Tax Incentives and Return Migration

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Abstract

Brain drain is a key policy concern for many countries. In this paper we study whether tax incentives are an effective policy to attract high-skilled expatriates back to their home country, exploiting a generous income tax break for Italian returnees. Using administrative data and a Triple Differences design, we find that eligible individuals are 27% more likely to return to Italy. Additionally, we uncover significant effects throughout the wage distribution, revealing that tax-induced migration is a broad phenomenon beyond top earners. A cost-benefit analysis shows that the tax scheme can pay for itself by targeting young high-skilled individuals.

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1 Introduction

Emigration of high-skilled individuals is a key policy concern for many countries (Docquier and Rapoport 2012; Docquier, Ozden, and Peri 2014). Brain drain is especially relevant within free labor mobility areas with significant wage differentials, such as in the European Union (EU), where south-eastern European countries experience large emigration flows towards north-western Europe (Dorn and Zweimüller 2021).

Several countries use preferential tax schemes to influence the location of high-skilled individuals, by granting fiscal incentives to individuals who move their residence to the country. Initially designed to attract high-skilled *foreigners* (Belgium 1983, Netherlands 1985, Denmark 1991), tax breaks have been adopted in multiple European countries (Finland 1999, Sweden 2001, Spain 2004, France 2008), including to attract high-skilled *expatriates* back, such as in the case of Portugal (2009) and Italy (2011).

Are tax incentives an effective policy to induce the return of high-skilled workers in a context of brain drain? While a growing literature documents large migration responses to taxes among top earners (Kleven, Landais, and Saez 2013; Kleven et al. 2014; Akcigit, Baslandze, and Stantcheva 2016; Muñoz 2023), there is limited empirical evidence on migration decisions of broader segments of the population, such as young college-educated individuals. Furthermore, it is unclear whether tax schemes are an effective policy to attract high-skilled expatriates for a country experiencing a brain drain.

In this paper, we study the effects of a 2010 tax scheme for young high-skilled expatriates who move back to Italy, named "counter-exdodus" (*Controesodo*) due to the context of brain drain. The 2010 scheme granted a generous tax incentive to expatriates who return to Italy, lowering their income tax rate by about 30 percentage points for 2-4 years. The scheme had two main eligibility requirements: holding a college degree and being born in 1969 or later (i.e., under-41 years old in 2010). The joint presence of these two requirements creates suitable quasi-experimental conditions to identify the effect of tax incentives on return migration.

To investigate the effects of the 2010 scheme, we implement a (Triple) Difference-in-

Differences design using two complementary data sources. First, we use administrative data on return migration of Italian expatriates from all host countries. Our identification strategy exploits the eligibility criteria of the tax scheme, comparing return migration of eligible (young college graduates) and ineligible Italians (college graduates born before 1969 and high school graduates) before and after the 2010 reform. While the two groups exhibit parallel trends before the reform, there has been a large and sudden increase in emigration of young college graduates after the Great Recession (Anelli et al. 2023), which may have mechanically increased return migration of eligible individuals relative to the ineligible. For this reason, we leverage the joint presence of the birth cohort and education requirements to estimate richer Triple Differences models, which absorb time-varying country-specific unobserved determinants of return migration of each birth cohort and education group.

Second, we use social security data on the universe of Italian workers in Germany (a top host country for Italian expatriates), and we estimate the effect of eligibility on the probability that Italians leave[1] after the reform, which allows us to explore heterogeneous responses to the tax scheme based on their labor market outcomes. Furthermore, as a robustness check, we add another layer of differencing by comparing Italian and Spanish citizens before and after the reform. As Spain was similarly affected by the recession but did not have a preferential tax scheme for young college graduates, any recession-induced determinant of differential return migration among eligible Italians around the reform should also have affected Spanish citizens leaving Germany.

We find that eligibility for the 2010 tax scheme increases the return migration of Italian expatriates. In the most restrictive specification using the Italian migration data, in which we absorb host-country-specific time-varying shocks by birth cohort and education, eligible individuals are 27% more likely to return after the introduction of the scheme relative to the ineligible, translating into an elasticity of return migration to the average net-of-tax rate of 0.7. The effect is driven by Italians returning from other European countries such as Germany, Switzerland and the United Kingdom.

[1]We proxy return migration based on the disappearances from the German social security data, which we validate using international migration data from Germany and Italy (described in Section 3).

Next, we focus on the universe of Italians workers in Germany. We find that eligible Italians are more likely to leave after 2010, compared both to ineligible Italians and to Spanish citizens within the same age and education level. We then explore the heterogeneity of this response. We find that marginal returnees are disproportionately from the upper half of the wage distribution among Italians in Germany, implying that tax-induced returnees are positively selected, compared to ineligible return migrants. While consistent with the literature on tax-induced migration, we document a large migration response for a broader group of workers, beyond top earners and specific occupations.

Finally, we evaluate the cost-effectiveness of the policy. We compare the foregone income tax revenue from infra-marginal returnees - who would have returned in any case - to the additional revenue generated by marginal returnees, who would not have returned absent the tax break. We find that the 2010 scheme roughly pays for itself: our most conservative DiD estimates translate into a marginal-to-inframarginal ratio close to the break-even threshold.[2] We then assess the sensitivity of this result. Our simulations show that the key parameters determining the fiscal impact are the average age of returnees (as young workers have a long horizon of fiscal contributions), the out-migration rate after the scheme elapses and the duration of the tax break. These parameters can be directly influenced by the policymaker, by restricting eligibility to young (high-skilled) individuals and by carefully designing the duration of the scheme.

Our paper contributes to three strands of literature. First, we contribute to a growing literature in public finance on the migration responses to tax differentials. Several studies finds that location choices of top earners are highly sensitive to income tax differentials, both internationally (Martínez 2022; Muñoz 2023; Advani, Burgherr, and Summers 2023) and within countries (Schmidheiny 2006; Schmidheiny and Slotwinski 2018; Agrawal and Foremny 2019)[3], and particularly among specific high-paying occupations such as inventors (Akcigit, Baslandze, and Stantcheva 2016; Moretti and Wilson 2017)

[2]We focus on the *direct* effect of tax incentives on income tax revenue. Tax-induced migration has also indirect effects due to human capital externalities (Kerr et al. 2016), wage-bargaining responses (Kleven et al. 2014), international tax competition (Kleven et al. 2020), as well as fiscal effects beyond income taxes, which are beyond the scope of this paper.

[3]In contrast, Young and Varner (2011) and Young et al. (2016) find little migration responses of millionaires within the US.

and football players (Kleven, Landais, and Saez 2013). Still, an open question is whether a broader population beyond top earners and specific workers migrates in response to income tax differentials (Kleven et al. 2020). We show that tax incentives for young college graduates – a broad group of high-skilled workers who are not necessarily top earners – trigger substantial migration responses.

Second, we uncover the causal effect of a large shock to net wage differentials on international migration. While the migration literature documents a strong association between income differentials and migration (Dustmann 2003; Grogger and Hanson 2011; Ortega and Peri 2013; Docquier, Ozden, and Peri 2014), the existing evidence is largely correlational due to the lack of exogenous sources of variation. We contribute to this literature by studying how Italians expatriates eligible for the tax schemes respond to a large unexpected shock in net wage differentials between their home country and the destination countries. Moreover, we speak to the literature on migrants selection, and specifically to the selective return migration literature (Borjas and Bratsberg 1996; Dustmann and Görlach 2016; Adda, Dustmann, and Görlach 2022; Akee and Jones 2024) showing that tax-induced return migration is heterogeneous with respect to returnees' labor market history in the host country.

Finally, we show that tax incentives can be an effective policy to attract expatriates in a context of brain drain. Previous work finds that high-skilled immigrants are generally responsive to foreigners tax schemes (Kleven et al. 2014; Timm, Giuliodori, and Muller 2022; Giarola et al. 2023); we complement these findings by showing that tax incentives can attract high-skilled nationals residing abroad.[4] This is important as expatriates may differ substantially from foreigners in their migration responsiveness to tax differentials, as well as in their propensity to stay beyond the duration of the scheme, because of their stronger ties to their country of origin, linguistic and cultural proximity. More generally, our paper speaks to the literature investigating the role of migration policies on the mobility of high-skilled individuals (Boeri et al. 2012; Kato and Sparber 2013; Kerr et al. 2017; Czaika and Parsons 2017; Di Iasio and Wahba 2023).

[4] A notable exception is Del Carpio et al. (2016), who study the effects of a program to attract Malaysian nationals living abroad that offers tax deductions upon return.

The remainder of this paper unfolds as follows. In Section 2 we illustrate our setting by documenting the context of brain drain and the main features of the Italian tax schemes for return migrants. In Section 3 we describe our data sources and show some descriptive statistics. In Sections 4 and 5 we outline our identification strategy and present our results. In Section 6 we explain our cost-benefit analysis of the preferential tax schemes, and in Section 7 we conclude with a discussion and policy implications.

2 Tax incentives for return migrants

In this section we describe the tax incentives for return migrants in Italy, with a focus on the 2010 preferential tax scheme. We begin by providing some context on international migration of high-skilled Italians, and then we describe the timeline and key features of tax regimes to attract high-skilled expatriates.

2.1 Context

Historically a country of emigration during the Age of Mass Migration (1880-1920) and in the post-war period, Italy became a receiving country of immigration in the 1970s (Del Boca and Venturini 2005). However, since the early 2000s, the country is experiencing a new emigration wave, characterized by an outflow of young high-skilled individuals, lured by higher salaries and better employment opportunities in other European countries such as the United Kingdom, Germany and Switzerland.[5]

The emigration rates of young college graduates surged in the aftermath of the twin recession – the Great Recession (2007-08) and the Sovereign Debt crisis that hit Southern Europe in 2011 –, reaching almost a 0.5% annual emigration rate. In this context, to mitigate the adverse effects of brain drain, the policymaker introduced fiscal incentives to attract high-skilled expatriates back to Italy.

[5]In addition to losing high-skilled citizens, Italy struggles to attract high-skilled foreigners. A "net exporter of brains" since the 1990s (Becker, Ichino, and Peri 2004), the share of foreign scientists in Italy is the lowest among EU countries (Franzoni, Scellato, and Stephan 2012).

2.2 The tax schemes

Figure 1 describes the timeline and key features of the preferential tax schemes for return migrants in Italy. Prior to 2010, expatriates returning from abroad were subject to the regular income tax schedule: for instance, an individual earning 75,000 euros faced an average income tax rate of 42%, in line with Germany and most European countries.[6] The tax rate became substantially lower with the introduction of the 2010 tax scheme.

The 2010 scheme. In December 2010, Italy introduced the first preferential tax regime for returnees, named "*Controesodo*" (counter-exodus; henceforth "2010 scheme"). The 2010 scheme granted a generous income tax exemption to young high-skilled expatriates moving back to Italy. Specifically, a fraction between 70-80% of returnees' labor earnings is exempt from income taxation, which translates in the 30 percentage point lower average tax rate shown in Figure 1.[7] In terms of duration, returnees expected to receive between 2-4 years of incentives when they made their return migration decision, although the effective duration ended up being longer (5 years).[8]

The 2010 scheme had two main eligibility criteria: holding a college degree (at least undergraduate) and being born after January 1st, 1969. In addition, it was required to having spent at least 2 years abroad, and having resided in Italy for at least 2 years prior to moving abroad. Despite all EU citizens were formally eligible, the pre-residency requirement implied that most non-Italian citizens (and some foreign born Italians) were likely ineligible, which is why we limit the analysis to Italian citizens born in Italy. Overall, the scheme targeted young high-skilled Italian expatriates under-40, who either earned a college degree abroad, or graduated in Italy and then migrated abroad for at least two years.[9]

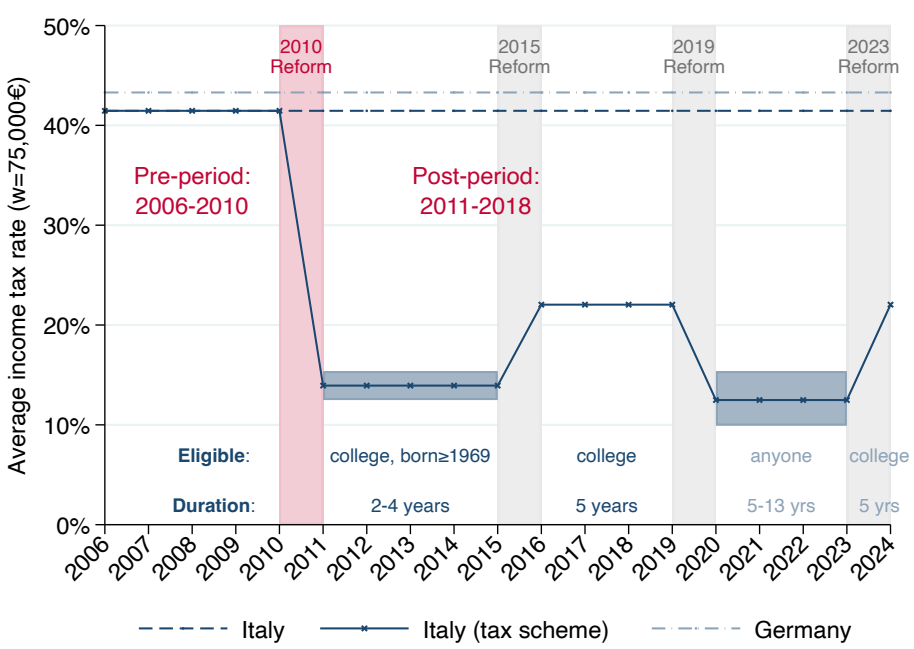
[6]The only exception were researchers and university professors, eligible for a dedicated tax scheme since 2003 and more generous than the 2010 scheme which is the focus of our paper. See Creanza (2024) for a study on the effects of the researchers' scheme.

[7]In the next section we explain how we convert the exempted shares into tax rates reduction. Labor earnings include employment, self-employment, as well as business income from unincorporated businesses (*società di persone*). The exempted share was 80% for women and 70% for men.

[8]This was the result of the tax scheme having a set expiration date, which was postponed several times. In Appendix Figure B.2, we show the exact duration as a function of the year of return.

[9]The 2010 scheme was described in the media as targeting "under-40 college graduates" (Appendix Figure B.1), despite the over-40 born after 1969 were eligible as well. We discuss the implications of this

Figure 1: Average income tax rate for eligible returnees, by year of return migration



Notes: assumes gross earnings 75,000 euros, single taxpayer, no dependents. Average tax rates include both income tax and payroll tax. The average tax rates with tax scheme assumes that all earnings derive from labor; 75% exemption between 2011-2015 (2010 scheme); 50% exemption after 2016 (2015 scheme). Section 2.2 and Appendix B provide additional details.

The changes in 2015. In September 2015, the 2010 scheme was replaced by a new version called *"Impatriati"* (back to homeland), which affected returnees who moved to Italy from 2016. The 2015 version differed from original scheme in three respects. First, it expanded the eligibility, by removing the birth cohort restriction, and by allowing individuals holding managerial positions and in highly qualified occupations to qualify (regardless of their education level).[10] Second, it reduced the exempted share to 50%, which, albeit smaller, still entails a 20pp lower average income tax rate.[11] Third, the duration was fixed to 5 years from the year of return migration, eliminating the uncertainty that characterized the original scheme.

In our baseline difference-in-difference analysis, the pre-period (2006-2010) comprises the years before the 2010 scheme and the post-period (2011-2018) includes both

framing in Section 4.

[10]This latter group was eligible after 5 years of experience abroad, as opposed to 2 years required for college graduates. Also, the 2015 reform eliminated the requirement of pre-residency in Italy, making the scheme available to foreigners.

[11]The exempted share was initially smaller (30%), but in 2017 it was raised to 50%.

the post-2010 and post-2015 scheme years.[12] For consistency, we keep the eligibility requirements fixed throughout the whole period. We pool the two schemes for two reasons. First, the tax incentive under each regime is comparable, as the 2015 scheme is less generous in terms of exempted income share (20pp vs. 30pp) but more generous in terms of duration (5 years vs. 2-4 years). Second, the eligibility requirements are similar, as they both targeted high-skilled individuals with a college degree; while the 2010 scheme had the birth cohort requirement, it was not as binding when the 2015 scheme kicked in 2016.[13] Results are nonetheless robust to excluding post-2015 years.[14]

The changes in 2019 and 2023. Finally, while beyond our period of analysis, it is worth mentioning two recent changes to the tax regime. In April 2019, a government decree (*Decreto Crescita*) substantially expanded the scheme by (i) increasing the exempted share, (ii) extending the maximum duration to 13 years under some conditions, and (iii) removing the high-skilled (college degree) requirement, implying that anyone moving to Italy after residing 2 years abroad was eligible for this generous scheme. In light of the mounting public finance cost due to the 2019 expansion, the scheme was modified again by another decree in December 2023, which restored the main features of the 2015 scheme (college/high-skilled only, 5 years duration, and 50% exempted share) and introduced a 600,000 EUR earnings cap. In Appendix B, we provide additional details on each of these preferential tax regimes.

2.3 Income tax rates with the scheme

In Figure 2, we simulate the reduction in the average and marginal income tax rates under the 2010 scheme for different levels of gross earnings.[15] This allows us to compare

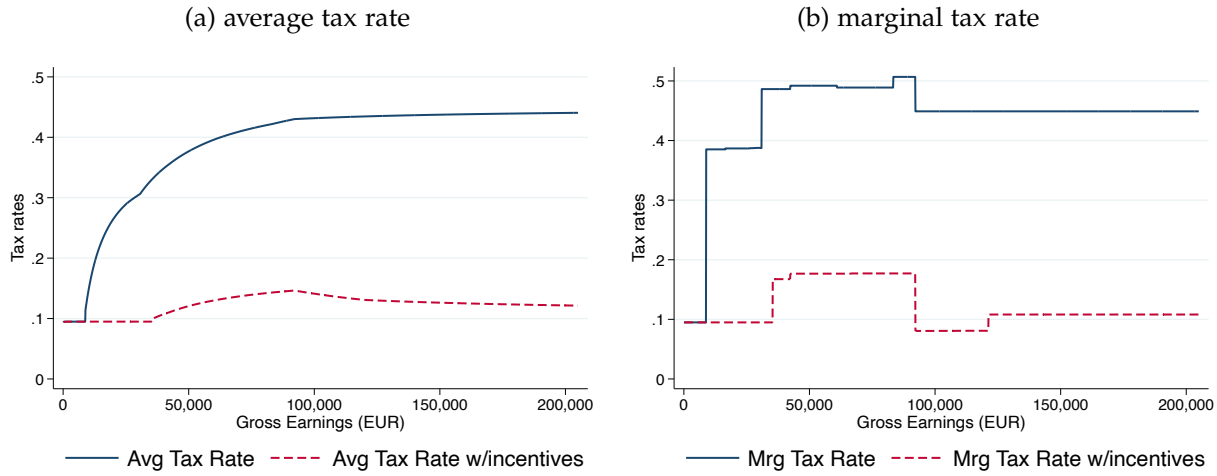
[12]The pre-period begins in 2006 to avoid capturing the researchers' tax scheme introduced in 2003. The researchers' scheme is more generous (exempted share 90% and duration 3-6 years) than the 2010 and 2015 schemes, therefore it should not affect our pre-post comparison.

[13]In Section 4.2 we show that as the peak age at return is around 35 years old, well below 47 years old in 2016, which would have been the cutoff age had the cohort requirement been preserved.

[14]If anything, the inclusion of college-graduates born before 1969 in the controls post-2015 should bias the results towards finding no effect of the tax scheme.

[15]The tax rates are simulated for a single taxpayer (the tax unit in Italy is the individual) with employment earnings only, taking into account the standard deductions of the Italian tax schedule, based on the

Figure 2: Income tax rates under the 2010 tax scheme, by gross earnings



Notes: (a) average and (b) marginal income tax rates, including compulsory social security contributions (payroll taxes) paid by employees, based on the 2010 Italian tax schedule for an individual with no dependents. The reduced tax rates are based on an exempted income share of 75% (average between the 2010 scheme shares, 80% for women and 70% for men), and gross earnings are assumed to be from employment income. *Source*: OECD Taxing Wages (OECD 2011).

the Italian tax schemes with those of other countries, as well as to estimate the elasticity of return migration to the average net-of-tax rate.

Formally, let w denote the annual before-tax labor earnings of an eligible individual. Absent the incentives, after-tax earnings c are given by $c = w - T(w)$, where $T(w)$ determines the income tax due as a function of gross earnings. With the incentives, a fraction $s \in [0, 1]$ of gross earnings is exempt from income taxation, and therefore the net earnings are given by $c = w - T(sw)$, where the exempted share is $s = 0.75$ with the 2010 scheme (we average the 0.8 for women and 0.2 men) and 0.5 with the 2015 scheme. In Figure 2, the solid lines in each graph plot respectively the average tax rate $T(w)/w$ and marginal tax rate $T'(w)$ without the incentives, while the dotted lines plot the average $T(sw)/w$ and marginal $T'(sw)$ tax rates under the 2010 scheme.

Two features of the Italian tax schemes emerge from the figures. First, the progressivity of the tax schedule amplifies the generosity of the tax incentives; this is because the taxable fraction (25%) is taxed at a lower rate than the exempted fraction (75%). For example, consider an eligible individual with gross earnings 100,000 euros from their employment. Under the scheme, this individual is taxed as if their earnings were 25,000

annual publication "OECD Taxing Wages" (OECD 2011; OECD 2017). The Stata code that computes the tax rates is available upon request.

euros, resulting in an income tax liability of 5,000 euros (as the tax rate on 25,000 euros is 20%), resulting in an effective average tax rate of 5% instead of the standard 34%. By adding the 9% payroll tax rate, we get the 14% tax rate shown by the dotted line, which is almost 30pp lower than the 43% tax rate shown by the solid line.[16]

Second, the income tax incentive is sizable along the entire earnings distribution, thus appealing to a broader population beyond top earners. This is important since the 2010 scheme specifically targeted young high-skilled individuals, who may be at the onset of their careers and thus not necessarily high earners. In this regard, the Italian tax scheme differs from tax schemes for foreigners implemented in other countries, which often entail a minimum earning threshold or take the form of a flat tax rate at the top (e.g. Netherlands, Denmark, Spain). Because of its design, the Italian tax scheme offers a unique opportunity to study migration responses of a broad population, beyond the very top of the income distribution.

3 Data

3.1 Italian migration data

Our first data source is administrative data on international migration of Italian citizens from the *Istituto Nazionale di Statistica* (Istat). Istat collects information from civil registries on all changes of residence, both within Italy and to/from abroad. These records include information on year of migration, origin and destination (Italian municipality or foreign country) as well as several demographic variables such as date of birth, birthplace, sex, education level, citizenship and marital status at the time of migration.[17]

The Istat migration data is based on the enrollment and dis-enrollment from the *Anagrafe degli Italiani Residenti all'Estero* (AIRE; registry of Italians residing abroad). Ital-

[16] This is easier to see in Appendix Figure B.3, which plots the income tax rates without payroll taxes (employee compulsory social security contributions), unaffected by the tax schemes. Appendix Figure B.4 show the corresponding graphs for the 2015 scheme.

[17] Access to the full individual-level microdata is restricted. Researchers can apply for access, which must happen in the Istat data rooms in Italy with several restrictions.

ian citizens are required by law to change their residence whenever they migrate abroad for more than 6 months, which involves a dis-enrollment from the civil registry of their municipality of origin and the enrollment in the AIRE registry. The main benefit of enrolling is that foreign income is not subject to income taxation in Italy, in addition to access to voting from abroad and consular services. Once they return to Italy, they are dis-enrolled from the AIRE registry and enrolled in the civil registry of their destination municipality, which is our measure of return migration. Istat collects all these individual records and aggregates them into emigration (from Italy to abroad) and return migration (from abroad to Italy) flows.[18]

In this paper we use a customized version of the Istat data, which includes yearly counts of Italian citizens returning to Italy from abroad (and emigrating abroad) by year of migration (2002-2018), birth cohort, education (less than high school, high school and college), sex, country of origin of returnees (or destination for emigrants) and a foreign-born indicator.[19] The key advantage of the Istat data for our purposes is that we observe the key variables determining eligibility for the 2010 scheme (birth cohort, education and year of return migration). The limitation is that there is no information on the stock of Italian expatriates abroad, which is necessary to construct a return migration rate.[20] For this reason, we complement the Istat data with the *Database on Immigrants in OECD and non-OECD Countries* (DIOC) data (OECD 2016). This dataset is based on destination countries decennial censuses, and include information on migrant stocks by country of origin, education, age and sex. We use this data to estimate the stock of eligible and ineligible Italian expatriates in the main host country as of 2010 (as described in Appendix C).

[18]Despite the substantial benefits to enroll in the AIRE registry, there is evidence that a large fraction of Italians do not enroll when they emigrate abroad (Anelli et al. 2023), and, consequently, they do not appear in the return migration data. Importantly, registration in AIRE was not required in order to be eligible for the 2010 scheme, as long as beneficiaries were able to prove their residence abroad (e.g. with pay stubs, lease, etc.). Therefore we should not expect any change in reporting incentives before-after 2010. In Appendix C we show some sanity checks and provide additional details on the Istat-AIRE data.

[19]In our data, the exact birth year is available for the top-5 countries only (Germany, Switzerland, UK, France, US), while for the other countries they are aggregated in 5-year bins (1964-1968, 1969-1973, etc.).

[20]The Italian Ministry of Interior keeps track of the stock of Italians abroad (AIRE registry) for voting purposes; however, they do not retain information about education level.

To build our estimation sample, we drop individuals with educational level below high school, to have a suitable control group for college graduates (the group targeted by the reform), and we limit our analysis to individuals 23-64 years old between 2006-2018, thus likely in the labor force. Last, we limit the analysis to Italian citizens born in Italy, to ensure that they satisfy the requirement of pre-residency in Italy prior to emigrating.[21]

3.2 German social security data

Our second main data source is the "Integrated Employment Biographies" (henceforth the IEB data) provided by the Institute for Employment Research (*Institut für Arbeitsmarkt- und Berufsforschung*, IAB). The IEB data is based on social security records covering nearly all private sector employees in Germany, and have been used extensively in the literature.[22] The data include a large set of employment-related variables, such as average daily wages, industry, occupation, begin and end dates of each spell, type of spell, reason of termination, as well as key demographics (date of birth, education, sex and citizenship) which allow us to precisely identify Italians eligible for the tax schemes.[23]

For this paper, we obtained access to the full-count IEB data covering the universe of Italian citizens (as well as Spanish citizens) with at least one employment spell in Germany between 2006-2016.[24] For the analysis, we created a yearly panel, selecting all job spells referring to June 30, and restricted the sample to include only individuals in the age range 23-64, who completed at least high school and were born between 1954-1988. For individuals with more than one job simultaneously, we keep the main job,

[21] In addition, eligibility requires at least 2 years of residency abroad before moving to Italy. While we do not observe the length of stay abroad, it is likely that individuals enrolled in the AIRE registry were abroad for at least 2 years. Importantly, any measurement error in this regard should not create a problem for our identification as long as it is not differential between treated and controls, before and after 2010. This would be the case if, for instance, eligible individuals were more likely to slightly extend their stay abroad in order to meet the 2-year requirement to qualify for the 2010 scheme. If this was the case, however, this should bias our results in the direction of finding no effect.

[22] See Card, Heining, and Kline (2013) and Dustmann, Ludsteck, and Schönberg (2009) for a description of the full-count IEB data.

[23] Employers must report these data for each employee. Typically, reporting occurs once a year, although any contractual change is also reported, e.g. from part-time to full-time.

[24] As individuals may naturalize, we consider Italian (Spanish) citizens those with an Italian (Spanish) nationality in their first record.

defined as the job with the highest daily wage or, in case of multiple jobs with identical wages, the full-time job (or part-time job if the other job is a marginal job).[25] Finally, we link each spell to firm characteristics (e.g., number of employees, sector, and firm fixed effects computed as in Abowd, Kramarz, and Margolis 1999) using unique firm identifiers.[26]

Because we do not observe international migration in the IEB data, we assume that working-age Italians who are absent from the registry for at least one year after their last employment spell are return migrants to Italy.[27] While most Italian citizens who disappear from the data likely return to Italy, some could also migrate to other countries or simply exit the labor force. Despite we cannot completely rule out this possibility, we take a number of steps to ensure that we are capturing return migration. First, as we observe the reason of termination, we exclude all individuals whose employment spells terminate for non-migration related reasons (e.g. death, retirement, etc.). Second, in Appendix C we validate our return migration measure ("leavers") by comparing it with actual migration flows of Italian citizens from Germany to Italy from the OECD International Migration Database (based on the German migration data from Destatis).[28]

In Appendix Table A.1 we show the main characteristics of Italian citizens in Germany in our estimating sample, separately for the pre- (2006-2010) and the post-period (2011-2016) and by eligibility. Relative to the ineligible, eligible Italians are younger and more likely to be female; they arrived later (likely after completing tertiary studies in Italy) and spent fewer years in Germany; they earn more (49,000 vs. 32,000 EUR), con-

[25]For the imputation of missing data on education we follow the procedure suggested by Fitzenberger, Osikominu, and Völter (2006). For the construction of the yearly panel we follow Dauth and Eppelsheimer (2020) and Dustmann et al. (2022). To deal with the wage top coding we follow Dustmann, Ludsteck, and Schönberg (2009) and Card, Heining, and Kline (2013).

[26]The procedure to compute establishment fixed effects in the German social security records is described in Lochner, Wolter, and Seth (2023). We use the terms establishment and firm interchangeably, following the literature (Dustmann, Ludsteck, and Schönberg 2009; Card, Heining, and Kline 2013).

[27]In a similar fashion, Bahar et al. (2024) use exits from the IAB data of Yugoslavian nationals to measure return migration to Yugoslavia; similarly, Dicarlo (2022) proxies migrants from Italy to Switzerland with exits from the Italian Social Security data.

[28]Overall, while both the Italian migration data and the German social security data are imperfect measures of return migration, their limitations are nonetheless very different in terms of their underlying causes: under-reporting in the Istat data, imperfect proxy of migration in the IEB data. Therefore, it is reassuring that we find similar results in our empirical analysis.

sistent with their higher education level (and despite the younger age), and they face a larger wage differential relative to Italy (23% vs 14% more);[29] and they are more likely to be employed in large firms, and in Finance and Healthcare. Overall, while we expect eligible and ineligible individuals to differ in many respects because of their different age and education (by construction), we take these differences into account in our empirical analysis, as we explain in the next sections.

4 Evidence from Italian migration data

4.1 Empirical strategy

Our identification strategy exploits the joint presence of the two key eligibility requirements of the 2010 scheme: being born in 1969 or later (birth cohort requirement) and holding a college degree (education requirement).[30]

Baseline Diff-in-Diff. We begin with a simple Difference-in-Differences (DiD) model:

$$y_{gt} = \beta Eligible_g * Post_t + \gamma_g + \lambda_t + \epsilon_{gt} \tag{1}$$

where y_{gt} denotes a return migration outcome for group g in year t (e.g., return migration rate), $Eligible_g = \mathbb{1}(c \geq 1969) * \mathbb{1}(e = college)$ is an indicator for the eligible group(s), $Post_t = \mathbb{1}(t \geq 2011)$ is a dummy for post-period years, and γ_g and λ_t denote group and year fixed effects respectively. In the regressions, groups g denote either a binary classification (eligible-ineligible) or finer cells defined by the interaction between birth cohort c, education e, origin country o and sex s.

The identifying assumption in the DiD model is that, absent tax incentives, eligible and non-eligible expatriates would have had a similar evolution in the likelihood of

[29] See Section C.3.2 for details on the earnings variable and the construction of earnings differentials between Italy and Germany.

[30] We use the terms "Eligible" and "Treated" interchangeably, as we do not observe actual take-up of tax schemes in our data. Thus, our estimates should be interpreted as intention-to-treat (ITT) effects.

returning. Under this parallel trend assumption, β can be interpreted as the reduced-form, intent-to-treat (ITT) effect of eligibility for tax incentives on return migration.

Figure 3 shows the return migration flows of Italian expatriates over time, by eligibility for 2010 preferential scheme, thus displaying the raw data behind the DiD model. Panel (a) plots the growth rates for the eligible and ineligible group, while panel (b) shows the levels and splits the ineligible into subgroups defined by education and cohort. The vertical lines marks the introduction of the tax incentives in 2010 and their modification in 2015.

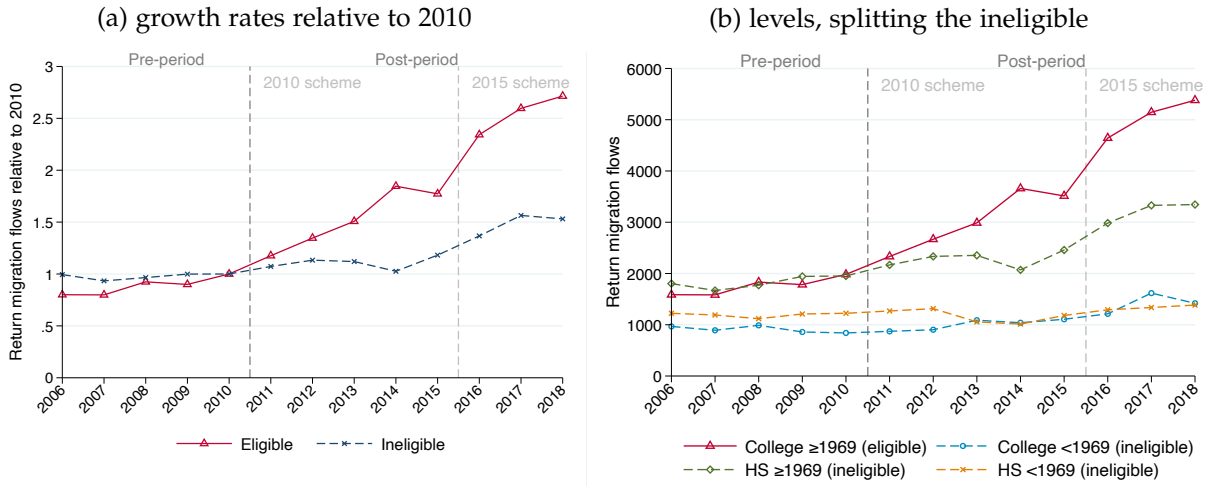
Reassuringly, return migration flows are stable in the pre-period, and do not exhibit differential trends depending on eligibility status, providing prima facie evidence on the validity of the parallel trend assumption. In contrast, there is a clear divergence following the 2010 scheme introduction, when eligible expatriates become increasingly more likely to return to Italy relative to the ineligible. By the end of the post-period, the annual inflow of young college graduates is over 2.5 times larger than in 2010, as opposed to a moderate 50% increase among the control group (panel a), corresponding to an increase from 2,000 to 5,000 eligible individuals returning each year (panel b).

Overall, the timing of the flows is consistent with the sequence of policy changes described in Section 2. The eligible-ineligible divergence gradually builds up after 2011, as expatriates learn about the tax incentives; it slows down in 2015, due to uncertainty surrounding the 2015 policy change; it increases again as the new regime becomes law. The increase post-2015 among young high school graduates (panel b) is consistent with the slightly expanded eligibility criteria of the 2015 scheme, which included non-college-graduates holding managerial positions and in highly specialized occupations (after being abroad for 5 years).[31]

Figure 3 provides reassurance on the validity of our parallel trend assumption. However, several confounders could pose a challenge to a causal interpretation of the estimated effect. For instance, if labor demand for college graduates in Italy was less

[31] In the regressions we keep constant eligibility to the 2010 scheme (college degree + born $\geq$ 1969), which implies that our DiD estimates will be a lower bound of the true effect post-2015.

Figure 3: Return migration flows over time, by eligibility for 2010 scheme



Notes: The figures plot the return migration flows of Italian citizens, 23-64 years old, born in Italy between 1954-1988, with at least a high school diploma, by eligibility for the 2010 tax scheme. Figure (a) shows the levels relative to 2010, while Figure (b) plots the raw levels and partitions the ineligible into three subgroups. *Source*: authors' elaboration on Istat data.

impacted than demand for high school graduates by the Sovereign Debt crisis in 2011, we would overestimate the effect of tax incentives.

Triple Differences. To deal with these threats, we exploit the joint presence of the birth cohort and education requirements to estimate a Triple DiD model:

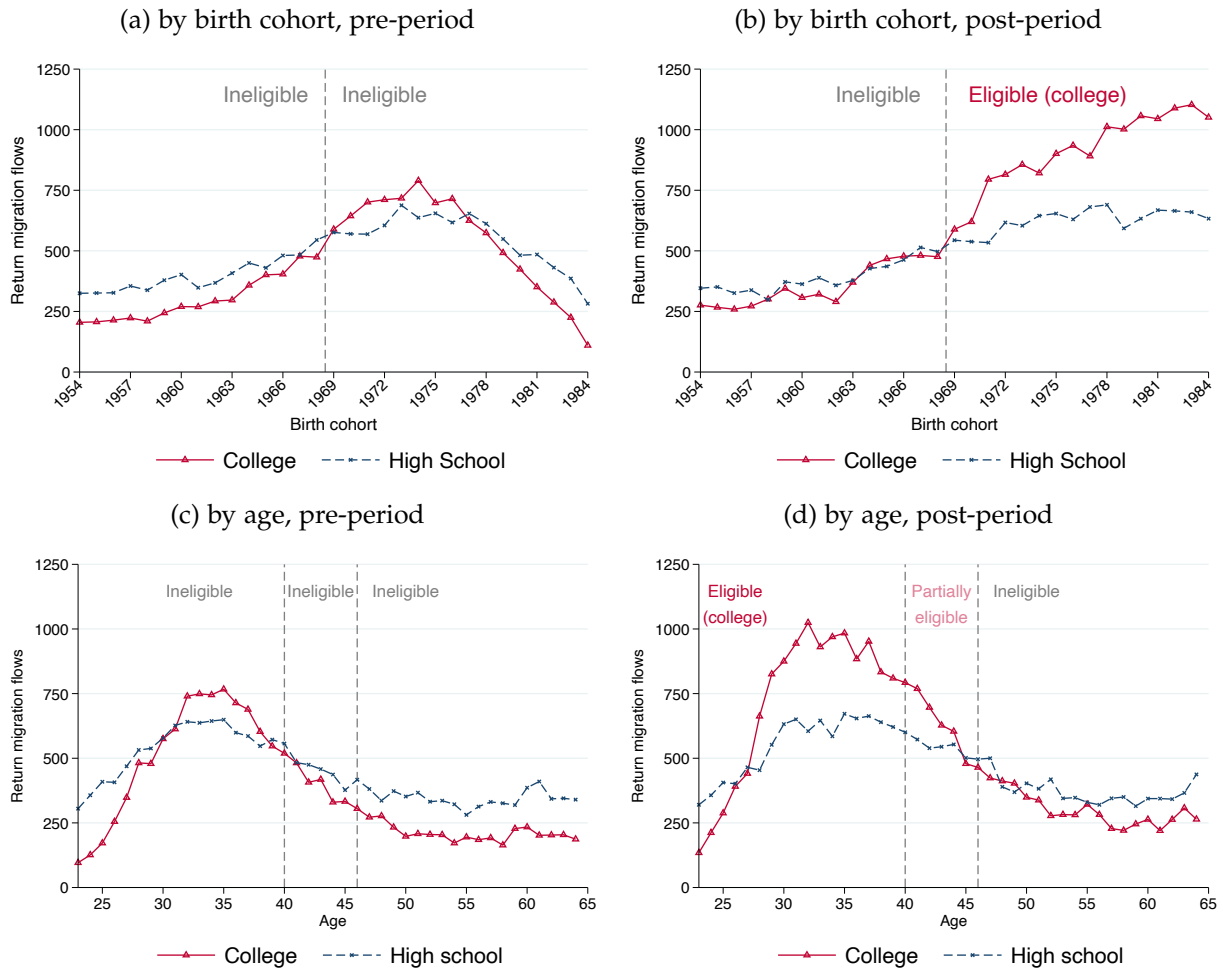
$$y_{gt} = \beta Eligible_g * Post_t + \gamma_g + \psi_{ct} + \phi_{et} + \epsilon_{gt} \tag{2}$$

where $Eligible_g = \mathbb{1}(c \geq 1969) * \mathbb{1}(e = college)$. The key feature of the Triple DiD model is the inclusion of cohort-by-year (ψ_{ct}) and education-by-year (ϕ_{et}) fixed effects, which absorb cohort-specific and college-specific time-varying shocks, such as changes in the relative labor demand for college-educated workers in Italy. The effect of eligibility is identified by the triple interaction $\mathbb{1}(c \geq 1969) * \mathbb{1}(e = college) * \mathbb{1}(t \geq 2011)$.[32]

The Triple DiD model relies on a weaker version of the parallel trend assumption, requiring that the relative outcomes between college and high school graduates among the younger cohorts (those born in or after 1969) would have evolved similarly as the relative outcomes among the older cohorts (born before 1969), absent the tax schemes.

[32]Notice that, if we were to include only year fixed effects λ_t in lieu of ψ_{ct} and ϕ_{et}, the coefficient β would leverage exactly the same variation as the Diff-in-Diff model in Equation 1.

Figure 4: Return migration by cohort and by age, pre- and post-2010 tax scheme



Notes: Figures (a)-(b) plot the total number of Italians 23-64 years old returning to Italy (a) between 2006-2010 and (b) between 2012-2016, by birth cohort (x-axis) and by education level (college and high school graduates). Figures (c)-(d) plot the total number of Italians 23-64 years old returning to Italy (c) between 2006-2010 and (d) between 2012-2016, by age at return migration (x-axis) and by education level (college and high school graduates). *Source*: authors' elaboration on Istat data.

Figure 4 illustrates the identifying variation that we leverage in the Triple Difference model, and corroborates its validity. Specifically, the upper panels plot the number of returnees by *birth cohort*, separately for college and high school graduates, in the pre-period (a) and in the post-period (b), which aggregate respectively the five-year period preceding (following) the 2010 scheme, 2006-2010 (2012-2016 respectively). The lower panels plot returnees by *age* (at return migration), before (c) and after (d) the reform.

Prior to the 2010 reform, the distribution of returnees by birth cohort (panel a) is similar between college and high school graduates, with no difference across the 1969 birth-year threshold. The pre-period age distribution (panel c) is also comparable be-

tween the two groups, and reveals that the typical age among return migrants is 35.[33]

After the 2010 reform, the same charts show a completely different picture. In panel (b), while the two series still overlap to the left of the vertical line, there is a systematic divergence between college (eligible) and high school (ineligible) among post-1969 born returnees.[34] Similarly, panel (d) shows that college graduates under-40 are systematically more likely to return than high school graduates after 2010 relative to before. Consistent with the 1969 threshold, the divergence declines among those 40-45 years old (who are partially eligible depending on their age and return year) and disappears for the over-45, who are ineligible for the 2010 scheme.

Overall, the graphical evidence is highly consistent with the eligibility for tax incentives influencing migration decisions. To further assuage the concern that the patterns are not driven by differential emigration among the eligible, Appendix Figure D.3 shows a placebo version of Figure 4, displaying year-of-birth and age distributions among *emigrants* by education level pre- and post-2010. Reassuringly, the distributions of college and high school graduate emigrants fully overlap in both periods, in contrast to the stark post-reform divergence between eligible and ineligible returnees. Overall, the evidence suggests that the prospect of a tax break upon return did not result in an unintended increase in emigration in the years following the 2010 scheme introduction.[35]

4.2 Effect of eligibility on return migration

Table 1 confirms the graphical evidence by estimating the DiD and Triple Differences regression models. Let group g denote a cell defined by the interaction between birth cohort (5-year bins), education level (college or high school), origin country and sex. The dependent variable is the return migration rate ($rmig_{gt}/expat_{g,2010}$), i.e. the number of returnees in group g in year t divided by the stock of Italians abroad in group g as of

[33] In addition, the age plot reveals that the return migration propensity varies substantially by age, which is why it is important to control for cohort-by-year fixed effects, which flexibly absorb the age gradient.

[34] There is only very a small difference at the exact discontinuity, i.e. between 1968 and 1969. This is likely due to the scheme being advertised as targeting *under-40* college graduates (Appendix Figure B.1). This is why we do not implement a regression discontinuity design.

[35] This is reasonable considering the uncertainty regarding how long the incentives would be in place.

Table 1: Effect of eligibility for tax incentives on return migration rates

	Outcome: Return Migration Rate		
	(1)	(2)	(3)
Eligible $*$ Post	0.501^{***}	0.313^{***}	0.255^{***}
	(0.094)	(0.073)	(0.061)
Observations	9,022	9,022	9,022
R-squared	0.638	0.712	0.792
Avg Outcome Pre	0.957	0.957	0.957
Marginal/Inframarginal	0.517	0.322	0.263
Year FE	✓	✓	✓
Group FE	✓	✓	✓
Cohort $\times$ Year FE		✓	✓
Educ $\times$ Year FE		✓	✓
Orig $\times$ Year FE		✓	✓
Sex $\times$ Year FE		✓	✓
Cohort $\times$ Orig $\times$ Year FE			✓
Educ $\times$ Orig $\times$ Year FE			✓
Elasticity	1.358	0.847	0.691
	(0.256)	(0.197)	(0.165)

Notes: Observations: groups g by years t (2006-2018), where groups are combinations of birth cohort (5-years bins), education, origin country and sex. All columns include year and group fixed effects; Column 2 adds year by cohort and year by education FEs, as well as year by sex and year by origin FEs; Column 3 also includes year by origin by cohort and year by origin by education FEs. The dependent variable is the number of Italian citizens, born in Italy between 1954-1983 and with at least a high school diploma, moving to Italy from abroad in year t (Istat data), divided by the stock of Italian expatriates as of 2010 (OECD DIOC data). "Average Outcome Pre" refers to the treated group in the pre-period. M/I is the implied marginal-to-inframarginal ratio, obtained by dividing the Eligible $\times$ Post coefficient by the mean outcome for the treated in the pre-period plus the change in the mean outcome for the untreated. The elasticity is the coefficient in percentage of Average Outcome Pre, divided by the log change in the average net-of-tax rate for an individual earning 75,000 euros. Observations are weighted by the stock of Italian expatriates in each group as of 2010, based on the OECD DIOC data. Standard errors (in parenthesis) are clustered at group level. * p < 0.10 ** p < 0.05 *** p < 0.01.

2010, just before the preferential tax scheme kicks in. We focus on this outcome for three reasons. First, it is economically meaningful and has an intuitive interpretation. Second, it accounts for the distribution of eligible and non-eligible individuals among expatriates before the introduction of tax incentives, which affects the return migration flows shown in the graphs. Third, it allows a direct comparison with the results obtained using the German data, where the outcome is the individual probability of leaving Germany, the individual-level counterpart of group-level return migration rate. As the regressions are estimated on grouped data, we weight observations by the stock of Italian expatriates in each group as of 2010 (i.e. the denominator of the outcome), and we cluster standard errors at the group level to account for within-cell serial correlation.

In Column 1 we estimate a simple DiD regression (Equation 1) where we only include for year and group fixed effects. In line with the graphical evidence, the coefficient

of the interaction term shows that the eligible group is 52% more likely to return, a 0.5 percentage point increase from the average yearly return migration rate of 0.96%.

The effect in Column 1 corresponds to an elasticity of return migration to the average net-of-tax rate of 1.36.[36] Compared to the literature, our estimates are smaller than the foreigners elasticity estimated in the case of Denmark (1.59 in Kleven et al. 2014) and the Netherlands (≈2 in Timm, Giuliodori, and Muller 2022), but larger and more precisely estimated than previous estimates for returning expatriates (close to zero in the Danish case). This is consistent with Italian tax incentives targeting Italian expatriates in a context of a brain drain, which was not the case in the Scandinavian context.

Column 2 shows the corresponding Triple DiD estimate (Equation 2), obtained by including cohort-by-year and education-by-year fixed effects (as well as origin country by year and sex by year). The Triple DiD estimate is statistically significant at the 1% level and economically significant (a 32% increase from the baseline return migration rate), but much smaller than the DiD estimate in Column 1, translating into an elasticity of 0.85. The comparison reveals the importance of partialling out age-specific and college-specific trends in the Triple DiD specification.

In Column 3, we further include cohort-by-origin-by-time ψ_{cot} and education-by-origin-by-time ϕ_{eot} fixed effects, to absorb any *origin country specific* shock pertaining to young and college-educated returnees after 2010, such as country-specific labor market shocks (push factors) that may affect the probability of returning to Italy differently for Italian expatriates in different cohorts and education groups. Our results survive to this demanding specification, with eligibility post-reform predicting a 27% increase relative to the baseline, confirming that host-country unobserved shocks affecting young and high-skilled workers in the post-period are not driving the estimated effect.[37]

[36] To obtain an elasticity, we estimate the same regression using log return migration as outcome and log average net-of-tax rate, determined by the $Eligible * Post$ interaction, as the main explanatory variable, assuming a gross income of 75,000 euros. As the tax rate reduction is fairly constant (30 p.p.) throughout the income distribution (Figure 2), the implied elasticity is not particularly sensitive to the earnings level. Still, we are implicitly assuming full take-up and a constant elasticity across the earnings distribution.

[37] One may worry that we might still be capturing the impact of other confounding factors, specific to the eligible group (young college graduates), and kicking in only after 2010. To rule out this possibility, with the German data, we will add another layer of differencing by comparing young college-educated Italians with the same exact group among Spanish citizens.

4.3 Robustness checks

The results are robust to different definitions of outcome variables and groups, as well as to restricting the post-period years and the birth cohort range. In Appendix Table A.2 the outcome is the absolute number of returnees (not divided by the expatriates stock) for different group g definitions: binary eligible-ineligible (Col. 1), birth year by education cells (Cols. 2-3), cohort-education-origin-sex (Cols. 4-5).[38] Despite the different definitions, the effects are stable and precisely estimated: the DiD estimate (Col. 1) shows that 770 additional eligible individuals return each year from the top-5 countries, equivalent to 40 returnees in each cohort-education cell (Col. 2) and to 4 returnees in each granular group as in the main table (Col. 4). The respective Triple DiD estimates (Cols. 3 and 5) are about 25% smaller, but still significant at the 1% level.

Next, Appendix Table A.3 replicates the main results (Table 1) but limits the post-period to 2015, thus excluding the years when returnees are subject to the 2015 scheme, which relaxed the eligibility requirements. While the DiD estimate in Column 1 is smaller, the Triple Difference estimates in Columns 2-3 are nearly unchanged, confirming that the additional fixed effects effectively control for education and cohort specific shocks. Finally, Appendix Figure A.3 shows that the effect survives to restricting the birth cohort bandwidth around the 1969 discontinuity, although the point estimate becomes smaller, in line with the raw-data in Figure 4.

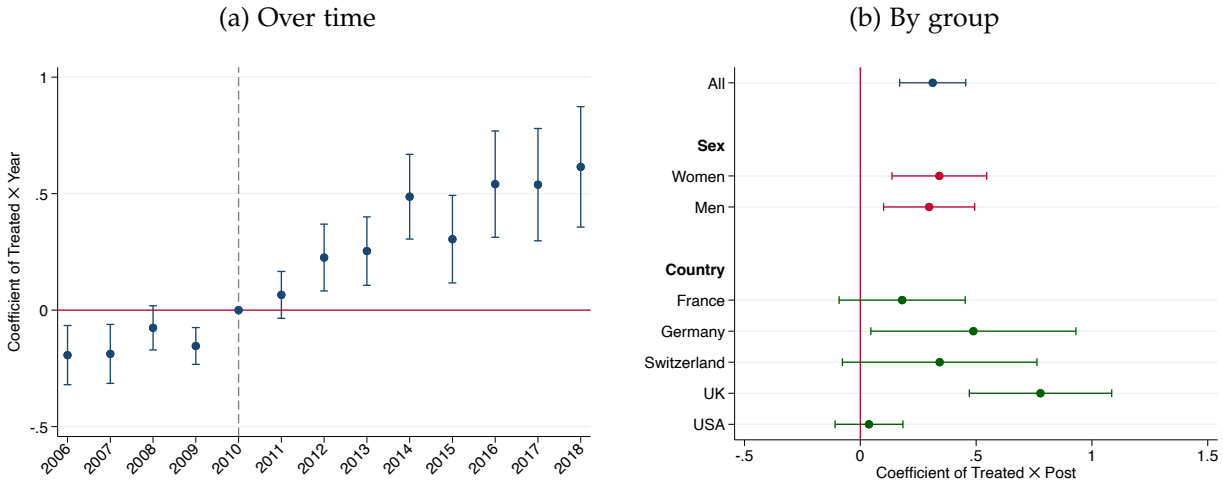
4.4 Heterogeneity

In Figure 5 we explore two dimensions of heterogeneity, using the available information in the Italian data. First, to gauge the evolution of the return migration response over time, Figure 5(a) plots the β_τ coefficients (and 95% C.I.) from the dynamic version of Equation 2, where we allow the treatment effect to vary by year.[39] Consistent with the raw-data evidence shown in Figure 3, the effect builds up over time, with the coefficient

[38] The sample only includes the top-5 countries for which the exact birth year is available (Germany, Switzerland, France, UK, US). Notice that Figures 3 and 4 are based on all origin countries instead.

[39] We estimate: $y_{gt} = \sum_\tau \beta_\tau * Eligible_g * \mathbb{1}(t = \tau) + \gamma_g + \epsilon_{gt}$, where g is defined by birth cohort, education, origin and sex, and $Eligible_g$ is interacted with year dummies $\forall \tau \in [2006, 2018]$, excluding 2010.

Figure 5: Heterogeneity of the effect of eligibility on return migration (Italian data)



Notes: Figure (a) plots the estimated coefficients β_τ (and 95% C.I.) of the interactions between the treated dummy and year dummies from the following specification: $y_{gt} = \sum_\tau \beta_\tau * Eligible_g * \mathbb{1}(t = \tau) + \gamma_g + \epsilon_{gt}$. Figure (b) plots the point estimate and the 95% C.I. of the Triple DiD coefficient (Table 1 Column 2) of separate regressions for different subgroups of returnees by sex and origin (host) country. Observations: group g by year t, where groups are combinations of birth cohort (5-years bins), education, origin and sex. The dependent variable is the number of Italian citizens 23-64 years old, born in Italy between 1954-1983 and with at least a high school diploma, moving to Italy from abroad in year t (Istat data), divided by the stock of Italian expatriates as of 2010 (OECD DIOC data).

starting to be significant around 2012-13 and then becoming larger and more stable around 2014.[40]

Finally, Figure 5(b) explores the heterogeneity by sex and host country, plotting the coefficients of separate regressions for each subgroup. The baseline coefficient is the estimate in Column 2 of Table 1. The estimates are not significantly different between women and men, despite the slightly larger tax incentive applying to women (until 2015). In contrast, the return migration response is heterogeneous in terms of origin countries. The largest effects are estimated for Italians returning from other European countries such as Germany, Switzerland and the United Kingdom. This is consistent with expatriates in nearby countries, thus with lower migration costs, being more responsive to the shock to net wage differentials induced by the tax break, as opposed to expatriates in more distant and visa-restricted host countries such as the United States.

[40]In the pre-period, the eligible groups is slightly less likely to return (in line with the raw data). For this reason, in Appendix Figure A.4 we implement the test suggested by Rambachan and Roth (2023), estimating the magnitude of the post-period violation of parallel trends that would invalidate our results, relative to the observed maximum pre-treatment violation, in 2016. Reassuringly, the estimate remains significant even if the post-period violation is twice (M=2) the size of the pre-period one.

5 Evidence from German social security data

As a second approach to evaluate the effects of tax incentives on return migration, we focus on the universe of Italian citizens working in Germany, from the IEB social security data. First, we replicate the analysis using individual-level data on Italians in Germany who leave the register. Then, we exploit detailed labor market information to investigate the characteristics and selection of tax-induced return migrants.

5.1 Empirical strategy

Leveraging the longitudinal structure of the data, we estimate an individual-level (Triple) Difference-in-Differences specification on the universe of Italian workers in Germany:

$$L_{igt} = \beta Eligible_g * Post_t + \psi' X_{igt} + \lambda_t + \epsilon_{igt} \tag{3}$$

where L_{igt} is a dummy equal to 1 if individual i leaves the German labor market in year t, $Eligible_g$ is a dummy the eligible group (born after 1969 with a college degree), $Post_t$ is a dummy equal to 1 for the post-2010 scheme years, and X_{igt} is a vector of individual-level controls and λ_t are year fixed effects.[41] The coefficient of interest is β, which captures the post-reform difference in the probability of leaving between eligible and ineligible Italians relative to the pre-reform period. We cluster standard errors at the individual level due to the longitudinal structure of the data.

A threat to identification which we can tackle with the German data, is that eligible Italians in Germany may have experienced differential labor market conditions relative to the ineligible after 2010, affecting the probability of return migration regardless of the tax break. For instance, if young college-educated Italians were disproportionately employed in sectors facing negative demand shocks in the post-period (e.g. German banks being exposed to the Sovereign debt crisis), they may have been more likely to

[41] Controls include birth cohort, education, sex, age at entry, years in the registry. In addition, we include year-by-education and year-by-cohort FEs, to mimic the Triple DiD specifications using the Italian data. We also include sector-year, occupation-year and local labor market by year FEs in some specifications.

return to Italy than the controls, for reasons unrelated to the tax incentives. Therefore, to further probe the validity of our DiD design, we use Spanish citizens in Germany by augmenting the specification with an additional layer of differencing:

$$L_{ignt} = \beta Treat_g * Italian_n * Post_t + \psi' X_{ignt} + \lambda_t + \epsilon_{ignt} \tag{4}$$

where we compare eligible individuals of Italian nationality n with eligible individuals with Spanish nationality to the same pre-post difference among the ineligible. Spaniards are a natural comparison group for Italians for two reasons. First, Spain experienced a double-dip recession similar to Italy, which triggered large emigration flows towards Germany (Bertoli, Brücker, and Moraga 2016).[42] Second, unlike Portugal,[43] Spain did not have any preferential tax scheme targeted to young college graduates in this period.[44]

5.2 Effect of eligibility on the probability of leaving Germany

Table 2 shows the results of estimating Equation 3 using social security data on Italian workers in Germany. The outcome variable is the individual probability of leaving the register in year $t+1$, conditional on being employed in year t. Eligible and ineligible groups are defined as in the analysis with the Italian data. As there is evidence in the literature that return migrants are likely to transition through unemployment spells before returning (Bijwaard, Schluter, and Wahba 2014; Akee and Jones 2024), we limit the analysis to leavers who were employed in the year before disappearing; for this reason, the pre-period begins in 2007 and the post-period ends in 2016.[45] The specification in Column 1 is a simple DiD model, while Columns 2-5 are Triple Differences models, as they include two-way interactions between birth cohort, education and year fixed effects, as well as additional FEs.

[42] Appendix Figure A.1 shows the aggregate migration flows of Italians and Spaniards to Germany.

[43] In 2009, Portugal introduced a tax break (the "non-habitual residents" regime) for immigrants and returnees in specific high-skilled occupations, most of which require a college degree.

[44] Since 2005, Spain has a preferential tax scheme for high earners, known as "Beckham Law", which allows foreigners and long-term expatriates (with at least 10 years abroad) who relocate to Spain to be taxed at a flat income tax rate of 24% for 6 years. Importantly for our comparison, Spanish scheme targets

Table 2: Effects of Tax Incentives on Eligible Italians leaving Germany

	Outcome: Probability of leaving				
	(1)	(2)	(3)	(4)	(5)
Eligible $*$ Post	0.355***	0.327**	0.343**	0.350***	0.347***
	(0.085)	(0.133)	(0.133)	(0.134)	(0.135)
Avg Outcome Pre	2.678	2.678	2.678	2.679	2.684
Observations	1,893,126	1,893,126	1,893,126	1,828,747	1,825,769
Individuals	279,306	279,306	279,306	278,715	278,596
R-squared	0.018	0.018	0.019	0.020	0.020
Controls	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓
Cohort $\times$ Education FE		✓	✓	✓	✓
Cohort $\times$ Year FE		✓	✓	✓	✓
Education $\times$ Year FE		✓	✓	✓	✓
Industry $\times$ Year FE			✓	✓	✓
Occupation $\times$ Year FE				✓	✓
State $\times$ Year FE					✓

Notes: Source: IEB data. Observations: individuals by years (2006-2016). The dependent variable is the probability of leaving the register in year t conditional on being employed in $t-1$, times 100. Sample is Italian citizens 23-64 years old born between 1954-1988, with at least high school diploma, and at least one employment spell in Germany between 2006-2016. "Eligible" is a dummy equal to 1 if birth year is equal or greater than 1969 and education level is college and "Post" is a dummy equal to 1 for the post period years (2011 and after). Baseline controls include sex, education, age at entry in the register, years in the register and year fixed effects. Column 2 adds fixed effects for the two-way interactions between birth cohort, education and year. Columns 3, 4 and 5 add industry-year, occupation-year and state-year (Länder) fixed effects respectively. Standard errors are clustered at the individual level. * p < 0.10 ** p < 0.05 *** p < 0.01.

We find a positive and statistically significant effect of the tax scheme on the probability of leaving the register. Specifically, we estimate a 0.355 percentage point increase in the probability of leaving Germany among the eligible relative to the controls after the reform, corresponding to a 13% increase relative to the baseline. The estimated effect is robust to the inclusion of two-way interactions between education, birth cohort and year fixed effects, as well as industry-year, occupation-year and local labor market by year fixed effects. Appendix Figure A.5 shows the dynamic version of the DiD model in Column 1. We do not see any pre-trend prior to 2011; in contrast, the probability of leaving increases gradually among the eligible group relative to the controls, with the effects being the largest after 2013, consistent with our results using the Italian data.

We additionally perform a series of robustness checks, reported in Appendix Table A.5. The first column shows the baseline effect. To rule out that our results are entirely driven by post-2010 arrivals, in Column 2 we restrict the sample to individuals who ar-

top earner foreigners, and does not limit eligibility based on education or age.

[45]Results are robust to using the employment spell two years before leaving (Appendix Table A.6).

rived before 2010; the coefficient is nearly unchanged. In Column 3, we exclude partially treated birth cohorts (see Figure 4), while in Column 4 we trim the youngest and oldest cohorts. Finally, Column 5 displays results for individuals who were employed two years before leaving the register.[46] All these alternative specifications lead to estimated coefficients that are comparable to the baseline effect.

5.3 Placebo: comparing Italians and Spaniards

To rule out that the effect is driven by unobserved differential trends specific to eligible group (young college graduates), in Table 3 we show the results of comparing Italians with Spaniards in three different ways.

In Columns 1-2, we estimate a DiD model on eligible individuals only, with treatment defined as being Italian citizen (as opposed to Spanish). Interestingly, despite the different definition, the treatment effect is similar in magnitude to our baseline: eligible Italians are 13% more likely to leave Germany post-reform compared to "eligible" Spaniards (Spanish college graduates born after 1969). The effect is robust to the inclusion of cohort-year and college-year fixed effects (Column 2).

In Columns 3-4, to deal with the potentially different composition in terms of age and education between Italians and Spaniards in Germany, we estimate a Triple DiD specification (Equation 4) on a 1:1 matched sample of Italians and Spaniards, based on observable characteristics.[47] Again, the coefficient of the key interaction $Italian * Eligible * Post$ is significant and similar to the baseline (a 16% increase).

As a final check, in Columns 5-6 we show placebo regressions where we estimate our main specification on Spaniards only, instead of Italians. If the treatment effect in Table 2 was due to differential shocks specific to young college graduates, this specification should deliver a significant effect of "eligibility" among Spanish expatriates in Germany.

[46] In Appendix Table A.6 we show all regression models presented in Table 2 conditional on two years of employment before leaving the register. The results are qualitatively similar to our baseline specifications.

[47] Matching variables: education, age, sex, sector, occupation, years in the registry. In Appendix Table A.4 we show descriptive statistics for the sample of Italians and Spaniards, in the pre- and post-reform period, pooling together eligible and non-eligible.

Table 3: Probability of leaving: Spanish as control group and placebo

	(1)	(2)	(3)	(4)	(5)	(6)
	Only treated		1:1 matched sample		Only spanish	
Italian ∗ Post	0.400**	0.316**	0.148***	0.095**		
	(0.158)	(0.159)	(0.046)	(0.046)		
Italian ∗ Eligible ∗ Post			0.519***	0.469**		
			(0.182)	(0.183)		
Eligible ∗ Post			-0.031	-0.245	-0.058	-0.069
			(0.142)	(0.178)	(0.143)	(0.224)
Average Outcome Pre	3.152	3.152	3.217	3.217	4.066	4.066
Observations	318,854	318,854	1,272,243	1,272,243	440,210	440,210
Individuals	68,195	68,195	186,759	186,759	76,203	76,203
R-squared	0.024	0.025	0.024	0.025	0.035	0.037
Controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Cohort × Education FE		✓		✓		✓
Cohort × Year FE		✓		✓		✓
Education × Year FE		✓		✓		✓

Notes: Source: IEB data. Observations: individuals by years (2006-2016). The dependent variable is the probability of leaving the register in year t conditional on being employed in $t-1$. "Italian" is a dummy equal to 1 for Italian citizens; "Eligible" is a dummy equal to 1 if birth year is equal or greater than 1969 and education level is college; "Post" is a dummy equal to 1 for the post period years (2011 and after). In Columns 1-2, sample is Italian and Spanish citizens 23-64 years old, born between 1954-1988, with college education, and at least one employment spell in Germany between 2006-2016. In Columns 3-4, sample is a 1:1 matched sample of Italian and Spanish citizens 23-64 years old, born between 1954-1988, with at least high school diploma, and at least one employment spell in Germany between 2006-2017, based on the following matching variables: education, age, sex, age at entry, sector, occupation. In Columns 5-6, sample is Spanish citizens 23-64 years old, born between 1954-1988, with at least high school diploma, and at least one employment spell in Germany between 2006-2016. Baseline controls include sex, education, age at entry in the register, years in the register and year fixed effects. Columns 2, 4 and 6 also include fixed effects for the two-way interactions between birth cohort, education and year. Standard errors are clustered at the individual level. * p < 0.10 ** p < 0.05 *** p < 0.01.

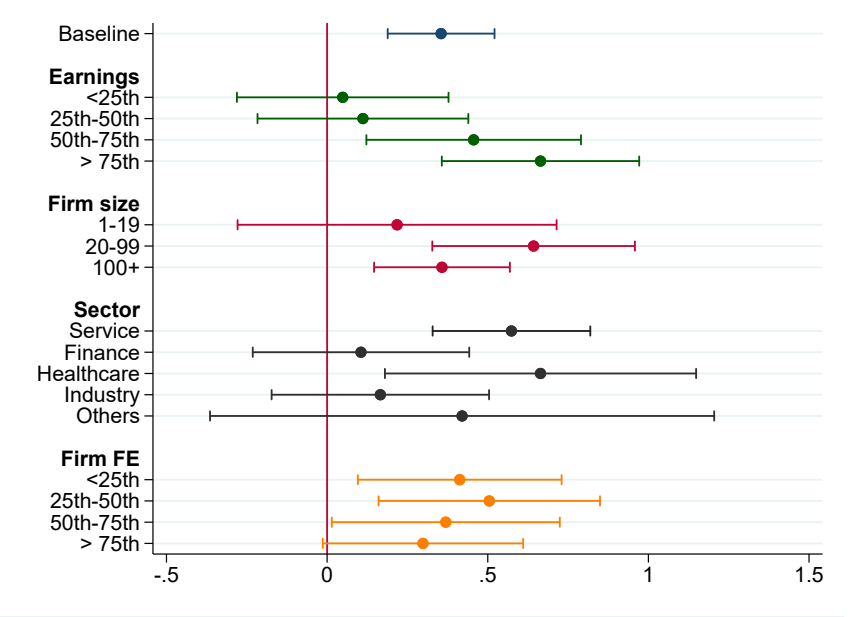
Reassuringly, the placebo *Eligible* ∗ *Post* interaction is statistically insignificant and an order of magnitude smaller in size than the true estimate, suggesting that the latter is not driven by these unobserved confounders.

5.4 Heterogeneity by earnings and firms characteristics

To shed light on the characteristics of marginal returnees, we estimate the DiD model separately for different subgroups of workers, based on their labor market outcomes throughout their employment history in Germany.[48] Specifically, we split individuals in quartiles of mean annual earnings (among Italians in Germany), as well as by firm size (number of employees), sector, and firm fixed effects, based on the main employer dur-

[48]Labor market outcomes change in proximity of return migration (Akee and Jones 2024) and are affected by return migration intentions (Adda, Dustmann, and Görlach 2022; Bassetto and Freitas Monteiro 2024). For this reason, we consider the entire employment history, as opposed to the last spell in the data.

Figure 6: Heterogeneity by earnings and firm characteristics in Germany



Notes: The figure plots the point estimate β and 95% C.I. of the interaction between the *Eligible* and *Post* (Equation 3), for the full sample (baseline) and for different subgroups. Source: IEB data. Observations: individuals by year (2006-2016). The dependent variable is the probability of leaving the register in year t conditional on being employed in $t-1$. Sample is Italian citizens born between 1954-1988, with at least high school diploma, and at least one employment spell in Germany between 2006-2016. Baseline controls include sex, education, age at entry in the register, years in the register and year fixed effects. Standard errors are clustered at the individual level.

ing their employment history in Germany in our sample period.[49] When constructing the earnings quartiles, to account for compositional differences between the eligible and ineligible (due to their age and education), we compute separate earnings distributions for each group.[50] In this way, we compare eligible and ineligible Italians within corresponding quartiles (e.g., the top quartile among eligible with the top quartile among ineligible).

Figure 6 show graphically the results of this exercise. We find that the effect is driven by workers in the upper half of the earnings distribution: the effect is the largest in the third (0.5) and fourth (0.7) quartiles of earnings in Germany (compared to a 0.3 baseline).[51] In addition, marginal leavers tend to be employed in medium-sized firms (20-99 employees), and in the healthcare and service sectors. In contrast, we find little

[49] We compute AKM firm fixed effects à la Abowd, Kramarz, and Margolis (1999) for the years 2007-2013.

[50] To reduce noise due to outliers, we trim the bottom and top 1% of each distribution. Using the median instead of the mean does not alter the results.

[51] The average earnings of eligible workers in the upper half of the earnings distribution is roughly 65,000 euros before-tax (37,000 after-tax).

heterogeneity by firm fixed effects, besides a slightly lower response among workers in firms paying higher wage premia.

Overall, two takeaways emerge from the figure: i) tax-induced migration is a broad phenomenon, not limited to top earners or specific occupations; and ii) marginal returnees are positively selected: among the eligible, tax incentives attract those who earn above-median wages in the destination country back to their home country. While the larger response among higher earners is consistent with the public finance literature (Kleven et al. 2020), we document a substantial migration response along the income distribution, as eligible individuals in our setting are young (under-40), likely at the onset of their careers, and typically not top earners. Finally, the positive selection among tax-induced returnees is important because return migrants tend to be negatively selected (e.g. Bijwaard and Wahba 2014). This is the case among Italians in Germany as well: descriptively, Appendix Figure A.7 shows that Italians in the bottom quartile are more likely to leave than the higher-earner Italians. Therefore, the fact that our Diff-in-Diff estimates pointed towards a positive selection among *marginal* returnees, implies that tax-induced return migration *reduces* the baseline negative selection among returnees, leading to a convergence of return migration rates along the earnings distribution.

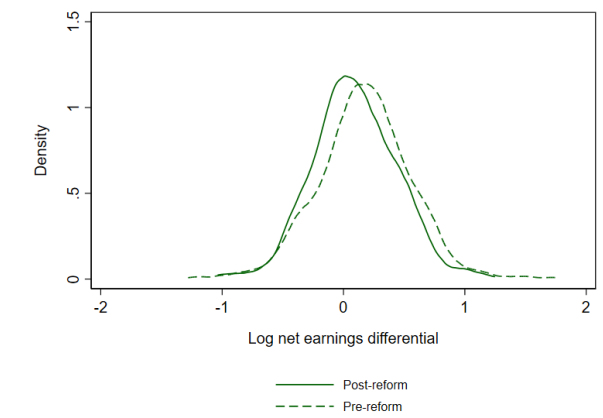
5.5 Wage differentials and return migration

The heterogeneity analysis shows that above-median earners in Germany are the most responsive to the Italian tax incentives. However, as the tax break apply to labor earnings in Italy, we need to think about how much these returnees would earn in Italy. Ideally, we would like to compare returnees' earnings in Germany with their actual earnings in Italy upon return. Since we cannot follow individuals across countries, we construct wage differentials by assigning a counterfactual Italian wage to each Italian worker in Germany, based on observable characteristics (age, education, sector, and sex), using Italian Labor Force Survey data.[52] We then compute net earnings using the 2010 tax

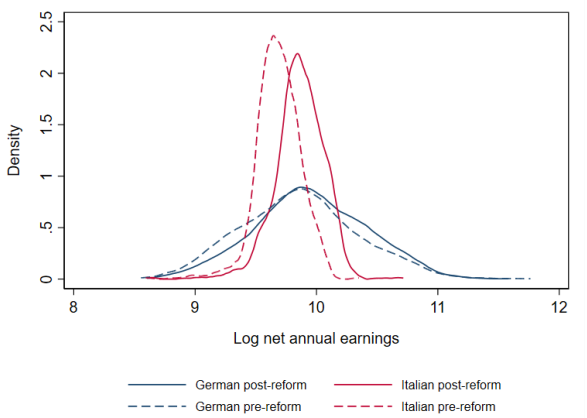
[52] Appendix C.3.2 describes the matching process in detail. Earnings are computed as full-time equivalents to make the two sources comparable.

Figure 7: Log net wage differentials (Germany-Italy) among eligible Italians in Germany

(a) Eligible - Log net earnings differential



(b) Eligible - Log net earnings in DE and IT



Notes: (a) log net earnings differentials between Germany and Italy, (b) log net Italian earnings and log net German earnings, pre-2010 (dashed lines) and post-2010 (solid lines), among eligible Italians in Germany. Observations: individuals by year, IEB data. Sample is Italian citizens born between 1969-1988 with a college degree, and at least one employment spell in Germany between 2006-2016. Earnings in Italy are imputed based on age, education, sector and sex as described in Section 3. Net German annual earnings below 5,000 EUR are excluded to make them comparable to the net Italian annual earnings. Earnings are computed as annual full-time equivalent. Source: IEB and IT-LFS data.

schedule in each country.

Figure 7 displays the distribution of log net earnings differentials among eligible Italians in Germany (panel a), as well as separate distributions of net earnings in Germany and Italy (panel b), before (dashed lines) and after (solid lines) the 2010 reform.[53] The figures reveals several interesting facts. Panel (a) shows that the wage differential is positive for the majority of Italians in Germany (71%), absent the incentives (dotted line). While the tax scheme shifts the distribution to the left (solid line), thus reducing the net wage differential with Germany, it is not sufficient to close the gap for the average Italian worker. In other words, despite the generous tax break, the average eligible returnee experiences a net pay cut when moving back to Italy. This is easier to see in Panel (b), which plots the separate wage distributions for the two countries.[54] The tax scheme increases post-tax earnings in Italy (red lines) as well as their dispersion, albeit not enough to match net earnings in Germany, especially for higher earners.[55]

[53] Appendix Figure A.8 show the corresponding figures for the ineligible group.

[54] Panel (b) reveals a larger wage dispersion in Germany than in Italy. While this is partially due to the lower variation in the Italian earnings due to the imputation procedure, it is consistent with the fact that German firms enjoy greater flexibility in local wage setting than their Italian counterparts, which are often bound by nationwide contracts (Boeri et al. 2021).

[55] German earnings (blue lines) increase slightly due to average (real) wage growth between pre and

In Appendix Table A.7, we take one further step and quantify the effect of the shock in net wage differentials induced by the tax break on the probability of leaving Germany. Specifically, we estimate the (semi)-elasticity of the probability of leaving with respect to the net earnings differential between Germany and Italy, instrumenting the latter with the $Eligible * Post$ interaction. The bottom panel shows the first stage estimates: conditional on individual-level controls, the Italian tax scheme increases (counterfactual) log net earnings in Italy by 19% and lowers the log net earnings differential with Germany by 10%. Focusing on the second stage estimates (top panel), a 1% increase in the counterfactual Italian earnings increases the probability of leaving by 0.6%,[56] and a 1% decrease in the wage differential increases the probability of leaving by 1.24%.[57]

Overall, Italian expatriates in Germany are responsive to the tax-break-induced change in the net wage in Italy, even though some workers (especially the higher earners) may experience a net pay cut due to the lower before-tax wages in Italy.

6 Effects on income tax revenue

In the previous sections, we showed that tax incentives are effective to attract Italian expatriates back to Italy. Are they a cost-effective policy? To answer this question, we perform a simple accounting exercise to estimate the effects of the tax scheme on income tax revenue. We focus on the *direct* effect on income tax revenue from tax-induced return migration (i.e. on the extensive margin), abstracting from cross-effects on other tax bases besides labor income (VAT, capital income, social security) as well as from non-fiscal effects, such as human capital externalities and other economic effects on receiving firms and locations. While deliberately simple, our cost-benefit analysis highlights how the fiscal impact crucially depends on key features of the tax scheme, such as the eligibility criteria, with important policy implications for the design preferential tax schemes.

post period.

[56] This is obtained dividing the percentage-point increase 0.017 (=0.01×1.69) by the baseline mean, 2.7%.

[57] These estimates are consistent with the reduced-form in Table 2 (dividing the reduced form by the first stage estimate), despite the slightly smaller sample due to unmatched individuals to the IT-LFS data.

To estimate the fiscal impact, we need to distinguish between marginal and infra-marginal returnees. The former are those who returned to Italy *because* of the tax scheme, and therefore would not have returned absent the incentives. The latter are those who would have returned anyway. Intuitively, the positive effects arise from marginal returnees, taxpayers who would be abroad if no tax scheme existed, while infra-marginal returnees constitute a cost from a public finance perspective.

Is the additional tax revenue from marginal returnees enough to offset the loss in tax revenue from infra-marginal returnees? Our Triple Difference estimates imply that around 30% of returnees are marginal. To evaluate if such an increase is large enough for the scheme to pay for itself, we derive a tractable formula for the fiscal break-even.

6.1 Fiscal break-even condition

Let the total number of post-reform eligible returnees be denoted by $M + I$, where M and I denote marginal and infra-marginal returnees respectively.[58] To fix ideas, consider Figure 3 (a). Under the parallel trends assumption, the average post-reform value of the eligible series (red line) proxies $M + I$, the average post-reform value of the ineligible one (blue line) gives I, and thus the number of marginal returnees M is equal to the difference between the two lines. Then, the share of marginal returnees M/I is the ratio between the Average Treatment Effect (ATE) and the average post-reform outcome for the untreated group.[59]

Let $T(sw_{it})$ be the tax liability of an individual i earning w_{it} in year t, where s denotes the taxable income share (as explained in Section 2). Let δ be the share of marginal returnees who leave after the incentives elapse, and β the discount factor. In

[58] The distinction between marginal and infra-marginal returnees is based on the potential outcome framework, with the two groups corresponding to "compliers" and "always-takers". Formally, let Y_i^0 denote the probability that an eligible expatriate i returns to Italy absent the reform ($D = 0$), and Y_i^1 the probability of i returning with the incentives in place ($D = 1$). Under the assumption of no-defiers (i.e., $Y_i^1 \geq Y_i^0$), we have $i \in I$ if and only if $Y_i^1 = Y_i^0$, and $i \in M$ if and only if $Y_i^1 > Y_i^0$.

[59] This is because in the graph the control series is standardized to be equal to the treated in 2010. If that was not the case, the ratio M/I would be given by the DD effect divided by the sum of the mean outcome for the treated in the pre-period and the change in the mean outcome for the untreated.

order for the tax scheme to break even, the following condition needs to be satisfied:

$$\underbrace{\sum_{t=1}^{d} \beta^t \sum_{i \in M} T(sw_{it})}_{\substack{\text{Revenue from M} \\ \text{during scheme}}} + \underbrace{(1-\delta) \sum_{t=d+1}^{\mathcal{T}} \beta^t \sum_{i \in M} T(w_{it})}_{\substack{\text{Revenue from M} \\ \text{after scheme}}} \geq \underbrace{\sum_{t=1}^{d} \beta^t \sum_{i \in I} [T(w_{it}) - T(sw_{it})]}_{\text{Revenue loss from I}} \tag{5}$$

The left-hand-side – the fiscal benefit – is the additional tax revenue generated by marginal returnees ($i \in M$), who would not have returned absent the incentives, and it is the sum of two terms. The first term is the present discounted value (PDV) of the reduced tax revenue from M individuals during their first d years in the country, when they benefit from the tax scheme (with taxable share s). The second term is the PDV of the full tax revenue from M individuals after the scheme elapses ($t > d$), assuming that a fraction δ leaves the country after the incentives end.

The right-hand-side – the fiscal cost – is the loss in tax revenue due to the fact that infra-marginal returnees ($i \in I$), who would have returned even absent the incentives, benefit from the scheme. This foregone revenue is the PDV of the difference between the full tax revenue and the reduced tax revenue from I individuals throughout the d years when the tax scheme (with taxable share s) is in place.

We can then solve Equation (5) to obtain the minimum share of marginal to infra-marginal returnees such that the fiscal benefit outweighs the cost, and compare this break-even threshold to the implied M/I from our DiD estimates. Table 4 outlines the baseline parameters values we use to solve (5). The duration d (5 years) and taxable share s (25%) are those of the 2010 scheme. The average age $a = 35$, which we observe in the migration data (Figure 4), determines the total number of periods $\mathcal{T} = 65 - a$, where 65 is the statutory retirement age.[60] In the baseline, we assume that marginal and infra-marginal returnees earn the same amount ($\theta = 1$, where $w_M = \theta w_I$), equal to the average gross earnings of 2010 scheme beneficiaries (75,000 EUR).[61]

[60] This implies 25 years of fiscal contributions beyond the 5 years duration.

[61] In practice, as the tax reduction is constant throughout the income distribution, changing this value has a limited impact. To obtain the tax liability, we use the exact tax schedule displayed in Figure B.3(a) (without payroll taxes); for $w = 75,000$, we have $T(w) = 23,651$ and $T(0.25w) = 3,006$.

Table 4: Baseline parameter values

Description	Parameter	Value
Duration (years)	d	5
Exempted share	$1-s$	0.75
Average age at return	a	35
Annual earnings (EUR)	w	75,000
Relative earnings M/I	θ	1
Out-migration rate	δ	0.3
Discount rate	$1-\beta$	0.01

Notes: Duration: average number of years of exemption under the 2010 scheme (see Appendix B for details). Exempted share: average between 0.8 (women) and 0.7 (men). Earnings: average gross income of 2010 scheme beneficiaries (MEF 2017) for the earliest year available (2016). Out-migration rate from Kleven et al. (2014). Discount rate: annual interest rate on newly issued Italian government bonds between 2010-2020.

Using the parameters values in Table 4, the break-even condition simplifies to:[62]

$$\frac{M}{I} \geq 27.8\% \tag{6}$$

i.e. we need at least 28 marginal returnees for each 100 infra-marginal, or, put differently, a 28% increase in the probability that eligible individuals return. As our most conservative estimates of the M/I ratio range between 26-32% (Table 1), our simple exercise suggests that the 2010 scheme roughly breaks even.

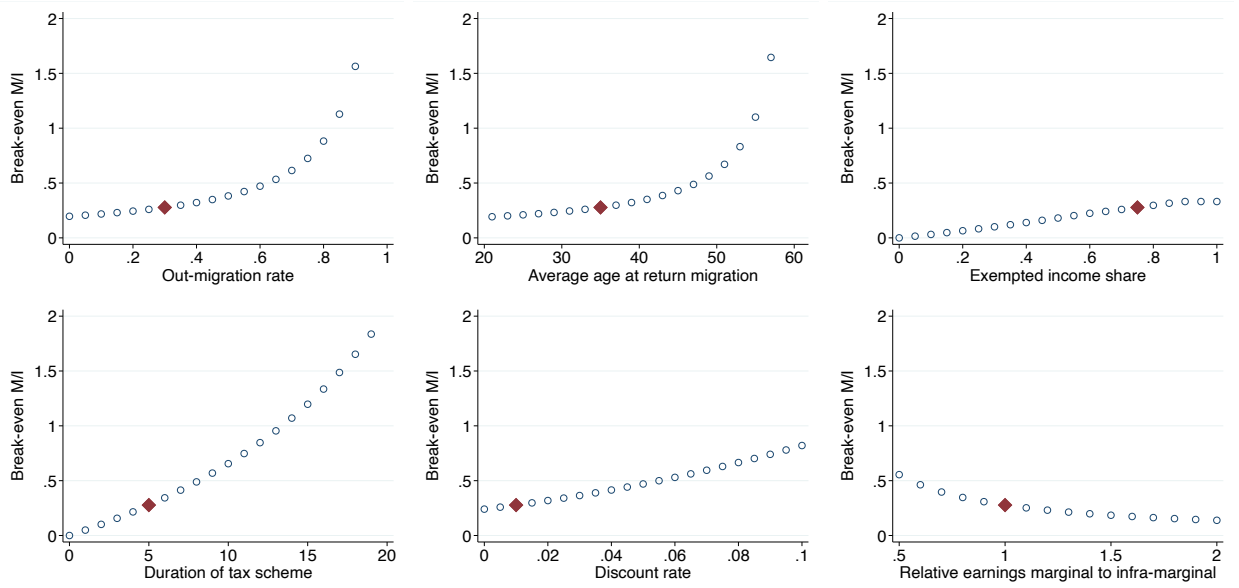
Importantly, this result hinges on the assumption that there is no tax-scheme-induced *emigration* in response. Furthermore, the break-even result is limited to the 2010 scheme; the subsequent changes likely worsened its net fiscal cost, as we argue below. Finally, to the extent that the marginal returnees exert positive externalities on other workers, as often found in the agglomeration (Moretti 2004; Winters 2014) and high-skilled migration (Kerr et al. 2016; Anelli et al. 2023) literature, the direct fiscal effect will a lower bound of the overall effect of the tax schemes.

6.2 Sensitivity and policy implications

To assess the sensitivity of the break-even condition, in Figure 8 we simulate the break-even marginal-to-inframarginal ratio (the solution of Equation 5) for a plausible range of values for each parameter, keeping all the other parameters fixed to their baseline value.

[62] In Appendix E we show the detailed steps and derive a simplified closed form solution.

Figure 8: Sensitivity of break-even marginal-to-inframarginal ratio to parameter values



Notes: the graph shows the break-even value of the M/I ratio that solves Equation 5, for different values of the parameters. In each graph, the dark red point is the baseline value of that parameter used in Section 6, and all points are computed by fixing the other parameters at their baseline values.

Figure 8 reveals that three parameters play a key role in determining the fiscal sustainability of the scheme. First, the out-migration rate δ after incentives elapse. Our baseline assumes a conservative 30% out-migration rate, which we take from the literature on foreigners' tax schemes.[63] Nevertheless, a small increase in δ erases the fiscal benefit swiftly. Therefore, it is crucial for the policymaker to keep out-migration low for the scheme to be fiscally sustainable. One potential avenue is to design a gradual phase-out of the incentives, to avoid a salient year-to-year drop in net earnings.

Second, the age at return migration. The higher the age at return, the lower the number of years of fiscal contribution from marginal returnees after the scheme elapses and before their retirement, and therefore the lower the net fiscal benefit.[64] Importantly, the policymaker can influence this parameter with an age limit or birth cohort restriction as in the 2010 scheme.

Third, the duration of the tax break. Intuitively, one more year of incentives implies

[63] Kleven et al. (2014) finds that about 30% of foreigners who benefit from the Danish tax scheme left after the break elapsed. Arguably, expatriates who return to their home country are more likely to stay beyond the duration than foreigners.

[64] Younger individuals may also be more mobile and thus have a higher probability of re-emigrating (i.e., a higher δ), which however we are unable to estimate with our data.

one less year of full tax contributions. Notice, however, that this mechanical effect abstracts from the behavioral response, as a larger duration plausibly increases the fraction of marginal returnees; therefore, the true gradient is flatter than in the figure. The same caveat applies to the exempted share: while the figure shows a limited mechanical impact (as the fiscal benefit mainly derives from post-scheme contributions), the behavioral response would make the gradient steeper, if a larger exemption attracts more returnees.

The other factors play a more limited but non-negligible role. The discount rate β is somewhat important: the higher the borrowing cost for the government, the costlier is to subsidize returnees today in exchange for larger tax contributions in the future. The higher the relative earnings between marginal and infra-marginal returnees (θ), the more likely is that the fiscal benefit exceeds the cost: if marginal returnees are positively selected ($\theta > 1$), as we found to be the case among returnees from Germany, the scheme is more likely to break even. In contrast, the average earnings level (shown in Appendix Figure A.9) has almost no bearing on the break-even condition due to the tax rate reduction being largely independent from the level of annual earnings (Figure 2).

Finally, we can use our framework to qualitatively assess the impact of the subsequent changes to the 2010 scheme. Overall, the fiscal sustainability of the scheme likely deteriorated. The 2015 reform removed the birth cohort requirement, plausibly increasing the average age of returnees and thus worsening the fiscal sustainability of the scheme. The 2019 reform also eliminated the high-skilled requirement, likely diluting human capital externalities for a given fiscal cost of the policy. In addition, it extended the duration for individuals with observable ties to Italy (having children and buying a house); while the aim is to keep out-migration low, it comes at the (high) cost of foregoing tax revenue in the years post-scheme. In fact, the recent changes in 2023, which reintroduced more restrictive features (high-skilled, 5 years max), suggest that the tax authority determined that the 2019 scheme was too costly for the Italian public finances.

7 Conclusions

Large emigration flows of young and highly educated individuals have characterized the recent history of several countries. While governments worry about reversing brain drain, few effective policies have been adopted. In this paper we investigate the effects of a unique policy to induce return migration of young high-skilled expatriates implemented in Italy in 2010. The reform granted a large income tax discount to Italian expatriates moving back to Italy, as long as they have a college degree and they were born on or after 1969. Exploiting these eligibility criteria in a Triple Differences strategy and using administrative data on return migration, we find that eligible Italian expatriates are 27% more likely to move back to Italy post-reform, with a larger response from Germany, Switzerland and the UK.

We then focus on Germany, a top destination for Italian expatriates, and estimate similar effects on the probability that Italian workers return to Italy, as proxied by exits from German social security data. Furthermore, we find that marginal returnees are mostly in the upper half of the wage distribution of Italians in Germany. Overall, our findings show that tax-induced mobility is a broad phenomenon, beyond top earners in specific occupations (e.g. inventors or football players), and affects the location of human capital across sending and receiving regions.

Finally, we perform a simple accounting exercise to compare the fiscal benefit of attracting and retaining marginal returnees (who returned because of the scheme) with the fiscal cost of subsidizing infra-marginal returnees (who would have returned anyway). Our estimates imply that the direct impact of the 2010 scheme on income tax revenue – a lower bound of the true effect in the presence of positive human capital externalities (Kerr et al. 2016) – is roughly neutral due to the scheme targeting *young* high-skilled individuals, whose fiscal contributions span several years beyond the (limited) duration of the incentives.[65]

A few limitations of our study are worth highlighting and suggest some caution

[65]Subsequent changes to the scheme likely deteriorated its fiscal sustainability, by expanding excessively its generosity and applicability.

in interpreting our estimates. First, as we do not observe actual take-up, our estimates are intention-to-treat effects of eligibility for tax incentives on return migration. Second, we do not observe in our data for how long eligible returnees remain in Italy, which is important to precisely estimate its fiscal impact. Last, we are unable to estimate the spillover effects of marginal returnees besides their direct fiscal impact.

To conclude, many countries have enacted or are enacting preferential tax schemes to attract high-skilled expatriates and foreigners. Our findings show that well-designed tax incentives are a cost-effective policy to reduce brain drain and to influence migration choices of workers at the margin, although more research (and more data) is needed to study the spillover effects of tax-induced immigration (the key welfare justification for these schemes), as well as the implications for countries that lose workers, and the effects on tax competition among countries to attract high-skilled workers, to inform the design of preferential tax schemes in the future.

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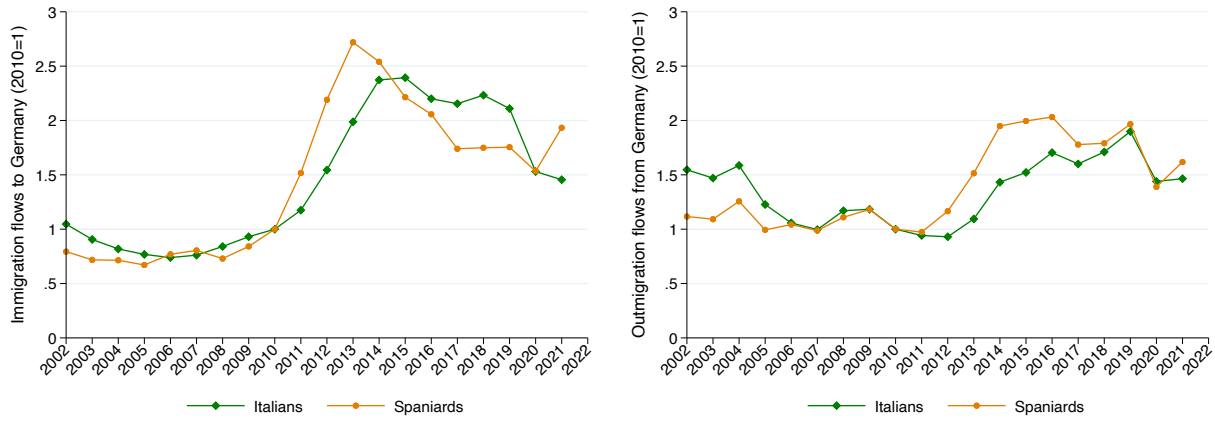
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Appendix - For online publication

A Additional Figures and Tables

Figure A.1: Migration flows of Italians and Spaniards to/from Germany (OECD data)

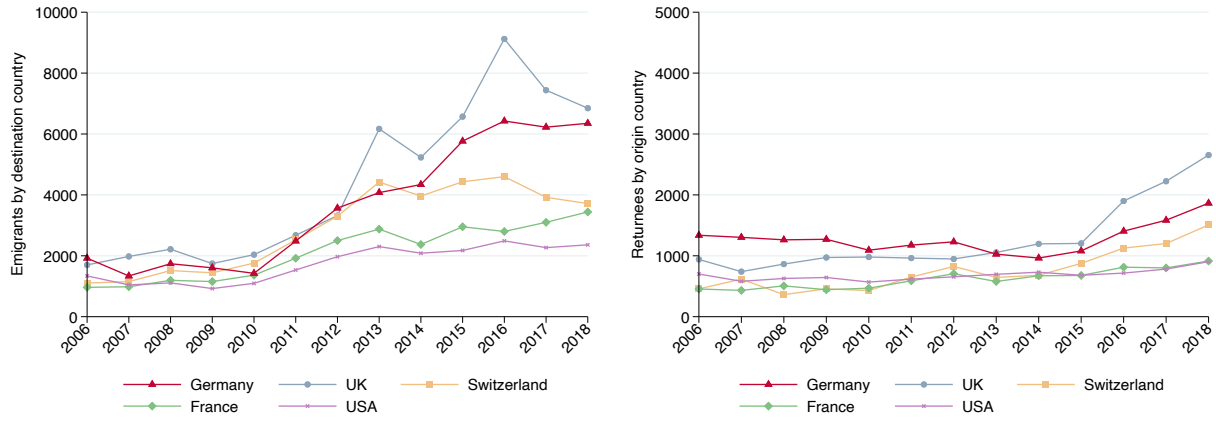


(a) Immigration to Germany

(b) Outmigration from Germany

Notes: number of Italian and Spanish citizens (a) immigrating to Germany and (b) emigrating from Germany, relative to 2010. *Source*: authors' elaboration on OECD International Migration Database data.

Figure A.2: Emigration and return migration flows of Italians to/from top-5 countries

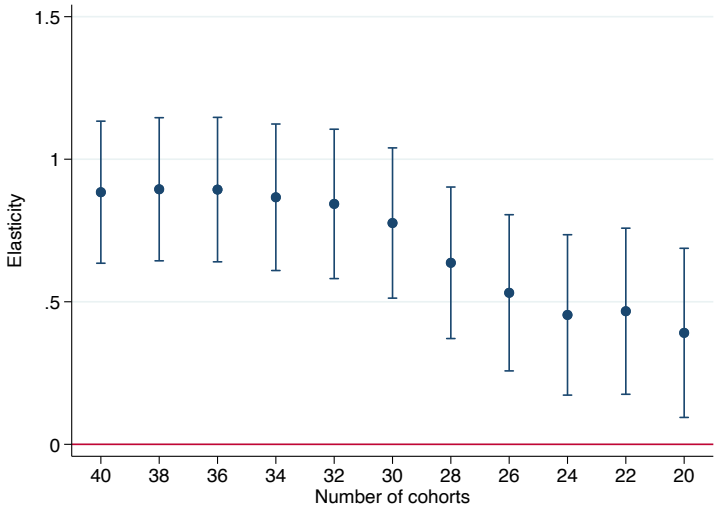


(a) emigration, by destination

(b) return migration, by origin

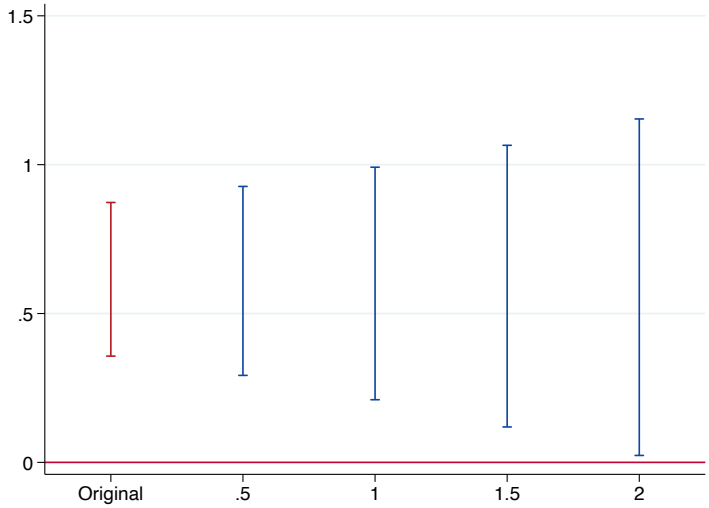
Notes: The figures plot the number of Italian citizens born in Italy, 23-64 years old, with at least high school diploma, migrating to (a) and returning from (b) each of the top-5 foreign countries of destination/origin in each year. Source: authors' elaboration on Istat data.

Figure A.3: Robustness: restricting birth cohort bandwidth (Istat data)



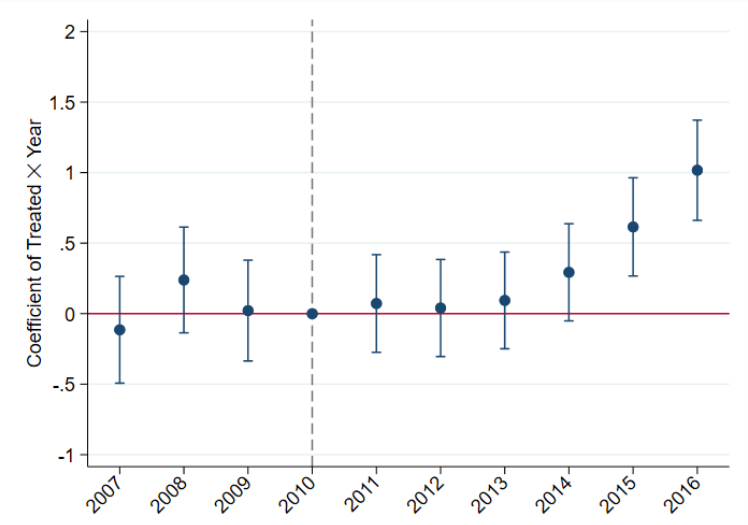
Notes: the figure plots the implied elasticity of return migration to the average net-of-tax-rate (determined by the *Eligible* $*$ *Post* interaction), and the 95% C.I., from the Triple DiD regression in Equation 2, where the unit of observation is a cell defined by education (high school and college), exact birth year, origin country (Germany, Switzerland, France, UK, US), sex, and year (2006-2018). Fixed effects included: group (cohort-educ-orig-sex), cohort-year, educ-year, orig-year, sex-year. Birth cohorts: the number in the graph refers to the number of cohorts (40 is 1954-1988, 38 is 1955-1987, .., 20 is 1959-1978). Sample is all Italian citizens 23-64 years old, with at least a high school diploma, moving from abroad to Italy between 2006 and 2018 (Istat data).

Figure A.4: Robustness: parallel trends sensitivity analysis (Istat data)



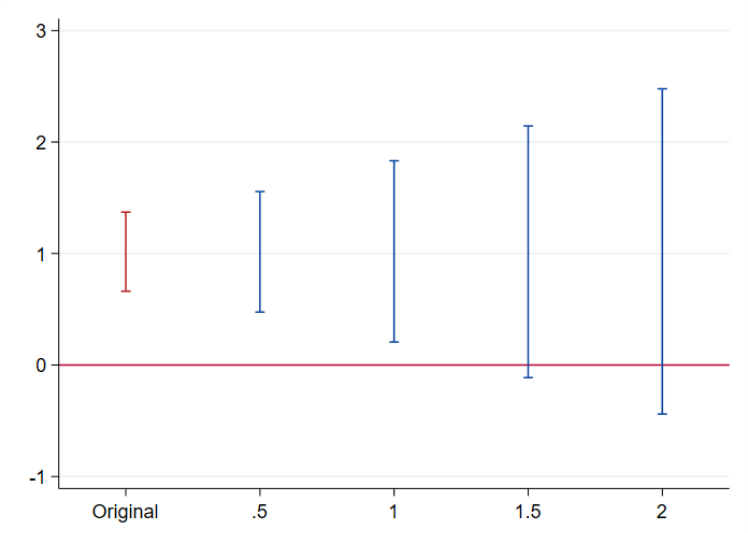
Notes: the figure implements the test suggested by Rambachan and Roth (2023), which bounds the relative magnitude of post-period violations of the parallel trend assumption relative to the maximum violation in the pre-period ($M = 1$ when they are equal), based on the point estimate for year 2016 (displayed in Figure 5(a)).

Figure A.5: Year-by-year effect of eligibility on the probability of leaving Germany



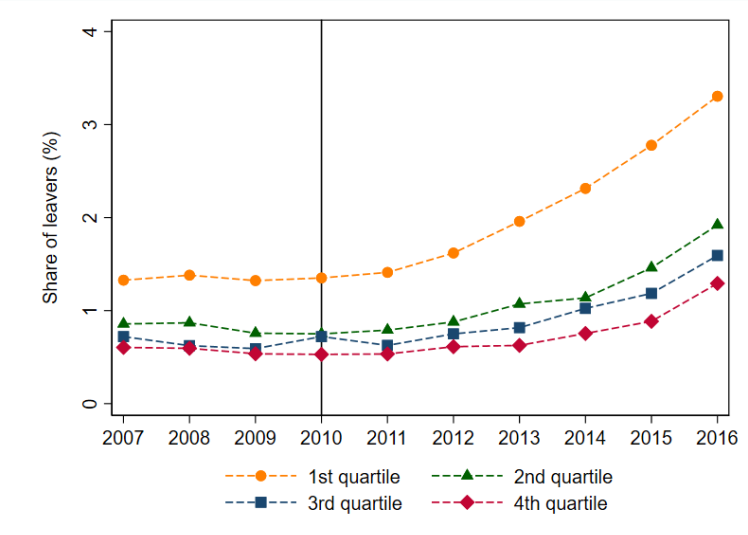
Notes: The figure plots the estimated coefficients β_τ (and 95% C.I.) from: $L_{igt} = \sum_\tau \beta_\tau Treat_g * \mathbb{1}(t = \tau) + \gamma_g + \psi' X_{igt} + \lambda_t + \epsilon_{igt}$. Source: IEB data. Observations: individuals by year (2006-2016). The dependent variable is the probability of leaving the register in year t conditional on being employed in $t-1$. Sample is Italian citizens born between 1954-1988, with at least high school diploma, and at least one employment spell in Germany between 2006-2016. "Eligible" is a dummy equal to 1 if birth year is equal or greater than 1969 and education level is college. Baseline controls include sex, education, age at entry in the register, years in the register and year fixed effects. Standard errors are clustered at the individual level.

Figure A.6: Robustness: parallel trends sensitivity analysis (IEB data)



Notes: the figure implements the test suggested by Rambachan and Roth (2023), which bounds the relative magnitude of post-period violations of the parallel trend assumption relative to the maximum violation in the pre-period ($M = 1$ when they are equal), based on the point estimate for year 2016 (displayed in Figure A.5).

Figure A.7: Share of Italians leaving Germany over time, by earnings quartile

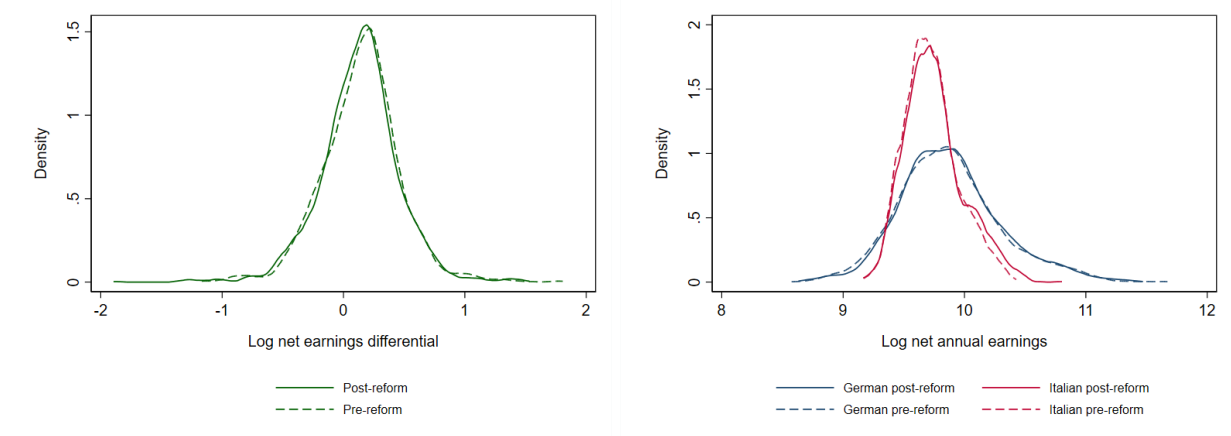


Notes: The figure plots the share of returnees over time, by quartile of the German net annual earnings distribution. Earnings considered are the average earnings throughout their time in the German register. Quartiles are defined within the distribution of treated and control groups (separately for college and high-school graduates). Source: IEB data.

Figure A.8: Log net wage differentials (Germany-Italy) among ineligible Italians in Germany

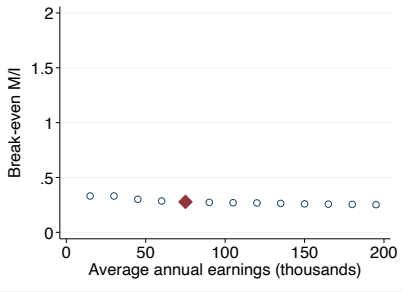
(a) Ineligible - Log differential

(b) Ineligible - Log net annual earnings



Notes: (a) log net earnings differentials between Germany and Italy, (b) log net Italian earnings and log net German earnings, pre-2010 (dashed lines) and post-2010 (solid lines), among ineligible Italians in Germany. Observations: individuals by year, IEB data. Sample is Italian citizens born between 1954-1988 with a high school diploma, and at least one employment spell in Germany between 2006-2016. Earnings in Italy are imputed based on age, education, sector and sex as described in Section 3. Net German annual earnings below 5,000 EUR are excluded to make them comparable to the net Italian annual earnings. Earnings are computed as annual full-time equivalent. Source: IEB and IT-LFS data.

Figure A.9: Sensitivity of break-even marginal-to-inframarginal ratio to average earnings level



Notes: the graph shows the break-even value of the M/I ratio that solves Equation 5, for different values of the parameters. The dark red point is the baseline value of that parameter used in Section 6, and all points are computed by fixing the other parameters at their baseline values.

Table A.1: Characteristics of Italians in the German Social Security Data

	Pre-period (2006-2010)		Post-period (2011-2016)	
	Eligible	Non-eligible	Eligible	Non-eligible
Demographic characteristics				
Female	0.43	0.37	0.43	0.38
Age	31.94	39.21	34.74	42.84
Age at entry	22.63	19.56	24.56	19.92
Years in the register	8.45	18.82	9.31	22.09
Leavers (%)	2.68	0.90	3.73	1.25
Earnings				
Gross annual earnings (FTE)	48810	32264	45557	31352
Net annual earnings (FTE)	29100	20387	27373	19922
Earnings differential (w/o tax incentives)	11150	4320	9856	4026
Firm characteristics				
Average firm size	1593	1237	1547	1162
Firm size 1-10	0.13	0.26	0.14	0.27
Firm size 11-20	0.22	0.28	0.22	0.28
Firm size 21-100	0.65	0.46	0.64	0.45
Firm fixed effect (AKM)	0.09	0.01	0.07	-0.01
Sector				
Industry	0.18	0.25	0.15	0.23
Service	0.32	0.45	0.32	0.46
Finance	0.27	0.14	0.29	0.15
Healthcare	0.19	0.10	0.20	0.11
Others	0.05	0.05	0.05	0.05
Observations	56788	628435	140064	1067834

Notes: the table displays the average characteristics of Italian citizens, born between 1954-1988 and with at least one employment spell in Germany, separately for the pre- (2006-2010) and post-period (2011-2016) and by treatment status: college graduates born in 1969 or after (eligible), high school graduates born in 1969 or after (ineligible), and college graduates born before 1969 (ineligible). Daily wages are expressed in 2018 euros. Source: authors' elaboration on IEB data.

Table A.2: Robustness: effect of eligibility on return migration (levels), different group definitions

	Outcome: N. of Return Migrants				
	(1)	(2)	(3)	(4)	(5)
	DiD	DiD	Triple Diff	DiD	Triple Diff
Eligible $*$ Post	769.938***	40.271***	30.586***	4.027***	3.059***
	(154.183)	(4.536)	(3.457)	(0.423)	(0.357)
Observations	26	880	880	8,800	8,800
R-squared	0.942	0.586	0.926	0.531	0.712
Avg Outcome Pre	1004.200	59.071	59.071	5.907	5.907
Marginal/Inframarginal	0.626	0.662	0.503	0.662	0.503
Year FE	✓	✓	✓	✓	✓
Group FE	✓	✓	✓	✓	✓
Cohort $\times$ Year FE			✓		✓
Educ $\times$ Year FE			✓		✓
Orig $\times$ Year FE					✓
Sex $\times$ Year FE					✓
Elasticity	1.989	1.769	1.343	1.769	1.343
	(0.398)	(0.199)	(0.152)	(0.186)	(0.157)

Notes: Observations: year by eligibility in Column 1, year by cohort by education in Columns 2-3, year by cohort (exact) by education by origin country by sex in Columns 4-5. The dependent variable is the number of Italian citizens 23-64 years old, born in Italy between 1954-1988 and with at least a high school diploma, moving to Italy from abroad in year t (Istat data) between 2006-2018, from the top-5 origin countries (France, Germany, Switzerland, UK, US). All columns include year and group fixed effects. Columns 3 and 5 include year by cohort and year by education FEs (also year by sex and year by origin in Column 5). "Average Outcome Pre" refers to the treated group in the pre-period. M/I is the implied marginal-to-inframarginal ratio, obtained by dividing the Eligible $\times$ Post coefficient by the mean outcome for the treated in the pre-period plus the change in the mean outcome for the untreated. The elasticity is the coefficient in percentage of Average Outcome Pre, divided by the log change in the average net-of-tax rate for an individual earning 75,000 euros. Standard errors (in parenthesis) are clustered at the cohort-education-sex-origin country level in Columns 4-5, and robust in Columns 1-3. * p < 0.10 ** p < 0.05 *** p < 0.01.

Table A.3: Robustness: effect of eligibility on return migration rates, excluding post-2015

	Outcome: Return Migration Rate		
	(1)	(2)	(3)
Eligible $*$ Post	0.389***	0.284***	0.253***
	(0.077)	(0.068)	(0.060)
Observations	6,940	6,940	6,940
R-squared	0.644	0.703	0.782
Avg Outcome Pre	0.957	0.957	0.957
Marginal/Inframarginal	0.417	0.304	0.272
Year FE	✓	✓	✓
Group FE	✓	✓	✓
Cohort $\times$ Year FE		✓	✓
Educ $\times$ Year FE		✓	✓
Orig $\times$ Year FE		✓	✓
Sex $\times$ Year FE		✓	✓
Cohort $\times$ Orig $\times$ Year FE			✓
Educ $\times$ Orig $\times$ Year FE			✓
Elasticity	1.055	0.769	0.687
	(0.207)	(0.183)	(0.163)

Notes: Observations: groups g by years t (2006-2015), where groups are combinations of birth cohort (5-years bins), education, origin country and sex. All columns include year and group fixed effects; Column 2 adds year by cohort and year by education FEs, as well as year by sex and year by origin FEs; Column 3 also includes year by origin by cohort and year by origin by education FEs. The dependent variable is the number of Italian citizens, born in Italy between 1954-1983 and with at least a high school diploma, moving to Italy from abroad in year t (Istat data), divided by the stock of Italian expatriates as of 2010 (OECD DIOC data). "Average Outcome Pre" refers to the treated group in the pre-period. M/I is the implied marginal-to-inframarginal ratio, obtained by dividing the Eligible $\times$ Post coefficient by the mean outcome for the treated in the pre-period plus the change in the mean outcome for the untreated. The elasticity is the coefficient in percentage of Average Outcome Pre, divided by the log change in the average net-of-tax rate for an individual earning 75,000 euros. Observations are weighted by the stock of Italian expatriates in each group as of 2010, based on the OECD DIOC data. Standard errors (in parenthesis) are clustered at group level. * p < 0.10 ** p < 0.05 *** p < 0.01.

Table A.4: Characteristics of Italians and Spaniards in the German Social Security Data

	Pre-period (2006-2010)		Post-period (2011-2016)	
	Italians	Spaniards	Italians	Spaniards
Demographic characteristics				
Female	0.36	0.46	0.36	0.45
Age	38.44	38.79	41.69	41.01
Age at entry	19.75	20.87	20.35	23.10
Years in the register	17.86	17.07	20.50	17.05
Higher education	0.13	0.29	0.15	0.38
Leavers (%)	0.89	1.56	1.40	2.72
Earnings				
Gross annual earnings (FTE)	34643	43013	33856	41075
Net annual earnings (FTE)	21642	26025	21240	25019
Earnings differential (w/o tax incentives)	5349	9026	5096	8183
Firm characteristics				
Average firm size	1414	1305	1337	1278
Firm size 1-10	0.12	0.07	0.12	0.07
Firm size 11-20	0.09	0.07	0.09	0.07
Firm size 21-100	0.28	0.25	0.29	0.27
Firm size 100+	0.51	0.61	0.50	0.60
Firm fixed effect (AKM)	0.03	0.10	0.02	0.07
Sector				
Industry	0.26	0.26	0.24	0.22
Service	0.44	0.35	0.44	0.35
Finance	0.15	0.18	0.16	0.22
Healthcare	0.11	0.16	0.12	0.17
Others	0.04	0.05	0.04	0.04
Observations	600831	129818	1071266	266562

Notes: the table displays the average characteristics of Italian and Spaniard citizens, born between 1954-1988 and with at least one employment spell in Germany, separately for the pre- (2006-2010) and post-period (2011-2016). Daily wages are expressed in 2018 euros. Source: authors' elaboration on IEB data.

Table A.5: Probability of leaving: robustness checks

	(1) Baseline	(2) Arrived before 2010	(3) No 1969-1970	(4) Cohorts 1958-1984	(5) Employed in t-2
Eligible $*$ Post	0.347***	0.361***	0.320**	0.287**	0.415***
	(0.135)	(0.132)	(0.139)	(0.145)	(0.127)
Avg Outcome Pre	2.684	2.7	2.8	2.7	2.123
Observations	1,825,769	1,765,519	1,700,180	1,520,596	1,716,596
Individuals	278,596	252,062	260,720	223,612	263,271
R-squared	0.020	0.011	0.020	0.018	0.013
Controls	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓
Cohort $\times$ Education FE	✓	✓	✓	✓	✓
Cohort $\times$ Year FE	✓	✓	✓	✓	✓
Education $\times$ Year FE	✓	✓	✓	✓	✓
Industry $\times$ Year FE	✓	✓	✓	✓	✓
Occupation $\times$ Year FE	✓	✓	✓	✓	✓
State $\times$ Year FE	✓	✓	✓	✓	✓

Notes: Source: IEB data. Observations: individuals by years (2006-2016). The dependent variable is the probability of leaving the register in year t conditional on being employed in $t-1$, times 100. Sample is Italian citizens 23-64 years old born between 1954-1988, with at least high school diploma, and at least one employment spell in Germany between 2006-2016. "Eligible" is a dummy equal to 1 if birth year is equal or greater than 1969 and education level is college and "Post" is a dummy equal to 1 for the post period years (2011 and after). Baseline controls include sex, education, age at entry in the register, years in the register and year fixed effects. All columns include fixed effects for the two-way interactions between birth cohort, education (college indicator) and year, as well as industry-year, occupation-year and state-year fixed effects. Column 2 limits the sample to individuals in the German data as of 2010. Column 3 excludes the 1969-1970 cohorts. Column 4 restrict the birth cohort bandwidth to the 1958-1984 cohorts. Column 5 limits the sample to individuals employed in the registry in $t-2$. Standard errors are clustered at the individual level. * p < 0.10 ** p < 0.05 *** p < 0.01.

Table A.6: Robustness: probability of leaving conditional on being employed in $t-2$

	(1)	(2)	(3)	(4)	(5)
Eligible $*$ Post	0.381***	0.383***	0.398***	0.415***	0.415***
	(0.082)	(0.126)	(0.126)	(0.127)	(0.127)
Avg Outcome Pre	2.118	2.118	2.118	2.119	2.123
Observations	1,780,889	1,780,889	1,780,889	1,719,426	1,716,596
Individuals	264,012	264,012	264,012	263,428	263,271
R-squared	0.011	0.012	0.013	0.013	0.013
Controls	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓
Cohort $\times$ Education FE		✓	✓	✓	✓
Cohort $\times$ Year FE		✓	✓	✓	✓
Education $\times$ Year FE		✓	✓	✓	✓
Industry $\times$ Year FE			✓	✓	✓
Occupation $\times$ Year FE				✓	✓
State $\times$ Year FE					✓

Notes: Source: IEB data. Observations: individuals i by year t. The dependent variable is the probability of leaving the register in year t conditional on being employed in $t-2$, times 100. Sample is Italian citizens 23-64 years old, born between 1954-1988 and with at least a high school diploma. Baseline controls include sex, education, age at entry in the register, years in the register and year fixed effects. Column 2 adds fixed effects for the two-way interactions between birth cohort, education (college indicator) and year. Columns 3, 4 and 5 add industry-year, occupation-year and state-year fixed effects respectively. Standard errors are clustered at the individual level. * p $<$ 0.10 ** p $<$ 0.05 *** p $<$ 0.01.

Table A.7: Tax-induced earnings differentials and return migration

Outcome: Probability of leaving	(1) 2SLS	(2) 2SLS
Log Net Annual Earnings in Italy	1.6897***	
	(0.4687)	
Log Net Annual Earnings Differential		-3.3449***
		(0.9446)
	First stage	First stage
Eligible $*$ Post	0.1879***	-0.0946***
	(0.0009)	(0.0036)
F-Stat	18000	524
Avg Outcome Pre	2.732	2.732
Observations	1,772,566	1,772,566
Individuals	271,688	271,688
R-squared	0.630	0.049
Controls	✓	✓
Year FE	✓	✓

Notes: Source: IEB data. Observations: individuals by years. The dependent variable is the probability of leaving the register in year t conditional on being employed in $t-1$, times 100. In the first stage equation in Column 1, the dependent variable is Italian log net annual earnings, in Column 2 is log net annual earnings differential. Sample is Italian citizens 23-64 years old born between 1954-1988, with at least high school diploma, and at least one employment spell in Germany between 2006-2016. "Eligible" is a dummy equal to 1 if birth year is equal or greater than 1969 and education level is college and "Post" is a dummy equal to 1 for the post period years (2011 and after). Baseline controls include sex, education, age at entry in the register, years in the register and year fixed effects. Standard errors are clustered at the individual level. * p < 0.10 ** p < 0.05 *** p < 0.01.

B Additional details on tax schemes

In this Appendix we describe the preferential tax schemes for return migrants implemented in the 2010s, including detailed eligibility criteria and legislative changes. The details are summarized in Table B.1.

The 2010 scheme

On December 30, 2010, the Italian Parliament approved Law 238/2010 (*Legge Controesodo*), the first set of tax incentives not restricted to a specific occupation (a dedicated scheme for researchers and professors is in place since 2003). The stated goal of Law 238 was "to contribute to the country economic growth by rewarding the human, cultural and professional experiences gained by EU citizens who resided in Italy [..], study, work or graduated abroad, and who decide to move back to Italy".[66]

Eligibility. Returnees needed to satisfy the following criteria to be eligible: i) holding a college degree (at least a 3-year degree) earned in Italy or abroad;[67] ii) being born on or after January 1st, 1969; iii) holding a EU citizenship; iv) having resided in Italy for at least 2 years prior to moving abroad; v) having spent at least 2 years abroad prior to moving to Italy. In addition, Law 238 explicitly excludes workers who are continuously hired (*tempo indeterminato*) by an Italian firm (or in the public sector) who go abroad under a contract with such a firm and then return, but it allows workers to go abroad to study while employed, as long as they were not on leave (*aspettativa non retribuita*) and returned to Italy to work for the same employer.

Importantly, despite the birth cohort restriction included all college graduates "born on or after January 1st 1969", the tax scheme was advertised by most media outlets as the tax scheme for the "under 40" graduates (*"laureati under 40"*), as shown in Figure B.1 for

[66] Law 238/2010 was a rare instance of a Law initiated by a group of members of Parliament, rather than by the government, and specifically a bipartisan group.

[67] While the original draft of Law 238/2010 states that the college degree had to obtained by "January 20, 2009", a subsequent change in early 2012 (Law 14/2012) added that the college degree could also be obtained "in the two years before returning", as clarified on May 4, 2012 with the *Circolare n. 14/E* from the Italian Revenue Agency (*Agenzia delle Entrate*).

the most prominent Italian economic newspaper (Il Sole 24 Ore) as well as for an online newspaper in Italian-language in Germany (Il Corriere d'Italia).[68]

Income tax exemption. A fraction of gross earnings deriving from labor (employment, self-employment, and unincorporated business income from a newly established firms) is exempted from income taxation. The exempted share is 80% for women and 70% for men.

Figure 2 in the main text simulates the effect of a 75% exemption (the average between 70%-80%) on the average and marginal income tax rates for different levels of gross earnings, for a representative taxpayer with solely employment earnings and no dependents. Figure B.3 show the corresponding graphs excluding compulsory social security contributions (payroll taxes) paid by the employee, which are unaffected by the tax schemes.

Duration. At the time it was approved in late 2010, Law 238/2010 stated that the tax incentives were to be in place until December 31, 2013. This deadline was set in the first draft of Law Controesodo, presented in the Parliament on January 20, 2009, implying that the policymaker had originally designed tax incentives for a duration of 5 fiscal years. As the legislative process took almost two years, the original deadline would have implied a rather short duration of the incentives. For this reason, in late 2011, the expiration date was postponed until December 31, 2015 by the government decree D.L. 216/2011 (Article 29), converted in Law on February 24, 2012 (Law 14/2012).[69] Similarly, in late 2014 the expiration date was further extended to December 31, 2017 by another *Milleproroghe* decree (D.L. 192/2014). However, the latter provision eventually applied only to those who returned to Italy by the end of 2015, as those who returned afterwards were subject to the 2015 scheme (D.Lgs. 147/2015), which we discuss below.

This sequence of adjustments implies that the effective duration of the scheme was quite uncertain (especially until early 2012), and eventually ended up being heterogeneous based on the actual year of return migration. Figure B.2 displays the expected duration

[68]This was due to the ambiguous wording of the law itself, requiring that the eligibility requirements – including being born on or after January 1st 1969 – had to be satisfied "as of January 20th 2009" (the date the law was first discussed in the Parliament), which was erroneously interpreted as "being under 40".

[69]The latter decree is also known as the *Milleproroghe* ("a thousands extensions"), the government decree issued at the end of each calendar year to extend the deadline of several public programs.

(ex-ante), i.e. what returnees were expecting at the time they returned, as well as the effective duration (ex-post), i.e. what they eventually got, as a function of the year of return migration (vertical axis). The expected duration was between 2-4 years, with the shortest being for those who returned in the first half of 2014 (2 years) and the longest for those who returned in 2012 (4 years). A simple average across years 2011-2015 yields an average expected duration of 3 years. The effective duration ranged instead between 3-7 years, i.e. from the year of return until 2017, implying that it was the longest for earlier returnees. A simple average across years 2011-2015 yields an average effective duration of 5 years, which we use in our cost-benefit analysis.

The 2015 scheme

In late 2015, the tax scheme was replaced by a new scheme by Legislative Decree 147/2015 *Impatriati* ("back to homeland"; *D.Lgs. 147/2015, Articolo 16*). Returnees who moved back to Italy starting from 2016 were subject to this new scheme.

The 2015 reform makes three main changes to the preferential tax scheme: i) the exempted income share is initially lowered to 30% (from the 70-80% of the 2010 scheme) and then raised to 50% in 2016 with an amendment to the law; ii) the duration is fixed to 5 fiscal years, the year of return and the subsequent four (in contrast to the uncertain duration under the 2010 scheme); iii) the birth cohort and the pre-residency requirements are abolished. Relative to the 2010 scheme, the 2015 scheme is less generous in terms of taxable share of income (50%) but more generous and certain in terms of duration. Further, it slightly expands the eligible pool by removing the birth cohort requirement and by relaxing the pre-residency requirement (thus making non-Italian EU citizens effectively eligible), although it also required enrollment in AIRE for Italians as an additional condition to prove the 2 years of residence abroad (which was not required in the 2010 scheme).

In addition, the education requirement was also slightly relaxed with the creation of a two-tier scheme. Specifically, to be eligible, an individual relocating from abroad needs to meet one of the following two sets of conditions: either a) holding a college degree,

as well as 2 years of stay abroad; or, b) being a "highly specialized worker", defined as holding a managerial or other highly specialized occupation (listed in a government decree), as well as 5 years of stay abroad. The first group correspond basically to the eligible for the 2010 scheme, with the exception of the birth cohort requirement as well as the 2 years pre-residence in Italy. The second group was not required to hold a college degree, however it had to prove a longer stay abroad (5 years) and to hold some managerial or other highly specialized occupation.

The 2019 reform

In mid 2019 the tax incentives were substantially expanded by the government decree *Decreto Crescita* ("decree for growth"; D.L. 34/2019, converted to Law 58/2019). The 2019 reform broadened substantially the eligible pool by removing the college degree requirement; as a result, any Italian or EU citizen who resided abroad for at least 2 years was eligible for reduced income taxes on labor earnings, regardless of their age and education level. It also increased the generosity, by lowering the taxable share to 30% and granting a more generous exemption (10% for the first 5 years) to individuals who move their residence to the Southern regions of Italy.[70] While the standard duration remains 5 fiscal years, it can be extended up to 13 years if individuals meet specific criteria related to developing "ties" to Italy, such as having one or more children or buying a house designated as their primary residence in Italy.

The 2023 reform

The generous 2019 regime was eventually tightened by a government reform in late 2023 (starting from January 1, 2024), which re-instated the high-skilled requirement and the 50% exempted share, eliminated the extensions beyond 5 years, and capped the income tax break to 600,000 EUR of gross earnings. Overall, the 2023 reform restored the key features of the 2015 scheme.

[70] A subsequent change limited the exempted share to 50% for professional soccer players.

Table B.1: Tax schemes for return migrants in Italy

Year	Regime	Valid from	Exemption	Duration	Eligibility requirements*
2003	Researchers and professors	2004	90%	4+ years‡	Researcher or university professor, 2 years abroad
2010	"Controesodo" (Law 238/2010)	2011	70-80%†	3-7 years	College degree, born 1969 or later, 2 yrs abroad, 2 yrs in Italy before
2015	"Impatriati" (D.Lgs. 147/2015, Art. 16)	2016	50%†	5 years	Either a) college degree + 2 yrs abroad, or b) highly specialized + 5 yrs abroad
2019	"Decreto Crescita" (DL 39/2019, Law 58/2019)	2020	70%†	5-13 years‡	2 years abroad
2023	"Impatriati 2024" (DL 209/2019)	2024	50%	5 years	College degree or highly specialized, 2 years abroad

(*): eligibility for 2010 scheme requires an EU citizenship, while the other schemes do not have any citizenship restrictions, as long as previous residence is not in a tax haven.
(†): [exemption] the percentages indicate the share of gross labor earnings (employment, self-employment, and unincorporated business income from a newly established firm (*società di persone*), which would normally be subject to income tax; since 2019, only business income from individual businesses (*ditta individuale*) is exempt) exempted from income tax (IRPEF); payroll contributions are not exempted. Exempted shares: 2010 scheme: 70% for men, 80% for women; 2015 scheme: 50% since 2016 (initially 30%); 2019 scheme: 50% for professional football players, 10% if move to Southern regions (Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia, Sardegna).
(‡): [duration] the extended duration (since 2019) is granted if individuals have children and/or buy a property where they establish their primary residence. From 2019, it applies to researchers and professors as well.

Figure B.1: Media coverage of the 2010 scheme



Il Sole 24 ORE

Data 24-12-2010
Pagina 31
Foglio 1

Fisco. Via libera definitivo del Senato al Ddl per incentivare il ritorno dei laureati

Arriva lo sconto Irpef per i rientri dei «cervelli»

Bonus diverso in base al genere e valido sino a dicembre 2013

Laura Cavestri
MILANO

Lasciare carriere, stipendi e opportunità professionali all'estero per uno sconto fiscale in Italia – differenziato tra uomini e donne – che durerà fino al 31 dicembre 2013.

articoli per favorire i laureati under 40 che hanno maturato esperienze all'estero e desiderano rientrare in Italia per attività di lavoro dipendente, autonomo o d'impresa.

Le categorie di beneficiari sono due. Innanzitutto cittadini-lavoratori, dell'Unione europea, laureati e nati dopo il 1° gennaio 1969, che hanno risieduto continuativamente per almeno ventiquattro mesi in Italia e che, sebbene residenti nei loro Paesi d'origine, hanno svolto un'attività dipendente, autonoma o di impresa in un Paese terzo negli ultimi due mesi. Secon-

voro autonomo in Italia, trasferendovi il proprio domicilio, nonché la propria residenza, entro tre mesi e per almeno 5 anni. Solo così scatterà uno sconto Irpef del 30% sulla base imponibile per gli uomini e del 20% per le donne.

La norma esclude chi ha già usufruito, in passato, degli incentivi per il "rientro dei cervelli" stabiliti dal decreto competitività (185/2008) e quelli della Visco Sud. Inoltre, è fuori anche chi studia o lavora all'estero in funzione di un rapporto di lavoro a tempo indeterminato con pubbliche am-

gioni – nell'ambito della loro disponibilità – potranno destinare una quota degli alloggi di edilizia residenziale pubblica per non meno di 24 mesi ai giovani "cervelli" che rientrano.

Sul fronte previdenziale, invece, il Governo avrà l'obbligo di stipulare accordi bilaterali con gli Stati di provenienza per attuare la totalizzazione dei contributi nazionali con quelli versati a gestioni pensionistiche estere.

Chi ottiene il beneficio ma opta di ritrasferire all'estero domicilio o residenza prima che siano scaduti cinque anni dalla fruizione dello sconto fi-

Corriere d'Italia ©
Pubblicazione italiana in Germania

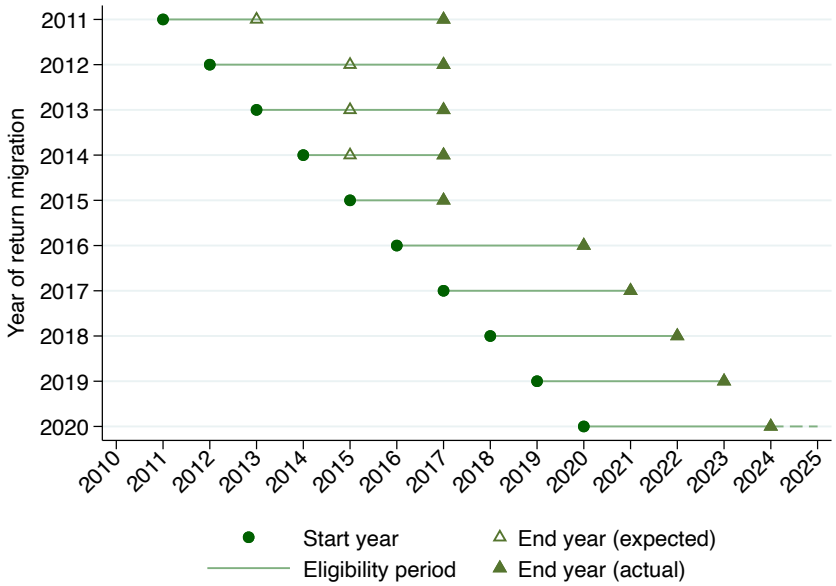
Giovani: incentivi per il rientro

13. Februar 2011 AUTORE Sabrina Sole 626 0

La norma si chiama "incentivi fiscali per il rientro dei lavoratori in Italia" e, caso ormai raro in Paese, è una legge bipartisan, voluta cioè da destra e sinistra italiane insieme. A potere godere delle agevolazioni non sono solo i cittadini italiani, ma anche quelli comunitari: un punto che serve a recuperare quei cervelli stranieri poco attratti dalle opportunità che gli riserva il Bel Paese.
Entrambi devono essere però laureati e al di sotto dei 40 anni, devono aver risieduto in Italia per almeno 24 mesi e svolto un'attività di studio o di lavoro fuori dal Paese d'origine o dall'Italia per un altrettanto periodo. Per ottenere gli incentivi non basta solo tornare, ma occorre essere assunti come dipendenti, esercitare un'attività di impresa o di lavoro autonomo e trasferire il domicilio entro 3 mesi dall'avvio dell'attività o dall'assunzione. Gli incentivi sono sotto forma di riduzione del reddito imponibile, che viene calcolato solo al 20% per le donne e al 30% per gli uomini, per un periodo di tre anni e fino al 2013.

Notes: Sources: Il Sole 24 Ore and Corriere d'Italia (https://www.corriereditalia.de/).

Figure B.2: Duration of tax incentives for high-skilled returnees

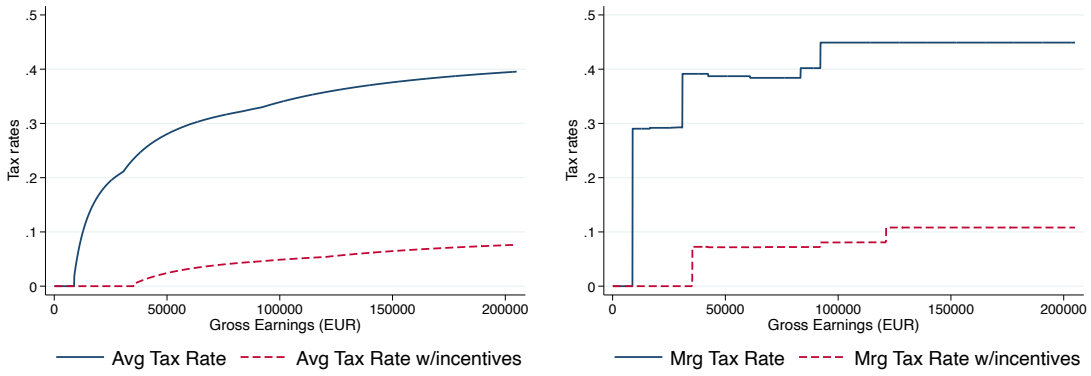


Notes: The graph shows the start and the end year (as well as the expected end year, if different), depending on the year of return to Italy (on the vertical axis).

Figure B.3: Income tax rates under the 2010 tax scheme (excluding payroll taxes)

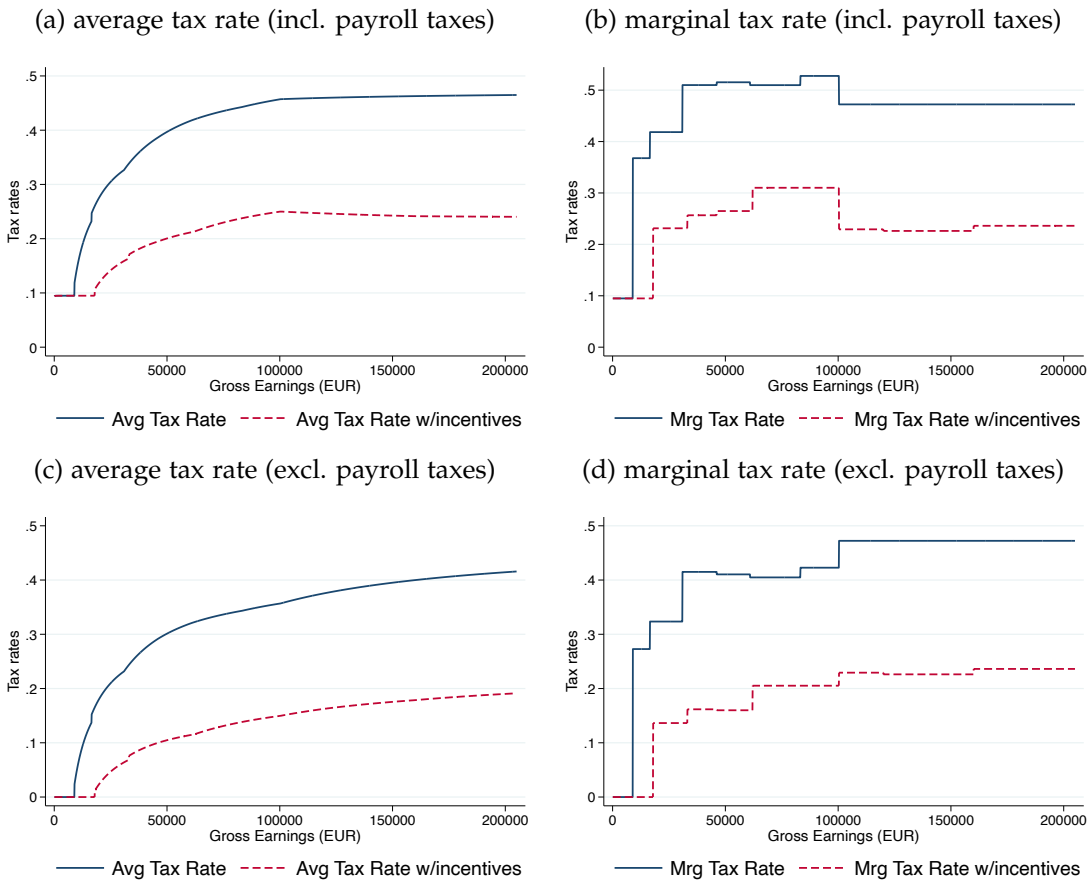
(a) average tax rate

(b) marginal tax rate



Notes: (a) average and (b) marginal income tax rates, excluding compulsory social security contributions (payroll taxes) paid by employees, based on the 2010 Italian tax schedule for an individual with no dependents. The reduced tax rates are based on an exempted income share of 75% (average between the 2010 scheme shares, 80% for women and 70% for men), and gross earnings are assumed to be from employment income. Source: OECD Taxing Wages (OECD 2011).

Figure B.4: Income tax rates under the 2015 tax scheme (with and without payroll taxes)



Notes: (a)-(c) average and (b)-(d) marginal income tax rates, including (a)-(b) and excluding (c)-(d) compulsory social security contributions (payroll taxes) paid by employees, based on the 2017 Italian tax schedule for an individual with no dependents. The reduced tax rates are based on an exempted income share of 50%, and gross earnings are assumed to be from employment income. Source: OECD Taxing Wages (OECD 2017).

C Additional details on data sources

In this Appendix we provide additional details on the data sources used in this paper.

C.1 Italian migration data (Istat)

Our main data source is the Italian migration data, which we obtained from Istat, the Italian National Statistical Institute.[71] The Istat data is based on the enrollment and dis-enrollment from the *Anagrafe degli Italiani Residenti all'Estero* (AIRE; Registry of Italians Residing Abroad). Italian citizens are required by law to enroll in the AIRE whenever they migrate abroad for more than 6 months. The main benefit of enrolling is that foreign income is not subject to income taxation in Italy, in addition to access to voting from abroad and consular services., while the main drawback of enrolling is the loss of non-emergency health coverage in Italy (e.g. the primary care physician).

Despite the substantial benefits to enroll in the registry, there is evidence that a large fraction of Italians do not enroll when they move abroad (Anelli et al. 2023), and, consequently, they do not appear in the return migration data. While this is an important limitation, it does not constitute a problem for our identification strategy as long as it is not differential between eligible and non-eligible individuals pre- and post-2010. Importantly, registration in AIRE was not required in order to be eligible for the 2010 scheme, as long as beneficiaries were able to document proofs of residence abroad (e.g. pay stubs, lease) to the tax authority in case of an audit.[72] Therefore, we should not expect any change in reporting incentives before-after 2010. This is indeed what we find by comparing the Italian with the German data: in Figure C.1b, we show that the share of eligible among returnees is similar between the two data source - and, importantly,

[71] In our version of the Istat data, there is a small inconsistency: the flows in 2011 include only individuals who returned/emigrated before the census day (October 9, 2011), resulting in flows roughly 25% smaller than the actual ones, when compared to the publicly available Ista data. For this reason, in Figures 3, A.2 and D.2, we interpolate 2011 by averaging the 2010 and 2012 values. In the regressions we use the non-interpolated data, since year fixed effects take care of this issue specific to 2011.

[72] While registration was required to be eligible for the 2015 scheme, our results are robust to excluding the post-2015 years from the sample.

is symmetric before and after 2010 - which provides reassurance that our results are not driven by any change in reporting incentives.

C.2 Database on Immigrants in OECD Countries (DIOC)

The Istat data measure the return migration *flows* of Italians; however, constructing a return migration rates requires information on the *stock* of migrants abroad. For this reason, we complement the Istat data with the OECD "Database on Immigrants in OECD countries" (henceforth DIOC; OECD 2016), a comprehensive database on immigrant stocks by destination country, origin country, age, sex, and education, based on destination countries decennial censuses (see Arslan et al. (2015) for a description).

Specifically, we use the DIOC data to measure of the stock of Italians resident in each destination country as of 2010, by age, education and sex. We use the 2010/11 release, which is based on the closest census wave to 2010 in each country.[73] We identify Italians based on their country of birth, as opposed to citizenship which is unavailable or incomplete for several countries. While this is a different definition than in the Istat data, which cover Italian citizens, in our analysis we exclude foreign-born Italian citizens from the Istat data, which makes the two sources comparable.[74]

Education is defined as in the Istat data, based on the International Standard Classification of Education (ISCED) definition. We keep individuals with at least high school education, resulting in two education groups, high school and college, with the latter group being eligible for tax incentives (if born in 1969 or later).

Age is classified in 10-year bins (e.g. 25-34, 35-44, 45-54, 55-64). We limit the analysis to individuals in working age (25-64). As eligibility is based on birth cohorts, we match these age bins to the 5-year cohort bins in the Istat data by apportioning each age group to the corresponding cohort bin based on the age in 2010. For example, the age group 35-44 in 2010 is composed of individuals born in 1966-1975; we assign a half of this

[73] The full methodology for the 2010/11 release is available at https://www.oecd.org/els/mig/DIOC-E-2010-11-methodology.pdf.

[74] As Italy does not grant birthright citizenship, the DIOC data may include some Italy-born individuals who are not Italian citizens; however, they are likely a negligible fraction relative to Italian citizens.

group to the 1969-1973 cohort bin, and a quarter each to the 1964-1968 and 1974-1978 bins respectively. This leaves us with 6 five-year birth cohort bins, 3 eligible (1969-1973, 1974-1978, 1979-1983) and 3 ineligible (1964-1968, 1959-1963, 1594-1958).

After matching the Istat and DIOC data, we construct the annual return migration rates by dividing the annual return migration flows (Istat) by the stock of Italians in 2010 (DIOC), for each destination country, birth cohort bin, education level and sex. The final dataset covers 29 OECD countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK, USA.[75]

C.3 German social security data (IEB)

C.3.1 Validate return migration measures

In this section, we validate our measure of return migration in the German social security data ("leavers") by comparing it with actual migration flows of Italian citizens from Germany to Italy from the OECD International Migration Database, which are based on data from the German migration data (Destatis).[76] The comparison, displayed in Figure C.1a, is reassuring: the evolution (changes) of leaver and return migration flows is very similar in the two data sources throughout our sample period (2006-2016).[77] In addition, Figure C.1b shows that the share of eligible returnees in the IEB and in the Italian data is remarkably similar throughout the period, suggesting that measurement error is unlikely to be differential across groups over time.

[75] We drop countries for which more than 10% of age-education-sex cells are missing (except Germany, for which we fill the missing cells with data from IEB), i.e. Chile, Cyprus, Estonia, Island, Malta, Romania and Turkey. Results are not sensitive to dropping these countries.

[76] Unfortunately there is no information on education in the OECD-Destatis migration data. Therefore, we compare total leavers (IEB) and migration flows (OECD) flows regardless of education level.

[77] 2016 is the last year in our analysis since we condition on having an employment spell the year before leaving, and 2017 is the last year for which we can construct the proxy for leavers.

C.3.2 Earnings levels and differentials with Italy

In this section, we explain in greater detail how we code our earnings variable and how we compute earnings differentials between Germany and Italy.

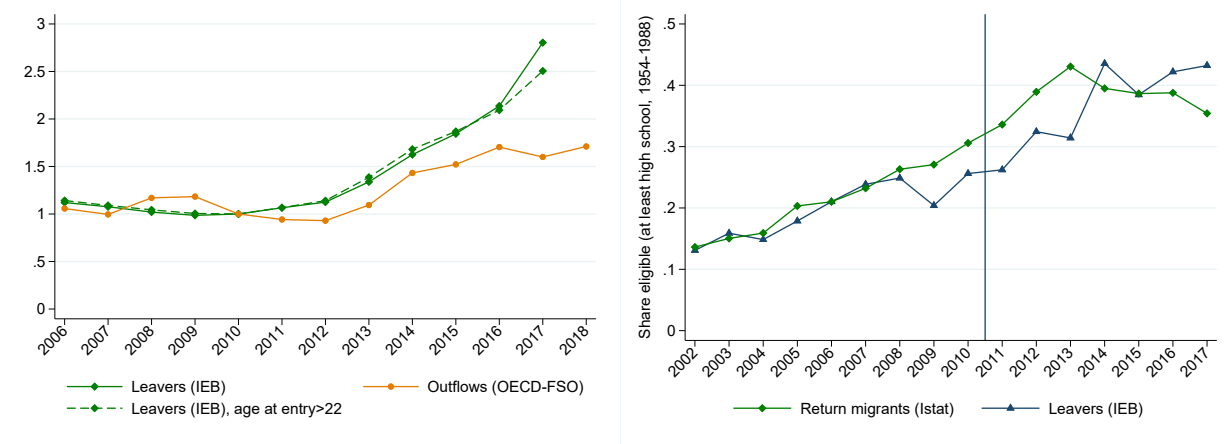
We use daily earnings both for our heterogeneity analysis (Section 5.4) and to construct net earnings differentials between Germany and Italy (Section 5.5).

The IEB data reports gross daily earnings associated with each specific employment spell, and is subject to top-coding above the Social Security earnings maximum. Therefore, before creating the yearly panel, we transform gross daily earnings into full-time equivalent net annual earnings as follows. First, we deflate all reported earnings to correspond to the 2010 CPI and follow Dustmann, Ludsteck, and Schönberg (2009) and Card, Heining, and Kline (2013) to impute the upper tail of the wage distribution. In our sample, the average full-time equivalent gross annual earnings range from approximately 25,000 EUR (high school graduates employed between 2006-2010) to 57,000 (college graduates employed between 2011-2016). For example, in 2011, the first year of tax incentives, the Social Security earnings maximum was 66,000 euros for West Germany. Next, we scale up daily earnings by a factor of 4 if the employment spell is recorded as part-time, and multiply each full-time equivalent daily earnings for the number of days of the employment spell (including weekends and holidays). Then, we compute mean daily earnings and scale up by a factor of 365 to obtain full-time equivalent annual earnings from mean daily earnings. Finally, we transform gross annual earnings in net using the German tax schedule from OECD Taxing Wages (OECD 2011).

To construct an individual-level measure of net earnings differentials between Italy and Germany, we combine German social security records with annual earnings from the Italian Labor Force Survey (*Rilevazione sulle forze di lavoro*, henceforth IT-LFS), a quarterly survey based on a representative random sample of the Italian workforce. The dataset provides information on type of employment, net monthly earnings, sector, occupation as well as demographic characteristics such as age, sex and education. The idea is to assign "counterfactual earnings" to each Italian worker in Germany, based on what they would earn in Italy from observable characteristics. To construct the net earnings

differentials, we proceed as follows. First, we pool together IT-LFS quarterly data for the period 2008-2016 and construct average net annual earnings from full-time employment within disaggregated cells (17 age classes, 3 educational levels, 2-digit sectors and sex). The earnings variable available in the IT-LFS is the net monthly income. In our sample, it is non-missing for 1,495,530 individuals. As the variable is top coded at 3,000 EUR, we apply the same imputation procedure as in the German social security data. We then scale up by a factor of 12 to have net annual earnings, and restrict the sample to full-time employees before averaging at the cell level. Next, we match cell-level data from the IT-LFS to the individual German social security records. Finally, we compute log net earnings differentials for each employment spell as the difference between the logs of the German and Italian net annual earnings.

Figure C.1: Return migration flows from Germany to Italy by data source



(a) return migration flows (IEB vs OECD) (b) share eligible among returnees (IEB vs Istat)

Notes: Figure (a): The green lines show the number of Italian citizens leaving the German IEB data - relative to 2010 -, as measured by one year since last spell in the data; the solid line include all Italians, while the dotted line only Italians who first appeared in the data after the age of 22, thus presumably born in Italy. The orange line shows the outmigration flows of Italian citizens from Germany to Italy - relative to 2010 -, as measured in the OECD International Migration Data, which are based on data from the German Federal Statistical Office. Figure (b): The two lines show the share of eligible (college graduates born on or after 1969) returnees among eligible plus ineligible (college graduates born before 1969 and high school graduates) returnees, by data source.

D Emigration

In this Appendix we describe the evolution of emigration flows from Italy around the 2010 reform, and we discuss the implications for estimating and interpreting the effect of tax incentives on return migration.

The twin recession experienced by Southern European countries induced high emigration rates from Italy (Anelli et al. 2023), particularly among younger and highly educated individuals, as shown in Figure D.1. As the 2010 scheme takes effect in 2011, the contemporaneous increase in emigration may complicate the interpretation of return migration flows. Specifically, one may worry that a simple before-after 2010 comparison between eligible and ineligible returnees may capture a "mechanical" increase in return flows due to the higher propensity of the former to emigrate after 2010.

Furthermore, the 2010 tax scheme may have induced Italian residents in the eligible group (college graduates born 1969 or after), who would have stayed in Italy absent the tax scheme, to leave the country in order to benefit from lower taxes upon return.[78] While an intriguing possibility, it is important to consider the uncertain duration of the 2010 scheme (with a fixed expiration date postponed several times), which likely deterred prospective emigrants to leave the country solely for a tax motive. However, we cannot exclude a priori the existence of such an unintended effect of the policy.

Empirically, it is hard to disentangle recession-induced emigration from the tax-induced unintended emigration. Nonetheless, we can compare the emigration and return migration flows among the eligible and ineligible groups: intuitively, if we see that net immigration *worsens* among the eligible relative to the ineligible, this would suggest that the tax schemes were ineffective in mitigating brain drain. This is what we do in

[78] This is a similar mechanism as in the *brain gain* literature (Beine, Docquier, and Rapoport 2001): as highly educated workers benefit from increased migration opportunities due to selective immigration policies (e.g. points systems), the prospect of emigration induces individuals in developing countries to invest more in their education to increase their chances of getting a visa; as not everyone ends up emigrating, this results in higher education levels at home (brain gain). In our case the hypothesized mechanism is the opposite: tax schemes may induce more individuals to leave with the prospect of lower taxes upon return, but a large share of these extra emigrants may end up staying abroad, thus exacerbating brain drain.

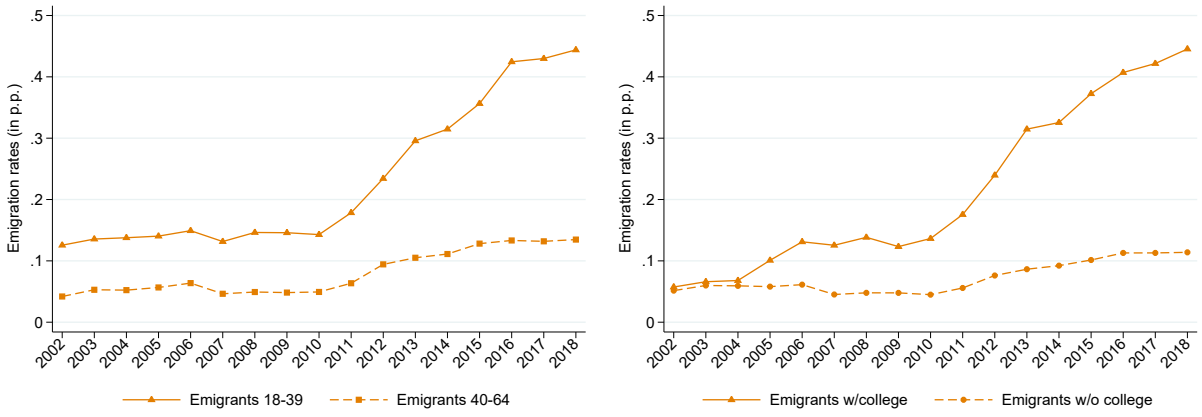
Figure D.2, where we plot the emigration and return migration flows among college graduates under-40 (eligible) and high school graduates under-40 (ineligible).

The graph shows the severity of brain drain discussed earlier in the paper: emigration is larger than return migration throughout the period, and it worsens dramatically after 2010. However, the post-period outflows are not differentially higher among college graduates (eligible) than among high school graduates (ineligible), while return inflows are higher among the eligible group, consistent with the timing and eligibility for tax incentives.

Finally, in Figures D.3a and D.3b we show the year-of-birth distributions of emigrants by education level, pre- and post-2010. Reassuringly, we do not see any differential changes between college and high school graduates between the pre- and post-period. In a similar fashion, Figures D.3c and D.3d plot the age distribution of emigrants before and after 2010, again showing overlapping distributions between college and high school graduates both before and after 2010, with no increase among the college graduates under 40 years old in the post period.

Overall, three main conclusions emerge from comparing emigration and return migration flows around 2010. First, while the 2010 decade is characterized by a deteriorating brain drain, with a large and sudden increase in net emigration from Italy, the comparison between eligible and ineligible groups reveal that tax schemes likely contributed to mitigate the increase emigration flows. Second, while we cannot completely rule out that the tax incentives induced some unintended increase in emigration, such an effect is negligible relative to the increase in return migration among the eligible group. Last, differential emigration after 2010 is unlikely to be a major confounder to identify the effect on return migration, as long as we include education and cohort by year fixed effects in the regressions.

Figure D.1: Emigration rates from Italy by age and education, relative to stayers

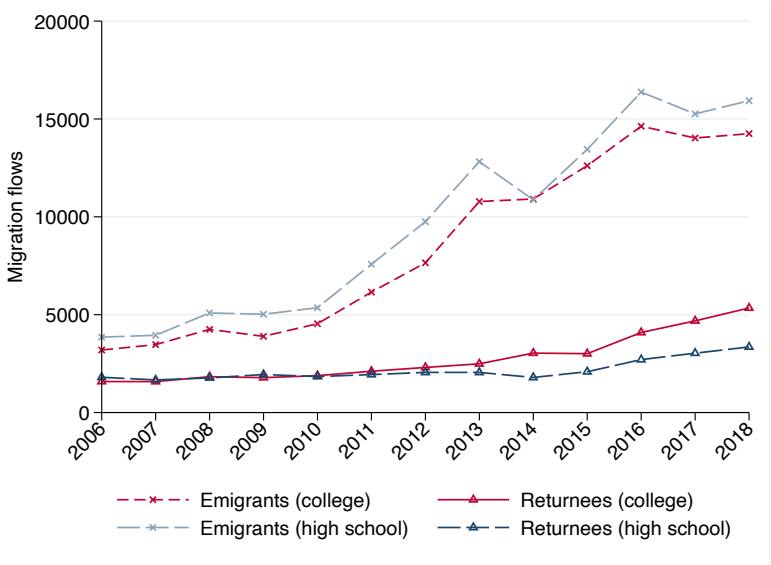


(a) by age

(b) by education

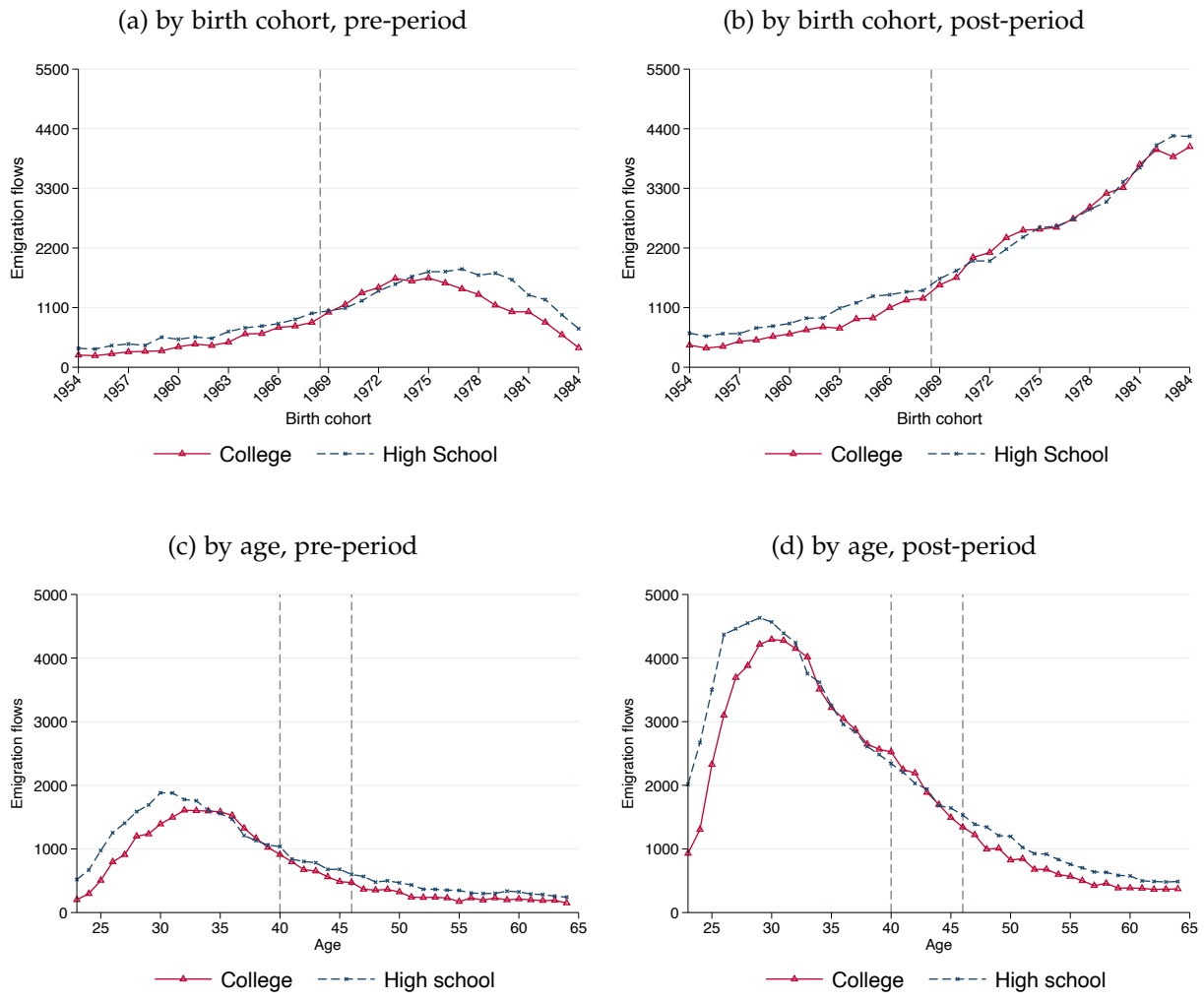
Notes: annual emigration flows of Italian citizens, as a share of the resident population in each age/education group as of 2011 Census and multiplied by 100, therefore in percentage points. Source: authors' elaboration on Istat data; replicating Anelli et al. (2023).

Figure D.2: Emigration and return migration of under-40 college and high school graduates



Notes: College graduates (high-skill) in red, high school graduates (mid-skill) in blue. Italian citizens born in Italy, 23-40 years old at the time of migration. Source: authors' elaboration on Istat data.

Figure D.3: Emigration by cohort and by age, pre- and post-2010 tax scheme



Notes: Figures (a)-(b) plot the total number of Italians 23-64 years old moving abroad from Italy(a) between 2006-2010 and (b) between 2012-2016, by birth cohort (x-axis) and by education level (college and high school graduates). Figures (c)-(d) plot the total number of Italians 23-64 years old moving abroad from Italy (c) between 2006-2010 and (d) between 2012-2016, by age at return emigration (x-axis) and by education level (college and high school graduates). Source: authors' elaboration on Istat data.

E Additional details on the cost-benefit analysis

In this Appendix we derive a closed-form solution for the break-even marginal-to-infra-marginal ratio and show basic comparative statics. Recall from Section 6 that the fiscal break-even condition is given by the following expression:

$$\underbrace{\sum_{t=1}^{d}\beta^t\sum_{i\in M}T(sw_{it})}_{\text{Revenue from M during scheme}}+\underbrace{(1-\delta)\sum_{t=d+1}^{\mathcal{T}}\beta^t\sum_{i\in M}T(w_{it})}_{\text{Revenue from M after scheme}}\geq\underbrace{\sum_{t=1}^{d}\beta^t\sum_{i\in I}[T(w_{it})-T(sw_{it})]}_{\text{Revenue loss from I}}$$

where M and I denote marginal and infra-marginal beneficiaries respectively, d is the duration of the tax scheme, β the discount factor, w_{it} is the gross (labor) income of individual i at time t, $T(.)$ the tax function, s the taxable share under the scheme, δ is the fraction of marginal beneficiaries who leave the country after the scheme elapses, and the total number of periods $\mathcal{T}$ is the difference between the retirement age and the average age at return migration.

To obtain a closed-form solution, we assume that individuals are identical within each group $\{M, I\}$, that earnings are constant over time, and that M individuals' earnings are θ-times the earnings of I individuals. Formally:

i) $w_{it} = w_I \ \forall i \in I$

ii) $w_{it} = w_M \ \forall i \in M$

iii) $w_M = \theta w_I$

Under assumptions (i)-(iii), the break-even condition simplifies to:

$$M\ T(sw_M)\sum_{t=1}^{d}\beta^t+(1-\delta)\,M\ T(w_M)\sum_{t=d+1}^{\mathcal{T}}\beta^t\geq I\ [T(w_I)-T(sw_I)]\sum_{t=1}^{d}\beta^t$$

which can be easily solved for the break-even marginal-to-inframarginal ratio:

$$\frac{M}{I} \geq \frac{[T(w_I) - T(sw_I)] \sum_{t=1}^{d} \beta^t}{T(sw_M) \sum_{t=1}^{d} \beta^t + (1-\delta)\, T(w_M) \sum_{t=d+1}^{\mathcal{T}} \beta^t} \tag{7}$$

To compute the break-even value in (6), we use expression 7, plugging the baseline parameter values in Table 4 as well as the exact tax schedule $T(.)$ depicted in Figure B.3(a) (i.e., Figure 2(a) without payroll taxes), under the assumption that $\theta = 1$, i.e. $w_M = w_I$. Likewise, to compute the values in Figure 8, we follow the same procedure by changing one parameter at the time, fixing all other parameters to their baseline values.

To derive comparative statics, we assume for simplicity that $T(sw) = sT(w)$, which is a reasonable approximation if the before-tax income w is large enough, as evident from Figure B.3(a), as well as $\beta = 1$. Under these assumptions, and allowing for $\theta \neq 1$, we have:

$$\frac{M}{I} \geq \frac{(1-s)d}{sd + (1-\delta)(\mathcal{T} - d)} \frac{1}{\theta} \tag{8}$$

Expression 8 highlights the key ingredients of our fiscal cost-benefit analysis. The numerator measures the fiscal cost of subsidizing infra-marginal beneficiaries during the scheme, and it is the product of the exempted income share $(1-s)$ and the duration d. The denominator measures the fiscal benefit, which is the sum of two components: the reduced fiscal contributions during the scheme years, ds, and the full fiscal contributions beyond the statutory duration $(\mathcal{T} - d)$, net of the out-migration rate δ. The fiscal benefit is amplified when $\theta > 1$, i.e. if marginal beneficiaries are positively selected ($w_M > w_I$).

From 8, it is straightforward to see that:

$$\frac{\partial}{\partial s}\frac{M}{I} > 0; \quad \frac{\partial}{\partial d}\frac{M}{I} > 0; \quad \frac{\partial}{\partial \delta}\frac{M}{I} > 0; \quad \frac{\partial}{\partial a}\frac{M}{I} > 0; \quad \frac{\partial}{\partial \theta}\frac{M}{I} < 0;$$

where a is the average age at return migration, and $\mathcal{T} = 65 - a$.