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Run, graduate, run: Internationally mobile students' reactions to changing political landscapes in Europe

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Abstract

Over the last decades, Europe attracted an increasing number of internationally mobile students. The related influx of talent into European labour markets constituted an important factor to the knowledge economy. This research addresses the question whether changing political landscapes in Europe, e.g. an increasing scepticism concerning migrants or support for right-wing parties, translated into a diminishing attractiveness of European economies. To this end, international graduates' staying behaviour in 28 European destination countries is investigated based on bilateral stay rates for almost 150 countries of origin in the years 2009 to 2019. Controlling for various immigration regimes and institutional settings, international graduates are found to display a high level of sensitivity with respect to political dynamics: A distinct dominance of the right political spectrum may lower the number of international graduates willing to stay by up to 50%. The effect is particularly strong in election years when voters' political preferences become more salient. Eventually, this amounts to a considerable loss for European economies since international graduates have acquired destination country specific human capital and are easily integrated into host societies.

Keywords: migration policies, graduate mobility, labour market integration, political preferences

JEL Codes: J61, F22, D91, I23

1 Introduction

Attracting and retaining talented workers to fuel the knowledge economy has become an important goal of most developed economies (Kerr *et al.*, 2016; Boubtane *et al.*, 2016). Within Europe a number of different strategies to foster labour market participation of foreign workers has been implemented: Besides preferential treatment of workers in occupations or sectors experiencing "labour shortages", several economies introduced Green Cards to attract high-skilled professionals , e.g. in the IT sector. On the EU level, the so-called Blue Card was launched to facilitate labour mobility of non-EU citizens within the common market area.

Another, yet related path of entry into European high-skilled labour markets exists for internationally mobile students who decide to stay in their country of study after graduation. This specific type of skilled migrant features two especially valuable characteristics: For one, they have been educated in the country they would enter the labour market, and thus their qualifications are relatively more transparent to potential employers. Second, these graduates acquired during their studies highly relevant country-specific human capital, i.e. a more distinct knowledge of cultural peculiarities and an improved language proficiency (Sorrenti, 2017). Eventually, this would make them more productive than otherwise comparable individuals entering European countries, and subsequently respective labour markets, for the first time.

Moreover, the pool of internationally mobile students graduating in EU countries is substantial. Despite high levels of intra-European short-term student mobility, almost two third of the 500,000 degree mobile students originate from non-European countries.[1] This highlights why international graduates are a highly relevant target group to boost the supply of skilled labour across a wide range of disciplines. The crucial question in this context is how many of those international graduates decide to stay (and work) in the country where they have been studying. Previous research has shown that countries' retention capability depends (unsurprisingly) on their economic attractiveness but also on their institutional characteristics (Bratsberg, 1995; Bijwaard and Wang, 2016; Hein and Plesch, 2008; Weisser, 2016), and broader opportunities, e.g. funding for post-graduate researchers (Kim *et al.*, 2011). International graduates seem to be highly sensitive regarding non-economic opportunities when it comes to deciding whether to stay or to move on. Most studies addressing post-graduation staying behaviour of international students, however, tend to focus on a small set of destination and origin countries or a highly specific population, such as those with a doctorate.

As a first contribution to the literature, this paper provides insights into 28 European countries' retention capability with respect to international graduates from almost 150 countries of origin. Furthermore, it sheds light on the relative importance of economic and institutional factors shaping international graduates' staying behaviour. The main contribution is a detailed analysis of the impact of socio-political factors, which affect international graduates' staying propensity, and thus eventually the pool of high-skilled labour. Changing political landscapes in Europe, which tend to reflect natives attitudes towards migrant workers, will take centre stage. In this regard, not only migration from third countries to the EU but also free movement within the EU

[1] Author's calculations, based on Eurostat enrolment and graduation data for 2018 (series EDUC_UOE_MOBG02). Degree mobile students are enrolled abroad for the full duration of a programmee.

has faced increasing scepticism in the national discourse.

The underlying drivers of adverse reactions regarding third country migrants were to a large extent due to perceptions of cultural differences, e.g. related to the influx of a relatively large number of migrants from non-Christian countries in 2015 and 2016. These migration flows raised levels of discontent with the political situation and strengthened support of far-right parties across Europe (Ajzenman *et al.*, 2019; Vasilakis, 2018; Steinmayr, 2021).

Brexit, on the other hand, is a direct consequence of natives opposing existing free movement arrangements for EU citizens. This points to an increasingly critical attitude towards the inflow of migrants. Yet, the UK government still seeks to attract high-skilled workers in specific fields of the economy. As part of its Global Talent Scheme scientists from EEA countries may even come to the UK without a job offer (UK Government, 2020).

The important question that remains unanswered so far is whether sought-after high-skilled migrants, such as international graduates, might also be deterred by more adversarial attitudes towards migrants in general or a completely different group of migrant workers, i.e. low-skilled migrants. In that sense, emerging negative attitudes towards migrants perceived as "undesirable" might result in negative externalities by lowering a country's attractiveness to migrants considered to be "desirable".

The consequences of political shifts, mirroring increasing scepticism towards migrants, with respect to the overall staying propensity of a cohort of international graduates will be investigated using a panel of European countries, covering the years 2009 to 2019.[2] Moreover, in order to account for notable differences between returns to human capital in a country of origin and a European destination county, staying behaviour is analysed on the destination-by-origin-country level. Scepticism towards migrants, and thus adverse attitudes towards migrants in general, are integrated based on Eurobarometer data, which allows the derivation of country-year-specific shares of individuals supporting the right-wing of the political spectrum. The impact of stronger support for the political right on cohort-specific staying behaviour is then evaluated in an empirical framework controlling for destination and origin characteristics, including differentials in economic prospects and institutional quality or design. These differentials are captured in two alternative specifications, one drawing upon the World Governance Indicators (Kaufmann *et al.*, 2010), the other relying on the Global Competitiveness Index (Schwab, 2014).

In this framework, attitudes towards immigrants, and thus also the support for right-wing parties could be driven by a rising number of immigrants. If international graduates constituted a substantial share of overall immigration, reverse-causality could pose a serious threat to identification. Therefore, I will resort to an instrumnental variable strategy to eliminate this channel of endogeneity.

Eventually, the empirical results point to strong and robust negative effects of changing political landscapes in European countries: Facing politically more polarised conditions, characterised by higher levels of support

[2]This time horizon coincides with the decade between two major (economic) crises, both directly or indirectly resulting in atypical migration patterns or severely restricted mobility choices.

for the right political spectrum, international graduates choose to cut and run, and not to contribute to the economic success of a former place of study.

The remainder of this paper is organised as follows: Recent trends of student and graduate mobility as well as drivers and implications of high-skilled migration will be discussed in section 2. The conceptual framework, including the data sources used, will be introduced in section 3. This includes a description of the derivation of stay rates, related caveats and a discussion of countries' retention capability. Section 4 presents the econometric results, building on a gravity-type model of migration, which integrates the migration environment and institutional attraction differentials. Once the general setting has been investigated, stay rates' responsiveness to changing political landscapes is examined, also accounting for their potential endogeneity. Results from further sensitivity analyses are discussed in section 5, and section 6 concludes.

2 Stylised facts on internationally mobile students and graduates

Internationally mobile students are an integral part of the European higher education landscape. They not only add to diversity within tertiary education but contribute to the funding of the higher education sector, typically by paying higher fees. If they choose to stay, they continue to contribute to the host country's economy and are sought-after members of the labour force.

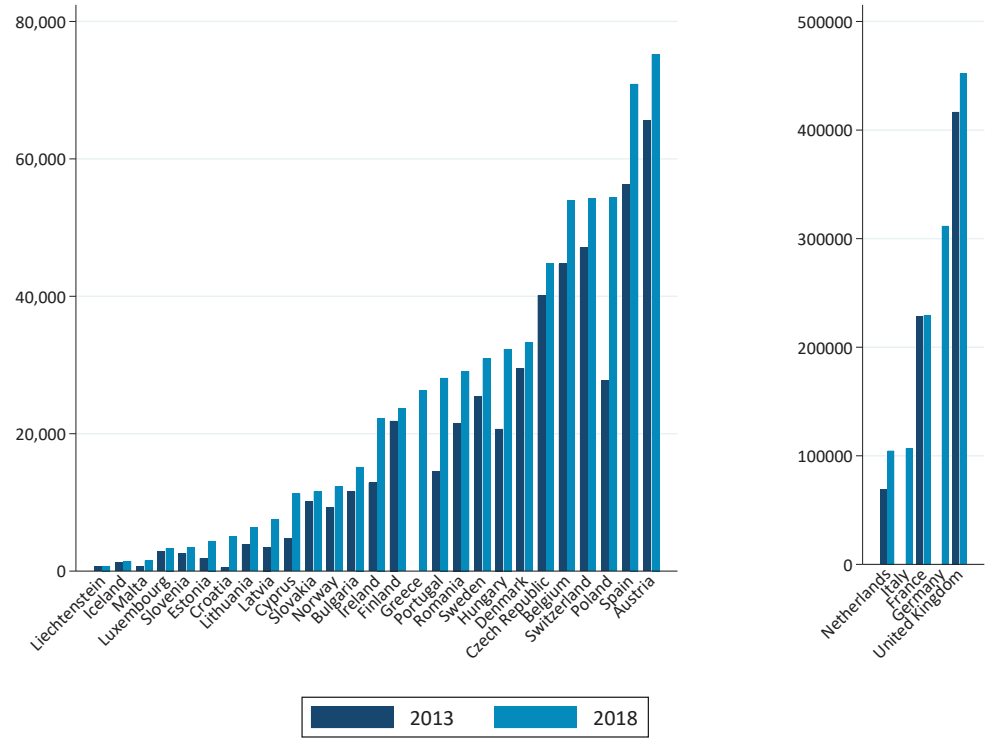
Subsequently, I will present stylised facts on the relevance of internationally mobile students and graduates for European countries. To set the scene for the subsequent empirical analysis of their staying behaviour after graduation, potential drivers of their initial mobility shall be discussed. However, little is known about what makes them stay and how they may react to changing political landscapes in their chosen place of study.

2.1 On the coming and going of internationally mobile students

Any potential stayer is part of a rather selective group, i.e. those students who decided to study abroad. In principle, there are two different types of internationally mobile students, namely credit and degree mobile students. The former study abroad for a short term but graduate from an institution in their home country. Within Europe this form of mobility is the most prominent one and actively encouraged by the ERASMUS mobility programme. Degree mobile students enroll regularly at a university in a destination country for the whole duration of a degree. Numbers of both groups have been steadily increasing over the recent years (Figure 1 and Figure 2). In 2018 there were more than 505,000 degree mobile students enrolled in an EEA country or the UK. 61.4% came from non-European countries of origin, though there is considerable variation across destination countries: Non-European degree mobile students may be a small minority of ca. 7% in Slovakia and Croatia, but for a number of countries they constitute the majority. In the case of the UK, Portugal, Ireland and France their share is above 70%.

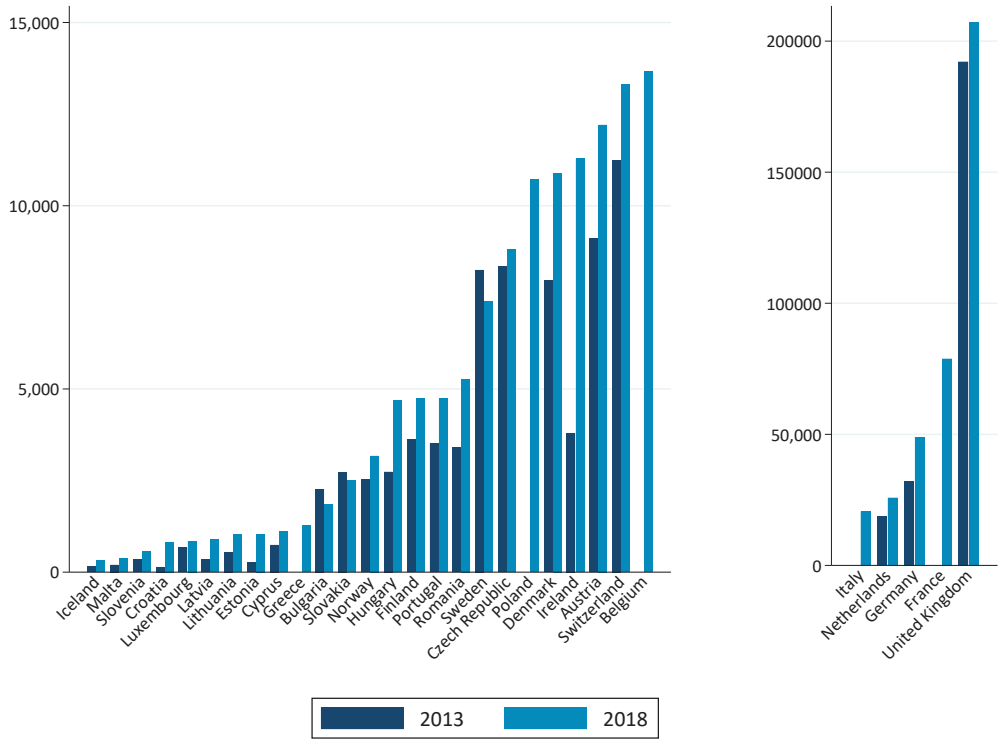
Before internationally mobile students and graduates decide on whether they want to stay or cut an run, they first have to choose a potential destination country. Generally speaking, their underlying motives (even

Figure 1 – All incoming students (2013 and 2018)



Note: Based on Eurostat series educ_uoe_enrt03.

Figure 2 – Incoming degree mobile students (2013 and 2018)



Note: Based on Eurostat series educ_uoe_mobg04.

in case of short term credit mobility) in the selection of a destination country are comparable to those of voluntary migrants: Distance acts as deterrent, whereas shared language, destination country size and economic perspectives increase student flows (Rodríguez González *et al.*, 2011; Caruso and de Wit, 2013). In a similar fashion a larger tertiary education sector, i.e. higher enrollment numbers and funding per student, as well as better ranking performance of a country's universities attract internationally mobile students to particular destination countries (Van Bouwel and Veugelers, 2010; Beine *et al.*, 2014).

Related to the research at hand, the decision to study outside of the country of origin is made in light of individual career plans. Acquiring social and cultural capital is an essential motive (Findlay *et al.*, 2012), but so is the potential of having access to labour markets promising better employment perspectives and income levels (Thissen and Ederveen, 2006; Perkins and Neumayer, 2013). The later may be especially relevant for students originating from least developed countries.

While there is a lot we know about the coming of degree mobile students, both in a quantitative and motivational sense, we know far less about their going. Some may leave after graduation simply because they planned to do so right from the start. Others may leave, despite initial intentions to stay, because they perceive staying no longer as desirable. Some of those who stay on may have changed their initial plans to return, for instance, because they obtained better information about their chosen destination countries during their studies. Eventually, a staying decision can also be reversed after some time and after collecting (potentially valuable) working experience abroad. This implies that staying behaviour is a dynamic phenomenon, likely to be influenced by recurring information updates and subsequent decisions.

The literature offers some insights into staying behaviour of various subgroups of degree mobile students. Unsurprisingly, stay rates decline over time (Finn, 2012; Nemeckova and Krylova, 2014; Suter and Jandl, 2006). Typically, however, the medium to long term dynamics can only be evaluated in comparatively small samples, for instance based on alumni samples for a subset of universities.

Economic perspectives do play a certain role for students originating from economically less developed countries (Hein and Plesch, 2008; Vasiljeva, 2014). In the long-run such economic differentials can be quite dominant, such that decreasing incomes in a country of origin can have a stronger positive impact on stay rates than increasing income in a destination country (Bratsberg, 1995). Relative scarcity of skills, reflected in higher income variations or skill prices in origin countries, was found to be negatively associated with stay rates in the US (Rosenzweig, 2006).

Interestingly it is not only future income prospects that are important, but so is the source of the current income in the case of internationally mobile doctoral students. Being funded by a host institution increases staying propensities for graduates from doctoral studies (Kim *et al.*, 2011, Van Bouwel and Veugelers, 2012).

There is also variation related to fields of study: Internationally mobile students are less likely to stay if they were enrolled in social sciences and humanities. The opposite applies to those with degrees in a technical subject or natural sciences, such as life sciences (Finn, 2012; Kim *et al.*, 2011; Wolfeil, 2009). This is in so far remarkable as the technical and field specific knowledge these graduates have acquired is not only sought-after,

but also relatively easily transferable across borders.

Qualitative evidence suggests that less restrictive immigration policies, such as the possibility to immigrate jointly with family members, translates into a higher willingness to stay (CIDA, 2005). The relevance of family (formation) is also documented in quantitative analyses (Bijwaard and Wang, 2013; OECD, 2014). The emergence of attachment to a destination country, growing with study length and the decision to enrol in a consecutive programme as well, has also been identified as positively affecting stay rates (Hein and Plesch, 2008; Kim *et al.*, 2011).

One of the most striking findings is that most analyses are based on restricted samples of bilateral stay or retention rates:[3] Samples include graduates from a small number of institutions in one country, a highly unrepresentative subset of graduates or are restricted to (all identified) stayers in one country. The other dimension, i.e. countries of origin, can be somewhat more extensive but often settles with global or regional aggregates. The 69 countries of Bratsberg (1995) constitute a sort of upper limit. To a large extent this is due to a lack of comparable data across countries (or even within countries across institutions). This also explains why there is little quantitative research dedicated to understanding how cultural and political dynamics in destination countries may impact on retention rates: The scarcity of countries for which stay rates can be derived consistently over time limits the amount of variation in political landscapes which can be exploited.[4]

2.2 The contributions of internationally mobile students and graduates

In the nexus of political preferences and attitudes towards migrants a common worry attributed to native voters is their perception that migrants will be a burden on the economy. Due to a selective migration process this argument does often not hold up to reality, for instance when labour market outcomes or fiscal contributions are scrutinised (Dustmann and Frattini, 2014).[5]

For internationally mobile students who decide to stay these worries are unfounded. Using European Labour Force data stayers performance one year after graduation can be compared directly to their native peers (Weisser, 2016). International graduate stayers from non-European countries have virtually the same employment probability (62.8%) as their native peers (62.5%). They are even more likely to have a permanent contract (62.5% versus 55.2%), and seem to be more flexible in terms of the job profile, i.e. they are more willing to work in a position requiring relatively lower qualification levels (44.3% versus 29.6%).

These percentages indicate not only that international stayers integrate smoothly into the labour force, but also that they do not pose a burden to the social security system of a destination country. Moreover, 97.1% of international stayers, who happen to be unemployed or inactive one year after graduation, do not receive any social benefits or assistance (94.6% in the case of domestic graduates).

[3]With respect to the fragmentary information on aggregate staying behaviour of tertiary educated internationally mobile individuals, Table A.1 provides an overview of stay rates in the literature.

[4]There is some evidence regarding the relevance of political freedom in origin countries (Hein and Plesch, 2008) or socio-political culture in a host country (CIDA, 2005). The latter is as unrepresentative for a broader population as it can get, i.e. based on a small sample of scholarship holders from French-speaking developing countries in Canada.

[5]Overall outcomes vary across various populations of immigrants. If there are negative fiscal contributions they are comparable to those of natives.

Whilst internationally mobile students contributed with their typically higher tuition fees to the funding of the higher education system, possibly even cross-subsidising the education of domestic students (Findlay, 2011), stayers will continue to create demand side effects once they stopped paying fees.

3 Measuring staying behaviour and a country's retention capability

3.1 A quantitative measure: Stay rates

In order to evaluate a country's retention capability, corresponding to the aggregate staying behaviour of a cohort of internationally mobile students (or graduates), two major (empirical) questions have to be answered: (i) who is a stayer, and (ii) what is the relevant population?

In light of the fact that mobile individuals can be inherently hard to track, these two questions are not trivial. The underlying measurement issue pertains to all migration-related analyses, but can be especially challenging in the case of internationally mobile students or graduates: being young, and typically without a family, costs of moving frequently are relatively low. So in order to derive a meaningful measure of aggregate staying behaviour, we require reliable data on the number of country and year specific stayers and the respective population of graduates.

Related to the overall size of the tertiary education sector in Europe, the number of countries and universities, there is no data on post-graduation mobility patterns available which is both representative and of good coverage across countries and years.[6] To circumvent this issue, this research draws on harmonised Eurostat permit data for the majority of European countries in the years 2009 to 2019.

Permit-based stay rates within this research differ across two major dimensions (cf. Table 1). The first relates to the implied reason of staying and differentiates between those who stay for any reason (*all*), and those who obtain permits to *work* or for *family* reasons. The second dimension reflects alternative derivation methods of the relevant population. A first derivation identifies the population of potential stayers based on a *demographic equality* (cf. OECD, 2011), which draws upon permit stocks, stock changes and data on newly issued permits. Due to reporting issues in some countries and periods, this demographic equality does not always hold, i.e. positive stock changes are not always counterbalanced by documented newly issued permits. Alternatively, imposing further assumptions with respect to the average time it takes to complete a degree, the population of potential graduates can be inferred based on past inflows. These past inflows correspond either to *lagged inflows*, mirroring typical study duration, or the *average inflows* over the last three years.

In principle, there is a number of alternative approaches to construct both the numerator and denominator.[7] Stayers, for instance, could be identified based on labour force surveys. Though such a calculation procedure would allow to derive further group-specific stay rates, and investigating labour market outcomes, small cell

[6] There is a number of reasonably representative graduate surveys in some countries running for a limited number of years, e.g. the Destination of Leavers from Higher Education survey in the UK. Alternatively, some universities have a tradition of continued alumni surveys. The overall picture remains, nevertheless, too patchy in order to conduct a reliable analysis on the EU level.

[7] A more detailed discussion of the potential advantages and disadvantages of these alternative derivation methods, as well as a direct comparison, is provided by Weisser (2016).

Table 1 – Stay rate types

stayer type	population derivation		
all work / family	(I) demographic equality	(II) lagged inflows in $t-j\ \forall j \in [1,5]$	(III) average inflows in the last 3 years

Note: Inflow lags of one to five years cover short-term degree mobility, e.g. one year masters programmes, as well as long-term and continued degree mobility, such as bachelor and consecutive masters programme.

sizes limit overall reliability. This becomes an issue especially in the context of origin-specific stay rates for graduates from small countries.

3.2 Derivation of stay rates

Stayers are identified as those who change their permit status from *education* to any of the following permit categories: remunerated activities reasons (*work*), *family* reasons, and *other* reasons as residual category. Using harmonised permit data, it becomes possible to derive overall bilateral stay rates SR for all pairs of European destination countries i and non-European countries of origin j:

$$SR_{ijt}^{I,X} = \frac{N_{ijt}^{E,X}}{N_{ijt}^{OE}}$$

The numerator ($N_{ijt}^{E,X}$) corresponds to non-European students who are assumed to have graduated in year t (or dropped out) and chose to stay in their country of study for one of the reasons above. The denominator (N_{ijt}^{OE}) consists of all individuals whose student permits expired in a given year, i.e. who left student status.[8] The outflow from the educational permit category, however, is not directly observable. Instead, it has to be recovered via the demographic equality (cf. OECD, 2011) of stock changes (ΔN_{ijt}^{E}), on the one hand, and in- and outflows on the other:

$$N_{ijt}^{OE} = N_{ijt}^{newE} - (N_{ijt}^{E} - N_{ijt-1}^{E}) = N_{ijt}^{newE} - \Delta N_{ijt}^{E}$$

Inflows, in turn, comprise newly issued education permits (N_{ijt}^{firstE}) and status changes from all other categories to the education category ($N_{ijt}^{X,E}$). Eventually, this gives the bilateral stay rate as

$$SR_{ijt}^{I,X} = \frac{N_{ijt}^{E,X}}{N_{ijt}^{firstE} + N_{ijt}^{family,E} + N_{ijt}^{work,E} + N_{ijt}^{other,E} - \Delta N_{ijt}^{E}}$$

A more labour market focused stay rate ($SR_{ijt}^{I,work}$) substitutes the overall number of stayers by the number of status changers from the education to work permit categories ($N_{ijt}^{E,work}$). The denominator remains unaffected. Rates for family reason stayers are constructed analogously.

As an alternative measure, and to remedy a potential violation of the demographic equality, the denominator

[8] Typically, N_{ijt}^{EX} comprises both students enrolled in any type of education programme and those enrolled at universities. Newly issued permits indicate that for most countries the share of permits for students enrolled in tertiary education is above 80%). Czech Republic, Ireland, Italy, Luxembourg, Poland and Slovenia have lower shares.

can be constructed based on lagged inflows ($N_{ij,t-h}^{firstE}$). The stay rates are then given as

$$SR_{ijt}^{II,X,h=h_i} = \frac{N_{ijt}^{E,X}}{N_{ij,t-h}^{firstE}}$$

This concept follows Bratsberg (1995) and implies a cohort matching over reasonable enrolment spells h. Such a cohort matching may provide reliable post-graduation stay rates if the attrition rate of international students is small enough and we can plausibly infer their enrolment spells in a given country. If attrition was relatively high the resulting stay rate would be downward biased, and not necessarily be indicative of the staying behaviour of internationally mobile graduates. Though individual enrolment duration cannot be observed, available degrees in the relatively harmonised European Higher Education Area are typically three years bachelor and two years master programmes. Therefore, average enrolment spells h can be assumed to be in the interval of two and three years.[9]

To account for a potentially high level of uncertainty regarding the actually relevant enrolment spells, a third type of stay rate integrates over all potential programme durations. Such a mixed cohort approach also accounts for shorter spells, such as one year Master programmes:

$$SR_{ijt}^{III,X,mixed} = \frac{N_{ijt}^{E,X}}{1/3 \sum_{l=1}^{4} N_{ij,t-l}^{firstE}}$$

Short-run dynamics in the numbers of incoming students would bias the derived stay rate. However, if the number of inflows was relatively constant or fluctuating around a long-run average the stay rate's expected value would be mirroring a cohort's staying pattern sufficiently well.

3.3 New descriptive evidence on staying behaviour across Europe

Figure 3 illustrates overall stay rates for EEA countries and the UK, according to the three major calculation procedures. The corresponding graph for employment stayers can be found in Figure A.1 (in the appendix). Notable differences can be observed primarily for smaller countries, respectively eastern European countries, such as Malta, Estonia, Poland and Slovenia. Most of the observed variation occurs across destination countries, and only to a lesser degree within country over time.

The Top-6 destinations with the highest yearly averages from 2009 to 2019 in Europe are the United Kingdom (26,298), France (19,818), Germany (14,534), Spain (4,094), Poland (3367), and the Netherlands (3,188). In 2018, the last year UK data is still available, there were 94,766 documented stayers on the EU level.[10]

Figure 4 documents the diverging attractiveness with respect to countries of origin for these top destination countries with the highest average overall number of stayers per year. What strikes the eye is the contrast between the UK and other Top-6 destinations, such as France and Germany: Whereas the UK features relative homogeneous low origin-specific stay rates, there is a stronger degree of variation (and higher stay rates) for

[9] Alternative specifications ($h \in [1, 5]$) have been tested as well.
[10] Without the UK the number was 85,411.

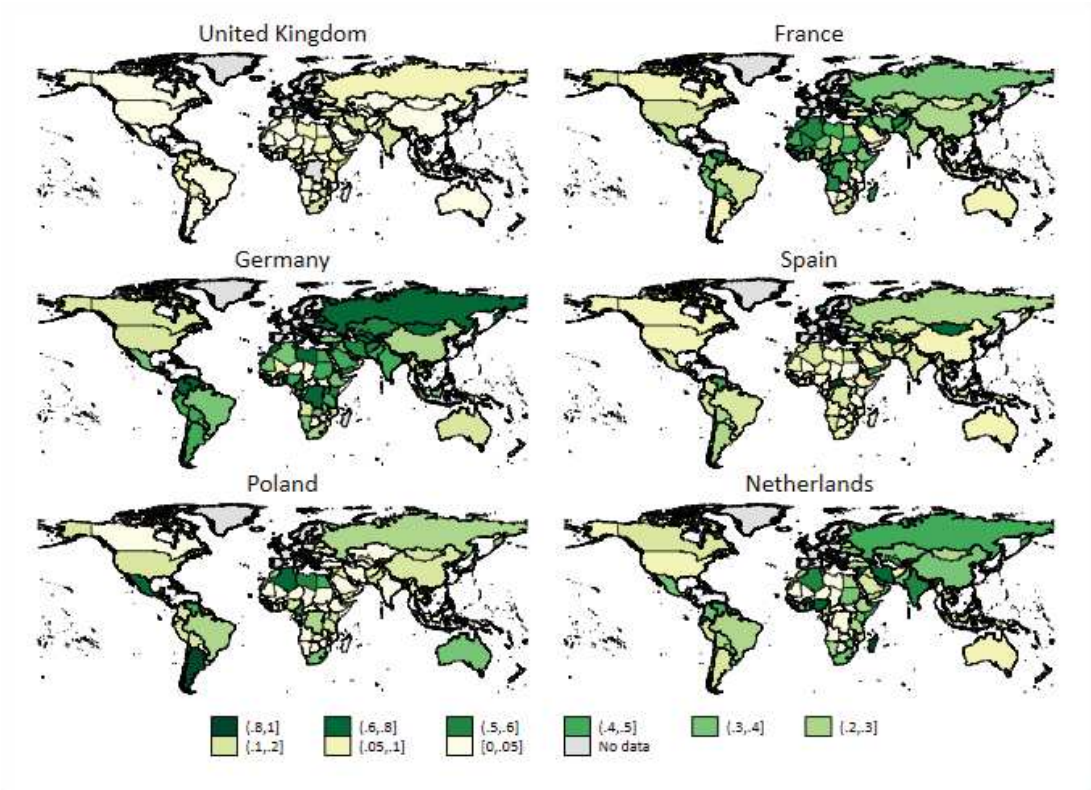
Germany and a more heterogeneous picture for France in general.

Figure 3 – Overall stay rate for all origins, by destination country (2009-2019)

With respect to the Top-6 destinations for employment stayers, the picture changes somewhat for the smaller countries. The ranking is now: United Kingdom (21,678), France (14,875), Germany (9,798), the Netherlands (2,965), Spain (1,979), and Poland (1,273). Unsurprisingly, origin-specific employment-related stay rates are distinctly lower. At the same time, the within destination country variation follows the general pattern of the overall stay rate.

For most countries we do not only observe an upwards trend in terms of absolute enrollment numbers of

Figure 4 – Origin-specific overall stay rates for Top-6 destinations (2018)



Note: Depicted stay rates are based on the demographic equality approach to infer the population of potential graduates.

internationally mobile students or stayers, but also a rising stay rate (cf. Figure 3): Staying in European destination countries becomes overall more attractive and feasible.

The most sizeable cohorts of stayers in any European country in 2018 originated from China (10,336), India (7,550), Morocco (6,208), Russia (4,342), Ukraine (4,315), and Algeria (4,236). In relative terms, staying was most widely spread amongst internationally mobile students from Madagascar (64.8%), Guinea (54.3%), Mali (51.4), Suriname (50,9%), Algeria (49.2%), and Cameroon (48.4%). This illustrates a predominance of high stay rates for African countries - 2/3 amongst the countries with the 30 highest stay rates are on the African continent. The Top-10 threshold, however, is defined by Venezuela (45.9%) and Syria (45.8%), two countries which have been experiencing either considerable economic turmoil or outright war.

On the other end, i.e. displaying robust stay rates not much above 5%, we find predominantly other high income countries, such as the USA, Canada or Australia, and those being in addition geographically and culturally relatively distant (Saudi Arabia, Japan, Thailand, Singapore, Taiwan).[11] This points to the relevance of a gravity-style model in the context of aggregate staying behaviour.

[11] Cultural and religious differences feature notable explanatory for migration amongst developed economies (Belot and Ederveen, 2012.

4 Determinants of staying behaviour: Empirical findings

When investigating aggregate staying behaviour of migrant populations, quantified via bilateral stay rates, there emerge four distinct complexities requiring further attention in an empirical analysis: (i) the *distribution of stay rates*, (ii) possibly unobserved *bilateral idiosyncrasies* of destination-origin country pairs, (iii) the *interplay of decision-relevant institutional and economic factors* with political landscapes in destination countries, and (iv) the potential endogeneity of shifts in political landscapes.

I describe the applied empirical strategy to address these four issues in section 4.1. Idiosyncratic and institutional as well as economic determinants of bilateral stay rates are discussed in sections 4.2 to 4.4. A closer examination of the set of institutional and economic factors is advisable since the sub-population of international graduates differs somewhat from the typical migrant: After the conclusion of an initially temporary stay in a destination country, and their likely graduation, they are not only highly educated but they had ample time to familiarise themselves with the peculiarities of their host countries. Thus, they not only have accumulated country-specific human capital but also have superior information in regards to their future prospects should they choose this country as more permanent residence.

Once the set of essential institutional and economic factors has been established, section 4.5 highlights graduates' sensitivity with respect to concurrent changing political landscapes in destination countries. The issue of potentially endogenous shifts in natives' political preferences and attitudes towards migrants in destination countries is examined in an instrumental variable (IV) approach in section 4.6.

4.1 Estimation strategy

A first peculiarity in the context of an analysis of stay rates is the prevalence of zero-outcomes. With respect to the main stay rate ($SR^{I,all}$), for instance, there are 48,376 non-missing bilateral stay rates for 57,784 origin-destination pairs for the years 2009 to 2019. Amongst these, only 25.5% are non-zero. This not only indicates a highly right-skewed distribution, but points to a rather distinct underlying process: For some origin-destination pairs, e.g. when a destination country features a rather restrictive immigration policy with respect to the country of origin, no graduate perceives staying to be feasible. Whatever factors would usually make graduates want to stay, such as favourable economic prospects in a host country, would be irrelevant and the observed bilateral stay rate would be zero. If staying was a feasible option, in principle, these economic or institutional factors might then come into play. This would be the case for all those origin-destination pairs for which we observe non-zero stay rates. The more favourable the conditions in a destination country the higher the observed stay rate we would expect.

In order to account for the existence of such fundamental differences, my econometric strategy starts by distinguishing between these two cases. In a first step, I report results for the full sample including a substantial share of zero outcomes. These specifications are based on original stay rates (SR), which are estimated using non-linear estimation methods to address their asymmetric distribution. These models assume the dependent

variable to have one of the following distributions: Poisson, negative binomial, binomial (with loglog link in the estimation). Then, in the second step I present results based on a binary stay rate variable ($I(SR)$), indicating non-zero outcomes and contrasting country pairs for which staying is a feasible option with those where the costs of staying are implicitly prohibitive. A last specification restricts the sample to the subset of country pairs with a strictly positive stay rate ($SR > 0$).

To highlight the implications of the dependent variable's distribution, the following equation is estimated as a benchmark

$$S_{ijt} = \mathbf{X}_{ij}\boldsymbol{\gamma} + \boldsymbol{\tau}_i + \boldsymbol{\tau}_j + \boldsymbol{\phi}_t + \boldsymbol{\varepsilon}_{ijt} \tag{1}$$

Here, S_{ijt} represents any of the previously introduced versions of yearly bilateral stay rates. The vector $\mathbf{X}_{i,j}$ comprises the set of historical and geographical determinants, which are essential factors in gravity-style models in the migration literature (cf. Bodvarsson and Van den Berg, 2013): distance (between capitals), origin and destination country population size; all enter log-transformed. Furthermore, drawing on the GeoDist database (Mélitz and Toubal, 2012; Mayer and Zignago, 2011), this vector contains bilateral indicators representing a shared common language, post-1945 colonial relationship, and the bilateral migration stock in 2000. All of these factors cannot be influenced by any contemporary policies or changes in political landscapes, and are thus assumed to be fully exogenous. This specification includes a complete set of destination (τ_i), origin (τ_j) and year (ϕ_t) fixed effects.

To investigate the impact of institutional context, i.e. potential determinants which can be influenced directly or indirectly by policy-makers in destination countries in the medium run, I first present in section 4.3 results from specifications addressing the *migration environment*. Under this umbrella term I subsume two principal aspects, i.e. immigration trends (MT) and immigration policies (MP) in the recent past. Factors representing the migration environment in previous years are not the outcome of a relatively large cohort of former students deciding to stay in the present. At the same time, the migration environment in previous years can be assumed to be of great interest to new graduates considering whether to stay or to leave.

The second aspect focuses more on legislative facilitators or impediments at the time internationally mobile graduates decide whether to stay or leave. Such migration policies can refer to immigration rules or the subsequent (labour market) integration of migrants. Three alternative types of measures will be used: the Migration Integration Policy Index (MIPEX, Solano and Huddleston, 2020), aggregates of immigration-related legislative changes from the DEMIG POLICY data (DEMIG, 2015), and measures of practised restrictive immigration policies (entry refusals at borders and expulsions). These measures are integrated into the migration environment specifications:

$$S_{ijt} = \mathbf{X}_{ij}\boldsymbol{\gamma} + \mathbf{MT}_{ij,t-1}\boldsymbol{\beta}_{1.1} + \mathbf{MP}_{i(j),t-1}\boldsymbol{\beta}_{1.2} + \boldsymbol{\tau}_i + \boldsymbol{\tau}_j + \boldsymbol{\phi}_t + \boldsymbol{\varepsilon}_{ijt} \tag{2}$$

Within the migration environment specifications, migration trends are reflected by bilateral immigration

variables in the previous year ($MT_{ij,t-1}$). The latter ensures that migration trends are not driven by the choices of a graduate cohort in year t. Pre-existing migration policies ($MP_{i,t-1}$), effective around the time potential stayers make their choice, can be destination country-specific or origin-destination specific.

Building on the migration environment specification, additional measures indicative of a destination country's institutional and economic attractiveness will be introduced in section 4.4: Here, the Global Competitiveness Index (GCI, Schwab, 2014) and the World Governance Indicators (WGI, Kaufmann *et al.*, 2010) serve to proxy otherwise unobserved, yet potentially relevant features which make internationally mobile graduates stay in their earlier chosen country of study. These measures of attractiveness provide insights into the sensitivity of internationally mobile graduates with respect to countries' performances in other domains, such as labour market features, innovative capacity or opportunities for political participation. Typically one would expect that the better a destination country performs relative to a country of origin the more attractive it becomes as a place of more permanent residence and the more likely a graduate actually chooses to stay. Eventually, what matters is not the absolute performance but the relative performance.

To investigate the impact of such relative attractiveness differentials (AD) in the various dimensions of the above mentioned indices, I integrate dimension-specific variables indicating whether a destination country distinctly outperforms a country of origin or not.

$$S_{ijt} = \mathbf{X}_{ij}\boldsymbol{\gamma} + \mathbf{MT}_{ij,t-1}\boldsymbol{\beta}_{1.1} + \mathbf{MP}_{i,t-1}\boldsymbol{\beta}_{1.2} + \sum_{k=1}^{K} \mathbf{AD}_{ijt}(k)\boldsymbol{\beta}_{2.k} + \boldsymbol{\tau}_i + \boldsymbol{\tau}_j + \boldsymbol{\phi}_t + \boldsymbol{\varepsilon}_{ijt} \tag{3}$$

As specified in equation 3, the coefficient vector $\boldsymbol{\beta}_{2.k}$ comprises for all k dimensions of the used attractiveness index (either GCI or WGI[12]) whether a stronger performance of a destination country translates into a higher stay rate or not.

Once the general determinants of bilateral stay rates, such as unchangeable idiosyncrasies and the pre-existing institutional or economic conditions have been retrieved, section 4.5 investigates how concurrently changing political landscapes in the destination countries may come into play. To this end, the model is augmented by measures of political dynamics (PD), such as increasing or diminishing support for the right political spectrum:

$$S_{ijt} = \mathbf{X}_{ij}\boldsymbol{\gamma} + \mathbf{MT}_{ij,t-1}\boldsymbol{\beta}_{1.1} + \mathbf{MP}_{i,t-1}\boldsymbol{\beta}_{1.2} + \sum_{k=1}^{K} \mathbf{AD}_{ijt}(k)\boldsymbol{\beta}_{2.k} + \beta_3\mathbf{PD}_{it} + \boldsymbol{\tau}_{ij} + \boldsymbol{\phi}_t + \boldsymbol{\varepsilon}_{ijt} \tag{4}$$

This paper's main analysis concludes in section 4.6, where I address the potential endogeneity of political dynamics in equation 4 in an instrumental variable approach. Endogeneity is further taken into account by contrasting two alternative types of country-level fixed effects $\boldsymbol{\tau}_{ij}$: one comprises both destination country (τ_i) and origin country (τ_j) fixed effects, the other integrates a full set of country-pair ($\tau_{i\times j}$) fixed effects.[13] A more detailed discussion of the selected instrument can be found in section 4.6.

[12]Estimations employ either one or the other since there is some degree of conceptual overlap, such as between GCI pillar 1 (institutions) and the WGI dimensions control of corruption or rule of law.

[13]In that case vector $\mathbf{X}_{ij}$ of gravity-model variables becomes irrelevant.

4.2 The inexorability of historical and geographical ties

Before analysing socioeconomic conditions and institutional settings, which can be addressed by policy makers in the medium to long run, I will set the scene by briefly highlighting the impact of history and geography in a gravity framework. In this context, I will also conduct a model comparison to evaluate the performance of different estimation procedures and stay rate derivation methods. Table 2 reports results for four virtually unchangeable factors, which are indicative of relatively lower perceived costs of staying in a country of study: Common language facilitates communication; a colonial relationship is indicative of cultural familiarity; geographically closer countries are more likely to be culturally similar and imply lower travel costs in order to maintain social connection in the country of origin; a relatively higher share of compatriots residing in a destination country constitutes an important network. All of these factors can be expected to lower transaction costs in daily life significantly.

Table 2 – Bilateral stay rates: Gravity model benchmark

Dep. var.	$SR^{I,all}$				$I(SR^{I,all})$		$SR^{I,all} > 0$		
	(1.1)	(1.2)	(1.3)	(1.4)	(2.1.1)	(2.1.2)	(2.2.1)	(2.2.2)	(2.2.3)
Est.	OLS	Poisson	NegBin	Bin (loglog)	OLS	Probit	OLS	Poisson	Bin (loglog)
distance†	-0.0128^{*}	-0.0258^{***}	-0.0290^{***}	-0.0237^{***}	-0.1033^{***}	-0.1087^{***}	0.0922^{***}	0.0776^{***}	0.0872^{***}
	(0.0072)	(0.0068)	(0.0069)	(0.0056)	(0.0179)	(0.0127)	(0.0150)	(0.0153)	(0.0140)
pop (D)†	0.1207^{***}	0.1417^{**}	0.1495^{***}	0.1211^{***}	0.3570^{***}	0.2392^{***}	0.1294	0.1206	0.1695
	(0.0303)	(0.0566)	(0.0579)	(0.0413)	(0.0681)	(0.0739)	(0.1636)	(0.1555)	(0.1506)
pop (O)†	−0.0383	0.0208	0.0190	−0.0043	−0.0398	0.0075	−0.0451	−0.0509	−0.0661
	(0.0239)	(0.0232)	(0.0254)	(0.0236)	(0.0470)	(0.0440)	(0.0636)	(0.0570)	(0.0584)
language	0.0400^{***}	0.0314^{***}	0.0333^{***}	0.0319^{***}	0.0978^{***}	0.0960^{***}	0.0193	0.0143	0.0224^{**}
	(0.0064)	(0.0047)	(0.0051)	(0.0046)	(0.0170)	(0.0124)	(0.0124)	(0.0122)	(0.0114)
col. rel.	0.0918^{***}	0.0329^{***}	0.0380^{***}	0.0553^{***}	0.1632^{***}	0.2167^{***}	0.0223	0.0421^{***}	0.0192
	(0.0131)	(0.0073)	(0.0082)	(0.0071)	(0.0315)	(0.0241)	(0.0174)	(0.0161)	(0.0156)
mig. stock†	0.0068^{***}	0.0050^{***}	0.0054^{***}	0.0048^{***}	0.0320^{***}	0.0186^{***}	-0.0038^{**}	-0.0047^{***}	-0.0035^{**}
N	39.806	39.806	39.806	39.806	39.806	39.806	11.791	11.794	11.794

*** p<0.01, ** p<0.05, * p<0.1

Note: † indicates variables which entered after a log or inverse hyperbole sine transformation. All specifications include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Results for non-linear models are average marginal effects.

Columns 2 to 4 introduce non-linear estimations to address the right-skewed distribution of the dependent variable. The obtained results are highly comparable across the three different non-linear estimation methods, and the overall patterns of significant results comparable to the OLS results. Estimates from the non-linear models indicate that a common language is associated with a 3.1 to 3.3 percentage point higher stay rate; the OLS estimate suggests a 4 percentage points stay rate increase. If distance between capitals was one percent larger, as implied by the log transformed distance variable, stay rates can be expected to decline by 2.4 to 2.9 percentage points (1.3 percentage points for OLS). Migrant clusters seem to be another highly influential determinant: if the share of compatriots was by one percentage point larger in 2000, the associated concurrent stay rate is ca. 0.5 percentage points higher.[14] The influence of these factors can also be retrieved in a specification where stay rates have been converted into a binary variable, $I(SR)$, equal to one for non-zero outcomes. Solely focusing on non-zero outcomes (last three columns) indicates that once there is a fundamental willingness (or opportunity) to stay in a country of study, international graduates are no longer deterred by a

[14] Since the migrant cluster variable is based on the number of citizens of a origin country who resided in a destination country in 2000, the implied network strength cannot be affected by either concurrent policy decisions or stayers choices.

larger distance or a smaller network of compatriots.

If we turn to the subset of international graduates who stay for employment reason, the overall patterns can be reproduced. Their stay rate ($SR^{I,emp}$) is negatively associated with distance and positively with a destination country's population size, shared language and colonial history, and the network proxy (cf. Table A.2, Panel B, column 1). Aside from population size, however, the effects are typically only half the size as compared to the overall stayer population. Since employment stayers are likely to be a positively selected group of successful labour market entrants, these measures of reduced transaction costs are not as informative as for the overall population of stayers, where more are still aspiring to integrate into destination countries' economies and societies.

With respect to the full sample, comprising 39,806 bilateral overall stay rates ($SR^{I,all}$), two noteworthy model diagnostic results emerge: As expected, the highly right-skewed distribution produces estimates which differ notably in a numerical sense depending on whether they originate from the linear or one of the three non-linear approaches. Yet OLS results still allow to retrieve influential determinants. Secondly, in terms of predictive power, the binomial model with a loglog link function outperforms all other estimation approaches (cf. Figure A.3): With 29.7 % it has the highest share of predictions which fall within the one percentage interval around the observed stay rate. Similarly it has the highest percentage of correctly predicted zero stay rates (29.5 %). Further diagnostics (right column in Figure A.3) reveal it is the only estimation approach generating predictions within the area of support, i.e. between zero and one. Due to these findings, the preferred non-linear estimation method for the remainder of this paper is the binomial model (with a loglog link function).[15] In case of more complex specifications, introducing a variety of interactions or fixed effects, I may resort to OLS in order to retrieve general patterns.[16] In these cases, however, obtained coefficient estimates should be interpreted more as an indication of the actual effect size.

How sensitive are the baseline results from the gravity specification with respect to the derivation of the stay rate? Table A.2 (Panel A) contrasts the average marginal effects, based on the binomial model (with loglog link), for the three different derivation methods. For those stay rates where the population of potential stayers, i.e. the denominator, is based on one to three year lagged education permits issued (SR^{II}) or the average thereof (SR^{III}), the results are highly similar: both average marginal effects and standard errors are stable, and not much affected by different sample sizes. This, in turn, lends confidence to the claim that the stay rate derivation method relying on the demographic equality (SR^{I}) is not only conceptually more plausible, and imposing fewer additional assumptions, but also efficient in terms of providing quantitatively robust results.

[15] The binomial model also outperforms the alternatives for the sample of positive stay rates (cf. Figure A.5). For the preceding stage, i.e. the estimation of binary stay rates $I(SR)$, classification errors (with a threshold of 0.5) are much smaller for the Probit model compared to OLS (cf. Figure A.4).

[16] Maximization procedures of non-linear estimation approaches tend to run into convergence issues for higher numbers of parameters.

4.3 Migration environment

Some important determinants of staying behaviour of internationally mobile students and graduates, as indicated by the gravity model results, are set in stone. Neither politics nor societies can influence these any longer. Yet when choosing whether to stay or not, potential stayers may also factor in trends, such as how open a potential country of residence was towards internationally mobile individuals in recent years. If a decision-maker assumes a relatively stable political climate, they may consider past immigration policies to be good predictors of future immigration policies, which would affect them if they choose to stay. Whilst technical details, such as more generous immigration legislation or support for migrants, may be somewhat obscure, populations of immigrants can be observed more readily. Eventually, recent trends pertaining to various groups of migrants may be informative in regards to what to expect from a potential country of residence.

Separating these recent trends reflecting openness towards migration from more contemporary, and less easily observable immigration policies can provide a more refined picture of what shapes the staying behaviour of international graduates.

4.3.1 Openness towards immigration

These recent trends will be incorporated via three different variables, each representing a different concept of openness towards immigration: A first measure relates to formal openness towards immigrants. This measure corresponds to the overall number of newly issued residence permits in a given year net those issued for education reasons.[17] The second accounts for all immigration (net domestic return migrants), indicating openness towards migrants who may require a residence permit but also those subject to free movement. The third measure indicates a country's openness towards individuals seeking protection and is quantified as the number of recognised refugees in a country.

To ensure that these migration trends could have been observed by the time someone considers to stay, these three variables enter after a log or inverse hyperbolic sine transformation in lagged form.[18]

Table 8 depicts the results for various permutations of these migration trends, mirroring a destination county's openness towards migrants. Columns 1 to 4 show the results for one migration trend at a time. The number of origin specific residence permits in the previous year displays an elasticity around one: If they were one percent higher the associated overall stay rate in the subsequent year would rise by one percentage point. No relationship can be observed for the overall number of issued permits or overall immigration numbers, also including free movement. Potential stayers seem to interpret a higher number of refugees in a destination country as a positive indication, as indicated by an elasticity of almost one.

A differentiation between the relative importance of these three concepts of openness to migration can be based on column 5, where all the non-origin-specific migration trends are included.[19] Observed stay rates

[17] Education permits are excluded; otherwise this measure would automatically be endogenous.

[18] This has the added benefit of reducing the risk of simultaneity bias where a potential stayer would also have been recorded in the headcount yielding one of the three migration trend variables.

[19] Aggregate destination level new permits have been used instead of origin specific numbers to retain the most comprehensive,

Table 3 – All reasons of staying: Recent migration trends

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
distance†	−0.0237***	−0.0138**	−0.0236***	−0.0236***	−0.0235***	−0.0236***	−0.0236***	−0.0237***
	(0.0056)	(0.0055)	(0.0057)	(0.0056)	(0.0057)	(0.0057)	(0.0056)	(0.0057)
pop (D)†	0.1248***	0.1449***	0.1464***	0.1729***	0.1930***	0.1839***	0.1813***	0.1500***
	(0.0415)	(0.0452)	(0.0431)	(0.0423)	(0.0437)	(0.0435)	(0.0427)	(0.0432)
pop (O)†	−0.0041	0.0113	−0.0037	−0.0003	−0.0002	−0.0007	0.0003	−0.0036
	(0.0237)	(0.0249)	(0.0241)	(0.0233)	(0.0238)	(0.0238)	(0.0233)	(0.0242)
language	0.0320***	0.0207***	0.0317***	0.0318***	0.0316***	0.0316***	0.0318***	0.0318***
	(0.0046)	(0.0049)	(0.0046)	(0.0046)	(0.0046)	(0.0046)	(0.0046)	(0.0046)
col. rel.	0.0555***	0.0467***	0.0562***	0.0552***	0.0564***	0.0562***	0.0554***	0.0564***
	(0.0071)	(0.0068)	(0.0072)	(0.0071)	(0.0072)	(0.0072)	(0.0071)	(0.0072)
mig. stock†	0.0048***	0.0016**	0.0048***	0.0049***	0.0048***	0.0048***	0.0049***	0.0048***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
new permits (t-1)†	0.0024				0.0068**		0.0047*	0.0030
	(0.0025)				(0.0029)		(0.0025)	(0.0029)
new permits (t-1,DO)†		0.0101***						
		(0.0010)						
immigration (t-1)†			−0.0005		−0.0056	−0.0024		−0.0017
			(0.0030)		(0.0034)	(0.0030)		(0.0034)
refugee pop. (t-1)†				0.0098***	0.0105***	0.0084***	0.0110***	
				(0.0023)	(0.0024)	(0.0023)	(0.0023)	
Observations	39.675	37.688	39.162	39.806	39.031	39.162	39.675	39.031

*** p<0.01, ** p<0.05, * p<0.1

Note: † indicates variables which entered after a log or inverse hyperbole sine transformation. New permits refer to the overall number of residence permits issued minus those for education purposes. All specifications include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

reveal a distinct sensitivity with respect to openness to refugee populations and migrants who require a formal residence permit. Potential stayers seem to pay attention to the conditions for those types of migrants who require some form of approved legal status, be it recognition as refugee or as permanent resident outside the European free movement - the latter being included in the immigration trend variable displaying an insignificant effect estimate.

Turning to employment stayers, this picture partly changes: Openness to refugees is not associated to employment stay rates. Higher degrees of openness towards migrants requiring residence permits display a positive marginal effect. Potential employment stayers from third countries may, however, refrain from competition with other migrants who potentially benefit from free movement arrangements and preferential employment rights: If overall immigration was one percent higher, employment stay rates are diminished by 0.6 percentage points.

These considerations do apparently not apply to potential family stayers. There is some evidence that they are more likely to stay in countries more open towards refugee populations. Though when differentiating between the three concepts, neither of them displays any predictive power.

4.3.2 Immigration policies

Potential stayers have been living in a destination country for some time, most of them for several years during their studies. Not only did they observe the host society's openness towards migrants but they may also have gained information on implemented immigration policies. Some of the information regarding these policies they may have obtained passively, e.g. from the news or exchange with peers. Other immigration policies might have a more direct impact on them, for instance if the procedures for renewing their permits has changed. Some

and thus representative sample.

policies may have resulted in lower transaction costs, others may have been more restrictive, i.e. costly both in terms of time spent on administrative procedures or fees. It would only be natural for any decision-maker to integrate such legal relaxation or tightening into their decision-making once they graduated. The impact of immigration policies is investigated in three settings: One quantifies how legal changes may reduce or increase the burdens various types of migrants face, a second one investigates the potential impact of restrictive border or residence regimes, and the third emphasizes policies aiming at migrants' integration and participation.

The influence of changing immigration policies is integrated using Determinants of International Migration (DEMIG) Policy data (DEMIG, 2015). This data provides information on the nature of policy changes pertaining to different groups of migrants across a variety of policy areas: each change is assessed whether it implies a change towards more or less restrictiveness. This information is then used to construct variables which indicate the overall number of policy changes, yielding either a relaxation or tightening, during the assumed three year duration of a study programme. Similarly I derived indicators for migrant sub-groups, depending on the policy's designated target: any migrant, irregular migrants or refugees, family migrants or skilled labour migrants. Whilst these measure provide direct insights into the effects of different policy measures they also come with a caveat. Since this data has only been compiled until 2014, the estimation sample is reduced by one half.

Table 4 – Influences of immigration policy changes: DEMIG

	$SR^{I,all}$				$SR^{I,emp}$	
	3y		5y		3y	
	(1)	(2)	(3)	(4)	(5)	(6)
relaxation (overall)	0.0014***		0.0017***		−0.0004	
	(0.0004)		(0.0005)		(0.0004)	
tightening (overall)	−0.0033***		−0.0015***		−0.0022***	
	(0.0006)		(0.0005)		(0.0005)	
relaxation (any migrant)		0.0002		−0.0024		0.0045***
		(0.0015)		(0.0017)		(0.0013)
tightening (any migrant)		−0.0126***		−0.0055***		−0.0066***
		(0.0016)		(0.0014)		(0.0013)
relaxation (irreg. & ref.)		0.0041***		0.0006		−0.0003
		(0.0013)		(0.0014)		(0.0011)
tightening (irreg. & ref.)		0.0003		0.0016		0.0000
		(0.0012)		(0.0010)		(0.0012)
relaxation (family migr.)		0.0050**		0.0079***		0.0018
		(0.0021)		(0.0020)		(0.0019)
tightening (family migr.)		−0.0060***		−0.0043**		−0.0011
		(0.0020)		(0.0018)		(0.0014)
relaxation (skilled LM)		0.0055***		0.0034**		−0.0031
		(0.0021)		(0.0016)		(0.0022)
tightening (skilled LM)		0.0015		−0.0226***		−0.0119***
		(0.0042)		(0.0056)		(0.0036)
N	15.158	15.158	15.158	15.158	12.660	12.660

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables and recent migration trends. Full set of year FE, as well as destination and origin FE are included. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

Acknowledging the sample size reduction, Table 4 documents the relevance of immigration policy changes in the context of retaining international graduates: For each additional relaxation over the previous three years, we can expect to observe bilateral stay rates to increase by 0.14 percentage points. Each additional restrictive policy would translate into a stay rate diminished by 0.33 percentage points. With an average of 7.8 relaxations

and 5.7 more restrictive policies per three year interval potential stayers demonstrate a considerable sensitivity with respect to such policy changes.

Differentiating by migrant group affected we can observe the strongest reaction to the broadest set of policy measures, i.e. those impacting on any migrant. In accordance with the previous findings on the relevance of a destination country's openness to refugee populations, policies easing the legal setting for irregular migrants or refugees do translate into higher stay rates. Employment stayers (Table 4, column 5), on the other hand, prove to be most susceptible to changes pertaining to skilled labour migrants: One additional restrictive immigration policy is associated with a stay rate decreased by 1.2 percentage points. This negative effect is almost twice the size of a more restrictive policy targeting any migrant.

To remedy the issue of a substantially reduced sample size, a second approach builds on the Migrant Integration Policy Index (MIPEX, Solano and Huddleston, 2020). Here, destination countries' migration related policies and laws in eight areas have been benchmarked on a scale from zero to 100 against what would amount to an outcome most suitable to migrants' successful integration.[20] Despite the constructed overall index covering the whole period of interest, not all areas have been assessed across the whole interval, and due to infrequent country assessments there is a lack of variation across time.

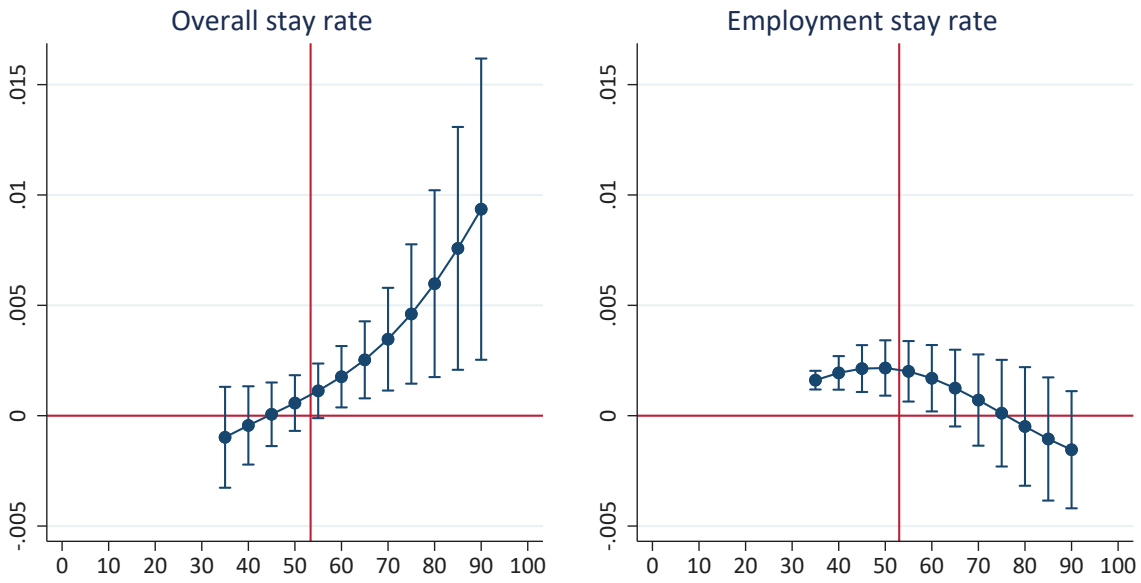
Given the fact that MIPEX indicators are bound between zero and one my preferred modelling strategy is to integrate a squared term of the indicator as well. This accounts for potentially diminishing returns to improving the design of integration policies for pre-existing higher integration standards.

With an estimated average marginal effect of 0.17 in case of the employment stay rate and 0.12 percentage points for the overall stay rate (Table A.4), the results from the larger sample support the findings from the above DEMIG-based policy change approach: Potential stayers are induced to actually stay if the integration setting is more favourable. Yet it is reasonable to assume there will be diminishing returns to further improving or facilitating integration offers once a certain standard has been achieved. This pertains especially to employment stayers, as demonstrated by Figure 5 which illustrates the estimated average effects of an incrementally higher score on the MIPEX overall indicator: For countries scoring above 2/3 of the maximum the returns to achieving even higher standards become insignificant. For the overall stay rate, on the other hand, the only significant effects (though less precisely estimated) can be observed for countries scoring above average (indicated by the vertical lines). They seem able to retain a higher share of international graduates, although this does not extend to those who are already ready to enter the labour market.

Lastly, I investigate to which extent potential stayers' decisions may be swayed by restrictive border or residence regimes. When deciding on whether to become a more permanent resident of a country, migrants may also evaluate how restrictive border enforcement is. If a potential stayer maintains their ties with their country of origin, and thus possibly plans on paying regular visits, re-entry conditions might be relevant. This will be integrated by the number of entry refusals, both on the destination and the destination-origin level. The latter

[20] The eight areas are: labour market mobility, family reunification, education, political participation, permanent residence, access to nationality, anti-discrimination, and health.

Figure 5 – The returns to migration integration policies (MIPEX based)



Note: The vertical line represent the mean of the MIPEX indicator. Average marginal effects are depicted over the area of support and obtained from a binomial model (loglog link) featuring the MIPEX overall indicator and its square. More detailed results can be found in Table A.4.

would account for border regimes differentiating by country of origin. Complementing this measure of entry restrictions, a further variable will reflect staying restrictions, i.e. the number of expulsions once the legally sanctioned duration of a stay has expired or a status revoked. Some destination countries may implement more lenient expulsion policies, such as not losing the permission to stay too quickly after a job loss. Depending on how strictly a destination country enforces these policies, the overall number of expulsions could be indicative of a substantial degree of uncertainty related to future status changes. This, in turn, would make staying more risky and costly.

Displayed average marginal effects in Table 5 suggest that, once the restrictiveness of border or residence regimes is accounted for on the destination-origin level, this form of practised immigration policy does not enter potential stayers decision-making process: Even if the share of individuals from one country of origin refused entry or expelled increases in comparison with the overall headcount of refusals or expulsions (relative refusals / expulsions) there is no diminishing effect on the stay rate to be observed. The same holds in case of the measure reflecting an over-proportionate likelihood to be refused at entry or expelled, relative to the population of migrants with non-education permits from a given country of origin. Both of these uncertainty measures do not carry any explanatory power. Within the selective group of international graduates this form of uncertainty does play a crucial role in choosing their future country of residence.

Table 5 – Border and residence regimes: Entry refusals and expulsions

	$SR^{I,all}$				$SR^{I,emp}$		$SR^{I,fam}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
entry refusals (D)†	0.0060***							
	(0.0021)							
expulsions (D)†	0.0108***							
	(0.0020)							
entry refusals (DO)†		−0.0004						
		(0.0008)						
expulsions (DO)†		0.0012*						
		(0.0007)						
rel. refusals (DO)			−0.0320		−0.0090		−0.0111	
			(0.0224)		(0.0154)		(0.0118)	
rel. expulsions (DO)			0.0059		0.0067		−0.0236	
			(0.0429)		(0.0291)		(0.0214)	
overprop. refusals (DO)				−0.0007		0.0003		0.0003
				(0.0028)		(0.0019)		(0.0015)
overprop. expulsions (DO)				0.0019		0.0020		−0.0009
				(0.0030)		(0.0021)		(0.0017)
N	36.912	36.918	36.918	29.735	34.303	28.157	33.018	27.286

*** p<0.01, ** p<0.05, * p<0.1

Note: † indicates variables which entered after an inverse hyperbole sine transformation. For the relative measure the respective statistic has been divided by the over number of entry refusals or expulsions. The indicator for over-proportionate exposure is one whenever the relative exposure measure is larger than the origin specific share of non-education permit holders. All specifications feature the complete set of gravity variables and recent migration trends. Full set of year FE, as well as destination and origin FE are included. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

4.4 Attraction differentials of institutional settings

What determines a country's retention potential with respect to international graduates beyond the migration environment? To evaluate further economic and institutional determinants, the subsequent modelling approaches draw upon attraction differentials. This allows to evaluate a destination country's attractiveness for potential stayers from a specific country of origin and could vary depending on whether the destination country outperforms the origin country in a domain or not.

4.4.1 Governance differentials

The selection of a place of residence and employment will inevitably be based on an evaluation of current and future prospects. These prospects are plausibly affected by institutional settings (Nifo and Vecchione, 2014), which may positively affect both personal but also economic opportunities. A reliable legal framework, for instance, is the foundation for prospering economies. Personal freedoms and participation, guaranteed by law and upheld by independent judiciary systems, are an essential feature of personal development perspectives.

Ultimately, both economic and personal prospects are influenced by legislative procedures, administrative implementations, and thus by a country's governance. To assess the potential impact of differences in governance on international graduates' staying behaviour I use data from the World Governance Indicator database (WGI, Kaufmann *et al.*, 2010), which provides yearly updated information on up to 214 countries' performance in one of the following six domains: control of corruption, government effectiveness, political stability, regulatory quality, rule of law, voice and accountability. In addition to the scores the data also provides standard errors, which allow to derive confidence intervals. These can be used to classify destination-origin country pairs into different categories: pairs where the destination country outperforms the origin country (the lower bound of

the destination country is above an origin country's upper bound, and those where the European destination country does perform similarly (indicated by overlapping 90% confidence intervals) or worse.[21]

In order to separate the effects of pre-existing stronger economic performance from governance effects, which may foster the development of future economic prospects, all governance specifications are based on an extended gravity-style model, introducing GDP per capita controls on both the destination and origin country level.

Table 6 – Governance indicators

	$SR^{I,all}$		$SR^{I,emp}$		$SR^{I,fam}$	
	(1)	(2)	(3)	(4)	(5)	(6)
corruption control	−0.0032	−0.0047	−0.0021	−0.0024	0.0023	0.0017
	(0.0047)	(0.0047)	(0.0039)	(0.0037)	(0.0028)	(0.0028)
government effect.	−0.0014	−0.0008	−0.0036	−0.0043	−0.0018	−0.0007
	(0.0044)	(0.0044)	(0.0037)	(0.0037)	(0.0029)	(0.0028)
pol stability	0.0002	0.0007	−0.0022	−0.0020	0.0023	0.0029
	(0.0034)	(0.0033)	(0.0026)	(0.0024)	(0.0019)	(0.0018)
rule of law	0.0068	0.0052	0.0058	0.0045	0.0003	−0.0002
	(0.0054)	(0.0054)	(0.0043)	(0.0042)	(0.0033)	(0.0033)
regulatory quality	0.0083*	0.0058	0.0095***	0.0074**	0.0009	0.0012
	(0.0046)	(0.0046)	(0.0035)	(0.0035)	(0.0028)	(0.0027)
voice and accountab.	−0.0047	−0.0041	0.0000	0.0007	−0.0021	−0.0020
	(0.0054)	(0.0054)	(0.0043)	(0.0042)	(0.0033)	(0.0034)
N	34.082	35.009	31.769	32.752	30.185	31.282
GDP controls	yes	yes	yes	yes	yes	yes
MIPEX	yes	no	yes	no	yes	no
Pract. imm. pol.	no	yes	no	yes	no	yes

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables and include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

The results of the governance specifications, including GDP and migration environment controls, indicate a limited sensitivity of stayers' choices with respect to the governance domains. The only robust association emerges for employment stayers and *regulatory quality*. This results is in so far plausible as this dimension reflects perceptions on implemented policies to support private sector development, such as the ease of starting a business or the existence of bureaucratic hurdles.[22] If a destination country clearly outperforms an origin country the observed bilateral stay rate is 0.74 to 0.95 percentage points higher.

These results have to be seen in light of the aggregated nature of the governance indicators integrating a variety of different concepts. Whilst some of these concepts might be relevant for potential stayers, others may be irrelevant. This would, eventually, translate into a lower degree of precision in the estimate when using the aggregate indicator. Alternatively, high scores in some underlying governance concept may sway a graduate in favour of staying whereas another may be perceived as conflicting attractor. A potential stayer may perceive a high level of fairness of judicial processes as appealing. Yet, at the same time, a high speediness of judicial processes could be perceived as contradictory, depending on the procedures a potential stayer is used to from their country of origin. This calls for a more differentiated evaluation of the institutional setting, going beyond six broad indicators.

[21] Alternative classification schemes, e.g. with three categories or 95% confidence intervals, have been explored as well. Neither of those specifications produced any stronger results than the subsequently presented ones.

[22] This dimension is also a good example why not too include both WGI and GCI indicators at the same time. Pillar 6 of the GCI is based on almost identical concepts, e.g. the number of days or required procedures to start a business.

4.4.2 Competitiveness differentials

Whereas the general issue of aggregation also applies to the Global Competitiveness Index (GCI, Schwab, 2014), this index features 12 different indicators. Some of them display a high degree of conceptual overlap with the WGI, e.g. Pillar 6: Goods market efficiency, which focuses on government imposed legislation and (trade) policies. Pillars 11 and 12, in contrast, represent the inherent capabilities of the private sector to drive economic development and increase competitiveness. Both could be perceived as attractive to potential stayers looking for labour markets in a promising economic setting.

Three caveats have to be considered: The GCI provides a less comprehensive country coverage, i.e. fewer attraction differentials can be derived on the destination-origin country level. Second, due to a methodological change affecting the construction of several pillars the GCI scores up to 2018 are no longer directly comparable to the values from 2019 onward. This also pertains to the overall GCI as from 2019 it is only available as a country ranking without providing the underlying scores. As a consequence, the maximum sample size using the more detailed consistent GCI pillars from 2009-2018 shrinks to 23,120. Using the aggregate rank-based GCI, including 2019 data, increases the sample only modestly to 25,465. Third, the base years of some components used in the creation of the GCI pillars typically refer to the previous year. This is rather unproblematic, and in line with previous modelling approaches, since it gives a lag interpretation to the estimation results. For some underlying measures, however, the base years vary further such that not all indicator components are consistently updated on a regular basis. This limits the overall degree of precision with which any relation between competitive institutional settings and stay rates can be estimated.

Attraction differentials for the score-based indicators are integrated as binary variables, which are one when the score difference between a destination and origin country is at least one standard deviation above the yearly mean of all scores. This can then be interpreted as the destination country distinctly outperforming an origin country in a given pillar. For the aggregate overall indicator covering all years, the derived destination-origin pair indicator is one if the destination country's rank is at least 30 ranks above (smaller in numerical terms than) the origin country's rank. This distance corresponds to one fifth of the maximum rank difference.

In terms of the overall competitiveness, the score-based indicator points to a certain responsiveness amongst the general population of potential stayers and family stayers: If the destination country distinctly outperforms an origin country observed stay rates are 1 percentage points higher for the latter and 1.8 percentage points for the former. The extended time series of the rank-based overall GCI indicator does not point to any association between competitiveness and stay rates.[23] Turning to the specifications introducing pillar specific relative country performance, it is only *Pillar 10: Market size* which is associated with somewhat higher stay rates. This result emerges despite the inclusion of GDP per capita controls. Eventually it points once again to the relevance of sub-dimensions of aggregate indicators, since pillar 10 draws in addition to domestic market size heavily on export related variables, such as export as a share of GDP and the value of exported goods. More

[23] Other thresholds for rank differences have been applied without generating notably different results.

Table 7 – Governance indicators

	$SR^{I,all}$			$SR^{I,emp}$			$SR^{I,fam}$		
	Score D > O	Rank D < O	Score D > O	Score D > O	Rank D < O	Score D > O	Score D > O	Rank D < O	Score D > O
Overall	0.0181***	−0.0052		0.0062*	−0.0045		0.0101***	−0.0028	
	(0.0047)	(0.0042)		(0.0034)	(0.0033)		(0.0027)	(0.0024)	
P1: Institutions			0.0021			−0.0025			0.0012
			(0.0050)			(0.0032)			(0.0027)
P2: Infrastructure			0.0072			0.0063*			−0.0013
			(0.0046)			(0.0033)			(0.0024)
P3: Macro env.			0.0049			0.0034			0.0013
			(0.0041)			(0.0031)			(0.0024)
P4: Health			0.0037			−0.0020			0.0038
			(0.0065)			(0.0047)			(0.0039)
P5: Higher educ.			−0.0038			0.0004			0.0021
			(0.0048)			(0.0038)			(0.0029)
P6: Goods market			−0.0084*			0.0010			−0.0056**
			(0.0044)			(0.0034)			(0.0023)
P7: Labour market			0.0026			0.0008			−0.0035
			(0.0045)			(0.0033)			(0.0025)
P8: Financial market			0.0070			0.0061*			−0.0012
			(0.0045)			(0.0034)			(0.0023)
P9: Tech. readiness			0.0067			0.0027			0.0036
			(0.0048)			(0.0035)			(0.0028)
P10: Market size			0.0223***			0.0112***			0.0151***
			(0.0050)			(0.0036)			(0.0030)
P11: Bus. sophist.			0.0114**			0.0001			0.0038
			(0.0049)			(0.0035)			(0.0026)
P12: Innovation			0.0040			−0.0010			0.0042
			(0.0053)			(0.0036)			(0.0029)
N	23,120	25,465	23,120	21,648	24,015	21,648	20,994	23,306	20,994
years	09-18	09-19	09-18	09-18	09-19	09-18	09-18	09-19	09-18

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables, migration environment variables, and GDP per capita controls. All specifications feature the complete set of gravity variables and include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

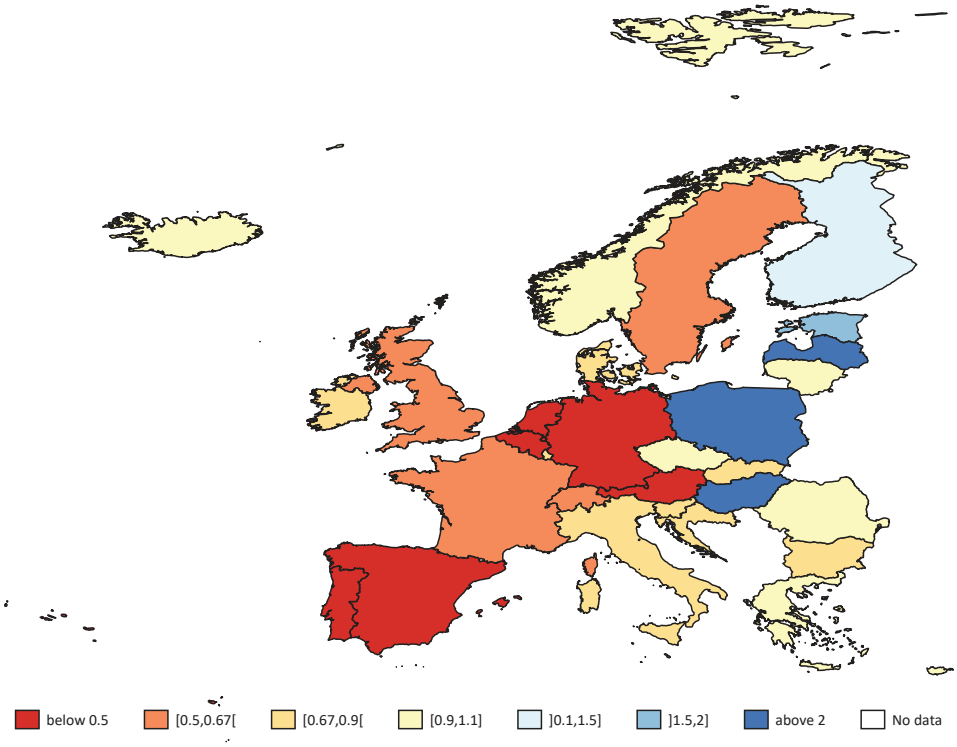
export oriented economies will have stronger ties with origin countries. Hence, potential stayers from these countries could perceive a higher degree of familiarity or attachment regarding these country whose products they may have consumed at home. In order to support this conjecture, however, the various sub-dimensions of the indicators would have to be disentangled.

4.5 Changing political landscapes

How sensitive are potential stayers with respect to political dynamics, possibly related to attitudes towards migrants, in their chosen country of study? To answer this question a measure is required which adequately reflects political changes across countries and time. The measurement has to be representative of the underlying political dynamics, comparable across European destination countries and occur rather frequently, so a yearly measure can be derived.

The Eurobarometer (cf. European Commission, 2020), a representative survey conducted since 1973 in an increasing number of European countries, features a number of items relating to respondents' preferences, perceptions and attitudes. One of these questions pertains to the self-assessed political preferences and has been implemented in almost all waves and countries. It asks respondents to locate themselves in the political

Figure 6 – Ratio of extreme placements: Right vs Left (2009-2019 averages)



spectrum using a scale from one (left) to ten (right).[24] From 2009 to 2019, there are 59 waves featuring this specific item on respondents' political placement.

Using the interview month, I construct for each country four yearly measures which reflect the overall political preferences of its citizens: (i) an indicator of the median respondent (voter) being in the right half of the scale, (ii) the share of respondents locating themselves clearly on the right (more than one standard deviation above the mean),[25] (iii) the ratio of respondents taking extreme positions on the right end (nine or ten) over those at the left end (one or two) of the scale, and (iv) a categorical variable indicating whether these extreme positions are relatively balanced (ratio between 0.9 and 1.1) or somewhat favouring one or the other extreme end of the political spectrum.

Relative dominance of extreme placements, either on the right or left spectrum, are represented in Figure 6, aggregated over the whole time horizon. In countries depicted in a red hue, the supporters of the left are more numerous than those of the right; the opposite applies for those illustrated in blue. There is substantial variation in terms of political preferences across countries, but also within a destination country over time. This variation will be exploited to investigate the influence of changing political landscapes on international graduates' decision-making.

In order to ensure that the derived conclusions are based on a sample as representative of the diverse population of internationally mobile students in the EU as possible, the preferred model specifications do not

[24]The full text of question D1 reads as follows: "In political matters people talk of 'the left' and 'the right'. How would you place your views on this scale?"

[25]Due to the integer scale the shares of respondents being classified as being on the right or left do not have to be symmetric. This measure can also be interpreted as an indication of the strength, respectively weakness, of the political centre.

include the WGI or GCI indicators. This avoids, especially in case of the GCI, drawing inference based on a sample discarding a large share of bilateral stay rates. As Table A.6 showcases, the exclusion of these proxies for destination countries' institutional setting does not materially alter the estimation results for the factors from the gravity or migration environment specifications. For this reason, changing political landscapes are investigated by augmenting the migration environment specifications by the respective political dynamics (PD) variables.[26]

Table 8 – Political preferences in destination countries - any stayers

Dep. var.	$I(SR^{I,all})$	$SR^{I,all}$			$I(SR^{I,all})$	$SR^{I,all}$		
Est.	OLS	OLS	Poisson	Bin (loglog)	OLS	OLS	Poisson	Bin (loglog)
median (right)	−0.0087	−0.0215***	−0.0172***	−0.0152***	0.0002	−0.0168***	−0.0185***	−0.0140***
	(0.0066)	(0.0040)	(0.0041)	(0.0036)	(0.0064)	(0.0040)	(0.0039)	(0.0035)
share (right)	−0.2313***	−0.1151***	−0.1153***	−0.1186***	−0.1288**	−0.0901***	−0.1372***	−0.1130***
	(0.0584)	(0.0292)	(0.0313)	(0.0331)	(0.0583)	(0.0295)	(0.0312)	(0.0323)
ratio (right / left)	0.0135**	−0.0048	0.0032	−0.0018	0.0310***	0.0041	0.0060	0.0048
	(0.0062)	(0.0034)	(0.0043)	(0.0037)	(0.0061)	(0.0035)	(0.0039)	(0.0034)
L >>R	−0.0037	−0.0294***	−0.0299***	−0.0223***	0.0020	−0.0305***	−0.0298***	−0.0230***
	(0.0088)	(0.0043)	(0.0055)	(0.0048)	(0.0087)	(0.0042)	(0.0054)	(0.0045)
L >R	−0.0208***	−0.0134***	−0.0241***	−0.0167***	−0.0282***	−0.0188***	−0.0308***	−0.0222***
	(0.0054)	(0.0030)	(0.0047)	(0.0037)	(0.0053)	(0.0029)	(0.0045)	(0.0035)
R >L	−0.0246***	−0.0176***	−0.0146***	−0.0132***	−0.0083	−0.0092**	−0.0057	−0.0046
	(0.0070)	(0.0040)	(0.0048)	(0.0041)	(0.0066)	(0.0038)	(0.0048)	(0.0040)
R >>L	−0.0355***	−0.0480***	−0.0423***	−0.0384***	−0.0094	−0.0348***	−0.0378***	−0.0295***
	(0.0116)	(0.0066)	(0.0063)	(0.0056)	(0.0114)	(0.0068)	(0.0063)	(0.0057)
N (all models)	35,744	35,744	35,744	35,744	37,214	37,214	37,214	37,214
Migr. env.	yes	yes	yes	yes	no	no	no	no

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables and include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Results for Poisson and Binomial (loglog) estimations are reported as average marginal effects.

Table 8 showcases the results for these four alternative political dynamics variables originating from different estimation methods or specifications; the last three columns investigate the influence of political landscapes in basic gravity-type specifications. Remarkably, estimates from OLS are highly comparable to derived average marginal effects from Poisson or Binomial estimation methods.

If the median respondent locates themselves on the right half of the political spectrum, overall stay rates are diminished by 1.5 to 2.2 percentage points in the migration environment specifications and by 1.4 to 1.9 percentage points in the gravity-specification. A similar picture emerges if we focus on the share leaning distinctly to the right: if share (right) increases by one percentage point the associated overall stay rate declines by approximately 0.09 to 0.12 percentage points.[27]

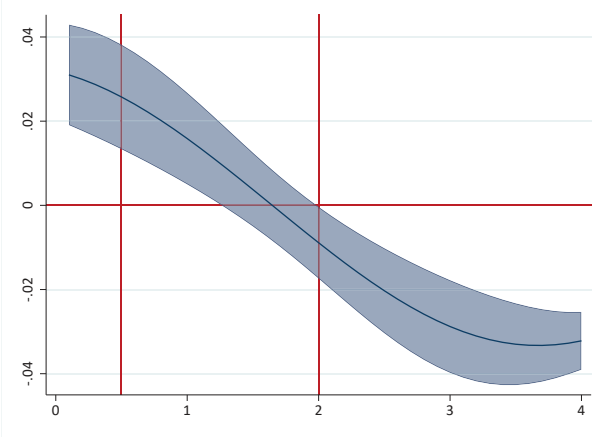
The ratio of right versus left supporters, indicating the dominance of one part of the political spectrum over the other, seems to lack any explanatory power. Any monotonous increase of the relative dominance of right-spectrum supporters does not translate into stay rate changes. However, this might be a premature conclusion. There seem to be non-linear effects, as indicated by the highly significant results for the categorical political

[26]Reported results draw upon the border and residence regime specification. PD estimates are rather invariant in case of a MIPEX specification. The latter, however, would result in a somewhat smaller sample.

[27]Reported average effects refer to a change by one unit. Since the explanatory variable is bounded between zero and one, i.e. zero and 100 percent, the incremental percentage changes can be approximated.

dominance variable: Compared to countries and years with a relatively balanced political climate, i.e. the ratio is between 0.9 and 1.1, both increasing dominance of left and right supporters is associated with a decreasing overall stay rate. If the ratio is above two, i.e. supporters of the right spectrum outnumber those of the left 2:1, stay rates are ca. 3 to 4.8 percentage points reduced compared to a balanced political climate. In the reversed case, i.e. when support for the left outnumbers the right 2:1 (ratio smaller than 0.5) the adverse effect on stay rates amounts to only 2.3 to 3 percentage points. This suggest that whilst potential stayers do favour a rather balanced and moderate political climate they react more sensitively to an increasing dominance of the right spectrum.

Figure 7 – Overall stay rate: Ratio of right versus left positions in the political spectrum



Note: Average marginal effects of the ratio are depicted over the area of support and obtained from a binomial model (loglog link) featuring the ratio and its square.

A more refined picture can be obtained from Figure 7, which displays average marginal effects of an increasing dominance of right versus left supporters over the area of support.[28] For lower levels of the political rights' dominance, an increasing support for this end of the spectrum would still translate into increasing stay rates. This represents the preference for a more balanced political climate. Interestingly the turning point does not occur around one, but around 1.2 where the supporters of the political right already outnumber those of the left. A significant deterring effect emerges not until the supporters of the right outnumber those of the left 2:1.

Whereas the overall patterns of responsiveness with respect to the political climate can also be observed for employment stayers, their sensitivity is somewhat less pronounced. If the median respondents locate themselves on the right, observed stay rates are diminished by only 1 percentage point (1.5 to 2.2 percentage points in case of the overall stay rate). In a similar fashion, the deterring effects of increasing population shares favouring the right spectrum are only half the size as for the overall stay rate. International graduates staying for employment reasons thus seem to be less worried about their prospects in a possibly less migrant friendly political climate than the overall population of potential stayers. Having employment, the prerequisite for obtaining a work-related permit, seems to lower the perceived uncertainty, and thus the riskiness of staying in a destination country.

[28]Based on the findings for the categorical variable, non-linear dynamics of political dominance are modelled by integrating a square term of the ratio.

Table 9 – Political preferences in destination countries - employment stayers

Dep. var.	$I(SR^{I,emp})$	$SR^{I,emp}$			$I(SR^{I,emp})$	$SR^{I,emp}$		
Est.	OLS	OLS	Poisson	Bin (loglog)	OLS	OLS	Poisson	Bin (loglog)
median (right)	−0.0041	−0.0106***	−0.0097***	−0.0109***	0.0070	−0.0033	−0.0077**	−0.0075**
	(0.0069)	(0.0030)	(0.0036)	(0.0030)	(0.0067)	(0.0029)	(0.0036)	(0.0030)
share (right)	−0.1903***	−0.0327	−0.0694***	−0.0673***	−0.0790	0.0081	−0.0416*	−0.0356
	(0.0576)	(0.0218)	(0.0247)	(0.0250)	(0.0567)	(0.0218)	(0.0244)	(0.0245)
ratio (right / left)	0.0098	−0.0090***	−0.0081**	−0.0089***	0.0303***	0.0024	0.0030	0.0016
	(0.0063)	(0.0026)	(0.0036)	(0.0031)	(0.0060)	(0.0025)	(0.0033)	(0.0028)
L >>R	−0.0128	−0.0178***	−0.0206***	−0.0156***	−0.0132	−0.0219***	−0.0221***	−0.0173***
	(0.0090)	(0.0033)	(0.0051)	(0.0040)	(0.0087)	(0.0032)	(0.0049)	(0.0037)
L >R	−0.0310***	−0.0106***	−0.0202***	−0.0155***	−0.0365***	−0.0148***	−0.0234***	−0.0184***
	(0.0057)	(0.0025)	(0.0042)	(0.0031)	(0.0054)	(0.0024)	(0.0041)	(0.0029)
R >L	−0.0081	−0.0099***	−0.0140***	−0.0128***	0.0084	−0.0040	−0.0045	−0.0058*
	(0.0072)	(0.0031)	(0.0042)	(0.0034)	(0.0067)	(0.0030)	(0.0042)	(0.0033)
R >>L	0.0035	−0.0193***	−0.0204***	−0.0204***	0.0304**	−0.0040	−0.0080	−0.0078
	(0.0128)	(0.0051)	(0.0065)	(0.0050)	(0.0123)	(0.0050)	(0.0074)	(0.0053)
N (all models)	33,128	33,128	33,128	33,128	34,394	34,394	34,394	34,394
Migr. env.	yes	yes	yes	yes	no	no	no	no

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables and include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Results for Poisson and Binomial (loglog) estimations are reported as average marginal effects.

This argument can also be made in case of family stayers, whose responsiveness to increasing levels of support of the political right is even weaker than in case of employment stayers (Table A.5). Joining a family member, who achieved already a certain level of successful integration into a host country, is influenced less by political uncertainty and possibly more by personal considerations and familial preferences.

Summarising above findings, there is distinctive evidence in favour of a relatively strong responsiveness of overall and employment stayers regarding an increasing dominance of the political right around the time potential stayers make their choices. At the same time the number of stayers in some countries and years can be substantial, e.g. reach several tens of thousands. This increases the chance that this group of migrants becomes more visible and might lead to a shift in natives' political preferences. Eventually, this would correspond to a reversal of cause and effect and imply a serious empirical issue.

4.6 Stay rates in the presence of potentially endogeneous political preferences

Such a scenario, where political preferences are swayed by increasing numbers of internationally mobile students deciding to stay after graduation, would be a classical case of reverse causality. Consequentially, all the above results regarding the impact of concurrent political attitudes in staying behaviour would be biased. To remedy the emerging issue of the resulting attenuation bias I present subsequently results from instrumental variable (IV) estimations.

Another issue to be considered pertains to unobserved idiosyncrasies on the level of destination-origin country pairs. For historical reasons potential stayers from a specific country of origin could worry about increasing support for the right in one destination country but not in others. This would imply correlation between the political dynamics variables and unobserved factors on the destination-origin level. A simple solution to avoid

bias due to such idiosyncrasies is to implement destination-by-origin controls. Unfortunately, increasing the number of parameters to be estimated by 32 × 167 proves to be technically unfeasible in the context of the employed non-linear models.

To overcome this problem, and in contrast to the previous analyses, the subsequently discussed IV results refer solely to linear estimations. Whilst linear estimation methods may not ensure the smallest prediction error (cf. Figure A.3), they may still produce effect estimates which are surprisingly closely aligned with those originating from Poisson or Binomial (with loglog link) estimations (cf. the discussion in Section 4.5, as well as Table 8 and Table 9).

A more comprehensive comparison of effect estimates for various model specifications (gravity, migration environment, and attractiveness differentials) in Table A.6 further demonstrates the general robustness of effect estimates across different FE specifications: Estimates from the Binomial estimation with destination and origin FE are highly comparable to those from an OLS estimation with the identical FE specification. This also extends to the case when panel (destination by origin) FE are introduced to the OLS model. The obtained effect estimates for share of citizens leaning to the right spectrum ranges from -0.1066 (OLS with panel FE) over -0.1151 (OLS with destination and origin FE) to -0.1186 (Binomial with destination and origin FE). Ignoring idiosyncrasies on the destination-origin level may still affect estimates to a certain degree but a large proportion of unobserved variation on the destination and origin level can be absorbed by the more parsimonious FE specification.

This lends support to the argument that despite some shortcomings in the context of stay rates OLS (with suitable destination and origin cotrols) can be used to retrieve general patterns and approximations of effect strengths. An important consequence is that IV estimations for stay rates can be implemented in a linear setting, which avoids the mentioned issues in the context of nonlinear models.[29]

In order to implement an IV approach for potentially endogenous political preferences a suitable instrument has to be relevant, i.e. correlated with the potentially endogenous variable. Furthermore, it should only impact stay rates indirectly, i.e. by shifting political preferences, and can thus be excluded from the stay rate estimation equation.

The latter requirement precludes the usage of any policy measures pertaining to immigration, although these might be designed to accommodate changes in the political landscape. Any factors that could be perceived as attractive from potential stayers' perspectives are also out of the picture. In a broader sense, this exclusion restriction practically eliminates all salient factors which could be factored in during the considerations of a typical decision-maker.

What would be required is an instrument representing a concept which is neither public knowledge nor discussed in the media. At the same time it should be related to shifts in political preferences. Focusing on

[29]The author is aware of the existence of estimation routines for nonlinear IV models, e.g. ivpoisson in Stata. Depending on the parameterisation of the model, however, these tend to face convergence issues during maximisation, may not be valid for FE specifications or the requirement to obtain bootstrapped standard errors in a relatively large sample renders these approaches hardly feasible.

preference shifts indicating increasing or decreasing support for policies attributed to the right political spectrum points to a potential concept. Supporters of the right spectrum, those who may also take a more disapproving position towards immigrants, perceive migrants as cultural and economic threat (Lucassen and Lubbers, 2012). They are worried that migrants may displace them in the labour market or only migrate to claim some forms of social assistance. Interestingly, the perception of not been given in life what one deserves may give rise to both increasing worries about immigration and right-wing support (Poutvaara and Steinhardt, 2018). Eventually, these fears are also reflected in party platforms offering lower levels of social assistance in the presence of larger shares of low-skilled immigrants (Moriconi *et al.*, 2019). Natives fearing job losses may also be concerned about how an increasing number of recipients of social assistance might affect their own levels of assistance, if they cannot quickly re-position themselves within the active labour force. This points to a potential link between political preference dynamics and features of the social security system. The latter relates to the mitigation of economic uncertainty, an issue which has been found to have notable impact on political outcomes (Remmer, 1991; Bellucci, 2014; Ross and Rouse, 2015; Hernández and Kriesi, 2016).

Table 10 – IV and benchmark results - all stayers

	Destination & origin FE				Panel FE		
	Bin (loglog)	OLS	2SLS		OLS	2SLS	
			S2	S1		S2	S1
median (right)	−0.0140***	−0.0189***	−0.0806***		−0.0143***	−0.0600**	
	(0.0039)	(0.0040)	(0.0282)		(0.0038)	(0.0280)	
instrument				0.0367***			0.0359***
				(0.0025)			(0.0025)
KP-Chi2			208.85			207.40	
Endog.-Chi2			4.91			2.70	
P(Endog-Chi2)			0.0267			0.1001	
share (right)	−0.1050***	−0.0998***	−0.4844***		−0.0920***	−0.3521**	
	(0.0364)	(0.0307)	(0.1689)		(0.0307)	(0.1635)	
instrument				0.0061***			0.0061***
				(0.0002)			(0.0002)
KP-Chi2			665.43			664.77	
Endog.-Chi2			5.49			2.67	
P(Endog-Chi2)			0.0192			0.1023	
ratio (right / left)	−0.0095**	−0.0121***	−0.0583***		−0.0123***	−0.0428**	
	(0.0038)	(0.0035)	(0.0204)		(0.0034)	(0.0200)	
instrument				0.0507***			0.0503***
				(0.0035)			(0.0035)
KP-Chi2			210.65			208.42	
Endog.-Chi2			5.37			2.44	
P(Endog-Chi2)			0.0205			0.1183	
I (R >L)	−0.0014	−0.0047	−0.0301***		−0.0007	−0.0221**	
	(0.0035)	(0.0032)	(0.0105)		(0.0032)	(0.0103)	
instrument				0.0982***			0.0974***
				(0.0024)			(0.0024)
KP-Chi2			1666.05			1666.28	
Endog.-Chi2			6.03			4.41	
P(Endog-Chi2)			0.0140			0.0357	
N (all models)	31,461	31,461	31,461		31,461	31,461	

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables, migration environment controls, and include year FE. Standard errors are clustered on the destination-origin level. Results for Binomial (loglog) estimations are reported as average marginal effects.

Features of a relatively generous social security system, such as eligibility criteria or the size of social benefits, could theoretically be relevant for potential stayers' choices. Details around the basic design of social security systems are often communicated in the Media. Hence they would not satisfy the exclusion restriction. Less salient, but still occasionally communicated in the media are budgets of social security systems. A related, but more obscure statistic is the net funding position of social security funds. Whilst government deficits, both on the national and the local level, are frequently subject to public scrutiny the same does not apply to the net position of social security funds.

Net funding positions of social security funds could also be correlated with political preferences, therefore satisfying the relevance criterion: A perceived lack of social protection (ensuing from a weak funding position) could entice voters to choose more extreme options within the political spectrum. Any adjustments to social security benefits could sway voters preferences whilst having an impact on the system's net funding position.

Social security funds' net lending or borrowing data is available for all (former) EU countries, but Ireland and the UK. The underlying Eurostat definition of these funds stresses their dependence on political processes: they affect certain groups by *law or legislation* (no voluntary private insurance schemes) and are ultimately within the *government's sphere of responsibility* (Eurostat, 2016).

The results of the Two-Stage-Least-Squares IV estimations for the overall stay rate are documented in Table 10 (columns labeled 2SLS). In addition to the coefficient estimates from the second stage it also features results from the first stage, such as the instruments' estimates (indicating its relevance) and statistics to assess the first stage's validity.

Referring to the second stages' results from specifications with destination and origin fixed effects, a clear pattern emerges: All estimates are approximately four times as large compared to the OLS benchmark. If the median respondent locates themselves in the right half of the political spectrum the corresponding overall stay rates is reduced by 8.1 percentage points (OLS: -1.9 percentage points). The second panel suggest that if the share of distinctly right-leaning natives increases by one percentage point, we observe stay rates decline by 0.48 percentage points. In all four specifications the relevance of the instrument seems to be given, indicated by its significant estimate in the first stage and the results of the weak instrument test. The Kleibergen-Paap test statistics result in a clear rejection of the Null hypothesis of the instrument being weak.

In the specifications drawing upon panel fixed effects second stage estimates display a similar increase in absolute magnitude: If the median respondent is in the right half of the political spectrum the overall stay rate is decreased by 6 percentage points; in the OLS case this effect amounts to only -1.4 percentage points. Relative to the IV estimates based on the more parsimonious FE specification, those from the panel specification are slightly smaller.

IV results for employment stay rates are in line with those for the overall stay rate. The only difference is that the second stage estimates in employment stay rate models are less sensitive with respect to the fixed effect specification.

Two main findings emerge from this endogeneity analysis: Bias in the political dynamics estimates due to

unobserved variation on the destination-origin country pair level is apparently no issue in the estimation of employment stay rates and only introducing a modest level in case of the overall stay rate. This claim is further supported by the non-rejection of the endogeneity test's Null hypothesis for the panel FE specifications. Second, simultaneity or reverse causality of potential stayers' choices and natives' political preferences may lead to an underestimation of the severity of adverse effects induced by a worsening political climate. The existence of the underlying phenomenon, i.e. the sensitivity of internationally mobile students regarding political moods in their country of study, can be detected nevertheless.

5 Further sensitivity analyses

Bilateral stay rates for a number of destination-origin combinations are based on small case numbers, i.e. very small populations of potential stayers and status changers. In some cases the demographic equality may be violated. Contrasting the results for alternative stay rate derivation methods in the initial gravity-style analyses, the latter does not seem to be a problem in itself. At the same time, seemingly large stay rates changes for small potential stayer populations could coincide with political dynamics, and thus lead to spurious effects.

To investigate the influence of small potential stayer populations and top-coding adjustments related to the demographic equality, the political landscape specifications are re-estimated: Table 11 reports the results for the median voter and the support share variables. Columns 2 to 5 document the average marginal effects for various sample restrictions. Accounting for imprecisions in the demographic equality by excluding all (potentially) top-coded stay rates does not materially affect the results. The same applies to the sample drawing upon stay rates for the subset of destinations where the population of potential stayers (the denominator) comprises at least five individuals in a given year. In the sub-sample where this denominators comprises over the years on average at least five potential stayers we see the effect estimates increase in absolute terms. A similar observation can be made when restricting to country pairs where staying is not a rare event in general, i.e. we observe at least three stayers during one year. Clearly the sample composition is quite different, but still the existence of the underlying deterring effect of political dynamics can be retrieved. Ultimately, the above identified effects are not driven by destination-origin pairs displaying large variation due to small potential stayer populations.

Table 11 – Sample composition: Low incident cases

	(1)	(2)	(3)	(4)	(5)
median (right)	-0.0152^{***}	-0.0101^{***}	-0.0163^{***}	-0.0420^{***}	-0.0498^{***}
	(0.0036)	(0.0027)	(0.0045)	(0.0069)	(0.0084)
share (right)	-0.1186^{***}	-0.1065^{***}	-0.0929^{***}	-0.1952^{***}	-0.2444^{***}
	(0.0331)	(0.0230)	(0.0329)	(0.0507)	(0.0595)
N	35.744	35.283	19.359	13.851	12.683
Sample restr.	None	SR < 1	den. ≥ 5	mean den. ≥ 5	max stayers ≥ 3

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables, migration environment controls, destination and origin FE, and year FE. Standard errors are clustered on the destination-origin level. Results for Binomial (loglog) estimations are reported as average marginal effects.

Another not yet considered factor in the context of migration choices are hedonic motives, indicating the importance of natural amenities such as climate (Roback, 1982; Rappaport, 2007). University graduates display a particular sensitivity with respect to climates considered as unfavourable (Fan *et al.*, 2016). Considering that European destination countries attract a substantial number of students from Africa or Asia, climatic preferences may come into play as well in the context of subsequent staying behaviour. European countries feature relatively distinct climates with somewhat colder countries in the North and warmer ones around the Mediterranean. At the same time, this temperature divide coincides with cultural but also economic differences, such as strikingly different youth unemployment rates (cf. Dietrich and Möller, 2016). This could explain why destination and origin GDP per capita levels in an augmented gravity-specification did not display any explanatory power. Eventually, the omission of climatic conditions being correlated with economic factors may also impinge on estimates of political preferences.

Table 12 – Political preferences and the (economic) climate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
median (right)	−0.0240***	−0.0137***	−0.0220***	−0.0217***				
	(0.0039)	(0.0037)	(0.0035)	(0.0038)				
share (right)					−0.2277***	−0.1121***	−0.1840***	−0.2181***
					(0.0387)	(0.0338)	(0.0350)	(0.0390)
climate diff.	−0.0017**			−0.0016*	−0.0017**			−0.0015*
	(0.0008)			(0.0008)	(0.0008)			(0.0008)
GDP ratio (DO)		0.0008***	0.0010***	0.0009***		0.0008***	0.0010***	0.0009***
		(0.0003)	(0.0003)	(0.0003)		(0.0003)	(0.0003)	(0.0003)
90/10 ratio (D)			0.0003	0.0010			0.0001	−0.0004
			(0.0014)	(0.0015)			(0.0014)	(0.0015)
N	24.475	34.080	26.491	23.094	24.475	34.080	26.491	23.094

*** p<0.01, ** p<0.05, * p<0.1

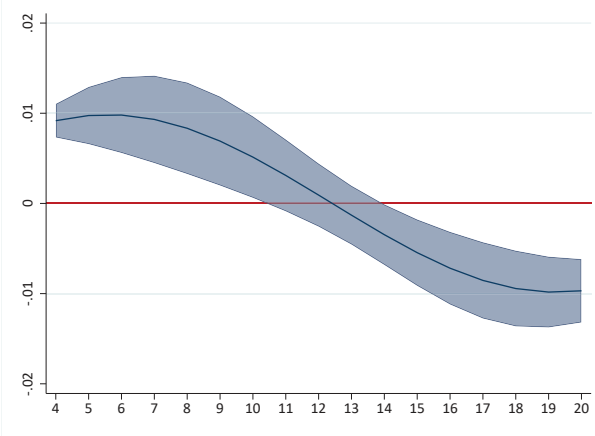
Note: All specifications feature the complete set of gravity variables, migration environment controls, destination and origin FE, and year FE. Standard errors are clustered on the destination-origin level. Results for Binomial (loglog) estimations are reported as average marginal effects.

Do stay rates vary across different (economic) climates and does this affect the estimates related to political preference dynamics? There is some evidence supporting the claim that climatic preferences also matter in the context of residence choices of internationally mobile graduates: The larger climatic differences, i.e. the larger the absolute difference between destination and origin in terms of months outside the moderate temperature interval, the smaller the observed stay rate.[30] If there is either one additional month outside the moderate temperature interval or one less, i.e. climate in the destination country deviates more strongly from the one in the origin country, stay rates are diminished by 0.15 to 0.17 percentage points.

Relative GDP per capita differentials bear explanatory power but do not alter the findings in regards to political preferences (cf. Table 11, column 1). If the GDP ratio increases by one unit, i.e. when GDP per capita in the destination was to double compared to the origin country, associated stay rates increase by ca. 0.1 percentage points. Accounting for inequality at the destination level (measured as the income ratio of the 90th and the 10th percentile) does not change the fundamental findings - although the political preferences estimate's size is

[30]The interval of moderate temperatures is defined by the base temperature for heating degree days (15.5 degree Celsius in Europe) and cooling degree days (22 degree Celsius). Outside temperatures within this interval do typically not require heating or cooling of interiors (cf. Eurostat, 2021) and could be perceived as moderate.

Figure 8 – Unequal economic climate: 90/10 income ratio



Note: The horizontal axis depicts the respective revel of the 90/10-ratio for which increases in this ration have been evaluated.

affected due to sample composition changes. At first glance, there is no interrelation between inequality and stay rates. Integrating non-linearities, and thus allowing for increasing or decreasing responsiveness depending on the level of inequality, shows why: At lower levels of inequality, an increase in the 90/10 income ratio is accompanied by stay rate increases (Figure 8). This is in line with the literature highlighting the relevance of skill price differentials attracting high-skilled labour (Bratsberg, 1995). For higher levels of inequality in the destination country, however, a deterring effect can be observed.

In the context of a potential instrument I briefly discussed the concept of salience to identify factors potentially relevant during the decision-making process. The following sensitivity analysis addresses the salience of (changing) political preferences. From an ex-post perspective, increasing levels of support for the right political spectrum are easily discern-able from the data. This may not necessarily be the case whilst these changes actually happen. To this end the subsequent analysis incorporates an additional measure on how salient such preferences might have been in a given year. This salience is represented by an indicator of parliamentary election years which tend to be characterises by frequent polling and intensive discussions in the media.

Table 13 – Salience of political preferences

	median (right)	share (right)
no election	-0.0112^{***}	-0.1522^{***}
	(0.0043)	(0.0364)
election year	-0.0202^{***}	-0.0191
	(0.0045)	(0.0493)
N	35,744	35,744

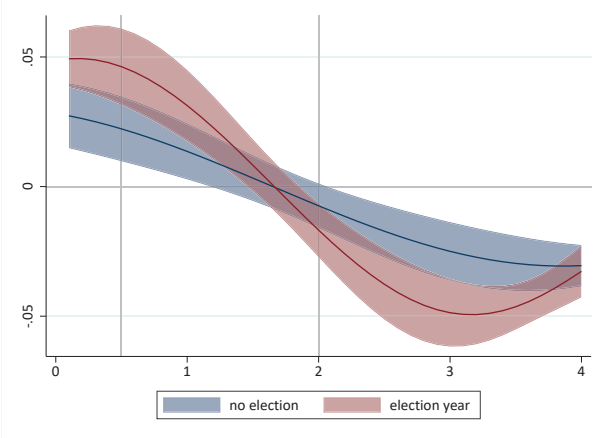
*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables, migration environment controls, destination and origin FE, and year FE. Standard errors are clustered on the destination-origin level.

Overall stay rates display a differential responsiveness with respect to the electoral cycle: Stay rates are diminished by 1.1 percentage points in years without parliamentary elections when the median voter's position is in the right half of the political spectrum (Table 13). In an election year the observed average marginal effect

estimate almost doubles to 2 percentage points. The share of support for the right spectrum does not indicate a similar salience effect in election years. Taking the relative dominance of more extreme political placements into account, the overall stay rate's sensitivity with respect to increasing relative support for the more extreme right spectrum is amplified in election years (Figure 9).

Figure 9 – Relative dominance of political positions in election years



Note: Average marginal effects of the ratio are depicted over the area of support and obtained from a binomial model (loglog link) featuring the ratio and its square.

Overall, and as indicated during the investigation of the migration environment, there is a wide range of plausible additional factors entering decision-making processes of potential stayers. Ultimately, and whilst they are insightful in their own right, they do neither eliminate nor weaken the findings pertaining to the relevance of natives' political preferences. The political climate in destination countries is one of the essential factors when it comes to the retention of internationally mobile graduates.

6 Conclusions

Related to recent immigration waves to Europe, the potential impact of an increasing migrant presence on political preferences of natives, and eventually electoral outcomes, has gained in importance. There is also accumulating evidence that political support for political parties traditionally labeled as left or right is increasingly influenced by preferences towards immigration (De Vries *et al.*, 2013; Harteveld *et al.*, 2017) and to a lesser degree by redistribution preferences. Little attention, however, is usually paid to how such a changing political climate may impact on migration choices of migrants.

Dire conditions in countries of origin and a lack of discretionary power where to settle in a destination country, for instance in case of refugees subject to allocated residences, may limit migrants' explicit or implicit choices in order to avoid relatively unfavourable destinations.

Such restrictions do typically not apply to potential high-skilled workers, such as internationally mobile students who finished their studies in a destination country. High levels of formal qualifications and valuable destination country specific human capital, acquired during their studies, make them potentially productive

members of a host country's labour force. Retaining them would prove beneficial to the destination country's economy. At the same time, this positively selected group of educational migrants has also more outside options. Consequently, a political climate which is perceived as somewhat hostile towards migrants could literally drive them out of the country, seeking greener pastures elsewhere. Eventually, a migrant-skeptical political climate might produce detrimental socioeconomic effects for an economy. Losing young, high-skilled and easy to integrate workers is especially problematic for European countries: Ageing populations and large birth cohorts entering retirement will put a strain on various industries, and especially on social security or health care systems, which rely on contributions (or taxes) paid by a shrinking labour force.

This research investigates how sensitive internationally mobile students and graduates are regarding pre-existing immigration and integration policies and how they react to a changing political climate in Europe. To answer these questions, aggregate staying behaviour of internationally mobile graduates in up to 28 European countries from almost 150 countries of origin has been examined.

Descriptive findings highlight that Europe has gained substantially in attractiveness: Over the last decade, and partly due to increasing levels of internationalisation of the higher education sector, virtually all countries hosted larger cohorts of internationally mobile students. Concomitantly, the share of those willing (and allowed) to stay has been hovering around 13 to 15 percent. Whilst this corresponds to an increase of stayers in absolute terms, Europe seems unable to boost its retention capability to benefit from the increased inflow of talent. Moreover, this retention capability is neither evenly distributed across European countries nor set in stone. The migration environment, influenced by past immigration and integration policies, and the present political climate potential stayers face are important determinants of their willingness to stay.

A first finding is that openness to other groups of migrants, not as positively selected as internationally mobile students, makes a country more appealing to potential stayers. Stay rates are significantly higher in destination countries displaying a more pronounced openness to vulnerable migrants, such as refugees. Past policies resulting in more leniency towards irregular migrants and refugees are appreciated in a similar manner as are policies targeted directly at the group of skilled migrants. Apparently the group of international graduates not only pays attention to their own prospects but factors in a host country's broader attitude towards migrants. Ultimately, seemingly targeted policies may have a broader, and possibly unintentional spillover effect on other groups of migrants as well.

Designing immigration and integration policies which satisfy migrants' and host societies' needs proves to be a challenge. Yet, at the same time migration policies do not have to be perfect: Whilst employment stayers do positively react to higher levels of more refined integration offers and participation opportunities, these policies come with decreasing returns. Improving migrant integration policies beyond a certain point, aiming for the perfect solution, does no longer translate into higher observed stay rates.

In addition to already implemented policies, another major influential factor of aggregate staying behaviour is the political landscape around the time potential stayers make their choice whether to stay or cut and run: If the median voter in a country is on the right half of the political spectrum the observed overall stay rates

are reduced by at least 1.5 percentage points. In relative terms this would correspond, on average, to a loss of almost one fifth of international graduates staying in the country. In election years, i.e. when political preferences become more salient and potentially heated political debates take place, this effect can amount to a drop of one fourth in the stayer cohort. Further results from IV estimations suggest that this loss could still be substantially higher.

For employment stayers, i.e. those who are ready to be immediately integrated into the labour market this effect amounts to 1.1 percentage points. Every sixth potential stayer would rather run instead of entering the labour market in their country of study.

In a broader sense, potential stayers display a notable preference for a balanced political environment, potentially also representing stability. Increasing support for the more extreme ends of the political spectrum, implying rising levels of political polarisation or a weakening of the political centre, is also associated with diminishing stay rates. Interestingly, potential stayers are still willing to hold out in countries where the political right is somewhat dominant. Up to the point where supporters of the right end of the political spectrum outnumber their counterparts 2:1, stay rates remain largely stable. Beyond this point, stay rates decrease by 3.8 percentage points, implying a collapse of 47% in terms of the overall number of stayers. Whilst overly dominant support for the left end of the political spectrum is also deterring students from staying, the effect is less pronounced.

These findings imply an interesting demographic conundrum: One the one hand, well educated and positively selected immigrants react adversely to right shifts on the political spectrum. Older voters, on the other hand, tend to be more likely to vote (economically) conservative (Tilley and Evans, 2014; Chrisp and Pearce, 2019) in line with preserving their accumulated life-time wealth . At the same time, parties offering conservative economic policies may also vocalise a tougher stance on immigration. How, then, can Europe succeed in retaining larger shares of internationally mobile graduates in the presence of ageing populations?

Eventually, these findings may even have further reaching implications. Assuming international graduate stayers are somewhat representative for skilled migrants considering to migrate in the first place, political imbalances and shifts toward the right end of the political spectrum could be rather costly for European countries.

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Appendix

Figure A.1 – Employment stay rate for all origins, by destination country (2009-2019)

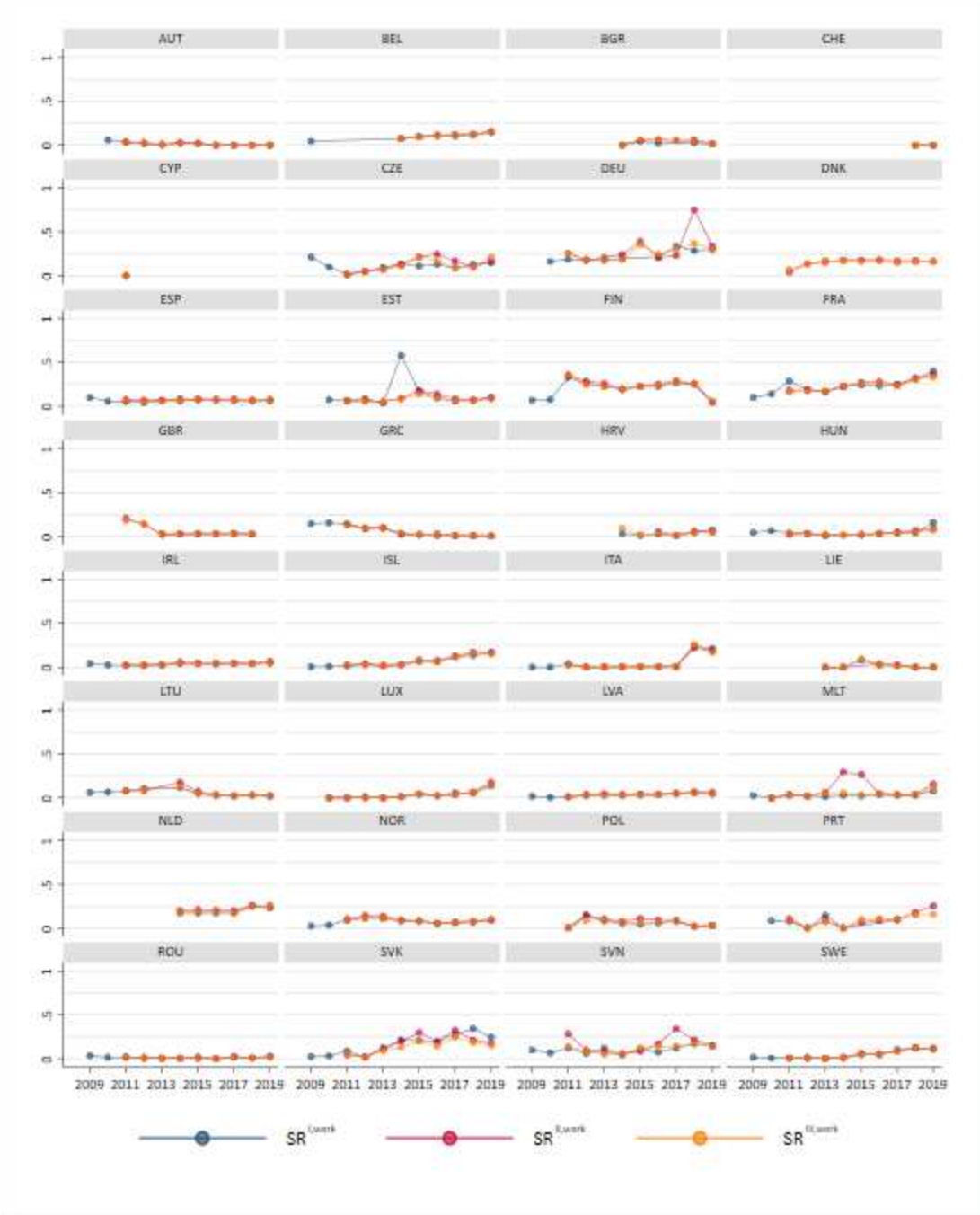
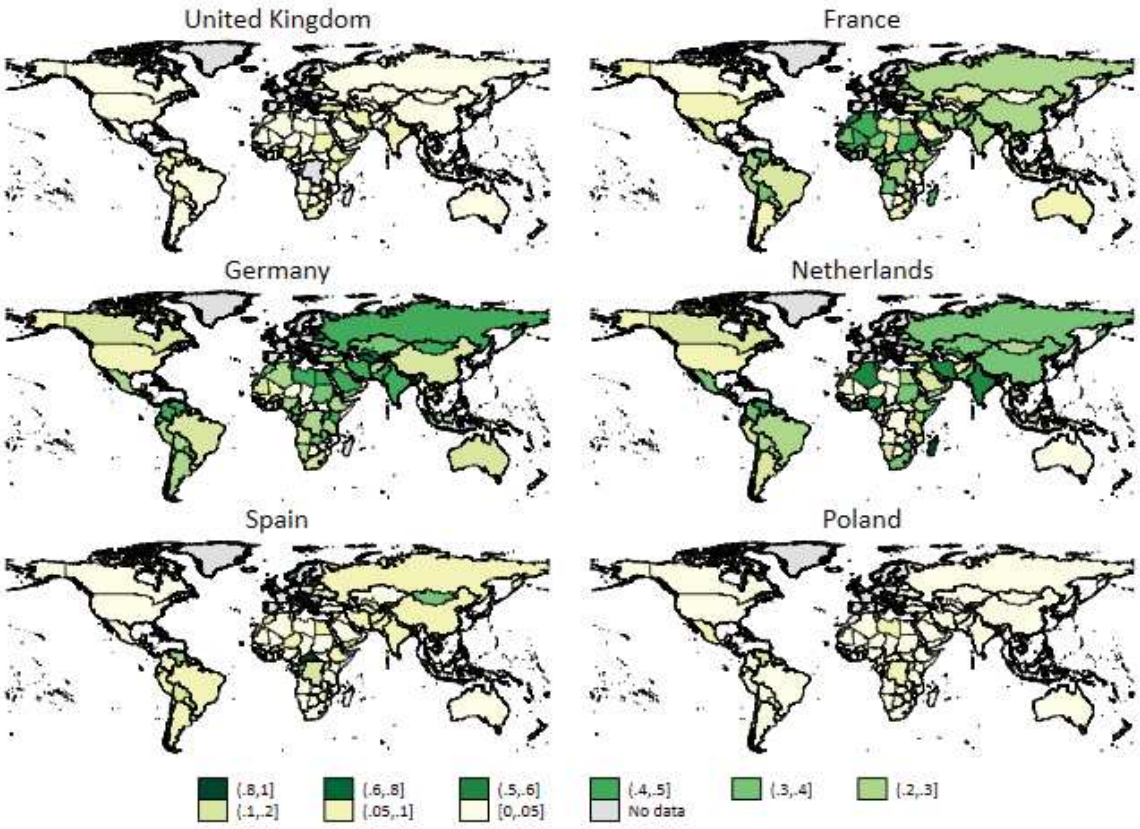
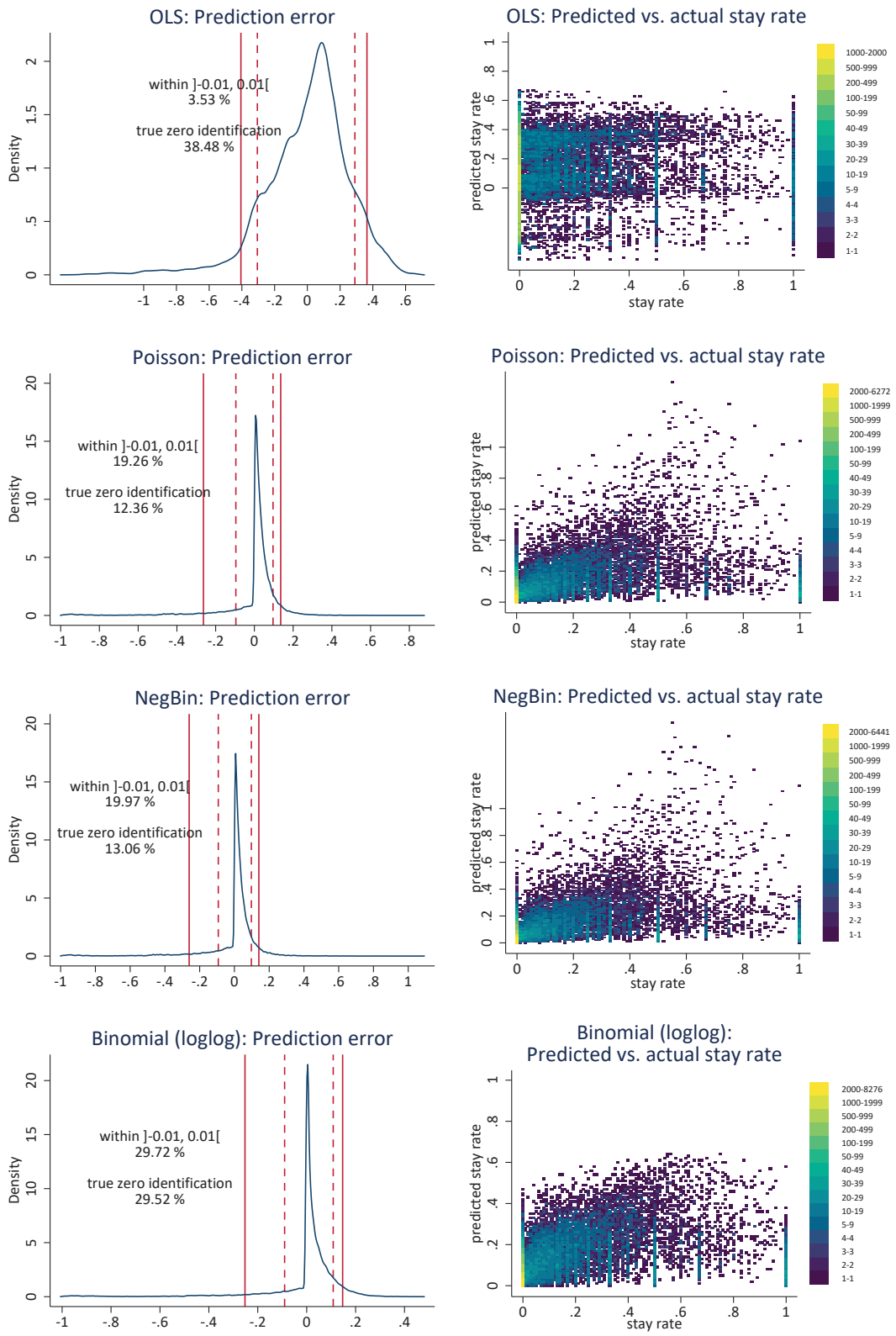


Figure A.2 – Origin-specific employment stay rates for Top-6 destinations (2018)



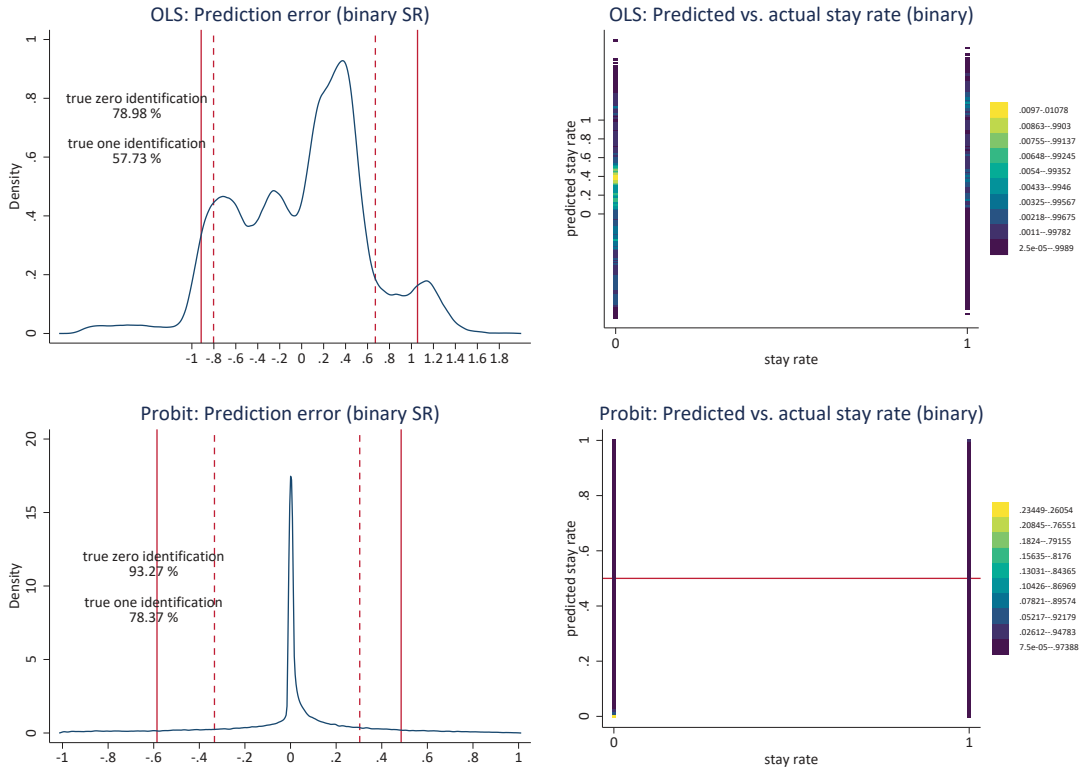
Note: Depicted stay rates are based on the demographic equality approach to infer the population of potential graduates.

Figure A.3 – Benchmark model comparison: Prediction errors ($SR^{I,all}$)



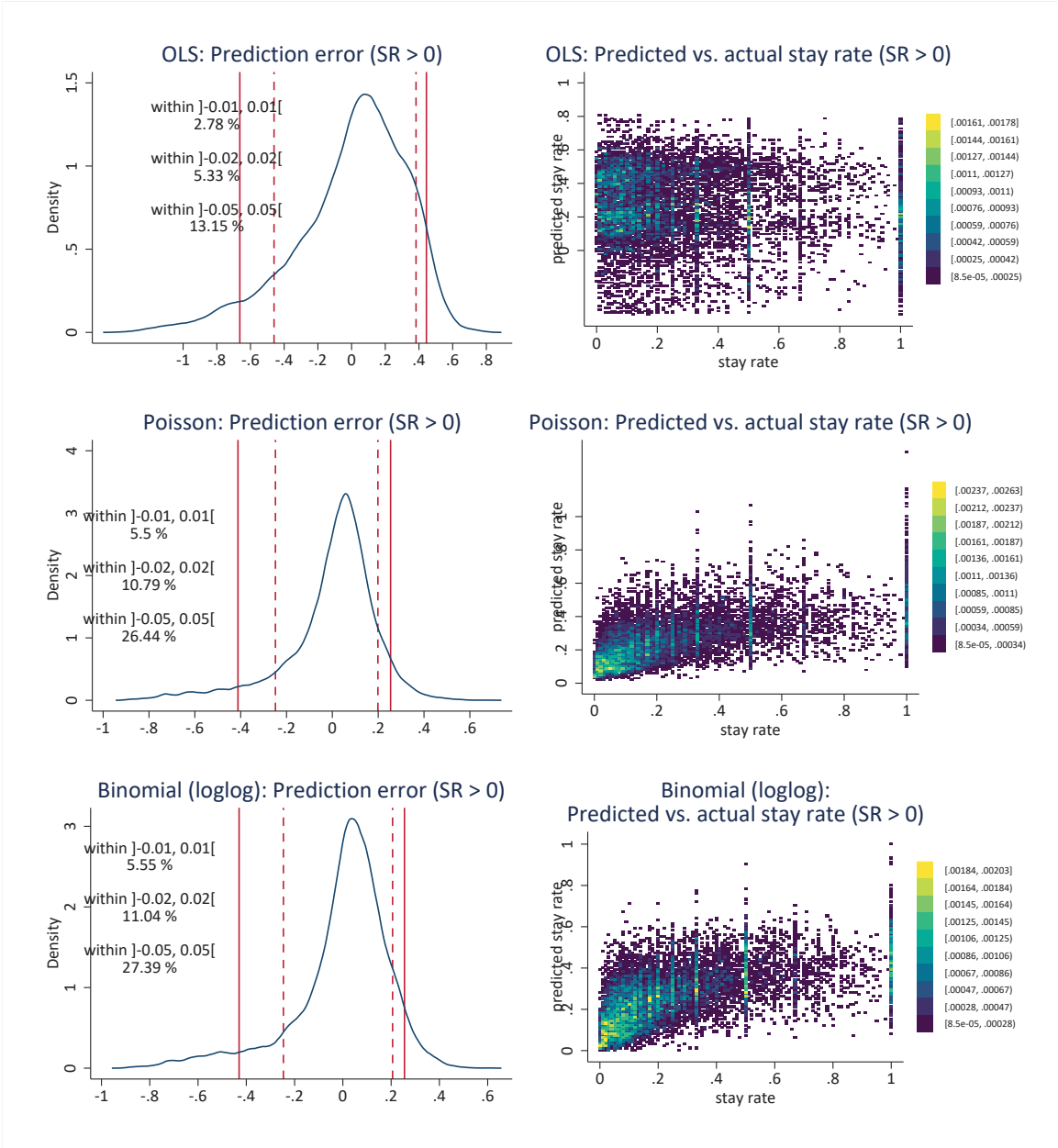
Note: Vertical lines in the prediction error (predicted minus actual SR) graphs indicate from left to right: 5th, 10th, 95th, and 95th percentile. The percentage of true zero identification represents the share of predicted stay rates below 0.005. Rounding values to the nearest percent would give a zero such that the prediction corresponds to the actual zero stay rate.

Figure A.4 – Benchmark model comparison: Prediction errors ($I(SR^{I,all})$)



Note: Vertical lines in the prediction error (predicted minus actual SR) graphs indicate from left to right: 5th, 10th, 95th, and 95th percentile. The percentage of true zero identification represents the share of predicted stay rates below 0.005. Rounding values to the nearest percent would give a zero such that the prediction corresponds to the actual zero stay rate.

Figure A.5 – Benchmark model comparison: Prediction errors ($SR^{I,all} > 0$)



Note: Vertical lines in the prediction error (predicted minus actual SR) graphs indicate from left to right: 5th, 10th, 95th, and 95th percentile. The percentage of true zero identification represents the share of predicted stay rates below 0.005. Rounding values to the nearest percent would give a zero such that the prediction corresponds to the actual zero stay rate.

Table A.1 – Overview of stay rates for EU countries in the literature

Host country	source country / region	Reference group	data (& method)	time horizon	SR	Source
Austria	non-EEA	international students	permit data	short	17.0%	OECD (2011)
Czech Republic	non-EEA	international students	permit data	short	32.0%	OECD (2011)
	developing countries	international students, awarded with scholarship	admin. data, survey data	long	24.0%	Nemeckova and Krylova (2014)
Denmark	RoW	foreign post-graduate	permit and register data	medium	35.0%	Vasiljeva (2014)
	Northern Europe	students			31.5%	
	Eastern Europe				46.5%	
	RoW	international students	data from Danish statistical	short	55.0%	Ministeriet for Forskning, Innovation og Videregående
			office	short - medium	44.0%	
Finland	non-EEA	international students	permit data	short	23.0%	OECD (2011)
France	non-EEA	international students	permit data	short	32.0%	OECD (2011)
	China	Chinese students abroad (compl. or still studying)	Ministry of Education and author's calculations	short - long	52.4%	Zhang and Li (2002)
	Algeria	international students	MIREM (Migration de	ukn	70.4%	Bououiyour *et al.* (2014)
	Morocco		retour au Maghreb) study		87.5%	
	Tunisia				67.8%	
Germany	non-EEA	international students	permit data	short	26.0%	OECD (2011)
	RoW	foreign students supported	KAAD micro data	medium - long	35.5%	Hein and Plesch (2008)
	Eastern Europe	by scholarship institution			13.3%	
	Asia	(KAAD)			37.3%	
	Middle East				77.5%	
	Africa				44.4%	
	Latin America				46.5%	
	Developing countries				44.3%	
	China	Chinese students abroad (compl. or still studying)	Ministry of Education and author's calculations	short - long	62.6%	Zhang and Li (2002)
	Poland	Polish graduates from German universities	Wissenschaft weltoffen, emplyment office data	short	9.0%	Wolfeil (2009)
	Poland		survey data	short - medium	20.6%	Wolfeil (2009)
	Armenia	DAAD scholarship beneficiaries	survey data	short	37.0%	Badikyan (2011)
Hungary	Armenia	OSF scholarship beneficiaries at CEU	survey data	short - medium	14.0%	Badikyan (2011)
	Baltic and CIS countries	foreign alumni of CEU	CEU alumni data	short - long	3.9%	Molodikova (2013)

Overview of stay rates for EU countries in the literature, cont.

Host country	Source country / region	Refrence group	Data & method	Time horizon	SR	Source
Ireland	non-EEA	international students	permit data	short	21.0%	OECD, 2011
Netherlands	non-EEA	international students	permit data	short	27.0%	OECD, 2011
	EU-15	foreign students, staying	permit and register data,	short - medium	68.6%	Bijwaard and Wang (2013)
	EU-12	longer than 2/3 of next six	linked with Social		57.9%	
	Surinam & Antilles	months whilst starting to	Statistical database		58.2%	
	Less dev. countries	study within three months			54.6%	
	Developed countries	upon arrival			55.9%	
	RoW	foreign students	permit and register data;	short	55.0%	Bijwaard (2010)
	China		observed and predicted SR		44.0%	
	Turkey		from duration analysis		41.0%	
	Morocco				29.0%	
	Europe	foreign students at unis in	post-graduation survey data	short	64.0%	Venhorst *et al.* (2010)
	non-Europe	peripheral regions			94.0%	
Spain	non-EEA	international students	permit data	short	19.0%	OECD, 2011
United Kingdom	non-EEA	international students	permit data	short	25.0%	OECD, 2011
	RoW	overseas students with 1st degree from U of Edinburgh	postal survey data	medium	48.0%	Bond *et al.* (2006)
	China	Chinese students abroad (compl. or still studying)	Ministry of Education and author's calculations	short - long	53.2%	Zhang and Li (2002)
	EU (2001)	students (unspecified)	survey data from stat. offices	short	19.0%	Suter and Jandl (2006)
	EU (2005)				27.0%	
	RoW	students with student visa	permit data	medium	21.0%	Achato *et al.* (2011)
	Russia	(also school pupils)			5.0%	
	China				22.0%	
	India				44.0%	
	Japan				9.0%	
	Pakistan				47.0%	
	Chinese Taipei				3.0%	
	Nigeria				49.0%	
	USA				11.0%	
	RoW	int. students with reg. domicile in EU and non-EU	event history calendar for U of Southampton graduates	medium	64.0%	Sage *et al.* (2013)
Europe	Europe	Marie-Curie fellowship participants	fellowship survey data	short - long	60.0%	van de Sande *et al.* (2005)
	RoW	foreign students	UNCTAD and migration data; elasticity of student on educ. foreigner stocks	short - long	71.0%	Felbermayr and Reczkowski (2012)

Note: CIS - Commonwealth of Independent States; CEU - Central European University.

Table A.2 – Overview of alternative stay rate concepts and derivation methods

	(1) SR^{I}	(2) $SR^{II,h=1}$	(3) $SR^{II,h=2}$	(4) $SR^{II,h=3}$	(5) $SR^{II,h=4}$	(6) $SR^{II,h=5}$	(7) $SR^{III,mixed}$
				Panel A: Stay rate - overall			
distance†	−0.0237***	−0.0269***	−0.0267***	−0.0316***	−0.0361***	−0.0419***	−0.0297***
	(0.0056)	(0.0057)	(0.0061)	(0.0064)	(0.0071)	(0.0076)	(0.0059)
pop (D)†	0.1211***	0.2077***	0.1213***	0.0979*	0.0009	0.0678	0.0954**
	(0.0413)	(0.0411)	(0.0452)	(0.0527)	(0.0619)	(0.0768)	(0.0473)
pop (O)†	−0.0043	−0.0052	0.0429*	0.0370	0.0408	0.0520	0.0517*
	(0.0236)	(0.0218)	(0.0255)	(0.0312)	(0.0386)	(0.0505)	(0.0274)
language	0.0319***	0.0307***	0.0318***	0.0361***	0.0332***	0.0331***	0.0337***
	(0.0046)	(0.0049)	(0.0049)	(0.0055)	(0.0060)	(0.0064)	(0.0050)
col. rel.	0.0553***	0.0568***	0.0616***	0.0659***	0.0703***	0.0721***	0.0611***
	(0.0071)	(0.0076)	(0.0078)	(0.0085)	(0.0090)	(0.0103)	(0.0078)
mig. stock†	0.0048***	0.0047***	0.0049***	0.0048***	0.0050***	0.0055***	0.0044***
	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0007)	(0.0008)	(0.0006)
N	39.806	44.010	40.347	36.113	31.963	27.587	36.444
				Panel B: Stay rate - employment			
distance†	−0.0175***	−0.0140***	−0.0150***	−0.0184***	−0.0205***	−0.0206***	−0.0176***
	(0.0038)	(0.0040)	(0.0044)	(0.0047)	(0.0052)	(0.0056)	(0.0041)
pop (D)†	0.1136***	0.1447***	0.0907**	0.1049**	0.0670	0.1265**	0.0674
	(0.0344)	(0.0354)	(0.0446)	(0.0461)	(0.0532)	(0.0627)	(0.0411)
pop (O)†	0.0046	−0.0063	0.0162	0.0282	0.0637**	0.0528	0.0438**
	(0.0193)	(0.0167)	(0.0217)	(0.0253)	(0.0316)	(0.0434)	(0.0215)
language	0.0149***	0.0177***	0.0181***	0.0192***	0.0174***	0.0155***	0.0171***
	(0.0033)	(0.0036)	(0.0037)	(0.0041)	(0.0043)	(0.0046)	(0.0035)
col. rel.	0.0333***	0.0354***	0.0407***	0.0421***	0.0457***	0.0528***	0.0386***
	(0.0048)	(0.0051)	(0.0055)	(0.0061)	(0.0065)	(0.0077)	(0.0053)
mig. stock†	0.0025***	0.0026***	0.0027***	0.0028***	0.0030***	0.0032***	0.0024***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0005)
N	36.894	40.675	37.249	34.521	31.823	28.141	34.681
				Panel C: Stay rate - Family			
distance†	−0.0065**	−0.0062*	−0.0051	−0.0070*	−0.0068*	−0.0152***	−0.0055*
	(0.0033)	(0.0034)	(0.0034)	(0.0038)	(0.0040)	(0.0046)	(0.0033)
pop (D)†	0.0806***	0.1433***	0.0907***	0.0816**	−0.0038	−0.0505	0.0836***
	(0.0272)	(0.0288)	(0.0305)	(0.0341)	(0.0356)	(0.0450)	(0.0304)
pop (O)†	−0.0013	−0.0258*	−0.0063	−0.0005	0.0128	−0.0022	−0.0154
	(0.0128)	(0.0136)	(0.0161)	(0.0170)	(0.0201)	(0.0259)	(0.0146)
language	0.0099***	0.0124***	0.0107***	0.0114***	0.0096***	0.0102***	0.0120***
	(0.0025)	(0.0028)	(0.0028)	(0.0029)	(0.0030)	(0.0032)	(0.0026)
col. rel.	0.0112***	0.0114***	0.0119***	0.0124***	0.0120***	0.0113**	0.0104***
	(0.0040)	(0.0042)	(0.0041)	(0.0043)	(0.0045)	(0.0048)	(0.0038)
mig. stock†	0.0018***	0.0021***	0.0023***	0.0025***	0.0027***	0.0024***	0.0023***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0004)
N	35.623	38.184	35.332	32.964	30.182	26.839	32.849

*** p<0.01, ** p<0.05, * p<0.1

Note: † indicates variables which entered after a log or inverse hyperbole sine transformation. All specifications include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

Table A.3 – Employment and family stayers: Recent migration trends

	(1)	(1)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A: Employment reasons				
new permits (t-1)†	0.0084***				0.0104***		0.0087***	0.0099***
	(0.0020)				(0.0023)		(0.0020)	(0.0023)
new permits (t-1,DO)†		0.0050***						
		(0.0007)						
immigration (t-1)†			−0.0021		−0.0062**	−0.0020		−0.0058**
			(0.0022)		(0.0025)	(0.0022)		(0.0024)
refugee pop. (t-1)†				−0.0000	0.0014	−0.0010	0.0014	
				(0.0018)	(0.0019)	(0.0019)	(0.0018)	
N	36.753	34.772	36.355	36.894	36.214	36.355	36.753	36.214
				Panel B: Family reasons				
new permits (t-1)†	−0.0011				−0.0010		−0.0004	−0.0016
	(0.0014)				(0.0017)		(0.0015)	(0.0016)
new permits (t-1,DO)†		0.0028***						
		(0.0006)						
immigration (t-1)†			−0.0016		−0.0015	−0.0018		−0.0010
			(0.0018)		(0.0021)	(0.0018)		(0.0020)
refugee pop. (t-1)†				0.0031**	0.0019	0.0019	0.0033**	
				(0.0014)	(0.0015)	(0.0014)	(0.0014)	
N	35.487	33.613	35.043	35.623	34.907	35.043	35.487	34.907

*** p<0.01, ** p<0.05, * p<0.1

Note: † indicates variables which entered after a log or inverse hyperbole sine transformation. New permits refer to the overall number of residence permits issued minus those for education purposes. All specifications feature the complete set of gravity variables and include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

Table A.4 – Migration integration policies

	$SR^{I,all}$		$SR^{I,emp}$		$SR^{I,fam}$	
distance†	−0.0222***	(0.0058)	−0.0173***	(0.0041)	−0.0055*	(0.0033)
pop (D)†	0.1482***	(0.0509)	0.0261	(0.0448)	0.0776**	(0.0349)
pop (O)†	0.0285	(0.0263)	0.0340*	(0.0203)	−0.0002	(0.0142)
language	0.0334***	(0.0047)	0.0171***	(0.0035)	0.0101***	(0.0025)
col. rel.	0.0570***	(0.0074)	0.0349***	(0.0051)	0.0113***	(0.0041)
mig. stock†	0.0046***	(0.0006)	0.0022***	(0.0005)	0.0019***	(0.0004)
new permits (t-1)†	−0.0007	(0.0032)	0.0077***	(0.0025)	−0.0029	(0.0018)
immigration (t-1)†	−0.0046	(0.0037)	−0.0109***	(0.0027)	0.0000	(0.0022)
refugee pop. (t-1)†	0.0087***	(0.0027)	−0.0021	(0.0021)	0.0016	(0.0016)
MIPEX (overall)	0.0012*	(0.0006)	0.0017***	(0.0005)	−0.0006	(0.0004)
N	35,953		33,284		31,871	

*** p<0.01, ** p<0.05, * p<0.1

Note: † indicates variables which entered after a log or inverse hyperbole sine transformation. All specifications feature the complete set of gravity variables and include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Reported marginal effects originate from a GLM model (binomial with loglog link).

Table A.5 – Political preferences in destination countries - family stayers

Dep. var.	$I(SR^{I,fam})$	$SR^{I,fam}$			$I(SR^{I,fam})$	$SR^{I,fam}$		
Est.	OLS	OLS	Poisson	Bin (loglog)	OLS	OLS	Poisson	Bin (loglog)
median (right)	0.0060	−0.0031	−0.0037	−0.0020	0.0070	−0.0045	−0.0044	−0.0031
	(0.0066)	(0.0028)	(0.0032)	(0.0028)	(0.0065)	(0.0028)	(0.0031)	(0.0027)
share (right)	0.0884	0.0117	0.0174	0.0174	0.1733***	0.0149	0.0271	0.0201
	(0.0575)	(0.0187)	(0.0217)	(0.0202)	(0.0570)	(0.0188)	(0.0212)	(0.0200)
ratio (right / left)	0.0090	0.0021	0.0026	0.0025	0.0276***	0.0048***	0.0073***	0.0065***
	(0.0059)	(0.0019)	(0.0027)	(0.0023)	(0.0057)	(0.0018)	(0.0024)	(0.0021)
L >>R	−0.0031	−0.0055**	−0.0055	−0.0051*	0.0057	−0.0041*	−0.0054	−0.0050*
	(0.0090)	(0.0026)	(0.0034)	(0.0028)	(0.0088)	(0.0025)	(0.0033)	(0.0027)
L >R	−0.0079	−0.0043**	−0.0047	−0.0044*	−0.0128**	−0.0055***	−0.0074**	−0.0066***
	(0.0056)	(0.0018)	(0.0030)	(0.0023)	(0.0054)	(0.0018)	(0.0029)	(0.0022)
R >L	−0.0019	0.0011	0.0027	0.0015	0.0206***	0.0051**	0.0085**	0.0066**
	(0.0072)	(0.0023)	(0.0036)	(0.0027)	(0.0069)	(0.0022)	(0.0038)	(0.0028)
R >>L	−0.0269**	−0.0100***	−0.0106**	−0.0102***	−0.0013	−0.0070*	−0.0064	−0.0070*
	(0.0112)	(0.0037)	(0.0043)	(0.0038)	(0.0109)	(0.0036)	(0.0045)	(0.0038)
N (all models)	31,860	31,860	31,860	31,860	33,156	33,156	33,156	33,156
Migr. env.	yes	yes	yes	yes	no	no	no	no

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables and include year FE, as well as destination and origin FE. Standard errors are clustered on the destination-origin level. Results for Poisson and Binomial (loglog) estimations are reported as average marginal effects.

Table A.6 – Comparison of linear and non-linear models for various FE specifications (overall stayers)

Model	Gravity (G)			G + migr. environment (ME)			G + ME + pol. pref.			G, ME + attraction diff. (GCI)			G, ME + attraction diff. (WGI)		
Est.	Bin (loglog)	OLS	OLS	Bin (loglog)	OLS	OLS	Bin (loglog)	OLS	OLS	Bin (loglog)	OLS	OLS	Bin (loglog)	OLS	OLS
distance†	−0.0237***	−0.0128*		−0.0289***	−0.0089		−0.0281***	−0.0074		−0.0286***	−0.0105		−0.0292***	−0.0191**	
	(0.0056)	(0.0072)		(0.0060)	(0.0076)		(0.0061)	(0.0078)		(0.0062)	(0.0085)		(0.0073)	(0.0094)	
pop (D)†	0.1211***	0.1207***	0.1147***	0.2394***	0.1892***	0.1875***	0.2357***	0.1829***	0.1818***	0.2396***	0.1886***	0.1867***	0.2703***	0.2230***	0.2246***
	(0.0413)	(0.0303)	(0.0302)	(0.0503)	(0.0357)	(0.0357)	(0.0502)	(0.0357)	(0.0357)	(0.0513)	(0.0379)	(0.0383)	(0.0623)	(0.0482)	(0.0484)
pop (O)†	−0.0043	−0.0383	−0.0345	−0.0005	−0.0302	−0.0118	−0.0058	−0.0341	−0.0168	0.0027	−0.0205	−0.0011	0.0329	0.0084	0.0244
	(0.0236)	(0.0239)	(0.0237)	(0.0245)	(0.0251)	(0.0252)	(0.0244)	(0.0253)	(0.0254)	(0.0282)	(0.0278)	(0.0288)	(0.0365)	(0.0344)	(0.0355)
language	0.0319***	0.0400***		0.0325***	0.0413***		0.0333***	0.0422***		0.0311***	0.0393***		0.0319***	0.0463***	
	(0.0046)	(0.0064)		(0.0047)	(0.0065)		(0.0046)	(0.0065)		(0.0047)	(0.0064)		(0.0057)	(0.0078)	
col. rel.	0.0553***	0.0918***		0.0573***	0.0910***		0.0563***	0.0902***		0.0596***	0.0944***		0.0469***	0.0825***	
	(0.0071)	(0.0131)		(0.0072)	(0.0132)		(0.0071)	(0.0132)		(0.0075)	(0.0135)		(0.0091)	(0.0159)	
mig. stock†	0.0048***	0.0068***		0.0044***	0.0060***		0.0040***	0.0057***		0.0044***	0.0060***		0.0046***	0.0046***	
	(0.0006)	(0.0008)		(0.0006)	(0.0008)		(0.0006)	(0.0008)		(0.0007)	(0.0008)		(0.0008)	(0.0009)	
new permits (t-1)†				0.0094***	0.0127***	0.0118***	0.0094***	0.0131***	0.0121***	0.0094***	0.0123***	0.0121***	0.0098***	0.0135***	0.0133***
				(0.0030)	(0.0031)	(0.0031)	(0.0029)	(0.0032)	(0.0032)	(0.0031)	(0.0033)	(0.0033)	(0.0038)	(0.0041)	(0.0042)
immigration (t-1)†				−0.0014	−0.0014	0.0002	−0.0028	−0.0022	−0.0005	−0.0032	−0.0033	−0.0022	−0.0023	−0.0022	−0.0013
				(0.0035)	(0.0038)	(0.0038)	(0.0036)	(0.0039)	(0.0039)	(0.0037)	(0.0041)	(0.0040)	(0.0046)	(0.0049)	(0.0049)
refugee pop. (t-1)†				0.0125***	0.0101***	0.0093***	0.0109***	0.0090***	0.0082***	0.0135***	0.0111***	0.0107***	0.0126***	0.0090***	0.0094***
				(0.0026)	(0.0025)	(0.0024)	(0.0026)	(0.0024)	(0.0024)	(0.0028)	(0.0027)	(0.0027)	(0.0034)	(0.0033)	(0.0033)
rel. refusals (DO)				−0.0320	0.0065	−0.0562	−0.0286	0.0107	−0.0628	−0.0335	−0.0083	−0.0581	−0.0315	−0.0190	−0.0974
				(0.0224)	(0.0384)	(0.0710)	(0.0227)	(0.0397)	(0.0828)	(0.0224)	(0.0387)	(0.0706)	(0.0246)	(0.0398)	(0.0667)
rel. expulsions (DO)				0.0059	0.0955	0.1520**	0.0111	0.1029	0.1436**	0.0167	0.1299	0.1626**	0.0426	0.1721	0.1968**
				(0.0429)	(0.0831)	(0.0703)	(0.0426)	(0.0837)	(0.0707)	(0.0475)	(0.0950)	(0.0826)	(0.0621)	(0.1159)	(0.0913)
GDP (p.c., D)†										0.0057	0.0160	0.0171	0.0118	0.0214	0.0331
										(0.0164)	(0.0183)	(0.0182)	(0.0180)	(0.0209)	(0.0208)
GDP (p.c., O)†										−0.0028	0.0060	0.0098	−0.0038	0.0215*	0.0203
										(0.0092)	(0.0092)	(0.0097)	(0.0132)	(0.0122)	(0.0125)
GCI (rank D <O)													−0.0052	0.0033	−0.0060
													(0.0042)	(0.0046)	(0.0053)
corruption control										−0.0047	−0.0126***	−0.0012			
										(0.0047)	(0.0041)	(0.0046)			
government effect.										−0.0008	0.0060	−0.0101*			
										(0.0044)	(0.0042)	(0.0053)			
pol stability										0.0007	0.0001	0.0016			
										(0.0033)	(0.0034)	(0.0036)			
rule of law										0.0052	−0.0098**	0.0094*			
										(0.0054)	(0.0047)	(0.0055)			
regulatory quality										0.0058	0.0007	−0.0022			
										(0.0046)	(0.0045)	(0.0046)			
voice and accountab.										−0.0041	−0.0015	0.0028			
										(0.0054)	(0.0047)	(0.0060)			
share (right)							−0.1186***	−0.1151***	−0.1066***						
							(0.0331)	(0.0292)	(0.0291)						
D-FE & O-FE	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes	no
D-FE × O-FE	no	no	yes	no	no	yes	no	no	yes	no	no	yes	no	no	yes
N	39,806	39,806	39,804	36,918	36,918	36,916	35,744	35,744	35,593	35,009	35,009	34,999	25,465	25,465	25,432

*** p<0.01, ** p<0.05, * p<0.1

Note: † indicates variables which entered after a log or inverse hyperbole sine transformation. Standard errors are clustered on the destination-origin level Results for Binomial (loglog) estimations are reported as average marginal effects.

Table A.7 – IV and benchmark results - employment stayers

	Destination & origin FE				Panel FE		
	Bin (loglog)	OLS	2SLS		OLS	2SLS	
			S2	S1		S2	S1
median (right)	−0.0122***	−0.0113***	−0.0944**		−0.0120***	−0.0895**	
	(0.0036)	(0.0030)	(0.0413)		(0.0030)	(0.0415)	
instrument				0.0197***			0.0195***
				(0.0019)			(0.0019)
KP-Chi2			109.88			109.61	
Endog.-Chi2			4.08			3.48	
P(Endog-Chi2)			0.0435			0.0620	
share (right)	−0.0928***	−0.0731***	−0.3419**		−0.0793***	−0.3208**	
	(0.0294)	(0.0247)	(0.1494)		(0.0246)	(0.1488)	
instrument				0.0054***			0.0054***
				(0.0002)			(0.0002)
KP-Chi2			647.83			655.96	
Endog.-Chi2			3.38			2.74	
P(Endog-Chi2)			0.0659			0.0981	
ratio (right / left)	−0.0124***	−0.0136***	−0.0501**		−0.0144***	−0.0474**	
	(0.0033)	(0.0027)	(0.0220)		(0.0027)	(0.0221)	
instrument				0.0371***			0.0368***
				(0.0031)			(0.0031)
KP-Chi2			144.97			144.98	
Endog.-Chi2			2.80			2.25	
P(Endog-Chi2)			0.0940			0.1335	
I (R >L)	−0.0044	−0.0029	−0.0236**		−0.0035	−0.0221**	
	(0.0029)	(0.0026)	(0.0102)		(0.0026)	(0.0102)	
instrument				0.0790***			0.0789***
				(0.0019)			(0.0019)
KP-Chi2			1660.09			1669.89	
Endog.-Chi2			3.96			3.23	
P(Endog-Chi2)			0.0466			0.0721	
N (all models)	28,841	28,841	28,841		28,831	28,831	

*** p<0.01, ** p<0.05, * p<0.1

Note: All specifications feature the complete set of gravity variables, migration environment controls, and include year FE. Standard errors are clustered on the destination-origin level. Results for Binomial (loglog) estimations are reported as average marginal effects.

Table A.8 – Destination country specific sample overview for main specifications (overall stayers)

	Gravity (G)			G + Mig Trends (MT)			G + MT + DEMIG			G + MT + IMMPOL			G+ MT + MIPEX			G + ME + WGI			G + ME + GCI			G + ME + POL			G + ME + POL IV		
	Y	N	range	Y	N	range	Y	N	range	Y	N	range	Y	N	range	Y	N	range	Y	N	range	Y	N	range	Y	N	range
Austria	11	145	09-19	11	145	09-19	6	142	09-14	11	145	09-19	10	147	10-19	11	137	09-19	10	99	09-18	11	145	09-19	11	145	09-19
Belgium	8	133	09-19	6	145	14-19	1	146	14-14	6	145	14-19	6	145	14-19	6	138	14-19	5	103	14-18	6	145	14-19	6	145	14-19
Bulgaria	6	145	14-19	6	145	14-19				6	145	14-19	6	145	14-19	6	137	14-19	5	101	14-18	6	145	14-19	6	145	14-19
Croatia	7	144	13-19	6	146	14-19				6	146	14-19	6	146	14-19	6	138	14-19	5	103	14-18	6	146	14-19	6	146	14-19
Czech Republic	11	146	09-19	11	146	09-19	6	147	09-14	11	146	09-19	10	146	10-19	11	139	09-19	10	102	09-18	11	146	09-19	11	146	09-19
Estonia	10	146	10-19	10	146	10-19				10	146	10-19	10	146	10-19	10	138	10-19	9	102	10-18	10	146	10-19	10	146	10-19
Finland	11	129	09-19	11	129	09-19	6	119	09-14	11	129	09-19	10	128	10-19	11	122	09-19	10	86	09-18	11	129	09-19	11	129	09-19
France	11	120	09-19	11	120	09-19	6	100	09-14	11	120	09-19	10	118	10-19	11	114	09-19	10	81	09-18	11	120	09-19	11	120	09-19
Germany	11	134	09-19	11	134	09-19	6	142	09-14	11	134	09-19	10	133	10-19	11	127	09-19	10	91	09-18	11	134	09-19	11	134	09-19
Greece	11	139	09-19	11	139	09-19	6	131	09-14	11	139	09-19	10	138	10-19	11	131	09-19	10	94	09-18	11	139	09-19	11	139	09-19
Hungary	11	138	09-19	11	138	09-19	6	134	09-14	11	138	09-19	10	136	10-19	11	130	09-19	10	94	09-18	11	138	09-19	11	138	09-19
Iceland	11	148	09-19	11	148	09-19	6	149	09-14	2	149	09-10	6	147	14-19	2	142	09-10	2	95	09-10	1	149	10-10			
Ireland	11	146	09-19	11	146	09-19	6	148	09-14	11	146	09-19	10	146	10-19	11	139	09-19	10	102	09-18	11	146	09-19			
Italy	11	147	09-19	11	147	09-19	6	147	09-14	10	147	09-18	10	146	10-19	10	140	09-18	10	102	09-18	10	147	09-18	10	147	09-18
Latvia	11	146	09-19	8	145	12-19				8	145	12-19	8	145	12-19	8	138	12-19	7	102	12-18	8	145	12-19	8	145	12-19
Lithuania	10	142	09-19	10	142	09-19				10	142	09-19	9	142	10-19	10	135	09-19	9	97	09-18	10	142	09-19	10	142	09-19
Luxembourg	10	147	10-19	10	147	10-19	5	148	10-14	9	147	10-19	10	147	10-19	9	139	10-19	8	102	10-18	9	147	10-19	9	147	10-19
Malta	11	147	09-19	11	147	09-19				11	147	09-19	10	147	10-19	11	140	09-19	10	102	09-18	11	147	09-19			
Netherlands	6	147	14-19	6	147	14-19	1	147	14-14	6	147	14-19	6	147	14-19	6	139	14-19	5	104	14-18	6	147	14-19	6	147	14-19
Norway	11	138	09-19	11	138	09-19	6	131	09-14	7	146	12-18	10	137	10-19	7	139	12-18	7	104	12-18						
Poland	10	133	10-19	10	133	10-19	5	122	10-14	10	133	10-19	10	133	10-19	10	126	10-19	9	91	10-18	10	133	10-19	10	133	10-19
Portugal	11	131	09-19	11	131	09-19	6	137	09-14	11	131	09-19	11	131	09-19	11	124	09-19	10	92	09-18	11	131	09-19	11	131	09-19
Romania	11	143	09-19	11	143	09-19				11	143	09-19	10	143	10-19	11	136	09-19	10	98	09-18	11	143	09-19	11	143	09-19
Slovakia	11	145	09-19	11	145	09-19	6	146	09-14	11	145	09-19	10	145	10-19	11	138	09-19	10	101	09-18	11	145	09-19	11	145	09-19
Slovenia	11	145	09-19	11	145	09-19	6	145	09-14	11	145	09-19	10	145	10-19	11	138	09-19	10	100	09-18	11	145	09-19	11	145	09-19
Spain	11	147	09-19	11	147	09-19	6	147	09-14	11	147	09-19	10	147	10-19	11	140	09-19	10	102	09-18	11	147	09-19	11	147	09-19
Sweden	11	139	09-19	11	139	09-19	6	132	09-14	11	139	09-19	11	139	09-19	11	132	09-19	10	94	09-18	11	139	09-19	11	139	09-19
United Kingdom	9	101	10-18	9	101	10-18	5	68	10-14	9	101	10-18	9	101	10-18	9	94	10-18	9	69	10-18	9	101	10-18			
Total		39816			39044			15165			36924			35977			35017			23134			35753			31472	

Note: Totals are based on rounded yearly numbers. Y indicates the overall number of years a destination country is represented in a given specification; range the earliest and latest year a country is include. N corresponds to the average number of origin countries whose bilateral stay rates entered a specification.