Halfway? Ninety per cent Germany, ten per cent Italy? Or what?

The synthetic counterfactual method answers the above questions formally. It uses statistical techniques to select the best set of comparators from a "donor pool" of a wider range of countries and it ascribes them the statistically best-fitting weights — all based on data for the period before whatever event we are interested in studying (the "treatment").

More specifically a synthetic control is created by matching the "treated" unit (in this case Switzerland — the country "treated" by adopting free movement from 2002 onwards) to a weighted combination of comparator units whose pre-treatment evolution closely follows the characteristics of the unit exposed to the intervention.[77] The impact on the unit of interest is assumed to occur following the intervention such that there are no anticipation effects, for example.

Our model uses time series data from the World Bank Open Data database for the years 1980-2018.[78] The synthetic counterfactual is constructed using independent variables real GDP in levels, investment, consumption and net exports of goods and services, all of which are indexed such that the 2002 level is equal to 100. It also includes CPI inflation in per cent. The dependent variable in both models is real GDP per capita indexed to the 2002 level, which we assume to be affected by the intervention only from after 2002. Below we present two synthetic counterfactual models, comparing the Swiss evolution of GDP per capita after 2002 with those of two synthetic controls derived from different donor pools. The first donor pool is a standard set of OECD comparator countries. The second donor pool is the set of countries we have most frequently

[76] Strictly speaking, one could imagine analysing effects from 1999 onwards, with citizens anticipating 2002 in their migration plans and businesses anticipating 2002 in their investment plans. In principle these effects could have had some indirect impact on their productivity and hence GDP per capita. However, we believe this effect is likely to be negligible.

[77] Abadie, Diamond & Hainmueller (2010), "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program", Journal of the American Statistical Association June 2010 **105**(490).

[78] https://data.worldbank.org/

compared Switzerland with in this report — the main origin countries for immigrants into Switzerland, namely France, Portugal, Italy, Germany, Spain and the UK. The "treated unit" in each graph is Switzerland.

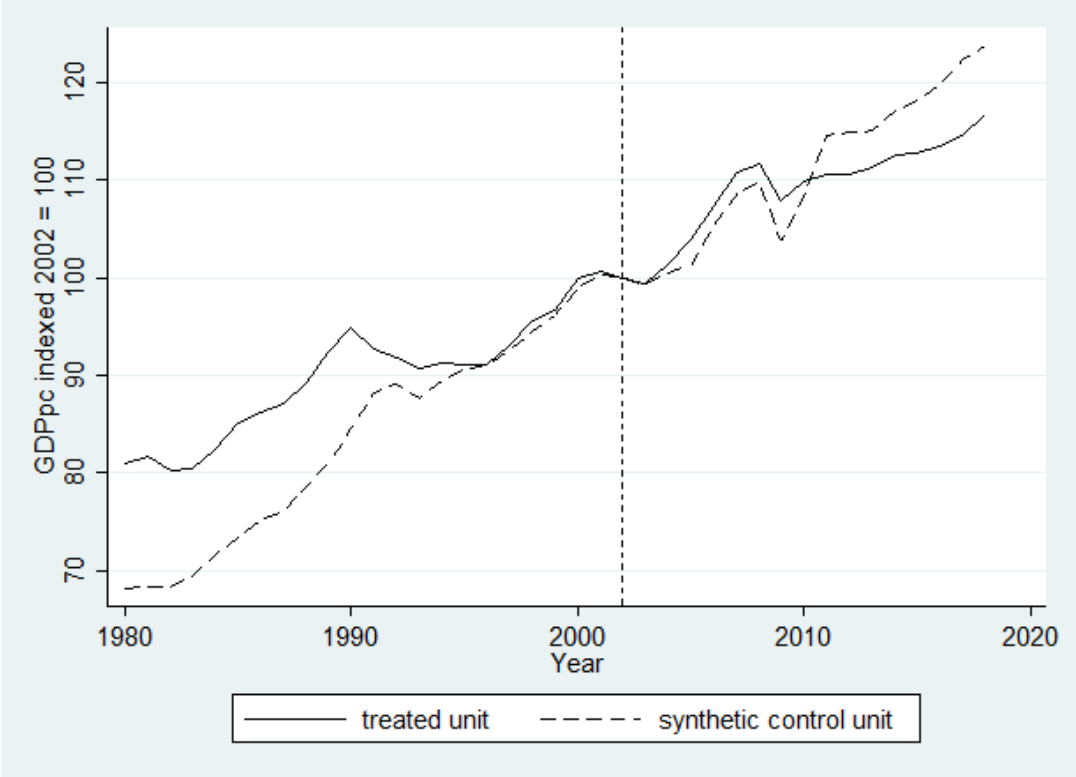
In our first model, we use a sample of 24 countries (the donor pool) to construct a synthetic counterfactual of what would have happened to Switzerland following the enforcement of the Bilateral I Agreements in 2002. The independent variables are averaged over the 1980-2001 period and augmented by adding three years of lagged real GDP (1986, 1993, and 2001 – the last pre-treatment year). The results are displayed in Table 6.1 which compares the pre-treatment characteristics of the actual Switzerland with that of the synthetic Switzerland constructed. As can be seen, the synthetic control produces a relatively similar picture of Switzerland's pre-treatment independent variables, with the only major exception being 1986 real GDP. The Root Mean Squared Prediction Error (RMSPE; the average of the squared discrepancies between per capita income in Switzerland and in its synthetic counterpart during the period 1980–2001) of 8.266 indicates that the synthetic control produces a somewhat acceptable fit for pre-treatment per capita income in Switzerland, though it is not a perfect fit.

Table 6.1: Specification 1 results, all countries

Independent variable	Treated (Switzerland)	Synthetic control
Investment	98.6	93.7
Consumption	84.4	83.3
CPI Inflation	2.7	2.6
Net exports	35.4	31.0
GDP(2001)	99.8	100.2
GDP(1993)	86.5	86.3
GDP(1986)	77.0	70.7
RMSPE	8.268	

The specification included the following countries: Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Turkey, UK, and US. The model resulted in a synthetic counterfactual comprised of the weighted combination of Australia (0.04) Germany (0.996); the remainder with negligible weights.

Figure 6.3: Synthetic counterfactual model using a general 24 country donor pool



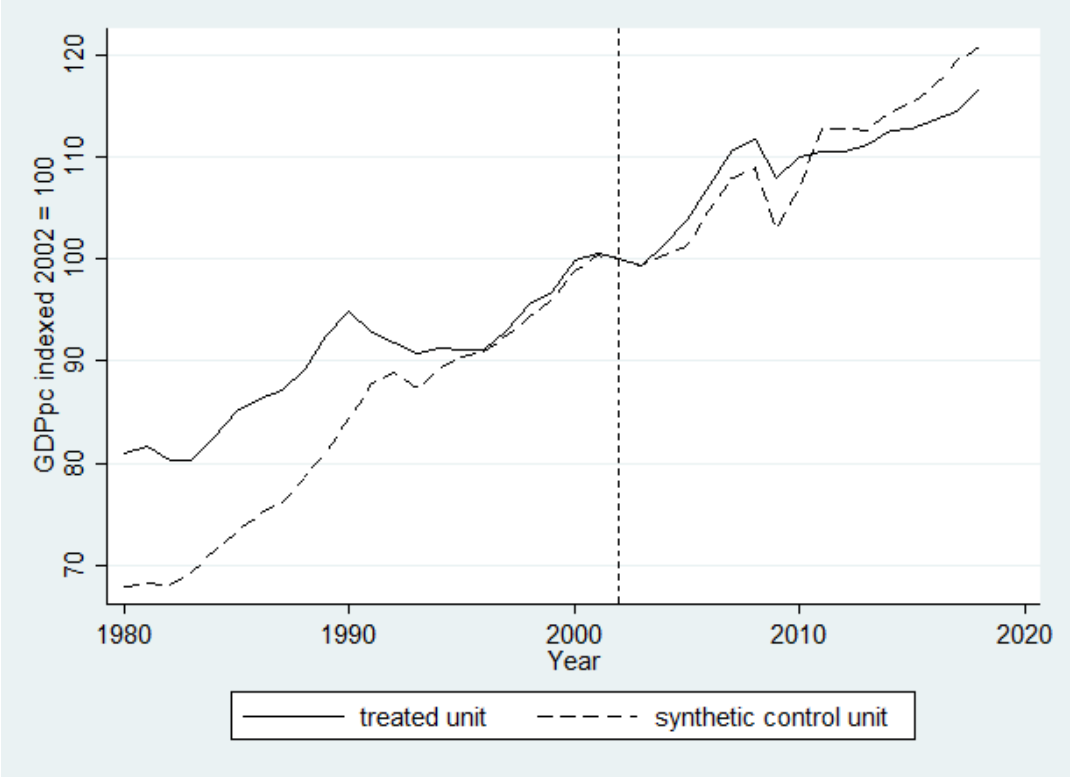
Our second model constructs a synthetic counterfactual using the countries against which we have been comparing Switzerland in analysis throughout this report: France, Portugal, Italy, Germany, Spain and the UK. Given the small sample, we do not average the predictors across the period 1980-2001 in this specification. The results are presented in Table 6.2. In this specification, the pre-treatment independent variables generally do not do quite as good a job at representing the Swiss case – a fact that is also reflected in the slightly larger RMSPE (8.372) – but the difference is modest and this model has certain important advantages over the first that we shall discuss below.

Table 6.2: Specification 2 results, selected countries

Independent variable	Treated (Switzerland)	Synthetic control
Investment	98.6	92.4
Consumption	84.4	83.3
CPI Inflation	2.7	3.1
Net exports	35.4	4.1
GDP(2001)	99.8	100.2
GDP(1993)	86.5	86.1
GDP(1986)	77.0	71.0
RMSPE	8.372	

The specification included the following countries: France, Portugal, Italy, Germany, Spain and the UK. The model resulted in a synthetic counterfactual comprised of the weighted combination of Germany (0.894) and Italy (0.106), the remainder with negligible weights.

Figure 6.4: Synthetic counterfactual model using a France, Portugal, Italy, Germany, Spain and UK donor pool



Each of these synthetic counterfactuals has the attractive feature that Switzerland outperforms the synthetic control unit for a few years after 2002 (as per the growth of GDP per capita from 2002 to around 2007 being faster than in the period to 2002) but then outperforms Switzerland thereafter.

- For the general 24 country donor poor model the drop in Swiss GDP per capita is 6.4 per cent. In this model, Switzerland and Germany are very close comparators pre-2002, with Germany carrying a weight of 99.6 per cent and Australia the other non-negligible weight at 0.4 per cent.

- For the restricted group of six countries donor poor model the drop in Swiss GDP per capita is 4.1 per cent – precisely in line with the drop in GDP relative to the 1976-2002 trend. In this model Germany carries a weight of 89.4 per cent and Italy 10.6 per cent.

Given that both Italy and Germany were materially affected by the Great Recession, the fact that Switzerland's underperforms a synthetic counterfactual made up of them by precisely the variation in its long-term GDP per capita trend strongly suggests that at least that 4.1 per cent fall is not attributable to the Great Recession. Furthermore, as we saw in Section 1.3, neither Germany nor Italy has had remotely as much immigration as Switzerland, meaning that neither of these has had the same "treatment" (i.e. immigration rising as a consequence of free movement) as Switzerland and therefore the drop need not arise from some other difference.[79]

As noted in our discussion of their RMSPEs, neither of these synthetic counterfactual models is perfect, and the method itself is not infallible (though it has come in recent years to be used frequently for such analysis).[80] In this case we see that the synthetic counterfactual sat well below Switzerland's evolution pre-1990. It is possible that the real point of departure was some "treatment" (some event or events) driving more rapid growth in the counterfactual countries from the 1990s onwards (eg perhaps German output is weaker pre-1990 and in the period immediately thereafter because of East Germany, or perhaps German growth accelerated after the euro was introduced?).

Consequently, (as with many other forms of modelling) synthetic counterfactual modelling is unable to identify the exact causal mechanisms between an intervention and the outcomes observed in the treated unit. In this case, the divergence, over time, of per capita incomes between Switzerland and the synthetic control following the year of the treatment (2002) may be influenced by some unobserved (unmodelled) event or characteristics. The SCM also does not escape the possibility that the assignment of Switzerland to the treatment itself – the Bilaterale I agreement – is correlated with unobserved characteristics that may confound the analysis. The same characteristics that led to the signing of the agreement may have also affected its outcomes in some way. Therefore, whilst with the SCM we cannot attribute the divergence of per capita incomes between Switzerland and the synthetic control to the free movement agreement alone (and indeed in what follows do not do so), these models nevertheless convey important messages about how Swiss GDP per capita developed relative to a formally-defined sample of its peers.[81]

The model in which Germany carries a 99.6 per cent weight is particularly vulnerable to the true difference being something that happened to Germany after 2002 rather than something that happened to Switzerland.

We are accordingly inclined to place more weight upon the more mixed model, which has the additional merit of matching closely to the simpler trend analysis result.

6.2.1 Conclusion: What is the correct counterfactual to assume for Swiss real GDP per capita?

We have seen that from 2002 to 2017 trend GDP grew by an aggregate of 4.1 per cent lower than in the 1976-2002 period. We have seen that it is arguable that the larger fall of 9.4 per cent from 2007 onwards

[79] To unpack this point: suppose that one used as a comparator for Switzerland some other country that had had about the same amount of immigration over the period, such as Norway. Then, given that the level of immigration wouldn't have been a material difference between the countries in that case, it would be problematic to attribute the GDP per capita drop to Swiss immigration.

[80] A widely-discussed example has been the various synthetic counterfactual models used for assessing the impact the Brexit process has had on UK GDP since 2016.

[81] It is perhaps worth noting that this attribution challenge is by no means unique to synthetic control modelling. Any form of benchmarking will suffer from it. It will also be shared by any form of econometrics that relies upon year dummies. If an econometric model had a "Post-2002" dummy variable, we would only be able to say that something happened from 2002 onwards. It would not tell us precisely *what* happened.

might be more relevant, but that the likelihood of special short-term factors affecting the 2002 to 2007 and 2007 to 2017 period data is non-trivial given other macroeconomic events in that period. Furthermore, our econometric analysis suggests that there was a series break in around 2003 and our analysis of the evolution of immigration in Section 1.10.1 suggests that there was a marked rise from 2002 onwards, as free movement began to be phased in.

We therefore believe it most reasonable to assume impacts commence in 2002.

We have seen that a synthetic counterfactual model for Switzerland gives reductions of 4.1 to 6.4 per cent in GDP per capita from 2002 onwards. The 4.1 per cent model is better in being less totally dependent on the evolution of the German economy and both the countries with the material weights (Italy and Germany) had much lower immigration than in Switzerland, implying that the difference between their evolution and that in Switzerland could be related to differences in immigration. They also were both materially affected by the Great Recession, implying that it is unlikely that Swiss underperformance, relative to them, is attributable to negative consequences for Swiss GDP growth of the Great Recession. Furthermore, the 4.1 per cent figure matches that of the drop relative to the long-term trend.

Accordingly, we conclude that the best evidence is that the implementation of free movement, along with other elements of the Bilaterale I package from 2002 onwards, led to a cumulative fall in Swiss GDP per capita growth of 4.1 per cent over the period to 2017.

Given that we have argued in previous sections that the trade elements of the Bilaterale I package ought to have boosted GDP by 0.1-0.2 per cent over the period, with perhaps a not-dissimilar effect so far from the aviation elements of Bilaterale I, we assign an aggregate 0.3 per cent of GDP per capital boost to GDP for these two other elements, therefore concluding that the immigration element of Bilaterale I should be assumed to have reduced GDP per capita by 4.4 per cent.

6.3 GDP impacts on "Swiss natives"

We have seen that free movement into Switzerland is likely to have been associated with a fall in GDP per capita of around 4.4 per cent in the period 2002 to 2017. Given that cumulative immigration over this period added around 14 per cent to the native Swiss population and that, as we have seen in Section 1.9.2, the immigrant workers had materially lower wages than Swiss natives and that, as we discussed in Section 2.1.1, immigrants are likely to come with much less capital than the average Swiss native, it would have been surprising if GDP per capita had not fallen.

But in itself such a fall in GDP per capita does not prove that anyone has become worse off, let alone that the average Swiss citizen who was living in Switzerland prior to 2002 has been made worse off. After all, a fall in GDP per capita could be made up of a rise in GDP per capita for domestic citizens combined with much lower GDP per capita for new arrivals. It is by no means obvious that a fall in GDP per capita overall must involve a decline in living standards for the native Swiss.

It is normal in analyses of the impacts of immigration to pay particular attention to the impacts on those that were living in the country before the immigration occurred, and that is what we shall consider in this section. Specifically, we shall attempt to answer the question: Given that GDP per capita fell by 4.4 per cent from 2002 to 2017 as a consequence of high immigration, what was the impact on the GDP per capita of those people that were living in Switzerland before the immigration occurred ("Swiss natives").

As discussed in Section 1.1.1, one could imagine a more global welfare focus — and indeed for certain sorts of abstract academic question, such a global focus might be more relevant. We could consider how the real incomes of the immigrants themselves were changed by the immigration. We could consider how the GDP per capita of citizens in the countries of origin of immigrants was affected by their departure. But the metric

we shall focus upon here is the impacts on those people who were living in Switzerland before the immigration occurred.[82]

We address this question using a production function approach. Such an approach implicitly assumes full employment or at least no material change in unemployment over the period. Given the sustained low level of Swiss unemployment over the past two decades this assumption is reasonably safe.

Under the production function approach, GDP is the output of a production function, which in our models uses labour, capital and, in some cases, a labour-enhancing technology we shall refer to as "productivity". Increases in labour or capital increase output. Falls in productivity reduce output. If labour increases by more than capital, unit wages tend to fall and the rate of return on capital rises, and vice versa.

The specific models we used are described in more detail below, but the general intuition is as follows. We know the shares of labour and capital in GDP (from national statistics). That tells us some important features of how the production function works. We know by how much immigration raised the population, and we assume the labour force rises by the same proportion. As immigration raises the labour force, that has an impact on output and on GDP per capita. The impact arises partly because of the labour itself, partly because immigrants come with at least some capital, and partly because changes in the economy induced by immigration change the relative incomes of those with and without wealth, with implications for public spending and taxes.

We know that the overall impact of these different factors results in GDP per capita dropping by 4.4 per cent. From that fact, and from the other facts we know, we can estimate what the impact may have been upon the wages and returns to capital of domestic Swiss citizens.

We report three variants of our model:

- A simple base-case model in which immigrants have the same productivity as domestic workers and make the same benefits claims for a given wage.
- A model in which average productivity is adjusted to take account of the lower average educational level of immigrants but assumes higher productivity of immigrants at a given level of education.
- A model in which immigrants arrive gradually and each new cohort of immigrants acquires capital as the next group arrives.

6.3.1 Model calibration: baseline model

We model the impact of immigration upon Swiss GDP per capita in a standard neoclassical production function setting, using a Cobb-Douglas form: $K^aL^{(1-a)}$

where L and K are the total labour force and the stock of capital, respectively, and a is the labour share of GDP. For our labour and capital shares in national income we use 0.62 and 0.38 (figures which come from Swiss national statistics). Thus, more specifically, our production function is $K^{0.38}L^{0.62}$.

We consider an increase in population such that immigrants constitute 12.0 per cent of the final population (summing immigrants from 2002 to 2017 vs the 2017 population), which we treat as a 13.6 per cent increase on the prior population (treating every non-immigrant as of 2017 as if they would have been a Swiss native absent the immigration).

[82] Strictly speaking, this is not quite correct in that some people living in Switzerland in 2001 have died and some of those living in Switzerland in 2001 have had children in Switzerland. Also, immigrants have had children, and under our approach they will be treated as part of the "native Swiss" or "pre-existing citizens" group. But, roughly speaking, our approach is intended to distinguish between impacts on immigrants versus upon those who, in some broad sense, were "already in Switzerland" before the immigration occurred.

We assume a 50 per cent deadweight cost of taxation and spending.[83]

We calibrate the capital brought by immigrants such that final GDP per capita over initial GDP per capita matches the drop in the real GDP data adjusted for domestic and immigration population growth.

Thus, if we normalise the pre-immigration population and capital stock to 1, that means the pre-immigration level of GDP is 1.[84] Domestic returns to labour will be 0.62 and domestic returns to capital will be 0.38. The wage will be the ratio of that 0.62 of returns to labour to the number of workers. If we normalise the number of workers to be 1 unit, that implies an average wage of 0.62 per unit of workers. GDP per unit of workers is 1.

Now consider what happens if the number of workers grows by 13.6 per cent but the capital stock grows only by 3.3 per cent (so, each immigrant has only about 24 per cent as much capital as the average Swiss person — reflecting the analysis around Figure 2.1 above regarding the typical capital holdings of those aged about 30 and the evidence in Section 1.6 that growth in the Swiss capital stock per person fell — eventually to zero — as immigration accelerated).

- $1.136^{0.38} \times 1.033^{0.62} = 1.096$, so total GDP grows by 9.6 per cent to 1.096 (or at least it would do so if the other effects described below did not also occur).
- Since the population has risen by 13.6 per cent but GDP only by 9.6 per cent, GDP per capita drops to 0.965.[85]
- Domestic returns to capital rise to 0.403.[86] The wage falls to 0.60.[87]
- To restore the wage to 0.62, taxes of 0.025 imposed on capital are required. These induce a deadweight loss of 0.0125.[88]
- So post-tax domestic capital returns are 0.367.[89]
- Final GDP is 1.083.[90] Final GDP for Swiss citizens is 0.987.[91] So the GDP per capita loss is 1.3 per cent.

Results:

- Implied increase in the level of transfers: 2.3 per cent of GDP.
- Drop wages of 3.5 per cent.
- Impact on domestic population GDP per capita: a fall of 1.3 per cent.

6.3.2 Model calibration: varying productivity model

In our second model we use the same parameters as above, but this time with three key differences.

- Immigrants have lower skill, on average (reflecting the data we have seen above on qualifications).
- Immigrants have higher productivity for a given skill level (given that there is a reason they are hired instead of an equivalent Swiss citizen).

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83 See Section 2.1.3 for details.

84 $1^{0.38} \times 1^{0.62} = 1$

85 1.096 / 1.136 = 0.965

86 The marginal return to capital is $a(K/L)^{a-1}$ and there is 1 unit of domestic capital, so domestic returns to capital are $1 \times 0.38 \times (1.033 / 1.136)^{-0.62} = 0.403$.

87 The wage is the marginal return to labour, which is $(1-a)(K/L)^{a}$. So the wage is $0.62 \times (1.033 / 1.136)^{0.38} = 0.598$.

88 Deadweight losses are half of tax and spend. Tax and spend is 0.025. So the deadweight loss is 0.0125.

89 0.403 – 0.025 – 0.012 = 0.0366. (Note that the tax and the deadweight loss here are multiplied by the ratio of domestic to total capital, but in this case that difference is lost in the rounding for the tax and only marginally affects the deadweight loss.)

90 That is 1.096 minus the deadweight loss of 0.0125.

91 Wages of 0.62 times 1 unit plus domestic capital returns of 0.367 = 0.987.

- We take the combined effect of these two factors as meaning that immigrants have 87 per cent of the productivity of domestic workers, as per the ratio of wages discussed in Section 1.9.2.

- Immigrants require lower transfers than a domestic citizen, because of their age (reflecting the data above on benefits).
  - In our model, this means that instead of transfers rising to restore wages to their pre-immigration level, they rise by less than this by an amount that reflects the lower social transfer needs of immigrants. Specifically, we assume that social transfers would be 10 per cent of GDP to domestic citizens, but are only three quarters as much, per person, for immigrants at point of arrival.

Note that we continue (as in the base case) to model labour as homogeneous. So the productivity differentials discussed above simply change the average of our labour force. We can interpret this as meaning that although labour has differences, firms are unable to observe what those differences are and make hiring and salary decisions based purely on the (known) average characteristics of workers. Our "productivity" concept is multiplicative, such that the effective labour force is given by the number of workers times average productivity. That means that this time our production function takes the form: $(AL)^{a}K^{(1-a)}$

where L and K are the total labour force and the stock of capital, respectively, a is the labour share of GDP, and A is productivity. For our labour and capital shares in national income we use 0.62 and 0.38 (figures which come from Swiss national statistics). Thus, more specifically, our production function is $L^{0.62}K^{0.38}$.

This time our calibration implies that immigrants have capital of only 41 per cent of that of native Swiss.

Results:

- Implied increase in the level of transfers: 2.0 per cent of GDP.
- Drop in wages of 3.7 per cent.
- Impact on domestic population GDP per capita: a fall of 1.8 per cent.

It is worth observing that in this model, the drop in average worker productivity means that domestic GDP per capita would be lower even without any increase in transfers. More than two fifths of the overall drop is driven by this factor in this case.

One perhaps-interesting feature of this scenario is that, in this model, per-capita social transfers for immigrants are lower than they were for pre-immigration Swiss citizens, even though immigrants get some extra benefits along with everyone else because the rate of social transfers goes up to maintain the salaries of low-income workers. In other words, it is not merely that they claim less than Swiss citizens do; they actually claim less than Swiss citizens would have claimed had the immigration not occurred. But, despite this, their presence in the economy, through increasing pre-social-transfers inequality, still leads to an increase in social transfers which in turn leads to a loss in GDP per capita for domestic citizens. Indeed, in this model, even if immigrants were prevented altogether from claiming any social protection expenditure, there would still be a 1.3 per cent rise in social protection spending and a loss of 0.3 per cent in GDP per capita for domestic citizens.

6.3.3 Model calibration: gradual arrival and integration model

In our last, more elaborate model, instead of immigrants being treated as if they arrive all at once (as is the assumption in the previous two models), they are assumed to arrive gradually, at a constant level each year over a 15 year period from 2002 to 2017. Immigrants upon arrival are assumed to be of age 30 (in line with the data set out in Section 1.9.1) and, as such, to have the following other features.

- Their productivity rises gradually, from an initial value that is calibrated (in a way we shall explain below) to reach a productivity of 95 per cent of that of domestic Swiss citizens after 15 years (aged 45).

- They begin with no capital and accumulate capital gradually over time, and by age 45 would have the same capital as that of an average Swiss person. That means that after 15 years the average immigrant arriving over those 15 years has around 47 per cent of the capital of the average Swiss person — fairly closely matching the calibrated result in the varying productivity model.
- They begin by being in receipt of social transfers of only half of those of the average Swiss person (reflecting their age) and rise over time so that by age 45 their receipts are in line with those of the average Swiss person at the same salary. That means that after 15 years the average immigrant has benefits claims of around 73 per cent of those of the average Swiss native — again fairly closely matching the assumption in the varying productivity model.

The model is calibrated so as to achieve the target overall GDP per capita after 15 years (matching the drop in the real GDP data adjusted for domestic and immigration population growth discussed in previous sections above), by setting the opening level of productivity of a 30 year old immigrant. The model calibration sets this at 74 per cent of that of an average Swiss person across the economy, with the average immigrant having a productivity 84 per cent of that of the average Swiss worker after 15 years. Having initial immigrants having a productivity 75 per cent, rising to be 95 per cent of that of the average Swiss person, with the average immigrant at 84 per cent of Swiss productivity, would appear to quite closely match the salary data set out in Section 1.9.2, insofar as salary differentials can be seen as a good proxy for productivity differentials.[92]

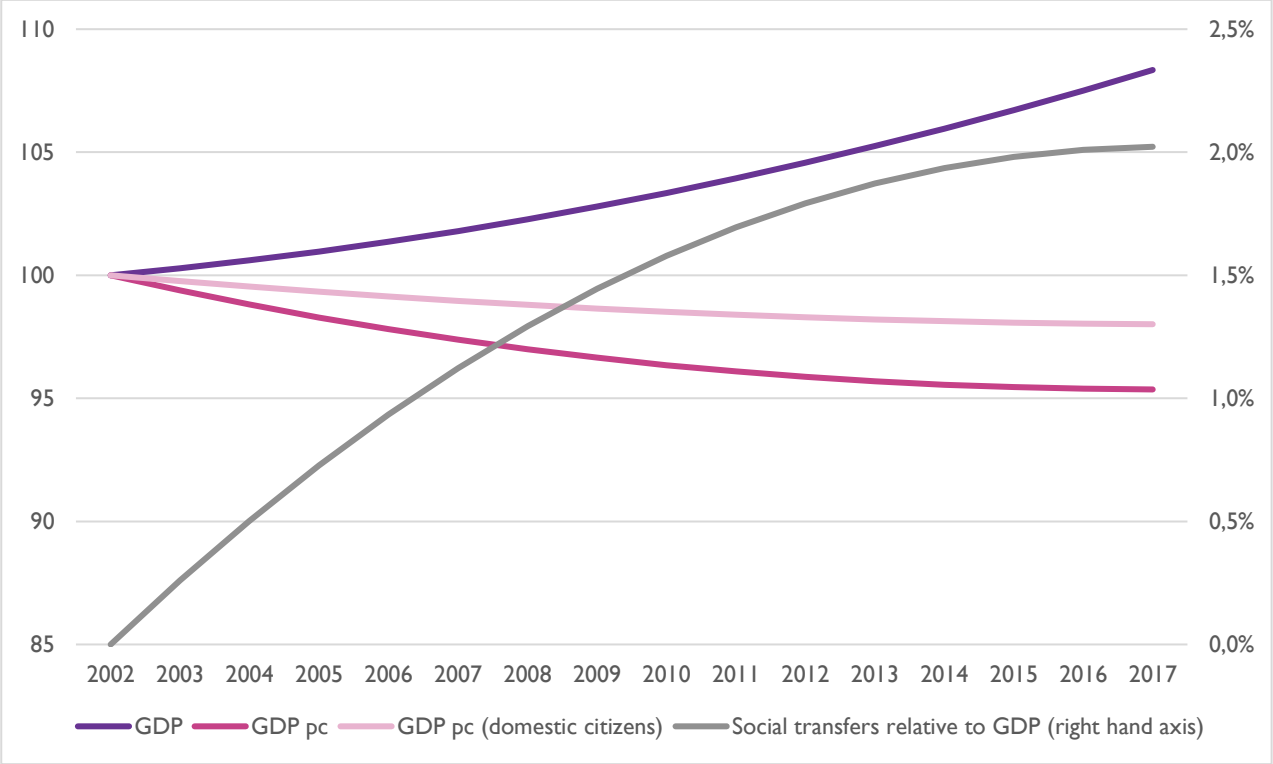
Results after 15 years:

- Implied increase in the level of transfers: 2.2 per cent of GDP.
- Drop in wages of 3.7 per cent.
- Impact on domestic population GDP per capita: a fall of 2.0 per cent.

We graph the evolution of various outputs of our model below, where a value of 100 for the left-hand axis variables should be interpreted as being in line with the pre-immigration long-term trend. We see that GDP grows, as immigrants enter the economy, but GDP per capita drifts down both overall and for domestic citizens, whilst social transfers rise.

[92] We also note that a standard assumption is that immigrants have around 80 per cent of the human capital of domestic workers — see Barro, R.J. & Sala-i-Martin, X., *op cit*, Section 9.1.1 especially p390.

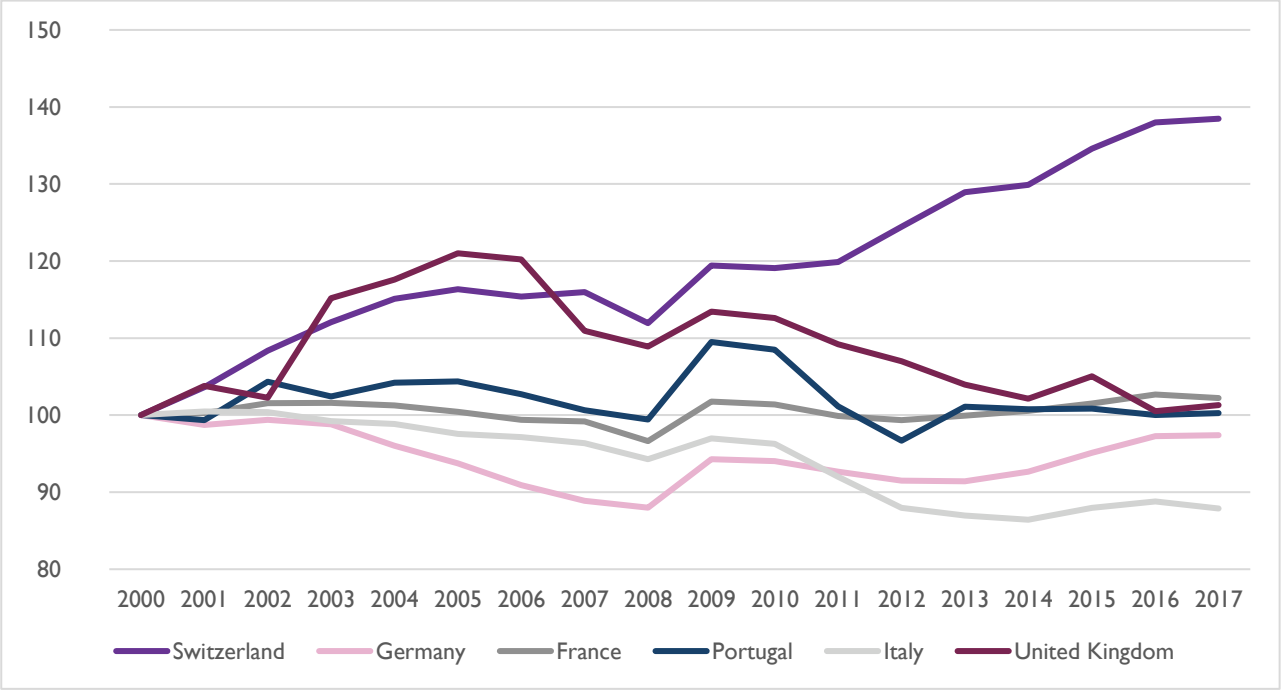
Figure 6.5: Evolution of various variables in simulation model (100 = in line with long-term trend)



6.3.4 Model validation: Does our modelled increases in transfers match the data?

The following graph sets out the evolution of real per capita social protection payments in Switzerland and other Western European developed economies since 2000.

Figure 6.6: Social protection, real per capita, 2000 = 100



We interpret this graph as implying that the developed European norm was for 2017 real social protection to roughly match its 2002 level. In Switzerland, by contrast, the figure rose by 28 per cent. Had Swiss social

protection spending in 2017 matched its 2002 level in real terms, it would have been lower by 2.2 per cent of GDP.

That figure matches very closely to the 2.0-2.3 per cent figures predicted by our models.

6.3.5 Model validation: Does our modelled fall in wages match the data?

As discussed in Section 2.2.2, Gerfin and Kaiser (2010)[93] investigate the effects of Swiss immigration inflows between 2002 and 2008 have on wages in Switzerland, with their main results being as shown in the following table.

Table 6.3: Real weekly wages for native and already settled immigrants in Switzerland in 2002 and 2008 (CHF)

	Native				Already settled immigrants			
	2002	2008	Diff	% Diff	2002	2008	Diff	% Diff
Low education	1,024	962	-62	-6.1%	1,036	991	-45	-4.3%
Middle education	1,342	1,288	-54	-4.0%	1,197	1,196	-1	-0.1%
High education	1,990	1,895	-95	-4.8%	1,879	1,913	34	1.8%

If we take a ratio of 90 per cent native Swiss workers to 10 per cent already-settled immigrant workers, and focus upon the Middle education group as the most representative, that implies an overall worker loss of 3.6 per cent. That is very close to the 3.5-3.7 per cent losses implied in our models above.

On the other hand, these results were only for the period to 2008 whereas ours are for the whole period to 2017. It is true that in a range of developed economies, real salary levels in 2017 were no higher than in 2008, potentially implying that a period of underlying wage stagnation might leave the overall period effect not hugely different from the effect to 2008.

Our interpretation is that if the Gerfin and Kaiser results were accurate, the likely implication is that our results here understate the losses to domestic citizens, suggesting that our estimated impacts could be conservative.

6.3.6 How much less would GDP have needed to fall for the impact on Swiss national citizens to be positive?

As discussed above in Section 6.2, it is by no means straightforward to assess what share of the reduction in GDP per capita from 2002 onwards, relative to our counterfactual, should be attributed to immigration (including possibly a share of more than 100 per cent). For the models so far we have assumed the whole 4.4 per cent contraction, relative to the previous trend, is attributable to immigration. That assumption is consistent with

- the standard evidence on the capital shares of immigrants (given that Swiss immigrants average about 30 years of age and so can be assumed to have much less physical capital than the average Swiss native);
- wage data (with immigrants into Switzerland in our models having wages of about 75-85 per cent of that of the average Swiss worker, upon first arrival); and
- data on the evolution of social protection spending in Switzerland, relative to that in other European countries, and on the evolution of transfers.

[93] Gerfin and Kaiser (2010), "The Effects of Immigration on Wages: An Application of the Structural Skill-Cell Approach", at: http://staff.vwi.unibe.ch/gerfin/downloads/immigration_and_wages.pdf

Under our models, GDP per capita for those who were living in Switzerland prior to the rise of net immigration falls by 1.3 to 2.0 per cent.

Next we explore the robustness of our results further by considering alternative scenarios for how much of the drop in Swiss GDP per capita growth over this period is attributable to immigration, and asking what would need to be true for those who were living in Switzerland prior to the rise of net immigration to have experienced GDP per capita rises as a consequence of net immigration.

To explore this, we re-calibrate each model.

- In our baseline model, immigrants would need to come with virtually exactly the same capital as native Swiss workers possess.
- In our differential productivity model, immigrants would need to come with around 60 per cent more capital than the average Swiss person.
- In our gradual integration model, the average immigrant would need to arrive with a productivity 10 per cent higher than that of the average Swiss person.

In our view, each of these requirements is implausible in itself and inconsistent with the Swiss data. Even if it could be disputed precisely how much of the contraction in GDP per capita, relative to the pre-2002 trend, is attributable to immigration, it should not be disputed that it is likely that immigration into Switzerland has been associated with a reduction in GDP per capita, not only for the post-immigration population but also for those that were living in Switzerland before the immigration occurred.

6.4 Conclusion

The models of this section suggest that, over the 2002 to 2015 period, the rates of immigration experienced induced a loss in GDP per capita of 4.4 per cent overall and for domestic Swiss citizens of some 1.3 to 2.0 per cent.

6.4.1 Comparison with other estimates

KOF (2015) estimated the impact of the Bilateral Agreement I up to 2007Q4 date (i.e. it adopted a historical approach). The authors impute the impact of the Bilateral Agreement I by comparing a baseline scenario to a counterfactual scenario over the period 2002Q3-2007Q4. The assumptions underpinning the construction of the baseline and counterfactual scenarios are as follows:

- The baseline scenario corresponds to the current developments in the Swiss economy after the agreements come into force (i.e. over the period 2002Q3-2007Q4).
- The counterfactual scenario is based on the following assumptions:
  - Immigration: it is assumed that in each quarter between 2002Q3-2007Q4 1,000 immigrants (i.e. 4,000 immigrants per year) are directly attributable to the implementation of the bilateral agreement. Therefore the number of immigrants in the counterfactual scenario is calculated by subtracting, in each quarter, 1,000 people from the actual immigration figures recorded.
  - Labour market: it is assumed that the gap between demand and supply in the counterfactual scenario is larger than in the baseline scenario. The implication of this assumption is that the extra immigration attributable to the Bilateral Agreement I has improved the labour market by filling job vacancy in firms that previously experienced a shortage of labour.
  - These assumptions produce exogenous parameters related to resident population (by the end of 2007Q4 this is 0.43 per cent lower under the counterfactual scenario, compared to the baseline) and employment (by the end of 2007Q4 this is 0.57 per cent lower under the counterfactual scenario, compared to the baseline).

The simulation is conducted by using KOF macroeconomic model to forecast the counterfactual development of the Swiss economy over the period 2002Q3-2007Q4. The simulation relies on the following set of exogenous and endogenous variables:

- Exogenous variables:
  - Population and employment variables (as described above).
  - International variable such as Interest rates, and import and export prices (this is justified on the ground that Switzerland is an open economy too small to influence international prices/variables).
- Endogenous variables:
  - GDP.
  - Private consumption.
  - Disposable real income.
  - Labour productivity.
  - Wages
  - Unemployment rate

According to the simulations results freedom of movement provisions did not lead to any rise in unemployment rate and reduction in nominal wages. However it resulted in an average annual increase in real GDP of 1.04 per cent and an average annual increase in real GDP per capita of 0.61 per cent by 2007Q4.

We can compare these results with those for our production function method by considering:

a) how GDP per capita growth from 2002 to 2007 compared with the 1976 to 2002 trend;
b) what our synthetic counterfactual method gives for 2007;
c) what change in the GDP per capita of Swiss citizens would have been associated with that overall change.

Taking these in turn:

- Swiss GDP per capita in 2007 was 4.4 per cent above its 1976 to 2002 trend. If we had assigned this increase to immigration as a whole (rather than to the added immigration from freer movement per se), then given that KOF's attributed effect is assigned to 4,000 extra immigrants per year from freer movement, or around 8.5 per cent of the immigration between 2002 and 2007, that implies we would have assigned a positive effect of about 0.4 per cent of GDP. If instead we assigned this impact to the acceleration of immigration (so, allowing for an assumed average of 30,000 immigrants per year prior to 2002 versus the 47,000 per year that occurred during the 2002 to 2007 period), then given that KOF assigns around 23 per cent of the acceleration to free movement, so under our approach we would have assigned a positive impact of about 1.0 per cent.
- Our synthetic counterfactual, with weights to Germany and Italy, would have given a rise in Swiss GDP, relative to counterfactual, of 2.6 per cent by 2007. Again, if we had assigned this increase to immigration as a whole, then given that KOF assigned only 8.5 per cent of the impact to we would have assigned an impact of 0.2 per cent whereas if we had assigned this increase to the acceleration in immigration we would have assigned an impact of 0.6 per cent.
- Focusing on the synthetic counterfactual case and the whole immigration impact (i.e. +0.2 per cent) we would have assigned a gain in GDP per capita for Swiss domestic citizens of 0.7 per cent under the gradual integration model.

The key message we are attempting to convey here is that, if we had applied our method to the 2002 to 2007 period, as KOF does, we would have obtained a positive result (as they do) of a very similar order of magnitude to theirs. The main reason our result here differs so materially from theirs is not a difference in methods; it is the difference in time periods.

7 Overall conclusion: the impacts of Bilaterale I upon domestic Swiss citizens

In this report we have discussed and estimated the impacts of the provisions of the Bilaterale I Agreement upon the Swiss economy and in particular upon those that were living in Switzerland before the Bilaterale I came into effect. We have seen that far and away the dominant effect of Bilaterale I has been upon immigration. Whereas the Bilaterale I trade provisions covered only what will be around 7 per cent of Swiss exports by around 2030, immigration has added around 14 per cent to the Swiss population between 2002 and 2017.

Neither should the inflow to Switzerland be assumed a one-off effect. It is true that net immigration has fallen back a little over the past five years, but the fundamental forces drawing people into the Swiss economy will very probably persist. Of these, the two most fundamental are as follows.

- Switzerland is a much wealthier economy than the EU, with a GDP per capita of around twice the EU average. As a consequence, immigrants into Switzerland can expect much higher wages than they can secure elsewhere, and if (at some later point in life) they were to fall in need of social protection, the levels of social protection in Switzerland are much higher than those elsewhere and have risen markedly over time whilst social protection payments elsewhere have been steady.
- Switzerland is a recipient of immigration driven by the Eurozone's "people pump" – a mechanism whereby economic shocks that affect low labour market flexibility Eurozone members tend to drive job-seekers out into higher labour market flexibility non-Eurozone members, particularly Switzerland, Norway and the UK.

Some often-discussed impacts of immigration have less effect in the Swiss case than unquantified discussion typically assumes.

- By having a large immigrant population it is true, as is often said, that Swiss people become more exposed to foreign ideas and ways of doing things, which may in turn be educational and stimulative for the Swiss. But there are many other routes to such exposure, not least foreign travel for business or leisure but also trade, television, books, the internet and so on. Taking foreign travel alone, we estimate that the immigrants arriving since 2002 have provided Swiss natives with about as many additional minutes of interaction with a foreigner each year as they would have obtained through three times as much foreign travel (including three times as many visits by foreigners to Switzerland). That is, of course, non-trivial but it is a smaller effect than many discussions imply.
- Again, it is sometimes suggested that immigration creates social churn, imposing costs of change on the domestic population as the shops they use disappear and they find it harder to coordinate over collective hobbies such as amateur dramatics or choirs. But in modern Western European societies the domestically-induced churn rate is sufficiently high, anyway, that for Switzerland immigration-related effects only add around one fifth extra such churn. Churn is mainly the modern world, not the immigration.
- Crime rates amongst immigrants from the main countries of origin for Switzerland are not materially higher than for Swiss citizens.

- Immigrants arriving primarily for the purpose of claiming benefits does not appear from the data to be a material issue. Furthermore, when they first arrive immigrants probably make less call upon public spending than the average domestic Swiss citizen – particularly because at their average age of 30, immigrants are not at a time in life when they require significant health or pensions spending. (On the other hand, over their lives as a whole immigrants may well ultimately make more call upon spending than the average Swiss person – because immigrants have on average lower wages and less capital – and they also probably induce increased taxes and spending in other ways we explain below.)

In quantitative terms the most material effects lie elsewhere.

- Because immigrants arrive with relatively little capital, the labour force rises by more than the capital stock. That means increased pre-tax returns for already-wealth Swiss capital-holders. Those with wealth become richer before taxes.
- The increase in the labour force with capital increasing by less (because immigrants – partly reflecting their age – have relatively little capital of their own) tends to put downward pressure on average wages. Partly that is because immigrants tend to be at lower average educational levels than the average Swiss worker, so the average wage is dragged down by the simply mathematical consequence of adding workers at below the average wage. But a further consequence of the lower average education level of immigrants to Switzerland is that downwards pressure on wages is more pronounced at lower parts of the income spectrum. We estimate that average wages in Switzerland are likely to be about 3.5 to 3.7 per cent lower, owing to immigration over this period.
- The combination of higher incomes for the already-wealthy and lower wages for lower-paid workers increases inequality, created added pressure for higher taxes and spending, to mitigate the inequality increase. We estimate that immigration has resulted in increases in social protection expenditure of around 2.0 to 2.3 per cent of GDP over this period.
- The combination of immigrants being at lower average productivity than the average Swiss person with less capital and an increased requirement for social spending has led to a reduction in GDP per capita growth, over the 2002 to 2017 period, of 4.4 per cent. Combined with an increase in GDP per capita of around 0.1-0.2 per cent for trade and for aviation, the net GDP per capita impact of Bilaterale I has been a reduction in Swiss GDP per capita growth of around 4.1 per cent over the period.
- This reduction in GDP per capita has not simply been a consequence of new migrants having lower extra GDP per extra person than the Swiss domestic citizen average GDP per capita. Swiss domestic citizens themselves have lost out, by around 1.3-2.0 per cent of GDP per capita.

The final question is what portion of this loss in GDP per capita should be attributed to that AFMP specifically, as opposed to to immigration in general. As discussed in Section 1.10 it is by no means straightforward to determine what the level of immigration into Switzerland might have been absent the Bilaterale I free movement provisions. A common crude assumption is that immigration might have been about one quarter less. Alternative assumptions include the use of worker shortage schemes or other special quotas. We shall now set out what our results would be under each of these alternative assumptions.

7.1 Crude one quarter reduction in immigration counterfactual

Focusing first on the assumption of a one quarter reduction in immigration, we note that it is by no means clear that the impacts of immigration are linear. An overall negative GDP per capita impact of 100,000 immigrants could, for example, be consistent with a positive GDP per capita impact of 10,000 immigrants. However, let us assume linearity for our purposes here. Then the negative impacts of the AFMP would be

one quarter of those of immigration as a whole, so a loss of 1.1 per cent in GDP per capita[94] for the Swiss average as a whole and a loss of 0.3-0.5 per cent in GDP per capita for Swiss domestic citizens.[95]

7.2 Application of a selective immigration policy counterfactual

In our alternative counterfactual, we assume that, absent the AFMP, Switzerland would have applied a selective immigration policy, including some combination of National worker priority, an aggregate maximum annual threshold, mix preferences targeted at industries with skill shortages, and a priority for some immigrants who came with their own capital.[96] So although we assume this would have the effect of reducing the *volume* of immigration by one quarter (as in our cruder model) it would also make a difference to the *nature* of immigrants.

To apply these assumptions in our models, we use the following.

- We assume that the educational calibre of immigrants throughout the period from 2002 onwards matches the achieved educational calibre of immigrants to Switzerland in 2017 discussed in Section 1.9.2 — ie about 6 per cent higher in 2017 than in 2002.[97]
- We assume that instead of immigrants arriving with zero capital, 5 per cent of them arrive with capital matching that of the average Swiss person.
- We assume that the volume of immigration drops by a quarter.

We then apply these results in our gradual integration model. Then, instead of a 2.0 per cent drop in GDP per capita for domestic Swiss citizens, the drop is 1.3 per cent. So GDP per capita would have been around 0.7 per cent higher for domestic Swiss citizens if such an immigration policy would have been adopted. Aggregate GDP per capita (including immigrants) would have been around 1.5 per cent higher.

So, overall, for this, our preferred counterfactual, the overall impact of the Swiss Bilaterale I package upon domestic Swiss citizens is as follows.

- A gain from trade that has so far been around 0.1-0.2 per cent of GDP but that will fall over time (particular as the UK leaves the EU's Single Market and as non-European trade continues to increase in importance, relative to EU trade, as China, India and the US continue to out-grow Europe).
- A gain from aviation of around 0.1 per cent of GDP, rising over time into the future by an amount that depends upon scenarios such as the evolution of aviation in response to climate change or pandemic disease risks.
- A loss from free movement of around 0.7 per cent of GDP for the period 2002 to 2017.

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[94] $4.4 \times 0.25 = 1.1$

[95] It could be argued that an assumption of only a 25 per cent drop in immigration is conservative (though as we have noted above it is in line with the assumption used in previous studies). Had we assumed a slightly larger reduction (eg a one third drop) it is natural to suppose that the impact would have been larger. We would, however, urge caution in too-mechanical an assumption of linearity throughout the range. For example, it might have been possible that a materially lower rise in immigration could even have been positive for GDP per capita whilst after some threshold losses become much more rapid than a linearity assumption implies. That might mean that our assumption that a 25 per cent reduction in immigration would be associated with a one quarter reversal of the overall loss is too conservative. Alternatively, it could be that the main losses are associated with the first part of a large immigration inflow and that after some threshold losses start to decline at the margin (diminishing marginal losses).

[96] Another possibility, that we do not consider here, would have been to link quotas for immigration to achieving targets for expanding the capital stock in other ways, such as by attracting additional foreign investment. If policy had delivered growth in the capital stock that more closely matched the growth in the population, that could have materially mitigated the negative impacts we have identified. Such a policy, if feasible, might also have complemented and enhanced our counterfactual immigration policy discussed in this subsection.

[97] This calculation is done as follows. In 2002 wages of immigrants are 82 per cent those of domestic Swiss citizens. In 2007 wages of immigrants are 87 per cent of those of domestic Swiss citizens. So the rise is 5 percentage points. $5/82 \approx 6\%$.

- The above sum to an overall effect of Bilaterale I on domestic Swiss citizens so far of a loss of around 0.5 per cent of GDP.
- Similar losses are likely to be repeated in the future as the Eurozone continues to act as a "people pump". Indeed, with the UK leaving the EU and imposing restrictions on EU immigration into the UK, one destination for these "people pump" emigrants will be removed, with the potential implication that some of them are diverted to Switzerland. So it is plausible that, in the future, impacts on Switzerland will be larger than those we have estimated here for the 2002 to 2017 period.

Thus the claim made in earlier studies that the Bilaterale I accord has been overall positive in terms of GDP per capita is not sustained by our findings in respect of domestic Swiss citizens.

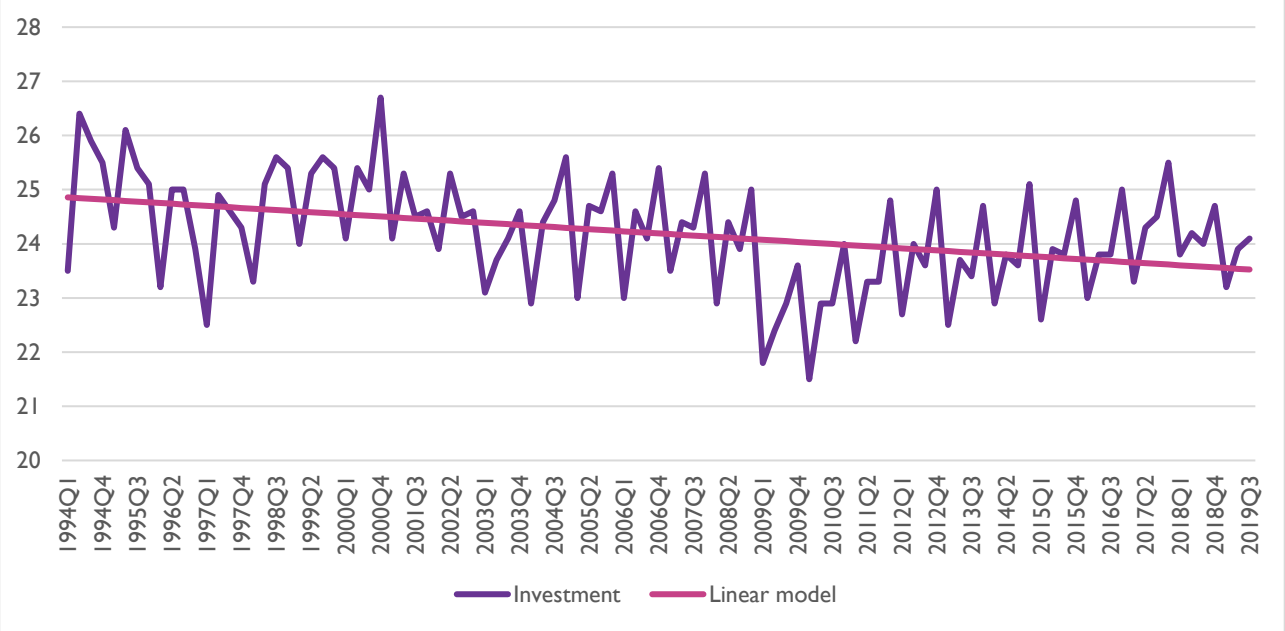
We note in closing that the measures we report above have focused on GDP per capita impacts for Swiss domestic citizens. As we have noted in earlier sections there are additional potential ways to think about the welfare impacts of immigration, both in terms of the nature of those impacts (GDP is not the only factor, but others such as cultural changes – positive or negative – might also be relevant) and those affected (eg it could be argued that the impacts on the lowest-income domestic Swiss citizens should have a higher weight, or that the impacts on immigrants and potential immigrants were relevant, or that more attention should be paid to impacts on the native Swiss that choose to live abroad). We do not pretend that impacts on the GDP per capita of domestic Swiss citizens is the only possible consideration, but it one important measure commonly considered – as we have done here.

8 Appendix 1: Econometric analysis of Swiss investment

8.1.1 Investment as a percentage of GDP

We begin the analysis by trying to explain the evolution of investment in Switzerland with a simple trend model. A graphic illustration and the estimation results of this linear trend model are displayed in Figure 8.1 and Table 8.1.

Figure 8.1: A linear model of investment as a % of GDP in Switzerland



Source: Eurostat and Europe Economics calculations.

Table 8.1: Estimation result of a linear model for investment as a % of GDP in Switzerland

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	25.58852	0.349333	73.24972	0.0000
Trend	-0.013058	0.003146	-4.151333	0.0001

Source: Europe Economics calculations based on Eurostat data.

As we can see the investments as a percentage of Swiss GDP have decreased linearly since 1994, and the trend coefficients of Table 8.1 suggests that the rate of decline has been of around 0.01 per cent in each quarter.

As we can see from Figure 8.1 there are periods in which investment levels have deviated significantly from the trend. From a visual inspection of the chart the periods in which such deviations are more striking are the periods are around 1997Q1, 200Q4, and the period 2009Q1-2011Q1. This observation rises the suspicion that there might be a statistically significant break in the series. We have therefore performed a series of multiple break-points tests. Differently from a standard break-point tests[98] in which a candidate

[98] Such as, e.g. the Chow break-point test.

break-point date is first selected by the researcher and then tested for the presence of a statistically significant break, we have performed a number of multiple break-points' tests that are agnostic about the potential break date(s). We have performed multiple break-points' test to test for the presence of up to a maximum of five breaks in the series. All the tests performed indicated that the most likely candidate date for a break in the series 2009Q1.

We have then tested two alternative versions of the linear model: one which allows for a break in the level of investment (without affecting the trend) at 2009Q1, and one which allows for a break in both the level of investments and the trend (both at 2009Q1). The estimation results and the graphical representations of these models are presented in the tables and the charts below.

Table 8.2: Linear model for investment as a % of GDP in Switzerland with a break in level

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	24.52141	0.515114	47.60388	0.0000
Break (2009Q1)	-0.971452	0.353454	-2.748454	0.0071
Trend	0.000705	0.005862	0.120222	0.9045

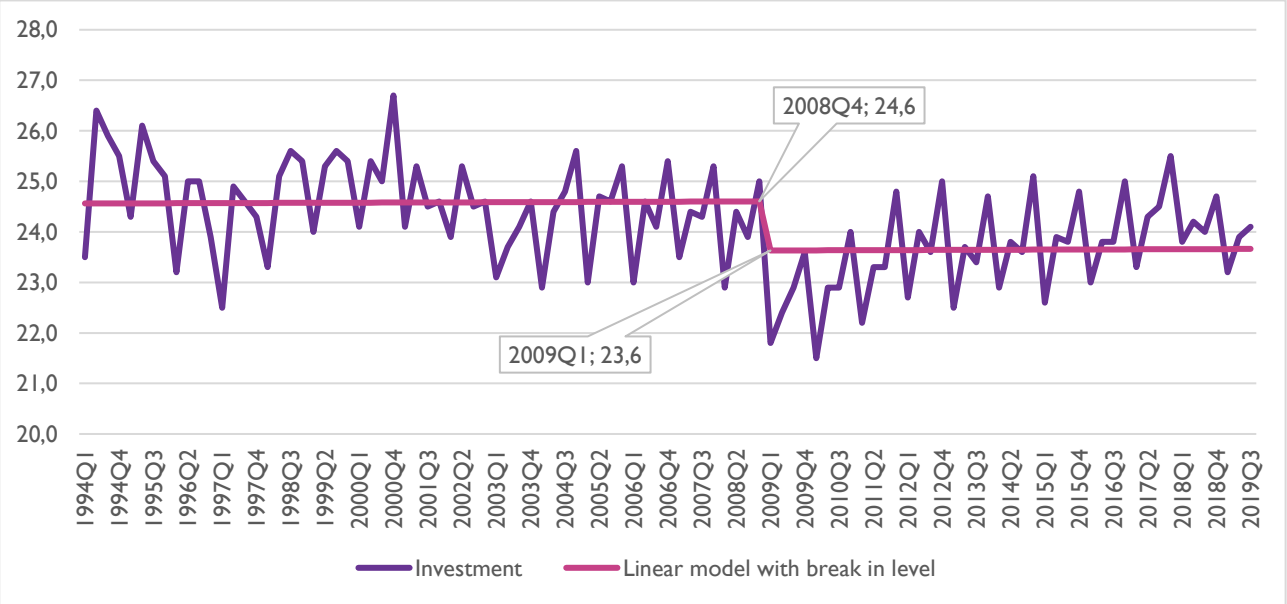
Source: Europe Economics calculations based on Eurostat data.

Table 8.3: Linear model for investment as a % of GDP in Switzerland with a break in level and trend

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	25.70987	0.553351	46.46212	0.0000
Trend	-0.013195	0.006343	-2.080255	0.0401
Break (2009Q1)	-7.334815	1.541167	-4.759260	0.0000
Trend * Break (2009Q1)	0.051673	0.012230	4.225110	0.0001

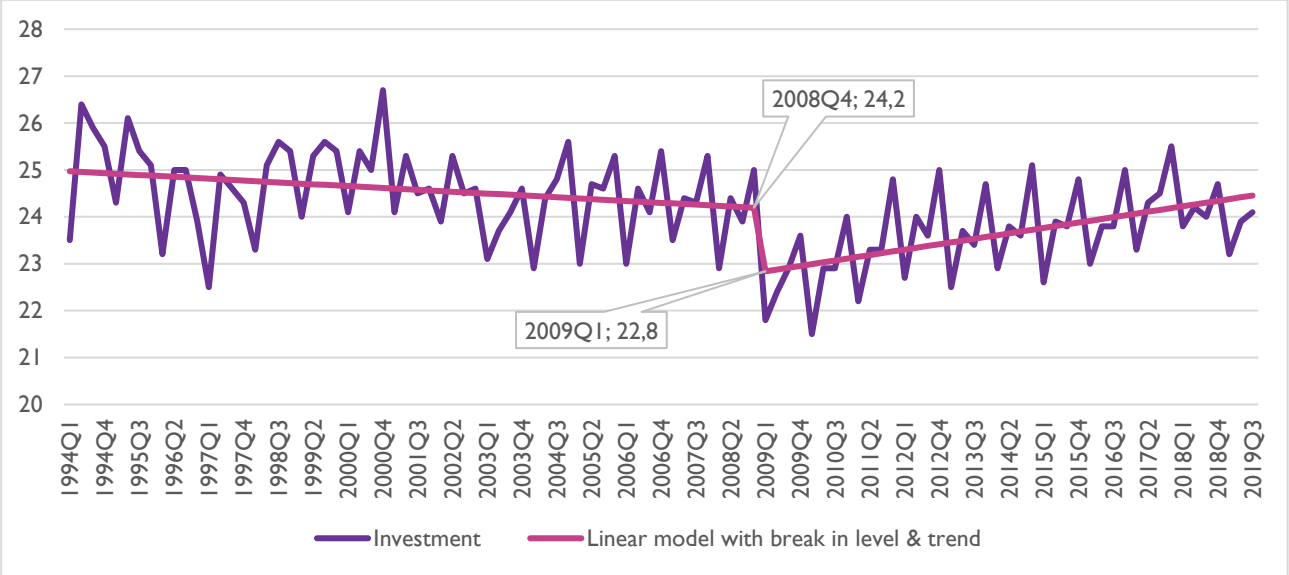
Source: Europe Economics calculations based on Eurostat data.

Figure 8.2: Linear model for investment as a % of GDP in Switzerland with a break in level



Source: Europe Economics calculations based on Eurostat data.

Figure 8.3: Linear model for investment as a % of GDP in Switzerland with a break in level and trend



Source: Europe Economics calculations based on Eurostat data.

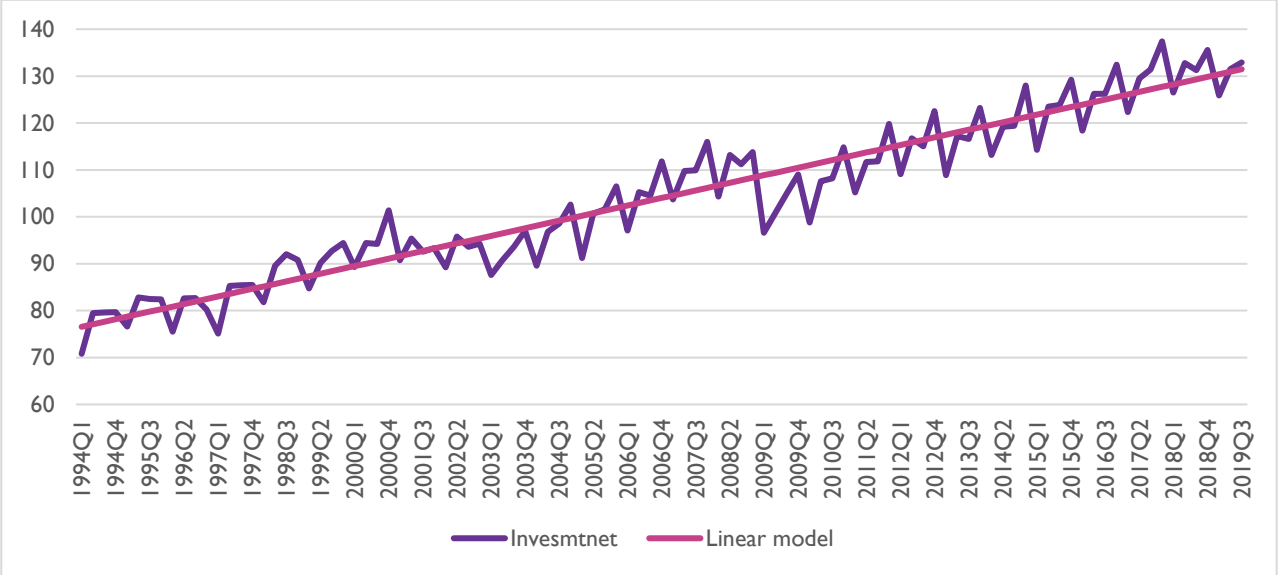
In simple linear trend models, in which we test for breaks, the conclusions that can be drawn about the evolution of investment in Switzerland's are as follows:

- According to the model with break in level — investment levels in Switzerland were stable at around 24.5 per cent of GDP prior to the great recession, and since 2009Q1, they stabilised towards a lower level (i.e. at around 23.5 per cent).
- According to the model with break in level and trend — investment levels in Switzerland experienced a slight decrease, relative to GDP (at a rate of around 0.01 per cent per quarter), up until 2008. Around 2009 the investment levels (expressed as percentage of GDP) dropped by around 1.4 percentage points, (from 24.2 per cent to 22.8 per cent) and since then they have experienced a recovery (with a quarterly increase of around 0.05 per cent).

8.1.2 Investment levels in real terms

As we did for the investment series expressed as a percentage of GDP we first try to explain the evolution of real investment with a simple trend model. A graphic illustration and the estimation results of this linear trend model are displayed in Figure 8.4 and Table 8.1.

Figure 8.4: A linear model of real investment in Switzerland



Source: Europe Economics calculations based on Eurostat data.

Table 8.4: Estimation result of a linear model for real investment levels in Switzerland

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	46.41477	1.751678	26.49731	0.0000
Trend	0.538270	0.015773	34.12562	0.0000

Source: Europe Economics calculations based on Eurostat data.

Compared to investments as a share of GDP — which have decreased linearly since 1994 (see Figure 1.13), the absolute level of investments in Switzerland have increased linearly since 1994. Since there appears to be a deviation from the trend around 2009 we have conducted the same type of breakpoint tests we employed in Section 1.5.1, and these confirm that, indeed the series displays a break in 2009Q1.

We have therefore tested two alternative versions of the linear model: one which allows for a break in the level of investment (without affecting the trend) at 2009Q1, and one which allows for a break in both the level of investments and the trend (both at 2009Q1). The estimation results and the graphical representations of these models are presented in the tables and the charts below.

Table 8.5: Linear model of real investment in Switzerland with a break in level

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	40.33435	2.554390	15.79021	0.0000
Trend	0.616694	0.029071	21.21319	0.0000
Break (2009Q1)	-5.535348	1.752738	-3.158115	0.0021

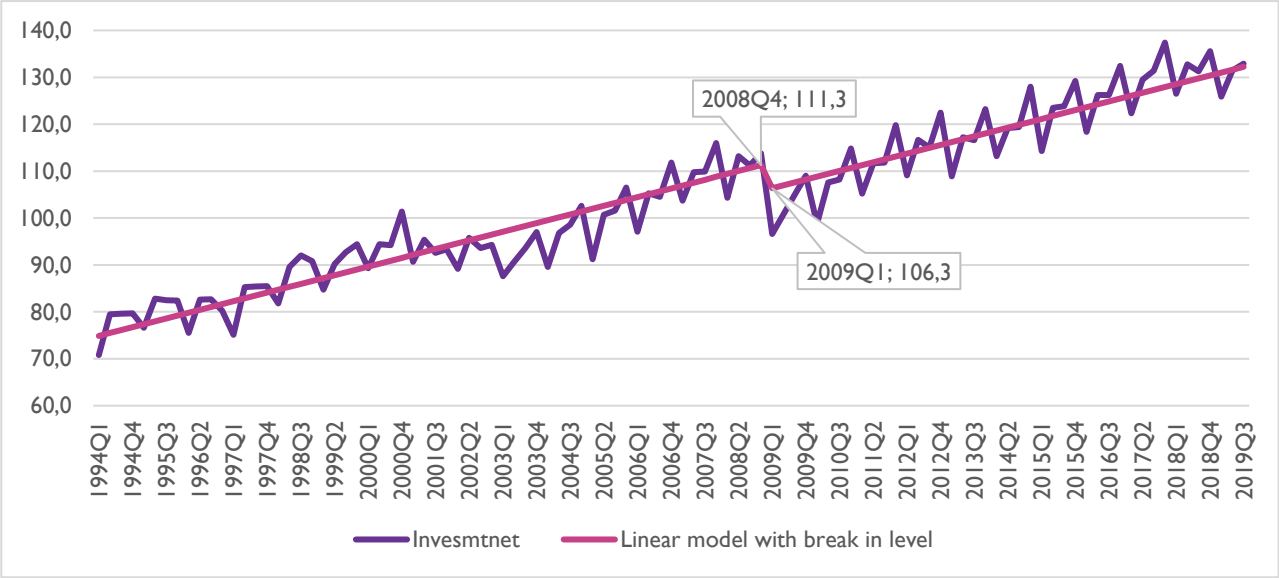
Source: Europe Economics calculations based on Eurostat data.

Table 8.6: Linear model of real investment in Switzerland with a break in level and trend

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	44.68254	2.854507	15.65333	0.0000
Trend	0.565838	0.032722	17.29250	0.0000
Break (2009Q1)	-28.81681	7.950236	-3.624648	0.0005
Trend * Break (2009Q1)	0.189055	0.063089	2.996617	0.0035

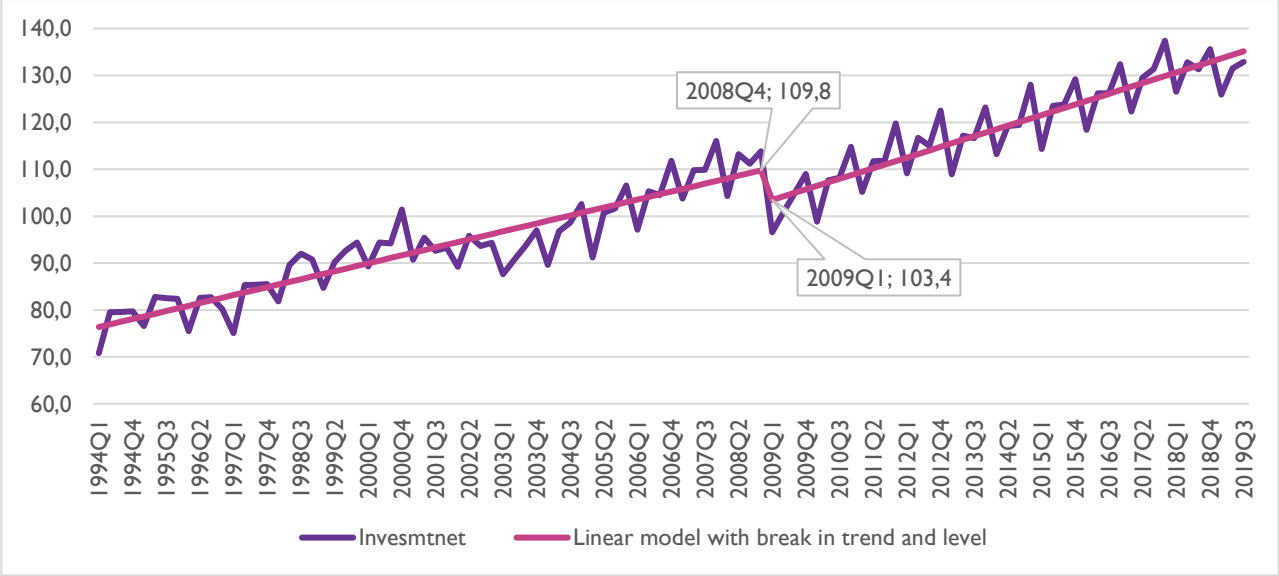
Source: Europe Economics calculations based on Eurostat data.

Figure 8.5: Linear model of real investment in Switzerland with a break in level



Source: Europe Economics calculations based on Eurostat data.

Figure 8.6: Linear model of real investment in Switzerland with a break in level and trend



Source: Europe Economics calculations based on Eurostat data.

The conclusions that we can draw from the models with breaks specified above are as follows:

- According to the model with break in level — investment levels in Switzerland have increasing linearly prior to the great recession. From 2009Q1 onwards they stabilised towards a lower level (around 4 per cent per cent lower than the level recorded in 2008Q4), but have since kept then rising at the same rate.
- According to the model with break in level and trend — investment levels in Switzerland have increasing linearly prior to the great recession, and since 2009Q1 they stabilised towards a lower level (around 6 per cent per cent lower than the level recorded in 2008Q4), but have since kept then rising at slightly higher rate than that experienced before the crisis.

8.1.3 Investment per capita

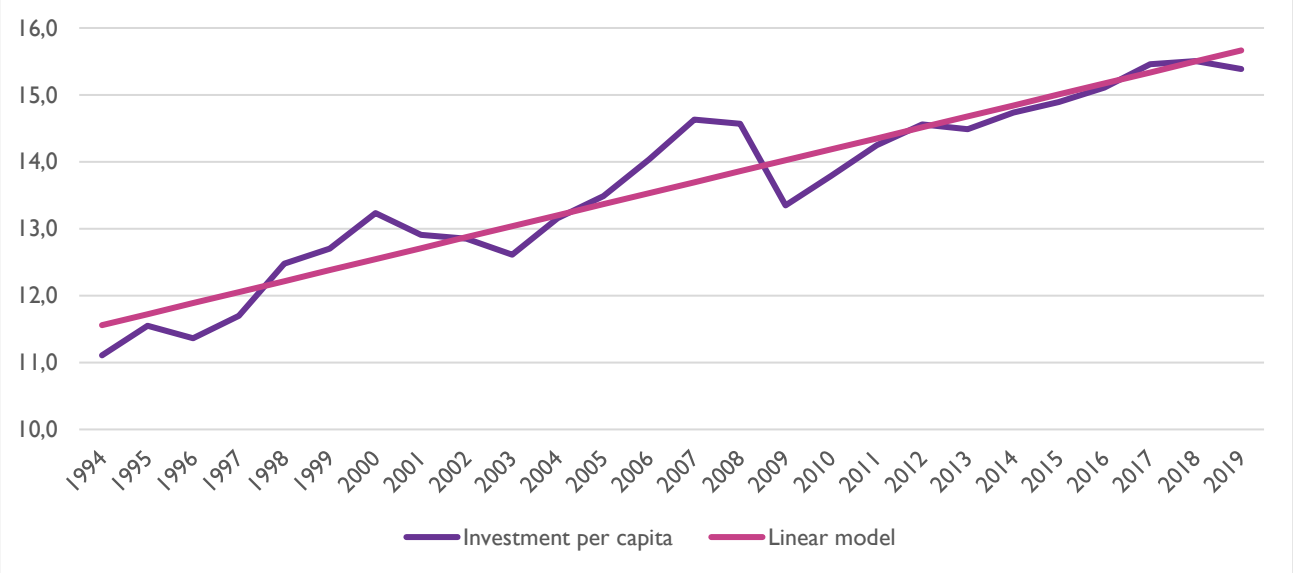
We have estimated a linear trend model and tested for the potential presence of breaks in the series. The estimation results and the graphical representation of the linear trend model are reported in Table 8.7 and Figure 8.7.

Table 8.7: Estimation result of a linear model for real investment per capita levels in Switzerland

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	9.259046	0.291787	31.73220	0.0000
Trend	0.164248	0.010595	15.50287	0.0000

Source: Europe Economics calculations based on Eurostat data.

Figure 8.7: A linear model of real investment per capita in Switzerland



Source: Eurostat and Europe Economics calculations

The multiple break point tests conducted suggest that there are two potential breaks in the series one in 2002 (i.e. around of the "dot com bubble" burst), and one in 2009 (the great recession). We have therefore estimated a model that allows for breaks in level and in trends at these specific dates. The estimation result of this model is reported below.

Table 8.8: Linear model of real investment per capita in Switzerland with a breaks in level and trend (breaks in 2002 and 2009)

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	6.745943	0.644467	10.46748	0.0000
Trend	0.307692	0.036515	8.426442	0.0000
Break (2002)	-2.121609	1.293580	-1.640107	0.1166
Trend * Break (2002)	0.052099	0.057735	0.902380	0.3776
Break (2009)	3.202506	1.360741	2.353501	0.0289
Trend * Break (2009)	-0.158109	0.050091	-3.156439	0.0050

Source: Europe Economics calculations based on Eurostat data

As we can see from Table 8.8 despite the multiple break points tests suggests that there is break in the series in 2002, such break does not appear to be sufficiently significant to affect the trend (as we can see from the p-values of the "Trend * Break (2002)" coefficients). However, the level break in 2002 is close to being

significant at the 10 per cent confidence level (the p-values of the "Break (2002)" coefficients is only marginally higher than 0.1). We have therefore re-estimated the model after excluding the "Trend * Break (2002)" coefficient. The estimating results are reported below.

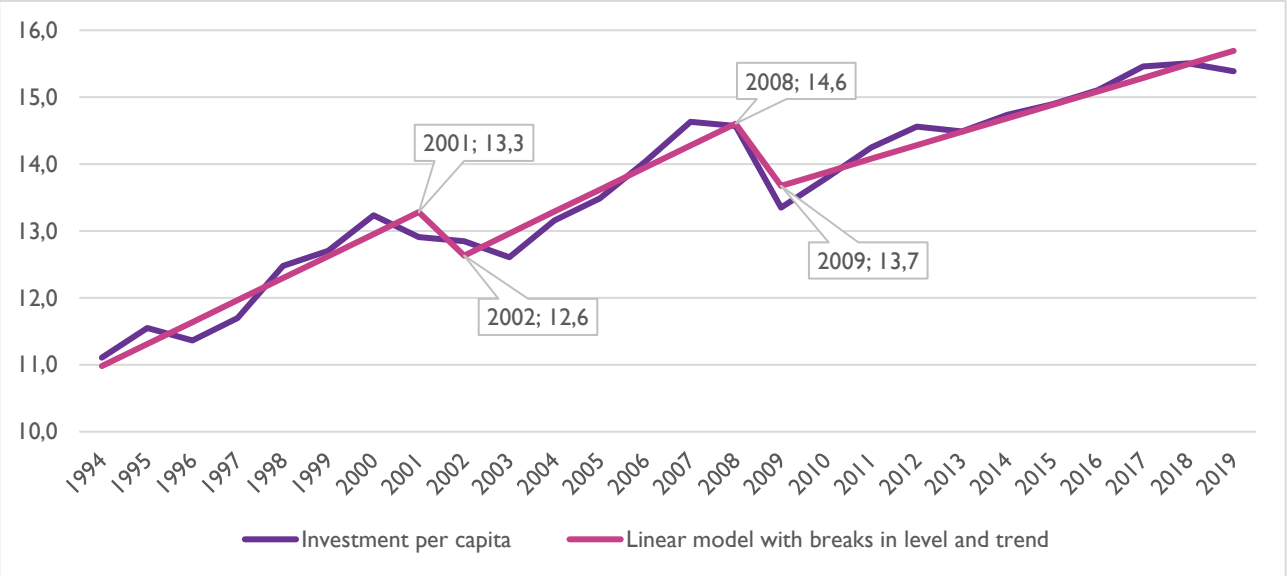
Table 8.9: Linear model of real investment per capita in Switzerland with a breaks in level and trend (break in level in 2002 and breaks in level and trend in 2009)

Variable	Coefficient	Standard error	T-statistics	P-value
Constant	6.381249	0.499774	12.76828	0.0000
Trend	0.328531	0.028159	11.66698	0.0000
Break (2002)	-0.975427	0.243865	-3.999869	0.0006
Break (2009)	2.421018	1.044925	2.316930	0.0307
Trend * Break (2009)	-0.126850	0.036021	-3.521534	0.0020

Source: Europe Economics calculations based on Eurostat data

A graphical representation of the model of Table 8.8 is provided below.

Figure 8.8: Linear model of real investment per capita in Switzerland with a break in level and trend



Source: Europe Economics calculations based on Eurostat data.

The conclusion we can draw from Figure 8.8 are as follows:

- Real investment per capita in Switzerland fell by around 5 percent (from 13.3 to 12.6) in 2002 but then continued to increase at the same rate experienced prior to 2002.
- Real investment per capita in Switzerland fell by around 6 percent (from 14.6 to 13.7) in 2009 and afterwards kept rising but at a lower rate than that experienced prior to 2009.