# The net fiscal contribution of foreigners in Germany

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## Document control sheet

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# Abstract

The present paper estimates the net fiscal contribution (NFC) of foreigners in Germany, based on data from the Socio-Economic Panel. It updates earlier studies and captures the situation after the arrival of a large number of refugees and migrants in the 2010s. We find that German nationals had in 2018 an average NFC of 629 euros, i.e. they paid more in terms of taxes and social security contributions than they received in terms of cash or in-kind transfers. The NFC was even higher for EU nationals, for which the difference was on average 3,175 euros. Nationals from non-EU countries had a negative NFC of -2,633 euros. For all three groups, aggregate NFC is fairly small in relation to GDP. The combined NFC of foreigners in Germany in 2018 was only slightly negative, at -2.5 billion euros or about 0.07% of GDP. An age-adjusted measure of NFC changes the ranking of the three groups. German nationals have the highest NFC over their synthetic life cycle, with EU nationals ranking second, while the NFC of non-EU nationals is slightly more negative in this case.

# 1. Introduction

The economic effects of immigration are a key issue in policy debates in Europe, the United States, and many other countries. While much of the debate focuses on the labour market effects in terms of employment and wages, there is also an important policy and academic debate about the fiscal effects of immigration.[1] The most passionately debated aspect is the welfare use of immigrants and the related question of whether the welfare state acts as a "welfare magnet" – a pull factor for migrants at either the national or sub-national level. In addition, there is the wider question of immigrants' overall impact on the public budget. A full answer to this question is complicated; there is both a direct (for a given pre-government income) and an indirect effect, the latter taking into account immigration's impact on pre-government income (e.g., via wages, prices, employment, innovation, and productivity). Moreover, a large body of literature has shown that immigration and, more generally, ethnic diversity affect support for redistribution and the design of the tax-benefit system, yet another indirect effect (see the surveys by Cavaillé and Van der Straeten 2023; Stichnoth and Van der Straeten 2013).[2] Most studies, therefore, focus on the direct fiscal effect of immigrants or foreigners. The studies compute the net fiscal contribution: the difference between the contribution of households and individuals to public revenue (via taxes and social insurance contributions) and the public expenditures (cash transfers, in-kind transfers, public goods) that they receive in a given year.

The present paper contributes to this literature by analyzing the net fiscal contribution of foreigners in Germany, a country that has seen a particularly large inflow of refugees and migrants in the past decade, often from countries (Afghanistan, Iraq, Syria, more recently Ukraine) from which migrant inflows to Germany had been relatively small before. As a result of the large inflow of migrants and changes in their composition, earlier studies (Bonin 2006, 2014; Bonin, Raffelhüschen, and Walliser 2000; Sinn et al. 2001, 2003) are likely to provide limited guidance on the net fiscal contribution of the current population of

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[1] In their study for the UK, Dustmann and Preston (2008) find that welfare concerns are more strongly correlated with attitudes towards immigration than labour market concerns.

[2] Based on survey experiments in several countries, Alesina, Miano, and Stantcheva (2022) show that immigrants tend to be perceived as more numerous, culturally distant, economically weak, dependent on and favoured by government transfers than they actually are. People who hold negative views on immigration tend to be less supportive of redistribution. Their support is hardly affected by information about immigration, while positive narratives have a somewhat stronger effect.

foreigners and migrants. This paper proposes an update to these studies by including the new groups of migrants from Afghanistan, Iraq, and Syria that arrived in the 2010s, with a peak in 2015/16.[3] It also estimates the net fiscal contribution separately for nationals from EU and non-EU countries, while earlier studies only reported results for foreigners or immigrants in aggregate.

Like the earlier German studies and the UK study by Dustmann and Frattini (2014), this study adopts a comprehensive framework that apportions the entire government budget to households and individuals. This sets the study apart from a recent wave of studies covering the same period that study several European countries in a comparative perspective, but apportion only parts of the budget (Boffi, Suari-Andreu, and Vliet 2024; Fiorio et al. 2023; Joxhe, Scaramozzino, and Zanaj forthcoming).

**Data and Methods**     Like the earlier studies for Germany, we use data from the German Socio-Economic Panel, a longitudinal survey conducted since 1984 (Goebel et al. 2019). The SOEP is well-suited for the analysis as it has a large set of questions on earnings and other income as well as on migration. Moreover, since its beginning in 1984, the SOEP has oversampled migrants, most recently with the addition of large samples of recent migrants and refugees in 2016/17. We use SOEP data up to wave 2019, which contains retrospective income information for the year 2018. More recent waves of the SOEP are not used because they reflect the particular conditions of the Covid-19 pandemic. (The most recent SOEP wave is for the year 2021.) We classify individuals by nationality, with a distinction between German citizens, EU citizens, and citizens of countries outside of the EU. Nationality has the advantage over country of origin of being available in most official statistics and administrative datasets, which allows validating our survey-based results.

In 2018, total government revenue in Germany was 1,510 billion euros, while total expenditure was 1,429 billion euros, leading to a budget surplus of 81 billion euros. The goal of this paper is to assign both the revenue and expenditure to individuals, and then to contribute their net fiscal contribution as the difference between the revenue and expenditure that is assigned to them. In many cases, this assignment can be directly based on information from the SOEP. This works very well for important items such as

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[3] The even more recent, post-2022 wave of migrants from Ukraine is not part of the analysis for lack of suitable recent data.

cash transfers, income taxes, and social security contributions, while the assignment is more uncertain in the (quantitatively much less important) cases of corporate taxes, taxes on the acquisition of real estate, and inheritance taxes. In other cases such as indirect taxes or public expenditure on education and health, we combine data from the SOEP with information from external statistics or previous studies. Again, this works fairly well for education, and less well for the other two items, where we only distinguish by income deciles (indirect taxes) or age and a rather crude measure of medical visits (health) without taking into account potential differences by nationality within these age or income groups. Finally, there are some items, mostly on the expenditure side, for which we have not found ways to assign them based on microdata, and where we follow the DINA literature (e.g. Piketty, Saez, and Zucman 2018) and assign them on a per-capita basis or, in a robustness check, proportional to income. For all the items in which the assignment is based on microdata, we compare our fiscal aggregates with the figures from the German national accounts, and rescale our values to match the official figures.

**Results** We find noticeable differences in the net fiscal contribution (NFC) by nationality. German nationals had in 2018 an average NFC of 629 euros, i.e. they paid more in terms of taxes and social security contributions than they received in terms of cash or in-kind transfers. The NFC was even higher for EU nationals, for which the difference was on average 3,175 euros. Nationals from non-EU countries had a negative NFC of -2,633 euros.

German nationals, by far the largest of the three groups, had a total NFC of 45.2 billion euros in 2018. EU nationals contributed 13.4 billion more to the public budget than they received, while non-EU nationals have a negative NFC of 15.9 billion euros. These total NFC values are fairly small in relation to GDP. The NFC surplus of EU nationals corresponds to about 0.40% of GDP, while the negative NFC of non-EU nationals represents about 0.47% of GDP. Combining both groups, the NFC of foreigners in Germany in 2018 was only slightly negative, at -2.5 billion euros or about 0.07% of GDP.

The differences in the NFC arise mostly on the revenue side, where they reflect the large income differences between groups. By contrast, the average amount of public expenditure received is fairly comparable across groups, with German nationals (who are the oldest of the three groups) actually receiving more than the other two groups because of pensions and high health expenditure for the elderly.

When controlling for age, we find that German nationals have the highest NFC within each group. When measuring the NFC using the simple sum over the age-specific NFCs (up to and including age group 70–74; the sample size becomes too small for older age groups), German nationals have an average NFC of

4,644 euros. This is substantially higher than the 629 euros that are found for the actual cross-section; the difference reflects the, from the point of view of the NFC, unfavorable age composition of German nationals, who tend to be older than the other two groups. For EU nationals, the NFC over the synthetic life-cycle is 2,909 euros, slightly below the 3,175 euros in the cross-section. Finally, non-EU nationals, who are the youngest of the three groups, have a NFC of -3,690 euros over the synthetic life-cycle, compared with -2,633 euros in the cross-section. Note that this measure is based on cross-sectional data and therefore differs from an actual life-cycle measure of the NFC. The latter would require to follow the same individuals over their entire lives, from birth (or at least the year of immigration or naturalisation) to death. This would limit the analysis to fairly old cohorts and would prove practically impossible even in these cases, as the SOEP and other datasets have been around for a few decades only and moreover suffer from fairly high attrition rates.

Education is highly correlated with the NFC. This also holds when looking at differences within age groups, and within the three groups defined by nationality. Interestingly, non-EU nationals have slightly higher NFCs than German nationals in the two lowest education groups. The negative overall NFC of non-EU nationals is thus both a result of their less favorable education distribution and of their lower NFC among people with more than a high school degree.

Given the uncertainty surrounding the assignment of some of the revenue and expenditure items, we have run a number of robustness checks. We also redid our analysis for 2018 for all years between 2005 and 2019. While our results prove very robust in these checks, we acknowledge that there is some remaining and, given the lack of suitable microdata for assigning some items, probably unavoidable uncertainty. Finally, we would like to stress again that the NFC is a static accounting measure that focuses on the public budget and assigns budget items for a given distribution of pre-government income. It does not measure the economic impact of foreign nationals on the German economy, nor does it capture the full impact on the public budget. These more comprehensive measures would also take into account the effects of foreign nationals on pre-government income, and the effects that these changes in pre-government income have on public revenue and expenditure. Measuring this involves comparing Germany with a counterfactual Germany without any foreigners (or a different distribution of foreigners); such a comparison is difficult and goes beyond what is attempted in the present paper.

**Related Literature**     While early empirical studies often focused on the welfare use of immigrants (e.g., Blau (1984), Borjas and Hilton (1996), and Borjas and Trejo (1991) for the US or Riphahn (1998) for

Germany), there were also more comprehensive estimates of the fiscal effect of immigration at both the national and state level in the US (e.g. Panel on the Demographic and Economic Impacts of Immigration et al. 1997; Rothman and Espenshade 1992; Simon 1984).[4] Auerbach and Oreopoulos (2000) produced such a comprehensive estimate as input for a a set of generational accounts by cohort and migration status. Generational accounts (Auerbach, Gokhale, and Kotlikoff 1991, 1994) combine static cash flow accounting for a given year with projections for key variables such as the number and future net fiscal contribution of immigrants. The studies for Germany by Bonin (2006, 2014), Bonin, Raffelhüschen, and Walliser (2000), and Sinn et al. (2001, 2003) mentioned above follow the same approach. Similar studies were done for other countries (e.g. Chojnicki 2013; Collado, Iturbe-Ormaetxe, and Valera 2004; Mayr 2005); see Rowthorn (2008) for a general survey of the literature and a critique of some of the assumptions used to construct generational accounts.

Dustmann and Frattini (2014) provide a detailed and comprehensive account of the net fiscal contribution of migrants in the UK. Like the present study, they limit themselves to the cash flow accounting in a (repeated) cross-section, without embedding these results in a generational accounting framework. Similar to our distinction between EU and non-EU nationals, they distinguish between migrants from EEA and non-EEA countries. Previous studies for Germany, by contrast, only distinguish German nationals and foreigners. A more recent wave of studies uses data from EU SILC to estimate the net fiscal contribution of migrants in several European countries (Boffi, Suari-Andreu, and Vliet 2024; Fiorio et al. 2023; Joxhe, Scaramozzino, and Zanaj forthcoming). As noted above, these studies only apportion parts of the government budget.

Again as noted above, all of these studies estimates only the direct NFC of immigrants or foreigners. Preston (2014) discusses how this cash flow accounting differs from more comprehensive assessments that take indirect effects into account.[5] Using a quantitative model, Colas and Sachs (2024) assess some of these

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[4] The 1997 study for the National Academies of Science (Panel on the Demographic and Economic Impacts of Immigration et al. 1997) covered not only the fiscal effects, but the overall economic effects of immigration. Borjas (1994) provided another comprehensive survey. The National Academies of Science commissioned another study twenty years later (Panel On The Economic And Fiscal Consequences Of Immigration et al. 2017).

[5] In the related context of Distributional National Accounts (e.g Piketty, Saez, and Zucman 2018), Saez and Zucman (2019) clarify the difference between current distributional analysis, which is an accounting exercise, and tax reform distributional analysis, which takes behavioral responses into account.

indirect effects (working via the wages and labour supply of residents) for low-skilled immigrants in the US. They find that for some groups the positive indirect effect may outweigh the negative direct NFC. Clemens (2022) suggests to capture some of the indirect effects by adding an estimate of the capital taxes paid by employers of immigrant workers to the standard NFC measures. Another approach for measuring total effects (direct plus indirect) is to use (plausibly exogenous) within-country variation to study the fiscal effect of migration at the regional level (Maxand and Sallam 2024, e.g.).

**Roadmap**       The rest of the paper is structured as follows: We present our data in Section 2, explain our methods for assigning public revenue and expenditure to households and individuals in Section 3, present our results in Section 4, and our conclusions in Section 5.

## 2. Data

The main dataset used in the analysis is the Socio-Economic Panel (SOEP). The SOEP is a longitudinal household survey that has been conducted since 1984 (Goebel et al. 2019).[6] It is well-suited for the present analysis as it includes information on earnings (both gross and net) and on the key cash transfers such as child benefits, unemployment benefits, social assistance, and housing benefits.[7] Moreover, it has information on many household and person characteristics, including attendance of day care centres and enrolment in schools and universities. These will be used for the allocation of public expenditure on education.

Importantly, the SOEP has, from its beginning, put a particular focus on migrants. It includes a large number of questions related to migration and integration, and oversamples several groups of migrants. The first migration sample (with a focus on the so-called guestworkers) was already part of the first SOEP

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[6] Sozio-oekonomisches Panel (SOEP), Version 37, Daten der Jahre 1984-2020 (SOEP-Core v37, EU-Edition). 2022. DOI: 10.5684/soep.core.v37eu

[7] As usual with survey data, the information is self-reported. However, almost all of the variables that we use are part of the "generated" files issued by the data provider, i.e. they received particular attention regarding data quality. Reassuringly, the SOEP aggregates are very close to the official fiscal aggregates.

wave in 1984; in 2016/17, the SOEP added a large sample of recent migrants/refugees, which is key for the present analysis (Brücker, Kroh, et al. 2014; Brücker, Rother, and Schupp 2017). [8]

We use the SOEP wave of 2019, which includes both information for the month of the interview and retrospective information for 2018. Following common practice, we do not use the two more recent waves (2020, 2021) that are currently available because they were affected by the circumstances of the Covid-19 pandemic. To avoid adjusting the sampling weights (which are important for comparing our population numbers and fiscal aggregates with official statistics), we decide not to delete any observations with missing values, but rather to impute the latter.

Table 1. Population by Nationality and Country of Birth

|  | Born in Germany | Born Abroad | Total |
|---|---|---|---|
| German Nationals | 66.6m | 5.1m | 71.7m |
| Foreign Nationals | 1.6m | 8.6m | 10.1m |
| Total | 68.2m | 13.7m | 81.8m |

*Notes:* The tables shows the distribution of the population in Germany by nationality (German vs. foreign) and country of birth (Germany vs. abroad). Source: Federal Statistical Office (Destatis): Datenreport 2021, Wiesbaden. Own calculations based on Tabelle 1: Bevölkerung nach Migrationsstatus. The information on nationality and country of birth is from the Mikrozensus 2019. Total values may differ from the sum of the individual values due to rounding.

In our main analysis, we will group people by nationality instead of country of origin as nationality is more readily available in administrative datasets that we use to complement and validate our analysis based on the SOEP survey data. As Table 1 shows, Germany has both a sizeable number of foreign nationals and immigrants, i.e. people who were born abroad. The total population in 2019 was 81.8 million. 71.7 million or 88% of these were German nationals, the remaining 10.1 million or 12% were of foreign nationality. The share of people born abroad is even higher at 17%, which corresponds to 13.7 million people.

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[8] IAB-SOEP-Migrationsstichproben (M1, M2), Daten der Jahre 2013-2020, DOI: 10.5684/soep.iabsoep-mig.2020. IAB-BAMF-SOEP-Befragung Geflüchteter (M3-M5), Daten der Jahre 2016-2020, DOI: 10.5684/soep.iab-bamf-soep-mig.2020

Unlike France or the United States, Germany does not have a "law of the soil" (*ius soli*) that grants citizenship to everyone born on its territory, which explains why 1.6 million people had foreign nationality although they were born in Germany. Until the early 2000s, Germany also had strict rules for naturalisation. This – and the large inflow of recent migrants – explains that while 5.1 million of the 13.7 million people born abroad have German nationality, a majority of 8.6 million are foreign nationals.

In our main analysis, we distinguish three groups based on their nationality: German nationals, nationals of other EU countries, and non-EU nationals. The SOEP comes very close to the official population figures for these four groups (Table 4 in the Appendix), with a relative error of at most 5%.[9] For all three groups, the SOEP provides a good coverage in terms of sample size, ranging from more than 28,000 individuals of German nationality to about 1,400 EU nationals in the 2019 wave.[10] In some of the analyses, we will further differentiate by age, in age groups of five years. Here, the number of observations in each cell is typically fairly high, with a maximum of more than 2,500 observations for German nationals (in the age group 10–14) and almost 1,500 observations for non-EU nationals (in the age group 5–9) (Figure 5 in the Appendix). For EU nationals, the numbers are smaller, with a maximum of 162 observations (age group 40–49). For all three groups and especially the two groups of foreigners, the numbers are lower for the older age groups. While there are still 1,032 observations for German nationals aged 75–79, there are only 28 observations for EU nationals and 46 observations for non-EU nationals in this age group. We therefore limit some of the analyses to people aged 74 or below.

Table 2.   Summary Statistics

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[9] The total number of foreigners is 10.1m in Table 1 and 10.9m in Table 4. The first table is based on the Mikrozensus 2019 (which includes information on the country of birth) while the numbers in the second table are from the Central Registry of Foreigners and are as of December 31st, 2018.

[10] Here and elsewhere in the paper, we use the shorthand "EU nationals" to mean "EU nationals from countries other than Germany".

| | Median Age | No High School | High School | More than High School | Employment Rate | Gross Earnings |
|---|---|---|---|---|---|---|
| German | 45 | 13% | 49% | 38% | 84% | 37k |
| EU | 43 | 23% | 37% | 40% | 84% | 32k |
| Outside EU | 37 | 41% | 28% | 32% | 65% | 25k |

*Notes:* The table shows key summary statistics based on the Socio-Economic Panel (SOEP), version v37. The statistics are weighted using the survey weights provided by the SOEP. The highest degree is shown only for people aged 25 and above. Employment rates and gross earnings are for individuals of working age, defined here as between age 20 and 65. Gross earnings (for those who report positive working hours) are in euros per year.

Table 2 shows key summary statistics for the three groups. The groups differ greatly by age: while the median age for German nationals is 45 years, it is 43 years for EU nationals, and 37 years for nationals from outside the EU. As will be shown later, these differences in age play an important role for the net fiscal contribution of the different groups.

There are also differences when it comes to education, particularly at the lower end of the education distribution. While 13% of German nationals did not complete high school, the share is 23% for EU nationals and rises to 41% for non-EU nationals. The share of individuals with more than a high school degree stands at 38% for Germans, 40% for other EU nationals and at 32% for non-EU nationals.

Finally, the groups also differ in their labour market performance. While 84% of German nationals and EU nationals between the age of 20 and 65 are employed, the share is only 65% for non-EU nationals. Gross earnings (conditional on working) are 37,000 euros for German nationals, 32,000 euros for EU nationals, and 25,000 euros for non-EU nationals.

## 3. Methods

### 3.1. Overview

In 2018, total government revenue in Germany was 1,510 billion euros, while total expenditure was 1,429 billion euros, leading to a budget surplus of 81 billion euros (Table 3). For comparison, GDP in 2018 was 3,365 billion euros. The revenue and expenditure figures are for the consolidated budget, i.e. including the three levels of government (federal, state, municipal) and the social insurance system, which includes the public pension system, public health insurance, unemployment insurance, and long-term care insurance as well as accident insurance. On the revenue side, social insurance contributions are the by far the most important item, with an annual revenue of 695 billion euros for the four main branches and an extra 13 billion euros for accident insurance. Revenue from indirect taxes was 393 billion euros, most of

which was from the Value Added Tax. Income tax revenue was 318 billion euros and revenue from corporate taxes 76 billion euros. The tax on the acquisition of real estate (*Grunderwerbsteuer*) contributed 14 billion euros. Revenue from the inheritance tax was a little less than 7 billion euros. Note that, while Germany nominally still has a wealth tax (*Vermögensteuer*), it has been suspended since 1997 after the constitutional court ruled it unconstitutional in its present form. Finally, another 7 billion euros came from a variety of smaller taxes.

On the expenditure side, social expenditure was by far the largest item, at 995 billion euros. This includes 337 billion euros of public health expenditure, 31 billion for childcare, and 627 billion euros of cash transfers. Expenditure for general and vocational schools was 70 billion euros, expenditure for higher education stood at 31 billion euros. Finally, there is a sizeable category of other expenditure; the 333 billion euros in this category include interest payments, pensions of civil servants, central administration, foreign affairs, public security, energy and water management, transport and communication, and defence.

The goal of this paper is to assign both the revenue and expenditure to individuals, and then to contribute their net fiscal contribution as the difference between the revenue and expenditure that is assigned to them. In many cases, this assignment can be directly based on information from the SOEP. This works very well for important items such as cash transfers, income taxes, and social security contributions, while the assignment is more uncertain in the (quantitatively much less important) cases of corporate taxes, taxes on the acquisition of real estate, and inheritance taxes. In other cases such as indirect taxes or public expenditure on education and health, we combine data from the SOEP with information from external statistics or previous studies. Again, this works fairly well for education, and less well for the other two items, where we only distinguish by income deciles (indirect taxes) or age and a rather crude measure of medical visits (health) without taking into account potential differences by nationality within these age or income groups. Finally, there are some items, mostly on the expenditure side, for which we have not found ways to assign them based on microdata, and where we follow the DINA literature (e.g. Piketty, Saez, and Zucman 2018) and assign them on a per-capita basis or, in a robustness check, proportional to income. In the following, we will discuss the assignment of the different items in more details.

For all the items in which the assignment is based on microdata, we compare our fiscal aggregates with the figures from the German national accounts, and rescale our values to match the official figures.

## 3.2. Revenues

**Income Tax**     Income tax in Germany consists of wage tax, assessed income tax, solidarity surcharge, non-assessed taxes on yields, and the final withholding tax. We assign income tax revenue based on the information provided in the SOEP. Following the DINA approach, we equally split the income tax paid by the household among all adults aged 20 or older. (We vary this threshold as part of the robustness checks.) When aggregating our measure using the weights provided by the SOEP, we arrive at an income tax revenue of 358 billion euros in 2018, 13% higher than the official figure of 318 billion. In addition to sampling variation, the difference is likely due to the fact that the simulated income tax in the SOEP only takes into account standard deductions and generally cannot capture the impressive complexity of the German income tax system. As noted above, we rescale our variable to match the official number.

**Social Insurance Contributions**     The German social insurance system has four branches (pension, health, unemployment, long-term care) that are mostly financed through contributions that are calculated as a function of labour earnings. These contributions are partly paid by the employee and partly by the employers. There is an upper ceiling for the contributions (*Beitragsbemessungsgrenze*) that differs by branch and region. Participation in the public health insurance system is mandatory up to a certain earnings threshold (*Versicherungspflichtgrenze*); employees who have higher earnings can choose to stay in the system or leave it for private health insurance. Note that civil servants are not part of social insurance. Their pensions are paid directly out of the public budget, and the state also contributes to their (private) health insurance payments. Finally, the self-employed are not requires to have social insurance, but can choose to opt into the system.

**Table 3.**    Consolidated Public Budget and Assignment Methods

| | Source | Assigned Based on | bn EUR |
|---|---|---|---|
| **Total Revenue** | *Sum of Taxes and SSC* | | **1,510** |
| Social Insurance Contrib. | BMAS Sozialbudget | SOEP + Simulation | 696 |
| Accident Insurance Contrib. | BMAS Sozialbudget | Employment Status | 14 |
| Indirect Taxes | Destatis | Income Decile | 393 |
| Income Tax | Destatis | SOEP + Simulation | 318 |
| Corporate Taxes | Destatis | Asset Income | 76 |
| Tax on Acquisition of Real Estate | Destatis | Rental Value of Owners | 14 |
| Inheritance Tax | Destatis | Windfall Income | 7 |
| Other Revenue | Destatis | Split Equally | 7 |
| **Total Expenditure** | Destatis | | **1,429** |
| Social Expenditure | BMAS Sozialbudget | | 995 |
| of which: Health | BMAS Sozialbudget | Age + Medical Visits | 337 |
| of which: Childcare | Destatis | Attendance Rate by Age | 31 |
| of which: Cash Transfers | Rest of Social Expend. | SOEP | 627 |
| General/Vocational Schools | Destatis | Enrolment | 70 |
| Higher Education | Destatis | Enrolment | 31 |
| Other Expenditure | *Rest of Public Expend.* | Split Equally | 333 |
| **Surplus/Deficit** | *Revenue - Expenditure* | | **81** |

*Notes:* The table shows the value of the different items of the consolidated public budget in billion euros per year in 2018. It also shows the data sources and methods that we use to assign these budget items to households and individuals. Tax revenue: Federal Statistical Office (Destatis), Genesis database, Table 71211-0001: Steuereinnahmen: Deutschland, Jahre, Steuerarten vor der Steuerverteilung. Social insurance contributions, accident insurance contributions, social expenditure, and health expenditure from Federal Ministry of Labour and Social Affairs (BMAS): Sozialbudget 2019, Berlin, Table II "Leistungen und Finanzierung, Sozialbudget insgesamt". Total expenditure from the Federal Statistical Office (Destatis): Expenditure, revenue and financial balance of public budgets – Public finance (time series). Childcare, general/vocational schools and higher education: Federal Statistical Office (Destatis), Genesis database, Table 21711-0001: Ausgaben der öffentlichen Haushalte für Bildung: Deutschland, Jahre, Körperschaftsgruppen, Aufgabenbereiche der öffentlichen Haushalte. "SOEP" indicates that the assignment is based on the self-reported values in the SOEP. "SOEP + Simulation" indicates that the self-reported values in the SOEP are combined with a simulation step (based on Schwarze 1995). When fiscal aggregates are not taken from the data, but are computed by us based on other aggregates, this is *indicated in italics*. Because of this, total revenue and the budget surplus differ slightly from the values reported in Federal Statistical Office (Destatis): Expenditure, revenue and financial balance of public budgets – Public finance (time series), where total revenue in 2018 is 1,482 billion euros and the budget surplus is 53.6 billion euros. Contrib.: Contributions. Expend.: Expenditure.

The SOEP has information on employees' social insurance contributions; we calculate employers' contributions based on known rules. We assign all contributions to the employee, including the part that is paid by the employer.[11] The assignment works fairly well. Our aggregated SOEP figure is 664 billion euros, about 5% less than the official figure of 696 billion euros. Unlike for income taxation (which in

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[11] Contributions to the (quantitatively much less important) occupational accident insurance (*Unfallversicherung*) are paid entirely by the employer, and the SOEP has no information on this. We therefore take the total amount from the BMAS Sozialbudget report and split it equally among employees.

Germany is at the household level), social insurance contributions are computed at the individual level. For simplicity, however, we follow the same equal-split rule as for income taxes, i.e. we sum up social insurance contributions at the household level and then split them equally among all adults aged 20 or older.

**Indirect Taxes** There are several indirect taxes, of which the Value Added Tax (VAT; 19% for most products; there is also a reduced rate of 7 %) is quantitatively by far the most important. The other indirect taxes include taxes on alcohol, tobacco, energy, vehicles, and real estate. As the SOEP lacks data on expenditure, we assign indirect taxes based on the study by Bach, Beznoska, and Steiner (2016), who use data from the German expenditure survey (*Einkommens- und Verbrauchsstichprobe*, EVS) to compute the indirect tax burden as a share of gross household income. As shown in Figure 6 in the Appendix, while the poorest 10% of households pay on average 22.0% of their gross income in indirect taxes, the share goes down to 13.8% in the 5th decile, and to 6.6% among the richest decile.[12] These calculations of Bach, Beznoska, and Steiner are for the year 2015. In what is admittedly an approximation, we use their shares for the year 2018 in our main specification, and for all years between 2005 and 2018 as part of our comparison over time. More importantly for the purpose of our paper, Bach, Beznoska, and Steiner report the indirect tax burden by income group, but do not distinguish by nationality. However, studies such as (Bauer and Sinning 2011, for Germany) and (De Arcangelis and Joxhe 2015, for the UK) have shown that migrants tend to have a higher savings rate than natives (other things equal), and this is likely also the case for foreigners vs. host-country nationals, i.e. the split that we consider in this paper. Moreover, in our own sample we find that foreigners are less likely than German nationals to own the house or apartment in which they live, and if they do, the property tends to have a lower value, as measured by imputed rents. This has implications for the assignment of revenues from the real estate tax, which, however, makes up only for a small share of indirect taxes. For lack of data, we abstract from these issues.

**Corporate Taxes** Corporate taxes in Germany include the municipal trade tax (*Gewerbesteuer*) as well as two types of income tax: corporations pay corporate income tax (*Körperschaftssteuer*), while sole

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[12] The share are in terms of gross household income, while the percentiles are defined in terms of equivalised gross household income, using the modified OECD scale (1 for the household head, 0.5 for other household member aged 14 or more, and 0.3 for those less than 14).

proprietorships are subject to the personal income tax (*Einkommensteuer*) already discussed above. The revenue from the municipal trade tax and the corporate income tax was 76 billion euros in 2018. As for the other taxes, the incidence of the tax is different from who nominally pays it. Corporate tax revenue can not only be borne by capital owners, but may also lead to lower wages for the employees, or a higher cost for the consumer. Cronin et al. (2013) evaluates that in the United States, 82% of the corporate tax is borne by capital income and 18% by labour income. In their study for the UK, Dustmann and Frattini (2014) subtract between 16 and 40% of corporate tax revenue for foreign owners and split the rest equally among adults. (In an alternative specification, they split the rest only among individuals with at least 10 years of residence in the UK.) We abstract from foreign ownership in our main analysis and assign the revenue from the corporate income tax and the municipal trade tax proportional to asset income observed in SOEP. We run robustness checks in which we split the revenue equally among adults or proportionally to disposable income.

**Tax on the Acquisition of Real Estate**     With an annual revenue of about 14 billion euros, the tax on the acquisition of real estate (*Grunderwerbsteuer*) is among the smaller sources of tax revenue in Germany. The tax rate is set at the state level and varied between 3.5 and 6.5 percent in 2018. We assign the tax revenue to owners-occupiers, proportional to the imputed rental value that is available in the SOEP. As the tax has to be paid only once, assigning the revenue to all current owner-occupiers (regardless of when they bought the property) is an approximation which assumes that the structure of buyers and property values remains constant over time. Likewise, we do not capture owners that rent out their property or the part of the tax on the acquisition of real estate that is paid for commercial (as opposed to residential) property.

**Inheritance Tax**     The revenue from the inheritance tax (*Erbschaftssteuer*) and the tax on gifts inter vivos (*Schenkungssteuer*) had a combined revenue of slightly less than 7 billion euros in 2018. The revenue is assigned based on a SOEP variable in which respondents report "one-time transfers, winnings, inheritance and gifts of money".

**Other Revenue**     There are a number of smaller taxes for which, for lack of good data, the revenue (less than 7 billion euros in 2018) is split equally among adults in the sample.

## 3.3. Expenditure

**Cash Transfers**        With annual spending of 627 billion out of a total 1,429 billion euros, the various cash transfers that we can directly observe in the SOEP make up almost half of the consolidated public budget in 2018. This wealth of information is a major plus of the SOEP data for the purpose of this article. On the social insurance side, the transfers observed in the SOEP include public pensions (old-age, disability, widows and widowers) and unemployment benefits. In addition, there are child benefits as well as several means-tested cash transfers such as basic allowance for job seekers (*Arbeitslosengeld II*), social assistance (*Sozialhilfe*), housing benefits (*Wohngeld*), and child allowance (*Kinderzuschlag*). Finally, the SOEP also has information on cash transfers for asylum seekers.[13]

**Education**        Enrolment in educational institutions is observed in the SOEP. The German school system is organised at the level of the 16 federal states. In most states, primary school (*Grundschule*) lasts four years. After these four (or, in some states, six) years, students are enrolled in one of three tracks.[14] The highest track (*Gymnasium*) offers, after completion, direct admission to academic studies. Depending on the federal state and the year, Gymnasium lasts 8 or 9 years. The other two tracks only last 5 years (*Hauptschule*) or 6 years (*Realschule*) and typically prepare students for vocational training. Parents can choose the track in which they would like to enrol their child, but typically follow the recommendation of the primary school. Tertiary education is divided between universities and technical colleges (*Fachhochschulen*). Most of these institutions are public and tuition fees are negligible. We combine the information on enrolment with the per-student public expenditure by education level (primary, secondary, vocational, tertiary) published by the Federal Statistical Office (Eichstädt, Fußmann, and Leiste 2021). Expenditure per student ranges between 7,100 EUR for primary schools and 11,200 EUR for *Hauptschule* (Table 6 in the Appendix).

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[13] Details on the different cash transfers can be found in an English-language brochure "Social Security at a Glance", published by the German Federal Ministry of Labour and Social Affairs (BMAS 2020).

[14] There are also some secondary schools that combine all tracks (*Integrierte Gesamtschule*).

For general schools, the aggregated enrolment numbers from the SOEP match the official aggregates fairly well. Based on the SOEP, we overestimate the number of children by 6% in primary education, 5% in secondary education, and 1% in tertiary education (Table 5 in the Appendix). For vocational schools, however, there is a substantial overestimate of 46 %. As vocational schools make up only a relatively small share of the education system, the total numbers look nevertheless alright, with an overestimate of 8% (15.34 vs. 14.21 million). Note that, as for all the other revenue and expenditure items, we rescale our aggregated fiscal numbers to match their official counterparts.

**Childcare**     The Federal Statistical Office also publishes data on public expenditure per child in day care and after-school care. We combine this with enrolment rates by age and migration background (defined as being born abroad or having at least one parent who was born abroad) that we also take from the Federal Statistical Office (Table 7 in the Appendix).[15] We use the migration background as an (admittedly imperfect) proxy for nationality.[16] About 30% of children below the age of 3 attend day care in Germany. The share is 43% for children without migration background, and only 21% for children with migration background. In the age group 3 to 5, i.e. kindergarten, overall enrolment is 90 %, with a share as high as 99% for children without migration background, and a share of 80% for children with migration background. Starting with age 6 and especially age 7, day care gives way to after-school care, which is relevant for only a small share of children.

**Public Health Expenditure**     At 337 billion euros per year in 2018, public health expenditure is an important expenditure item. From the perspective of the patient, this expenditure is in kind, and the expenditure is not directly observable in the SOEP or other micro datasets. We therefore base the assignment on official expenditure data, but use the SOEP to scale these numbers based on the number of doctor visits and nights at the hospital.

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[15] The data are for the year 2020. We assume that they also hold for 2018, the year of our main analysis.

[16] The share of children with migration background is much higher than the share of children with foreign nationality. As can be inferred from the overall mean and the group means in Table 7, almost half of children below the age of 6 in Germany have a migration background.

Expenditure data from the public health insurance is available by five-year age group from the Federal Health Monitoring (*Gesundheitsberichterstattung des Bundes*). The values are only available for 2015 and 2020. We use 2015 to avoid any Covid-related effects, and assume that the expenditure structure also holds for 2018, the year of our main analysis. We combine the expenditure data with demographic statistics from the Federal Statistical Office to arrive at per-capita expenditure for each age group. Average public health expenditure was 4,119 EUR (Table 8 in the Appendix). The expenditure is strongly concentrated among older people. In the age group 80 to 84, for instance, average expenditure is about 12,000 EUR, while for people below the age of 40 the average is typically less than 2,000 EUR per year.

Following Bonin (2014), we assign public health expenditure within each age group proportionally to a measure of health care use, which we define as

$$c_{it}^{HEALTH} = DOC_{it} + h \times HOSP_{it},$$

where $i$ indexes individuals, $t$ indexes years, $DOC_{it}$ is the number of doctor visits and $HOSP_{it}$ the number of nights spent at the hospital. The weights $c^{HEALTH}_{it}$ are then normalised by age groups so that the average public health expenditure by age group remains the same.

The factor h reflects the relative cost of hospital nights compared to doctor visits. The choice for h matters because in our sample foreigners spend 29% fewer nights in the hospital but have only 12% fewer doctor visits than German nationals in 2018. (This is without controlling for age or other factors; we will come back to the question of the different age distributions in Section 4 below.) In 2016, an average physician visit in the United States cost $265 and hospitals charged an average of $2,338 per inpatient day, which gives h ≈ 9.[17] We also try other values for h as part of the robustness checks, including Bonin's assumption

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[17] Cost per physician visit is from Medical Expenditure Panel Survey, Agency for Healthcare Research and Quality. Cost per hospital inpatient day from American Hospital Association (cited by the Kaiser Family Foundation website).

of h = 5. The SOEP provides the number of doctor visits and hospital nights only for adults (aged 18 or more), so we do not use any weights for minors.[18]

**Other Expenditure**     There is a substantial part of public expenditure (333 billion euros, or 23% of total expenditure) that, for lack of a better approach, we assign by assumption. This residual category of "other expenditure" is much bigger than on the revenue side, where only 7 billion euros of "other revenue" is assigned using these rules. In our main analysis, we split this expenditure equally among adults. As a robustness check, we alternatively assign it proportionally to disposable household income. Among this "other expenditure", the biggest spending items are interest payments, pensions of civil servants, central administration, foreign affairs, public security, energy and water management, transport and communication, and defense.

## 4. Results

## 4.1. Net Fiscal Contribution

Figure 1 shows the net fiscal contribution (NFC) – defined as revenues minus expenditure – in 2018 for the three groups defined above: German nationals, EU nationals (excluding Germany), and nationals of non-EU countries. German nationals had an average NFC of 629 euros, i.e. they paid more in terms of taxes and social security contributions than they received in terms of cash or in-kind transfers. The NFC was even higher for EU nationals, for which the difference was on average 3,175 euros. Nationals from non-EU countries had a negative NFC of -2,633 euros. The estimated 95% confidence interval ranges from 211 to 1,047 euros for Germans, from 2,007 to 4,342 euros for EU nationals, and from -3,019 to -2,246 euros for non-EU nationals (Table 9 in the Appendix). These intervals do not overlap, the ranking between the three groups is thus unaffected by sampling variation.

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[18] Some of the doctor visits reported by their parents may actually have been with their children. The SOEP question is not clear about this possibility ("Have you gone to a doctor in the last three months? If so, please state how many times."). As long as parents and children have the same nationality, this should not matter much for the calculation of the net fiscal contribution by nationality.

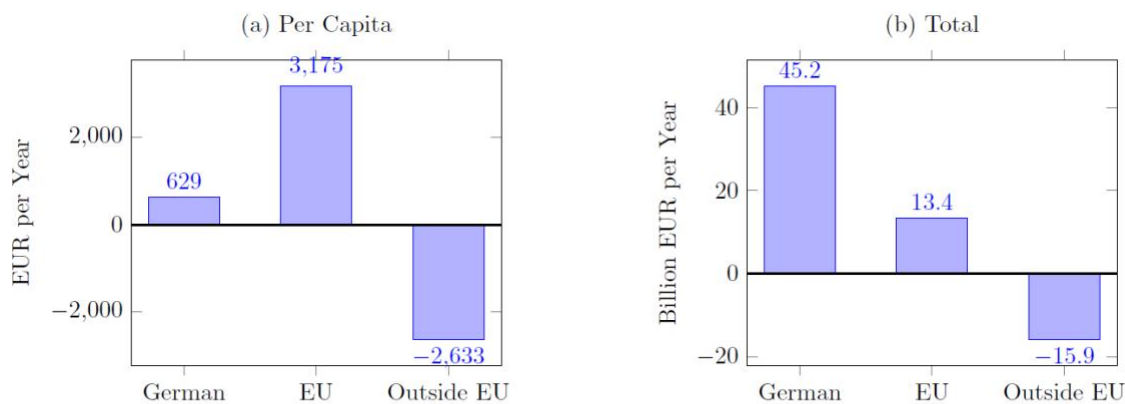## Figure 1.    Net Fiscal Contribution in 2018



Figure 1: Net Fiscal Contribution in 2018

*Notes:* The figure shows our estimates for the net fiscal contribution (NFC) of German nationals, EU nationals, and non-EU nationals in Germany in 2018. The estimates are based on the Socio-Economic Panel, version v37. See Sections 2 and 3 for details on the data and methods used. The left panel of the figure shows the average NFC in euros per year, the right panel the total NFC in billion euros per year.

The figure also shows the total NFC for the different groups. For German nationals, which, as seen in Section 2 and Table 4, are by far the largest of the three groups, had a total NFC of 45.2 billion euros in 2018. EU nationals contributed 13.4 billion more to the public budget than they received, while non-EU nationals had a negative NFC of 15.9 billion euros. Note that the total NFC was positive, reflecting the surplus in the consolidated budget in 2018.

These total NFC values are fairly small in relation to GDP. The NFC surplus of EU nationals corresponds to about 0.40% of GDP, while the negative NFC of non-EU nationals represents about 0.47% of GDP. Combining both groups, the NFC of foreigners in Germany in 2018 was only slightly negative, at -2.5 billion euros or about 0.07% of GDP.

As noted above, the NFC is merely an accounting measure that is derived under particular incidence assumptions. It does not measure the economic impact of foreign nationals on the German economy, nor does it capture the full impact on the public budget. These more comprehensive measures would also take into account the effects of foreign nationals on pre-tax/pre-transfer income, and the effects that these changes in pre-tax/pre-transfer income have on public revenue and expenditure. Measuring this involves comparing Germany with a counterfactual Germany without any foreigners (or a different distribution of foreigners); such a comparison is difficult and goes beyond what is attempted in the present paper.

## 4.2. Composition of the NFC

Figure 2 distinguishes between the revenue and the expenditure side. German nationals contribute on average 18,513 euros to the public budget, and receive 17,884 euros. EU nationals contribute less (16,833 euros), but also receive more than 4,000 euros less expenditure (13,658 euros), which explains their higher NFC. Non-EU nationals contribute 11,625 euros, much less than the other two groups and less than the public expenditure of 14,258 euros that they receive on average.[19]

Zooming in further, we see that German nationals pay only slightly higher social insurance contributions (which are capped at an upper ceiling) than EU nationals (8,684 euros vs. 8,640 euros).[20] For income tax (which is not capped and where the tax base also includes revenue other than earnings), the difference is a little larger (4,326 euros vs. 3,597 euros).[21] In relative terms, the difference between the two groups is largest for corporate taxes, which, as explained above, are allocated proportional to asset income. For German nationals, corporate taxes make up 1,196 euros per person and year, while EU nationals pay only 503 euros. Non-EU nationals contribute less to all four revenue items than the other two groups. Their social insurance contributions amount to 5,782 euros, their income tax payments to 2,069 euros, their indirect tax payments to 3,490 euros, and their corporate tax payments to 202 euros.

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[19] The difference between these values differs slightly from the NFC of -2,633 euros reported above. This is due to rounding.

[20] The values for the components of revenue and expenditure are also reported in Table 9 in the Appendix, where we include estimates of the standard error and confidence intervals.

[21] For the purpose of this breakdown, the taxes on inheritance and acquisition of real estate are grouped with income taxes.

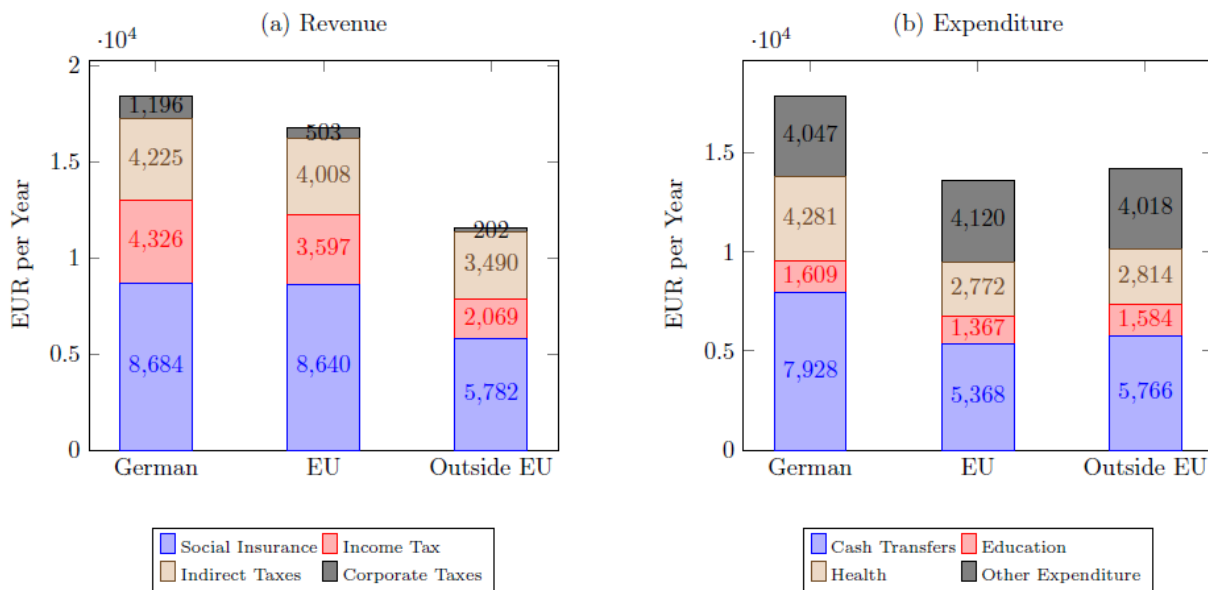Figure 2. Composition of Revenue and Expenditure by Nationality (2018)



Figure 2: Composition of Revenue and Expenditure by Nationality (2018)

*Notes:* The figure shows our estimates for the different main components of the net fiscal contribution (NFC) of German nationals, EU nationals, and non-EU nationals in Germany in 2018. The estimates are based on the Socio-Economic Panel, version v37. The values are also reported in Table 9 in the Appendix, where we include estimates of the standard error and confidence intervals. The left panel of the figure shows the components on the revenue side. We distinguish between social insurance contributions, income tax, indirect taxes, and corporate taxes. To reduce visual clutter, the small "other revenue" category (cf. Table 3) is not shown, and the income tax category includes the tax on the acquisition of real estate and the inheritance tax. The right panel shows the expenditure side. We distinguish between cash transfers (see Figure 3 for a more detailed breakdown), public education expenditure, public health expenditure, and the residual category of "other expenditure". The small "social housing" category is not shown. All values are averages and are expressed in euros per year.

The expenditure side is dominated by cash transfers. These make up 7,928 euros for German nationals, 5,368 euros for EU nationals, and 5,766 euros for non-EU nationals. With 1,584 euros, non-EU nationals receive almost as much as public education expenditure (including childcare) as German nationals (1,608 euros), and more than EU nationals (1,367 euros).For health expenditure, German nationals and non-EU nationals are far apart, with average expenditure of 4,281 euros for the former and of 2,814 euros for the latter group. EU nationals have again the lowest value (2,772 euros). For education and childcare as well as for health expenditure, the patterns are strongly influenced by differences in the age distribution among the three groups. German nationals are the oldest group and non-EU nationals the youngest, with EU nationals in the middle.

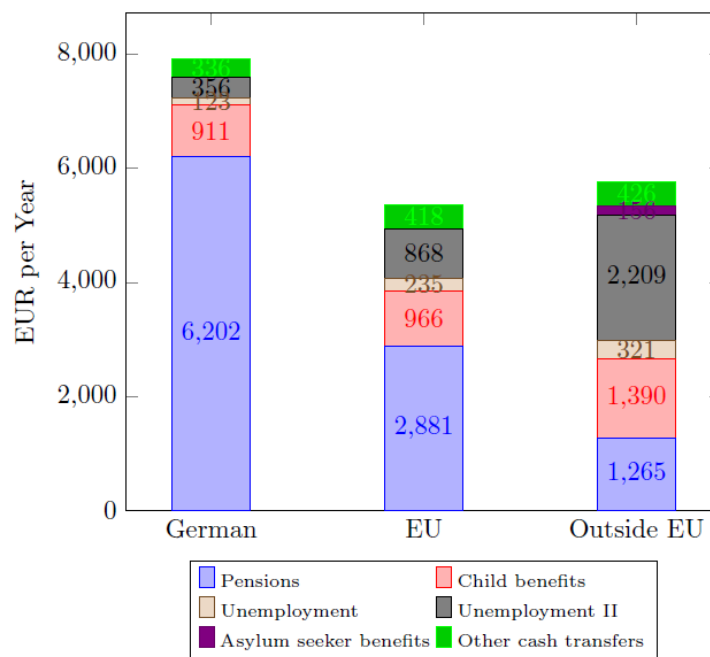Figure 3.     Composition of Cash Transfers by Nationality (2018



Figure 3: Composition of Cash Transfers by Nationality (2018)

*Notes:* The figure shows our estimates for the public cash transfers received by German nationals, EU nationals, and non-EU nationals in Germany in 2018. The estimates are based on the Socio-Economic Panel, version v37. The values are also reported in Table 10 in the Appendix, where we include estimates of the standard error and confidence intervals. We distinguish between pensions, child benefits, unemployment benefits (non means-tested and part of social insurance), unemployment II benefits (i.e., basic allowance for job seekers, a means-tested transfer), asylum seeker benefits, and other cash transfers.

Zooming in even further to cash transfers again shows important differences related to the age distribution (Figure 3).[22] As seen, German nationals receive the highest cash transfers on average. However, the bulk of these transfers are pensions and, to a smaller extent, child benefits, while means-tested transfers play only a relatively small role. For EU nationals, the overall amount of transfers is lower. Pensions pay a much smaller role for them, while means-tested transfers are more important than for German nationals. Finally, non-EU nationals receive overall slightly higher cash transfers than EU nationals, but their composition is fairly different. Pensions make up only a small share of the transfers that they receive. For non-EU nationals, a relatively large share of cash transfers take the form of means-tested benefits, in particular the basic allowance for job seekers (*Arbeitslosengeld II*). Non-EU nationals are also the group

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[22] The values are also reported in Table 10 in the Appendix, where we include estimates of the standard error and confidence intervals.

that receive the highest amount of child benefits. Note, however, that this reflects only part of financial support for children. The tax benefit arising from the child tax allowance (which grows with taxable income) is not reported among cash transfers, but enters via the income tax paid by household and is therefore part of the revenue side.

## 4.3. Influence of Age and Education

**Age**    There are important differences in the age composition between the three groups. The median age is 47 for German nationals, 42 for EU nationals, and 37 for non-EU nationals.

Figure 4.        Relationship between Age and the Net Fiscal Contribution (2018)
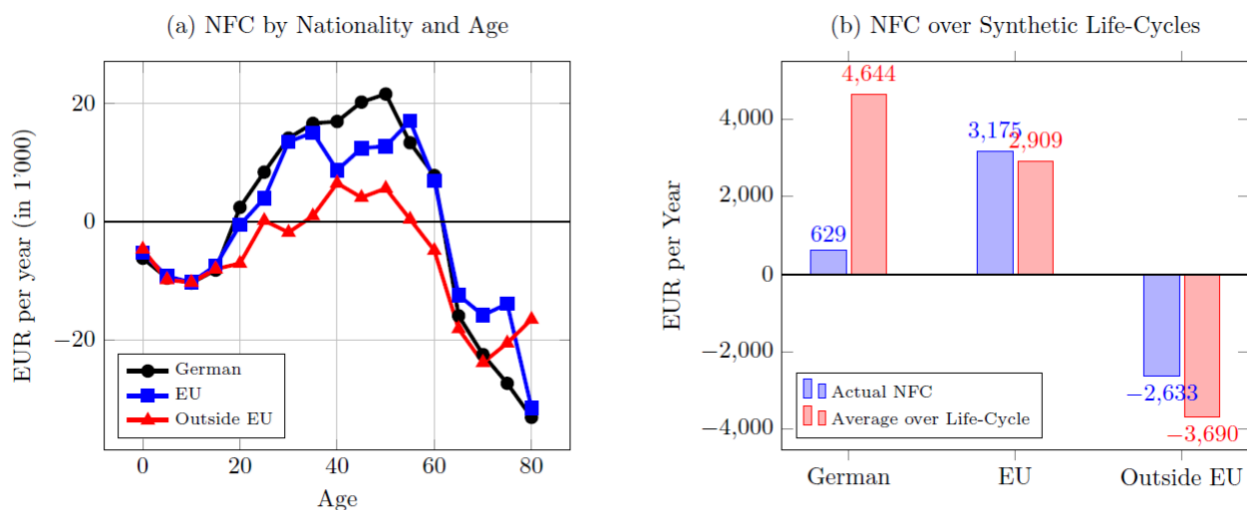


Figure 4: Relationship between Age and the Net Fiscal Contribution (2018)

*Notes:* The figure illustrates the relationship between age and the net fiscal contribution (NFC). The estimates are based on the Socio-Economic Panel, version v37. The left panel shows the estimated average NFC by nationality group (Germans, EU, non-EU) and age group (0–4, 5–9, . . . , 80+) in Germany in 2018. The right panel compares the NFC for the actual age distribution with the average NFC over a synthetic life-cycle, constructed by summing over the age-specific NFCs in the left-hand panel. In the left panel, values are in 1'000 euros per year; in the right panel, they are in euros per year.

As seen, the composition of the NFC reflects these differences in the age distribution. To take this age differences into account, we also computed the NFC by age for the three different groups (Figure 4, panel a). Up to age 20, the NFC is almost identical for all three groups. There are only slight differences in the age group 0 to 5, as German nationals are more likely to attend day care.

During the prime working years between ages 20 and 55, German nationals have the highest NFC of all three groups. EU nationals are a close second; especially in their 30s, their NFC reaches almost the same

level as for German nationals. The highest NFC is observed for German nationals in their 40s and early 50s; in these age groups, German nationals contribute on average about 20,000 euros more per year than they receive in terms of public expenditure.

During the transition from working life to retirement, i.e. for age groups 55–60 and 60–65, the NFC drops for all groups and especially for German nationals, but is still positive as most people still work.[23] In these two age groups, EU nationals have the same or even a slightly higher NFC than German nationals.

For age groups 65–70 and older, the NFC is negative for all three groups. EU and non-EU nationals have a less negative NFC than German nationals because their pension payments tend to be lower. Note that we can only observe pensioners who still live in Germany. By rescaling out SOEP aggregates to official budget figures, we assign to them the entirety of pension payments in a given year, including the payments from the German pension system that in reality go to pensioners living abroad. Foreigners are more likely than German national to be part of these pensioners abroad, and there is likely some selectivity both for German and foreign pensioners. Public health expenditure is another important expenditure item for these age groups. However, recall that, within age groups, we can only capture differences in public expenditure to the extent that they are reflected in the number of doctor visits and hospital nights, which is only a crude proxy for health expenditure.

As a way of adjusting for differences in the age composition between the three groups, we sum up over the age-specific NFCs, creating a synthetic life-cycle view of the NFC. As the sample size becomes fairly small for older age groups, we create this measure only up to (and including) age group 70–74. Note that this measure is based on cross-sectional data and therefore differs from an actual life-cycle measure of the NFC. The latter would require to follow the same individuals over time. With our panel survey that started in 1984, we could at most cover about 35 years.[24] Because of panel attrition, however, the actual time span is much shorter for most people in the sample.

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[23] For all birth cohorts until 1947, the statutory retirement age was 65 years. The threshold is increased by one month for each year after 1947 and reaches 67 years for all cohorts born in 1964 or later.

[24] As noted in Section 2, we use the SOEP wave of 2019 because the waves of 2020 and 2021 are affected by the pandemic. At the time of writing, more recent waves are not yet available.

When measuring the NFC using the simple sum over the age-specific NFCs (up to and including age group 70–74), German nationals have an average NFC of 4,644 euros (Figure 4, panel b). This is substantially higher than the 629 euros that are found for the actual cross-section; the difference reflects the, from the point of view of the NFC, unfavourable age composition of German nationals, who tend to be older than the other two groups. For EU nationals, the NFC over the synthetic life-cycle is 2,909 euros, slightly below the 3,175 euros in the cross-section. Finally, non-EU nationals, who are the youngest of the three groups, have a NFC of -3,690 euros over the synthetic life-cycle, compared with -2,633 euros in the cross-section.

The ranking between German nationals and EU nationals is thus reversed when regarding the synthetic life-cycle instead of the cross-section. Note, however, that the synthetic measure only runs until age 74. In the age group 75–79 and to a lesser extent in the group 80+, EU nationals have a higher (i.e., less negative) NFC than German nationals. While these differences are based on a small sample, they suggest that in a full synthetic life-cycle the difference between the two groups would be somewhat reduced. However, given the large difference of 4,644 euros vs. 2,909 euros, this is unlikely to change the ranking.

**Education** Education is highly correlated with the NFC. This also holds when looking at differences within age groups (Figure 7 in the Appendix). Between ages 20 and 60, individuals with a high school degree or more than a high school degree have about the same NFC, which is higher than for individuals without a high school degree[25] For the latter group, the average NFC is close to zero until age 50–54, and then turns clearly negative. For the other two groups, the NFC starts diverging in their early 30s: while the NFC of people with a high school degree grows only a little up to age 50–54, individuals with more than a high school degree tend to increase their NFC substantially over these age groups, up to a peak of about 35,000 euros per year. During retirement age, i.e. for age 65 and older, all three groups have a similar (and negative) NFC.

The positive correlation between education and the NFC also appears within the three groups defined by nationality (Figure 7 in the Appendix). Individuals with less than a high school degree have on average a negative NFC. Interestingly, the NFC in this group is most negative for German nationals, while EU nationals have the least negative NFC among individuals without a high school degree. For people with a

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[25] We start at age 20 to exclude the age groups in which most people are still in education.

high school degree, German nationals again have the lowest NFC, which is even slightly negative. EU nationals again do best in this group and also among individuals with more than a high school degree. Here, German nationals are a close second, while non-EU nationals have the lowest (but still positive) NFC in this group. The overall negative NFC of non-EU nationals is thus both a result of their less favourable education distribution and of their lower NFC among people with more than a high school degree. Both factors more than offset the fact that non-EU nationals do slightly better than German nationals in the two other education groups.

## 4.4. Robustness Checks

Given the uncertainty surrounding the assignment of some of the revenue and expenditure items, we have run a number of robustness checks (Table 11 in the Appendix). None of these checks overturn the ranking of the three groups with respect to their average NFC. The only check that leads to a major change (while keeping the ranking constant) concerns the assignment of the revenue from corporate taxation. In our main specification, we assign this revenue based on information on the SOEP about asset income. When we replace this assumption with an equal split among all adults, the NFC of German nationals falls from 629 euros to 519 euros, while the NFC of EU nationals increases from 3,175 euros to 3,777 euros. The major change concerns non-EU nationals, whose NFC increases from -2,633 euros to -175 euros, i.e. from a clearly negative value to a value close to 0. When the revenue from corporate taxation is assigned proportionally to disposable income (as opposed to asset income, which is more concentrated), the results are in between, but – for non-EU nationals – much closer to the main specification. German nationals now have a NFC of 549 euros, while the NFCs of EU nationals and non-EU nationals are 3,692 euros and -2,053 euros, respectively.

A second set of robustness checks regards public health expenditure, an important item on the expenditure side of the consolidated public budget. The check concerns the weighting of expenditure on doctor visits and nights at the hospitals. In our main specification, we set h = 9, i.e. a night at the hospital receives nine time the weight of a visit to the doctor. When we use values of h = 5 (as in Bonin 2014) or h = 20 (an arbitrary round value to the other side of h = 9) instead, the results change little. This reflects the fact that the variation in public health expenditure is mainly driven by age, while the additional variation that is captured by our proxy based on doctor visits and hospital nights is rather negligible. Note, however, that there may be other sources of variation within age groups that may be important, but are not captured in our analysis.

We also ran a number of other, more technical checks. We set the minimum age for adults, i.e. the people to which we assign all household level variables, to 18 or 22 instead of age 20. We also used a different SOEP file (the longitudinal file *pgen* instead of the cross-sectional file *bjp*) for determining educational enrolment of people aged 17 or older, and used linear regression instead of simple means to impute missing answers in the SOEP refugee samples. These checks leave the results virtually unchanged.

We also checked whether our results were specific to the particular year, either because of the SOEP sample (e.g., due to the different refreshment and extension samples) or to actual differences. We limit the check to the period since 2005, when a major reform of cash transfers (the so-called Hartz IV reform) went into effect. In each year since 2005, we redo our main analysis (which is for 2018), yielding a set of results from repeated cross-sectional analyses (Figure 9 in the Appendix). Over this period, the NFC increases slightly for Germans and EU nationals, although with some fluctuations for the latter group. For non-EU nationals, the trend is nearly flat. In each year, the ranking and the magnitudes from our main analysis are thus preserved. However, the results have to be interpreted cautiously as both the size and the composition of the three groups changed over time.

## 5. Conclusion

This paper analyses the net fiscal contribution of foreigners in Germany, based on data from the Socio-Economic Panel. It updates earlier studies to capture the situation after the arrival of a large number of refugees and migrants in the 2010s. In 2018, German nationals had an average NFC of 629 euros, meaning they paid more in taxes and social security contributions than they received in cash or in-kind transfers. The NFC was even higher for EU nationals, for which the difference is on average 3,175 euros. Nationals from non-EU countries had a negative NFC of -2,633 euros. For all three groups, aggregate NFC is fairly small in relation to GDP. The combined NFC of foreigners in Germany in 2018 was only slightly negative, at -2.5 billion euros or about 0.07% of GDP.

The differences in the NFC arise mostly on the revenue side, where they reflect the large income differences between groups. By contrast, the average amount of public expenditure received is fairly comparable across groups, with German nationals (who are the oldest of the three groups) actually receiving more than the other two groups because of pensions and high health expenditure for the elderly.

When controlling for age, we find that German nationals have the highest NFC within each group. An age-adjusted measure of NFC changes the ranking of the three groups. German nationals have the highest

NFC over their synthetic life-cycle, with EU nationals ranking second, while the NFC of non-EU nationals is slightly more negative in this case. Education is highly correlated with the NFC. This also holds when looking at differences within age groups, and within the three groups defined by nationality. Interestingly, non-EU nationals have slightly higher NFCs than German nationals in the two lowest education groups. The negative overall NFC of non-EU nationals is thus both a result of their less favourable education distribution and of their lower NFC among people with more than a high school degree.

While our results prove very robust in these checks, we acknowledge that there is some remaining and, given the lack of suitable microdata for assigning some items, probably unavoidable uncertainty. Moreover, while we document differences in the NFC between groups, there is no straightforward policy conclusion to be drawn. If one group has a higher NFC than another, this could, from the point of view of the public budget, call for having more people from the first group. However, extrapolating from a given situation is not straightforward because additional people from the first group may not have the same NFC as those already in the country. Moreover, the same finding of group differences could also be read as a call for action to bring the NFC of the second group closer to the one with the higher NFC, either through changing their pre-tax and pre-transfer economic position or by redesigning the tax-transfer system and public expenditure. For instance, the NFC of non-EU migrants increases less with education than for Germans or EU nationals. This could point to particular difficulties that non-EU nationals have with the recognition of their degrees on the German labour market. In addition, as many of the non-EU nationals are still young when arriving in the country, there is still time for them to obtain degrees in Germany, e.g. through occupational training.

Finally, we would like to stress again that the NFC is a static accounting measure that focuses on the public budget and assigns budget items for a given distribution of pre-government income. It does not measure the economic impact of foreign nationals on the German economy, nor does it capture the full impact on the public budget. These more comprehensive measures would also take into account the effects of foreign nationals on pre-government income, and the effects that these changes in pre-government income have on public revenue and expenditure. Measuring this involves comparing Germany with a counterfactual Germany without any foreigners (or a different distribution of foreigners); such a comparison is difficult and goes beyond what is attempted in the present paper.

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## 7. Datasets

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- IAB-BAMF-SOEP-Befragung Geflüchteter (M3-M5), Daten der Jahre 2016-2020,
  DOI: 10.5684/soep.iab-bamf-soep-mig.2020

- Sozio-oekonomisches Panel (SOEP), Version 37, Daten der Jahre 1984-2020 (SOEP-Core v37, EU-Edition). 2022.
  DOI: 10.5684/soep.core.v37eu

# 8. Additional Tables and Figures

Table 4.   Validation of Population Numbers

| Nationality | n | Official Aggregate | SOEP Aggregate | Relative Error |
|---|---|---|---|---|
| German | 28,044 | 71.7m | 72.0m | 0.04% |
| EU | 1,393 | 4.8m | 4.2m | -5% |
| Outside EU | 9,779 | 6.1m | 6.1m | -1% |

*Notes:* The table shows the sample size for our three nationality group and compares aggregates (using the weights provided by the SOEP) with official population numbers. The last column shows the relative error. The SOEP values are own calculations based on the Socio-economic Panel, version v37. The official population number for German nationals is from the Federal Statistical Office (Destatis): Datenreport 2021, Wiesbaden, which is based on data from the Mikrozensus 2019. The numbers for EU and non-EU nationals are from the Federal Statistical Office (Destatis): Ausländische Bevölkerung 2016 bis 20231 nach ausgewählten Staatsangehörigkeiten, Wiesbaden. In this case, the source is the Central Register of Foreigners (*Ausländerzentralregister*).

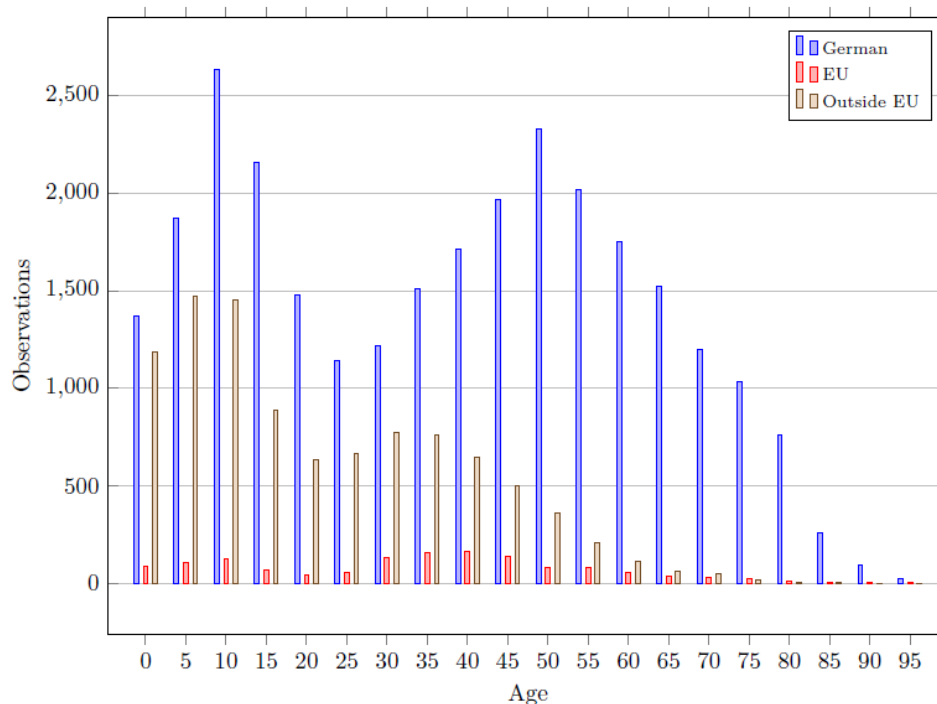## Figure 5.     Sample Size by Nationality and Age



Figure 5: Sample Size by Nationality and Age

*Notes:* The figure shows the number of observations by nationality group (German, EU, non-EU) and age group (0–4, 5–9, . . . , 95–99). The data are from the Socio-Economic Panel, version v37.

## Table 5.   Validation of Educational enrolment

| Level | Official | SOEP | Relative Error |
|---|---|---|---|
| Primary | 2.80 | 2.97 | 6 % |
| Secondary | 7.21 | 7.54 | 5 % |
| Vocational | 1.33 | 1.94 | 46 % |
| Tertiary | 2.87 | 2.89 | 1 % |
| Total | 14.21 | 15.34 | 8 % |

*Notes:* The table compares the number of students at different education levels in our SOEP analysis sample (grossed up using the weights provided by the SOEP) to official enrolment numbers. The last column shows the relative error. The official enrolment numbers for primary and secondary schools are from the Federal Statistical Office (Destatis), Genesis database, Table 21111-0002: Schüler: Deutschland, Schuljahr, Geschlecht, Schulart, Jahrgangsstufen. For vocational schools, the numbers are again from the Genesis database, Table 21211-0001: Auszubildende: Deutschland, Stichtag, Nationalität, Geschlecht, Ausbildungsbereich. Finally, tertiary enrolment numbers are from Table 21311-0001: Studierende: Deutschland, Semester, Nationalität, Geschlecht.

## Table 6.   Annual Public Expenditure per Student

| Type of School | German Name | Expenditure per Student |
|---|---|---|
| Primary Schools | Grundschule | 7,100 EUR |
| Secondary General Schools | Hauptschule | 11,200 EUR |
| Schools with Various Courses of Education | Schule mit mehreren Bildungsgängen | 9,200 EUR |
| Intermediate Schools | Realschule | 7,900 EUR |
| Grammar Schools | Gymnasium | 9,300 EUR |
| Integrated Comprehensive Schools | Integrierte Gesamtschule | 9,500 EUR |
| Vocational Schools | Berufsschule | 5,700 EUR |

*Notes:* The tables hosws the annual public education expenditure per student. Source: Eichstädt, Fußmann, and Leiste (2021): Bildungsausgaben: Ausgaben je Schülerin und Schüler 2019, Federal Statistical Office, Wiesbaden. Expenditure for general schools (*allgemeinbildende Schulen*) is from Table 2: Ausgaben für öffentliche Schulen je Schülerin und Schüler 2019 nach ausgewählten allgemeinbildenden Schulen und Ländern. Expenditure for vocational schools is from Table 1: Ausgaben für öffentliche Schulen je Schülerin und Schüler 2019 nach Schularten und Ländern.

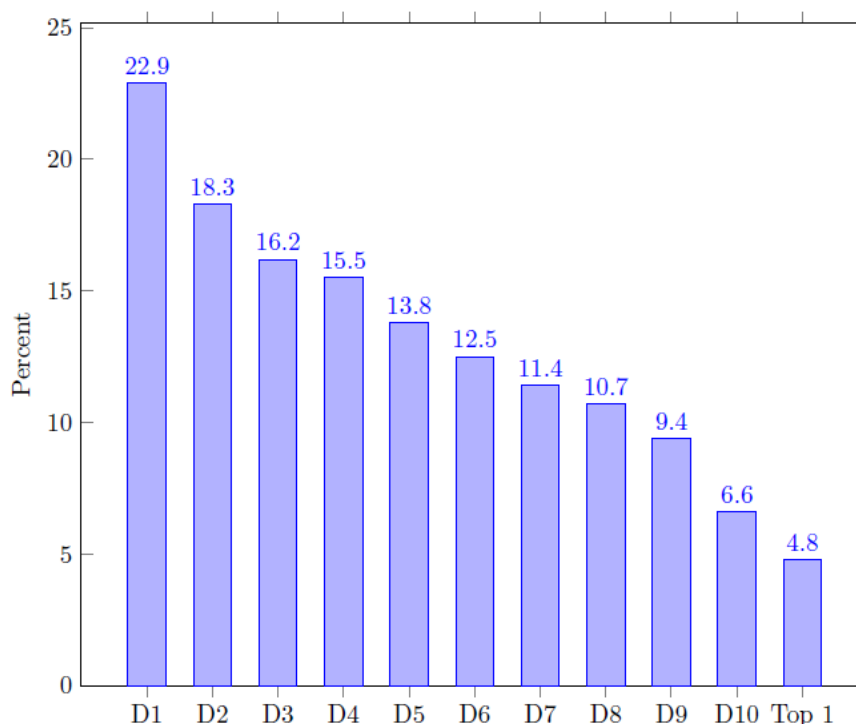## Figure 6.   Indirect Tax as a Percentage of Gross Household Income



Figure 6: Indirect Tax as a Percentage of Gross Household Income

*Notes:* The figure shows the share of indirect tax as a percentage of gross household income that we assign to households in the SOEP. We take these values from Bach, Beznoska, and Steiner (2016). Their estimates, which are based on data from the Income and Expenditure Survey (*Einkommens- und Verbrauchsstichprobe, EVS*, are for the year 2015. We assume that they also hold in 2018. D: Decile. Top 1: Top 1%. The shares are in terms of gross household income, while the quantiles are defined in terms of *equivalised* gross household income, using the modified OECD scale (1 for the household head, 0.5 for other household member aged 14 or more, and 0.3 for those less than 14). Bach et al. report a value for the 10th decile and a value for the Top 1%. We apply their value for the 10th decile only to percentiles 90 to 99, and use the Top 1% value for the richest 1%.

**Table 7.** Share in day care/After-School Care

| Age | Overall | Immigration Background Yes | No |
|---|---|---|---|
| Below 3 | 30 % | 21 % | 43 % |
| 3 to 5 | 90 % | 81 % | 99 % |
| 6 to 10 | 23 % | n.a. | n.a. |
| 11 to 13 | 1 % | n.a. | n.a. |
| Total | 35 % | 51 % | 71 % |

*Notes:* The table shows the share of children enrolled in day care or after-school care. The overall share is calculated by dividing the number of children enrolled by the total number of children in the respective age group. enrolment numbers are from the Federal Statistical Office (Destatis), Genesis database, Table 22541-0001: Tageseinrichtungen, Pädagogisches Personal, Kinder, Genehmigte Plätze, Gruppen: Deutschland, Stichtag. Population numbers are also from the Genesis database, Table 12411-0005: Bevölkerung: Deutschland, Stichtag, Altersjahre. The distinction between children with and without migration background is only possible for children below the age of 6. The shares are taken from the Federal Statistical Office, Betreuungsquote von Kindern unter 6 Jahren mit und ohne Migrationshintergrund in Kindertagesbetreuung am 1. März 2020 nach Ländern.

**Table 8.** Health Expenditure by Age Group

| Age | Expenditure (million EUR) | Group Size | Expenditure per Capita (EUR) |
|---|---|---|---|
| 0-4 | 7,488 | 3,613,546 | 2,072 |
| 5-9 | 7,288 | 3,571,914 | 2,040 |
| 10-14 | 9,083 | 3,695,666 | 2,458 |
| 15-19 | 12,321 | 4,189,964 | 2,941 |
| 20-24 | 7,017 | 4,587,878 | 1,529 |
| 25-29 | 9,094 | 5,387,681 | 1,688 |
| 30-34 | 10,310 | 5,167,860 | 1,995 |
| 35-39 | 10,489 | 4,951,744 | 2,118 |
| 40-44 | 11,700 | 4,990,088 | 2,345 |
| 45-49 | 17,593 | 6,523,704 | 2,697 |
| 50-54 | 22,756 | 6,954,765 | 3,272 |
| 55-59 | 24,223 | 6,038,640 | 4,011 |
| 60-64 | 24,580 | 5,202,056 | 4,725 |
| 65-69 | 23,667 | 4,331,884 | 5,463 |
| 70-74 | 29,139 | 3,969,193 | 7,341 |
| 75-79 | 38,405 | 4,269,898 | 8,994 |
| 80-84 | 30,948 | 2,524,412 | 12,259 |
| 85-89 | 25,023 | 1,322,875 | 18,916 |
| 90+ | 17,319 | 881,916 | 19,638 |
| Total | 338,444 | 81,175,684 | 4,119 |

*Notes:* The tables explains how we computed annual per-capita public health expenditure by age group. The expenditure by age group is taken from the Federal Health Monitoring (*Gesundheitsberichterstattung des Bundes*), Krankheitskosten in Mio. € für Deutschland. Gliederungsmerkmale: Jahre, Alter, Geschlecht, ICD-10. The values are for 2015. We combine this with information on the population by age group from the Federal Statistical Office (Destatis), Genesis database, Table 12411-0005: Bevölkerung: Deutschland, Stichtag, Altersjahre. The population values are also for 2015. The data source from the Federal Statistical Office groups all people aged 85 or older. We estimate that 60% of them are in the 85-89 age group based on French data (INSEE: Estimations de population, Pyramide des âges au 1er janvier 2020, France, update January 2023).

Table 9. Composition of Revenue and Expenditure by Nationality (2018)

|  | Mean | Std. Error | 95 % CI |
|---|---|---|---|
| **German Nationals (n=28,014)** | | | |
| Net Fiscal Contribution | 629 | 213 | [211; 1,047] |
| Social Insurance Contributions | 8,684 | 48 | [8,590 8,779] |
| Income Tax* | 4,326 | 60 | [4,209; 4,442] |
| Indirect Taxes | 4,225 | 17 | [4,192; 4,258] |
| Corporate Taxes | 1,196 | 87 | [1,026; 1,366] |
| Other Revenue | 82 | 0.2 | [82; 83] |
| Cash Transfers | 7,928 | 78 | [7,775; 8,081] |
| Public Education Expenditure | 1,609 | 19 | [1,570; 1,646] |
| Public Health Expenditure | 4,281 | 84 | [4,116; 4,447] |
| Other Expenditure | 4,047 | 11 | [4,025; 4,069] |
| Social Housing | 20 | 1 | [18; 22] |
| **EU Nationals (n=1,393)** | | | |
| Net Fiscal Contribution | 3,175 | 595 | [2,007; 4,342] |
| Social Insurance Contributions | 8,640 | 216 | [8,216; 9,065] |
| Income Tax* | 3,597 | 173 | [3,258; 3,936] |
| Indirect Taxes | 4,008 | 62 | [3,885; 4,131] |
| Corporate Taxes | 503 | 83 | [340; 667] |
| Other Revenue | 84 | 1 | [82; 86] |
| Cash Transfers | 5,368 | 268 | [4,843; 5,893] |
| Public Education Expenditure | 1,367 | 81 | [1,208; 1,526] |
| Public Health Expenditure | 2,772 | 220 | [2,341; 3,203] |
| Other Expenditure | 4,120 | 49 | [4,024; 4,216] |
| Social Housing | 30 | 5 | [21; 39] |
| **Non-EU Nationals (n=9,315)** | | | |
| Net Fiscal Contribution | -2,633 | 197 | [-3,019; -2,246] |
| Social Insurance Contributions | 5,782 | 72 | [5,641; 5,924] |
| Income Tax* | 2,069 | 54 | [1,964; 2,175] |
| Indirect Taxes | 3,490 | 24 | [3,443; 3,536] |
| Corporate Taxes | 202 | 12 | [179; 226] |
| Other Revenue | 82 | 0.4 | [81; 83] |
| Cash Transfers | 5,766 | 81 | [5,608; 5,925] |
| Public Education Expenditure | 1,584 | 33 | [1,519; 1,649] |
| Public Health Expenditure | 2,814 | 96 | [2,625; 3,003] |
| Other Expenditure | 4,018 | 20 | [3,979; 4,057] |
| Social Housing | 75 | 3 | [69; 80] |

*Notes:* The table reports our estimates of the net fiscal contribution and its main components by nationality group (German, EU, non-EU) in Germany in 2018. The estimates are based on the Socio-Economic Panel, version v37. See Sections 2 and 3 for details on the data and methods used. All values are in euros per year. Std. Error: Standard Error. CI: Confidence Interval. *) Income tax plus tax on the acquisition of real estate and inheritance tax.

Table 10. Composition of Cash Transfers by Nationality (2018

|  | Mean | Std. Error | 95 % CI |
|---|---|---|---|
| **German Nationals (n=28,014)** | | | |
| Total Cash Transfers | 7,928 | 78 | [7,775; 8,081] |
| Pensions | 6,202 | 77 | [6,051; 6,353] |
| Child Benefits | 911 | 13 | [884; 937] |
| Unemployment Benefits | 123 | 9 | [106; 140] |
| Unemployment II Benefits | 356 | 12 | [334; 379] |
| Asylum Seeker Benefits | 0 | 0 | [0; 0] |
| Other Cash Transfers | 336 | 12 | [313; 359] |
| **EU Nationals (n=1,393)** | | | |
| Total Cash Transfers | 5,368 | 268 | [4,843; 5,893] |
| Pensions | 2,881 | 239 | [2,412; 3,350] |
| Child Benefits | 966 | 57 | [855; 1,077] |
| Unemployment Benefits | 235 | 50 | [137; 332] |
| Unemployment II Benefits | 868 | 82 | [707; 1,029] |
| Asylum Seeker Benefits | 0.2 | 1 | [-2; 2] |
| Other Cash Transfers | 418 | 64 | [292; 544] |
| **Non-EU Nationals (n=9,315)** | | | |
| Total Cash Transfers | 5,766 | 81 | [5,608; 5,925] |
| Pensions | 1,265 | 50 | [1,168; 1,363] |
| Child Benefits | 1,390 | 30 | [1,331; 1,449] |
| Unemployment Benefits | 321 | 23 | [276; 365] |
| Unemployment II Benefits | 2,209 | 46 | [2,119; 2,298] |
| Asylum Seeker Benefits | 156 | 12 | [133; 178] |
| Other Cash Transfers | 426 | 19 | [390; 463] |

*Notes:* The table reports our estimates of the net fiscal contribution and its main components by nationality group (German, EU, non-EU) in Germany in 2018. The estimates are based on the Socio-Economic Panel, version v37. See Sections 2 and 3 for details on the data and methods used. All values are in euros per year. Std. Error: Standard Error. CI: Confidence Interval.

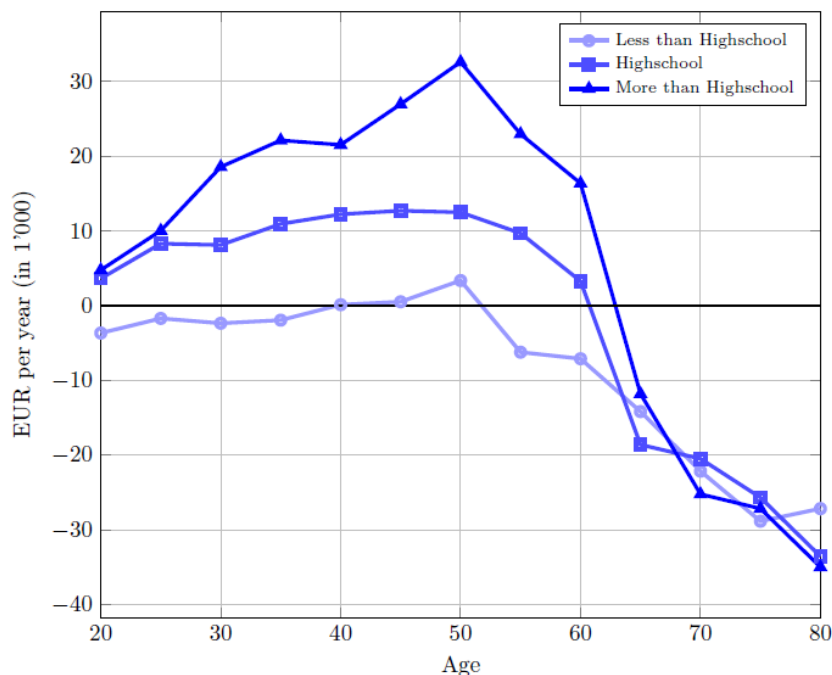## Figure 7.    Net Fiscal Contribution by Education and Age



Figure 7: Net Fiscal Contribution by Education and Age

*Notes:* The figure shows the estimated average net fiscal contribution by education (less than highschool, high-school, more than highschool) and age group (20–24, 25–29, ..., 80+) in Germany in 2018. We start at age 20 to exclude the age groups in which most people are still in education. The estimates are based on the Socio-Economic Panel, version v37. The values shown are in 1'000 euros per year.

## Table 11.  Robustness Checks

|  |  | Germany | EU | Outside EU |
|---|---|---|---|---|
| Main Specification |  | 629 | 3,175 | -2,633 |
| Corporate Taxes | Equal Split | 519 | 3,777 | -175 |
|  | ∝ Disposable Income | 549 | 3,692 | -2,053 |
| Public Health Expenditure | $h = 5$ | 632 | 3,089 | -2,630 |
|  | $h = 20$ | 625 | 3,277 | -2,626 |
| Minimum Age for Adults | 18 | 633 | 3,145 | -2,822 |
|  | 22 | 643 | 3,179 | -2,512 |
| enrolment (age 17+) | Based on *pgen* File | 654 | 3,143 | -2,896 |
| Missing Answers Refugee Samples | Regression Imputation | 628 | 3,174 | -2,627 |

*Notes:* The table reports results from different robustness checks. Details can be found in Section 4.4. All values in euros per year. The main specification assigns corporate tax revenue based on asset income, assumes a value of $h = 9$, and an age threshold of 20 years; educational enrolment for people aged 17 and above is taken from the cross-sectional *bjp* files, and missing answers in the refugee sample are imputed using means.

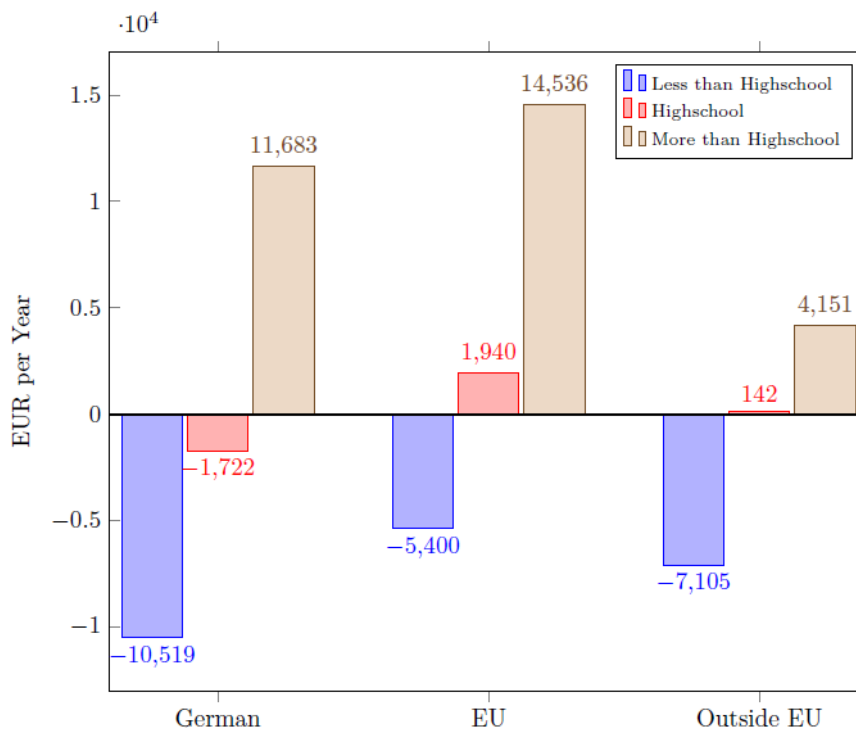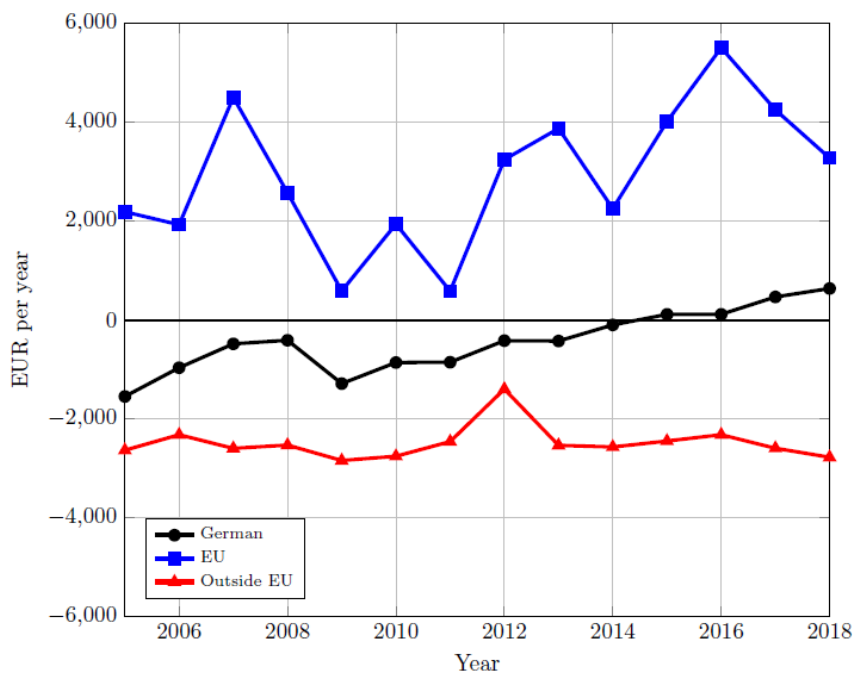Figure 8. Net Fiscal Contribution by Education and Nationality



Figure 8: Net Fiscal Contribution by Education and Nationality

*Notes:* The figure shows the estimated average net fiscal contribution by education (less than highschool, high-school, more than highschool) and nationality group (German, EU, non-EU) in Germany in 2018. We start at age 20 to exclude the age groups in which most people are still in education. The estimates are based on the Socio-Economic Panel, version v37. The values shown are in euros per year.

Figure 9.     Net Fiscal Contribution by Nationality and Year



Figure 9: Net Fiscal Contribution by Nationality and Year

*Notes:* The figure shows the estimated average net fiscal contribution by nationality group (German, EU, non-EU) in Germany for the years 2005 to 2018. The estimates are based on the Socio-Economic Panel, version v37. The values shown are in euros per year.

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WeLaR is Horizon Europe research project examining the impact of digitalisation, globalisation, climate change and demographic shifts on labour markets and welfare states in Europe. It aims to improve the understanding of the individual and combined effects of these trends and to develop policy proposals fostering economic growth that is distributed fairly across society and generates opportunities for all.

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