Effect of Subsidized Higher Education on Highly Skilled Migration in the European Economic Area

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Abstract: Highly skilled migration is a hotly debated topic that involves controversy about its determinants. The academic literature till date have focused on economic migrants, neglecting the migration of highly skilled students. This research investigates the flow of skilled student and economic migrants into the European Economic Area. It aims to uncover the likely effect subsidized tertiary education has on attracting or deterring student and economic migration. Using Panel Data of Eurostat and OECD as well as employing variety of econometric techniques, such as OLS, fixed effects, interaction effect and instrumental variable, the research aims to test its main hypothesis: higher public spending on tertiary education is likely to attract highly skilled migrants. Interaction effect seems to support this proposition.

Keywords: migration, tertiary education, public spending on education, highly skilled migrants

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Content

1. INTRODUCTION

Global economic developments such as the shift from manufacturing to service-oriented and knowledge-based economy, advancement in IT and health care sectors, creation of transnational businesses stretching from the far east to Europe requires highly skilled and mobile professionals. Faced with labor supply shortages and growing old age population, countries of European Economic Area (EEA) implemented regional and national policies to attract highly skilled migrants, which seemed to be a perfect remedy to tackle these problems of developed economies (Guhlich, 2017).

Although highly skilled migration is an old phenomenon dating back to the middle ages, the concept entered the vocabulary of scientists around 1960 – 70s (Guhlich, 2017). OECD (2008) and European Commission (2009b) define highly skilled migrant as a third-country national with tertiary education or university degree prior to arrival at the destination country[1]. However, the definition differs, as in the case of Belgium, which regards highly skilled migrants as those with professional experience coupled with university degree. All in all, highly skilled migration is a movement from one country to another of individuals who have at least acquired tertiary education certificate equivalent to the bachelor's degree of EU's Bologna system prior to arrival in destination country (European Migration Network, 2006).

Highly skilled migration is undoubtedly a hotly debated topic of this century. Google Scholar (2020) records almost 140,000 scientific articles dedicated to the issue between 2000-2010. Skilled migration[2] is still under the radar of prominent social scientists who examine the migratory behavior of highly qualified professionals. Regardless their origin, skilled migrants today make up more than 50% of the foreign population of Bulgaria, Ireland, Lithuania, Luxembourg, and Poland as per the Eurostat statistics (2020g). Attention is drawn to countries such as Austria, Lithuania and Sweden, which have experienced a recent surge in the number of highly skilled migrants. Few countries - Iceland, Latvia, and Slovakia saw a decline, while others - Belgium, Czech Republic, Germany, France, Ireland, and Portugal - maintained a steady increase (Eurostat, 2020g).

Questions emerge on why highly skilled individuals choose to emigrate, what determines their decision to migrate to one country over another, and where do they migrate the most. 'Push' and 'Pull' factors developed by the Migration theory (Ravenstein, 1885) help in answering these questions. Push factors seen as 'unfavorable' conditions in the home country seem to perfectly explain the reasons to migrate. However, pull factors

[1] Destination country/receiving country/host country is used interchangeably in this research.
[2] Highly skilled migration/skilled migrants/highly skilled professionals/skilled student migrants is used interchangeably in this research.

represented by favorable conditions in the destination country largely determine the migration opportunities (Larrison & Raadschelders, 2020).

Highly skilled migrants increase the economic prosperity of the receiving country through knowledge creation and scientific discovery (Bosetti et al, 2015). It may also destabilize the labor market conditions in the destination country by oversupply of manpower, leading to harsh competition among job hunters and reduced remuneration levels. Simultaneously, highly skilled migration impacts the sending countries, exemplified by human capital depletion or 'brain-drain'. Along with its disadvantages, brain-drain generates remittances in the sending country and reduces competition in the labor market thereby granting low-skilled workers who remain in the country of origin a leverage (Guhlich, 2017).

In the quest for the best talent, EEA member states implemented various immigration policies to attract the highly skilled migrants. These policies include provision of special visas, such as 'Highly Skilled Migrant Visa' or work permits, such as 'EU Blue card'. Both the visa and the blue-card are aimed at attracting non-EU citizens to the EU labour market, especially to the areas of the economy that encounter severe labour supply shortages of highly qualified specialists (Cerna, 2014). Additional features of the immigration policy include a possibility for family reunion and the rights for the spouse to work, access to welfare benefits and acquisition of permanent residence and/or citizenship upon extended stay (EU Immigration Portal, 2020).

There are however policies in place that are not particularly aimed at attracting highly skilled migrants, but nevertheless act as a pull factor. It includes the welfare system, labour market returns, better infrastructure and facilities, and improved quality of life compared to home country. Facchini and Lodigiani (2014), Kvist (2004), Gümüs (2010) and many others tried to understand how these non-immigration policies impact the highly skilled migration and what the driving forces of migration are in general. It is the socio-economic factors that encourage the migrants to move, maintain some scientists, while others emphasize the importance of family networks, proximity to homeland and cultural openness (Guhlich, 2017; Larrison & Raadschelders, 2020).

Despite the purpose of immigration policies that are currently in place to attract skilled migrants, they eventually impede the process by imposing higher standards and requirements, therefore making it more difficult for qualified migrants to enter the EEA labor market (Facchini & Lodigiani, 2014). For example, the EU Directive on Blue-Card requires the migrant to have an employment contract for at least one year and minimum salary that equals one and a half of average salary of the receiving country. The same directive stipulates that member states may change/increase the stated requirements at their discretion (European Commission, 2009b). The impediment may come as a result of meeting recruitment quotas by the receiving countries, or full employment/increased

unemployment rate. But migration, driven by push factors and inertia, may continue to explore the different routes of entering the destination country. Not all qualified migrants can find a job prior to entering the host country. So, they turn to either legal or illegal pathways by way of marriage, asylum, education and many others (Guhlich, 2017) Increase in unemployment rates in the EEA (Cerna, 2016; OECD, 2020a) and strict rules to obtain job permits (Facchini & Lodigiani, 2014) may pave the way for an exploration of these alternative ways to enter EEA labour market. One such pathway could be the educational opportunities of the receiving country, what Liversage (2009) calls as "re-education" path.

Tertiary education is the highest educational attainment as per the International Standard Classification of Education (ISCED) of the EU (Eurydice, 2018). It is mainly financed by public funds, but also includes private sources of funding (Eurydice, 2020; OECD, 2020b). However, countries in the EEA have adopted different strategies in providing tertiary education for third-country nationals. Countries such as Germany and Norway provide almost free tertiary education to both national and international non-EEA students charging no tuition fee for students of Master's and PhD degree programs, while Denmark, Finland, Netherlands and Sweden charge a substantial fee (OECD, 2020g). As such, and in line with the organization of public funds for EEA universities, subsidized higher education entails a government policy aimed at providing tertiary education to national and/or international non-EEA students at public HEI at free to moderate tuition fee rates.

1.1. Research Question

The research aims to establish a link between subsidized higher education in the receiving country and highly skilled migration as well as measure the likelihood of an increase or decrease in highly skilled migration as a result of the provision of subsidized or free education at Higher Educational Institutions in the EEA member states.

The research in the Public Administration domain has so far focused on highly skilled migrants who have crossed the border with pure economic and employment motives, thus neglecting other forms of migration such as student mobility which also involves skilled migration (Guhlich, 2017). Students can be identified as highly skilled migrants if they moved to study Master's or PhD degree programs since those study programs require completed tertiary education equivalent to 3-4 years of Bachelor's degree program from a recognized university (with additional work experience or advanced degree for PhD programs). Region-wide initiatives such as Erasmus+ designed by the European Commission to enable student movement within the region and across continents, affordable or free education in the host country, special scholarships and grants – all these open up the gateway for highly qualified internationals to enter the labour markets of EEA region through education migration. As such, students as highly skilled migrants have not

been featured much in recent academic discussions on the topic. This is the main motivation for writing this thesis, focusing on student mobility and linking it to highly skilled migration, with the expectation to contribute to the existing body of scientific literature.

Highly skilled migration is important for the political elite as well as the ordinary taxpaying citizens. Understanding that highly skilled migration takes place within the walls of public universities and research institutes that are financed by taxpayers' money may open up a debate, especially if recently educated migrants leave for another country. Policymakers of Ministry of Education and Internal Affairs are particularly in the spotlight since they are in charge of allocating public funds in tertiary education (Eurydice, 2020). If public spending on tertiary education indeed plays role in attracting/deterring highly skilled migrants, then policymakers may be crucial in changing the trend in migration.

The research is based on the retrospective analysis of Eurostat panel data that contains information on public spending on tertiary education of 26 EEA countries (4 other countries that belong to EEA region are dropped from the sample due to missing data) and migration of tertiary educated individuals to EEA region between 2004-2017. Applying the research question to this panel data and estimating the effect of public finance of tertiary education on the flow of highly skilled migrants in the receiving country is the contribution this thesis attempts to make. Two separate time periods are analyzed: 1) 2004-2017 and 2) 2013-2017. Additionally, the tuition fees charged to international non-EEA students during 2007-2017 and estimation of the effect of affordable education of the receiving country on highly skilled migration is another analysis this thesis makes. In both methodologies, the research examines whether or not the educational policy acts as a pull factor for highly skilled migration.

The research investigates two types of highly skilled migrants- student migrants who have tertiary education prior to arrival to EEA, and economic migrants with tertiary education prior to their arrival to EEA. The research uses OLS regression with fixed effects, interaction effect and instrumental variable to estimate the effect subsidized higher education has on highly skilled migration.

Empirical findings using OLS and interaction effect suggest that there is a positive and statistically significant correlation between the subsidized higher education and economic migration, indicating that an increase in public spending on tertiary education is likely to attract highly skilled migrants. Inclusion of control variables, such as unemployment rate and welfare generosity does reinforce the main coefficient. However, fixed effects model reverses the relationship into negative and statistically insignificant value. Evaluation of the effect of public spending on student migration yields negative relationship, however statistically insignificant.

The thesis proceeds in the following order. The next section briefly introduces the scientific literature concerning the highly skilled migration and subsidized education. The third section explains the theoretical framework, hypothesis and causal mechanism. The fourth section consists of comprehensive description of the research design, including data collection and analysis, evaluation techniques and separate subsections on dependent and independent variables. The fifth section presents the empirical findings and the sixth section provides analysis of the overall research results. The thesis concludes with the seventh section and adds some remarks in the end.

2. LITERATURE REVIEW

Initial search of scholarly publications in Public Administration journals linking highly skilled migration with subsidized education did not yield much result. Guhlich (2017) notes that most of the academic discussion about highly skilled migration was predominantly theoretical and based on qualitative analysis using interviews and surveys. It was then found that quantitative analysis of tertiary educated migrants were not possible up until the beginning of 2000 since most of the statistics on migrants' educational backgrounds were missing.

Indeed, literature connecting highly skilled migration and subsidized education was almost none, except for two qualitative (Liversage, 2009 a, b; Riano, 2012) and two quantitative studies (Beine et al, 2014; Hubner, 2012). Study conducted by Dr. Anika Liversage examined how tertiary educated 'Eastern European' migrant women explore different pathways to access Danish labor market. One of the pathways is additional education in the destination country and Liversage names this method "path of re-education". According to an interview with a Croatian lawyer whose educational certificates were not recognized in Denmark to practice law, she had to enroll at a Danish university to acquire Danish certification be able to be able to subsequently work in her field of expertise. The study was based on qualitative analysis by conducting 15 interviews with highly educated migrant women hailing from different countries (Liversage, 2009 a, b). Riano (2012) investigated how highly skilled women migrants in Germany worked in low-skilled jobs and looked for better job opportunities to match their qualifications. Riano called this the "act of re-skilling", where women migrants took part in language courses, enrolled in post-graduate university to repeat their studies, but this time in the destination country. The author stressed that re-skilling in the destination country was crucial in finding a job that matched migrants' qualifications.

Beine et al (2014) studied the determinants of international student migration. They examined how different factors are associated with the attraction of international students, including network effect, housing prices and quality of universities. Since the study uses total number of international students, including those who study at

undergraduate level, it does not fall under highly skilled migration literature, but relates to the bigger topic of migration. The study assumes that tuition fees paid by native students are same for internationals, thus missing an important distinction to be made while analyzing tuition fee as a determinant of international student migration. The authors mention that, at the time, data reporting tuition fees for international students was not available, so they use tuition fee paid by native students as a proxy.

Hubner (2012) conducts natural experiment to study the likely effect tuition fees has on the decision of student enrollments in different states of Germany (Hubner, 2012). As per the study, tuition fees seem to play a deterrence effect on student enrollments in Germany. As in the case of Beine et al (2014), this research paper does not focus on highly skilled migration either.

The next stream of research literature focused on determinants of highly skilled migration, examining migration of professionals from one sector to another using labour corridors. Majority of these literature dates between 2009-2015. Looking at the publications during this period, it seems that there was a growing interest in the EEA countries to understand what attracts highly skilled professionals, perhaps owing to its positive effects on the economy of the receiving countries (Cerna, 2014, Bosetti et al., 2015). Cerna (2014) highlights few countries that saw the benefits of bringing in highly skilled migrants when Europe experienced lack of labour supply in selected sectors of the economy. At the time when the European Commission forecasted to have a shortage of 1 million professionals in the health care and 700,000 in IT sector by 2015, EU member states implemented national immigration programs to enable highly skilled migration through coalitional forces of capital owners, unions of low and high skilled native workers and political parties. National programs designed to attract highly skilled non-EU nationals, such as France's '*skills and talents visa*', Germany's *Green-card* and later '*quota and point based system*', UK's '*highly skilled migrant*' program, helped fill the gap of severe labour supply shortages in IT and Healthcare sectors. Countries such as Germany, France and Sweden liberalized their immigration rules to attract highly skilled migrants, while UK went from being open policy towards highly skilled migration in 2000 to more restrictive in 2011 due to changing labour market conditions.

Some researchers have studied the likely impact of EU-wide immigration policies on highly skilled migration, such as EU Blue-Card Initiative introduced in 2009. EU Blue-card is a permit to live and work in the EU for people with university degree and relevant professional experience. (European Commission, 2009b). Gümüs (2010) stresses that EU implemented Blue-card system to better the inflow of highly skilled professionals in addition to the national immigration programs put in place since the end of WW2. EU Blue card system represents a legal framework and harmonized immigration tool to help attract the best talent to the EU in order to meet the demand for highly skilled labour and

to tackle the problem of aging population. It is a fact that EEA countries are facing financial difficulties in their social security system due to the increasing number of people in pension and very low rate of working population, known as dependency ratio. EU Blue-card however has been involved in a lot of controversy, insomuch that long-term negative effects is known to threaten its short-term benefits. Countries that had successful national immigration policies (Germany, Netherlands, Austria, UK) were against the Blue-card system due to the existing high unemployment rate caused by the financial crisis of 2008 and potential job misplacement of newly educated highly skilled native workers, whose employment opportunities will be taken away from them by foreign nationals in the long run, thus jeopardizing host country's investment in building national human capital. Moreover, recent enlargement of the EU stretching to Eastern European countries and their initial restriction on employability in EU-15 countries would mean that they are disadvantaged by the new EU Blue-card system that favors third-country nationals over Romanian and Bulgarian highly skilled workers. In view of these issues, the author recommends that EU Blue card should be granted based on the analysis of long-term benefits it presents to the host country and not to be taken into consideration by short-term benefits.

Facchini and Lodigiani (2014) suggest that EU's Blue-card system may not be functional in attracting highly skilled migrants because of stringent rules. Potential migrants may not be able to obtain an employment contract that meets the requirement of 1-year duration and minimum salary. The authors contrast two different strategies employed by major western economies in attracting highly skilled migrants: *employer-driven* and *migrant-driven*. Employer driven strategy requires that migrants meet certain characteristics (education level, work experience, etc.) and have an employment contract before they can qualify as a highly skilled migrant to eventually receive a work permit. Historically, EU countries were focused on employer-driven strategy, recruiting low-skilled workers from low-income countries for a temporary period based on bilateral agreements. Recent introduction of EU's blue card system resembles somewhat the same strategy and is similar to USA's H1B visa[3]. On the other hand, a migrant driven strategy used by Australia, Canada and New Zealand, grants the work permit based on professional qualifications and does not require any job contract prior to receiving the work permit. Aydemir and Borjas (2007) and Aydemir (2009) prove that migrant-driven strategy is more successful in raising the skill level of the migrants in the country than an employer-driven strategy. Bosetti (2015) adds that migrant-driven strategy directly impacts the competitive advantage of the host country. The higher the number of skilled migrants in the mix of native and foreign workers in an industry as well as academia, the higher the registration of patents and number of citations. The upward trend in highly

3 The US H1B visa allows companies to recruit highly educated foreigners to work in the sectors such as IT, finance, accounting, architecture, engineering, mathematics, science, medicine, etc.

skilled migration leads to innovation and knowledge creation, increase in the productivity, economic growth and competitiveness in the host country.

One stream of research focused on the dilemma of welfare magnet hypothesis, contesting that welfare generosity of the receiving country is likely to either attract or deter highly skilled migration (De Giorgi and Pellizzari 2009; Razin and Wahba, 2015; Kremer, 2016; Cebolla-Boado and Miyar-Busto, 2020). De Giorgi and Pellizzari (2009) and Kvist (2004) both maintain that in general, migrants are attracted to countries with generous welfare system. De Giorgi and Pellizzari (2009) illustrate that migration decision is based on high employment possibility and high wages at the destination country. Migrants tend to avoid going to countries where unemployment rate is high and real wages are low. Those who migrate before 25 years of age pay less regard to the labour market conditions. While skilled migrants prioritize wage opportunities than welfare benefits when choosing the destination for migration, unskilled workers are only attracted by welfare generosity. Cebolla-Boado and Miyar-Busto (2020) add that highly skilled migrants who want to settle for a long-term in the destination country may also be attracted by welfare generosity while Razin and Wahba (2015) confirms that highly skilled migrants are deterred by the rich welfare benefits.

Nifo and Vecchione (2014) find that many research studies so far have focused mainly on push and pull factors of highly skilled migration, particularly looking at the impact of unemployment rate, wage structure, and the welfare system, regarding potential migrants as rational individuals who base their decisions on cost-benefit analysis. However, based on the empirical investigation using the Italian case, authors argue that alongside economic factors that seem to influence the decision to migrate to certain countries, highly skilled migrants pay special attention to social, cultural and institutional aspects of the economy. Better institutions seen in the greater infrastructure, better quality of services, judiciary and public administration, public order and protection of property rights influences the decision to migrate as well.

Overall, literature described above helps to identify alternative explanations of highly skilled migration except for tertiary education, thus giving an idea of using welfare system and unemployment rate as control variables in the regression analysis of this research.

3. THEORETICAL FRAMEWORK

The research uses the neoclassical theory of migration that analyses the labour market conditions of sending and receiving countries. According to it, individuals decide to migrate from low-wage (sending country) to the high-wage countries (receiving country) (Wickramasinghe & Wimalaratana, 2016).

The theory is characterized on a macro- and micro level. Macro level involves "push" factors: poverty, low salaries, high unemployment rate, low economic development, corruption and political/religious repression in the sending country; and "pull" factors: favourable immigration policies, job opportunity, improved quality of life, political/religious freedom and existing family links in the receiving country. Micro level theory examines the causes of individuals' decision to move abroad, describing how potential migrants calculate the costs and benefits of emigrating. The costs are seen as an investment in moving abroad and integration into the new society, whereas benefits are expectations of future salary and job security (Boswell, 2002; Larrison & Raadschelders, 2020).

The core concepts used in this research are subsidized higher education and highly skilled migration. Subsidized education entails a government policy aimed at providing free education both for national and international students at public universities. Highly skilled migration is a classification term used in the EU context which defines "a third-country national who seeks an employment in an EU Member State and has the required adequate and specific competence, as proven by higher professional qualifications" (European Commission, 2009a,b). In essence, highly skilled migrant is an individual who is in possession of at least tertiary education certificate equivalent to the bachelor's degree program of EU educational system as per the definition of EU member states (European Migration Network, 2006).

3.1. Causal mechanisms

Potential migrants with tertiary education fall under the classification of highly skilled migrants and eligible for permit system designed by national or regional immigration policy, such as EU Blue-card or *highly skilled migrant* visa. However, these migrants are not granted the permit because they have not succeeded in securing an employment contract in the receiving country. They will enroll for tertiary education, particularly in Master's and PhD programs at higher educational institutions of the receiving country as a way of entering the EEA and eventually its labour market, after graduation. Potential migrants will consider the costs and benefits of degree programs in the universities of EEA countries and choose the best possible alternative based on their individual criteria, for example: the least costly option. Since the range of tuition fees at universities across EEA vary greatly (some EEA countries provide free education, others charge different fees to non-EEA students), universities that offer free tuition fees to non-EEA students are likely to attract more applicants. Alternatively, EEA members that invest more on tertiary education that make the education more affordable for students/migrants will see higher number of student applications as opposed to those who invest or spend less. These applicants may include highly skilled migrants pursuing Master's and PhD degree programs.

In line with the theory and causal mechanism, subsidized higher education in the receiving country may act as a pull factor for highly skilled migrants, who see the educational opportunity as an investment in future career and easy entrance to the EEA. Educational opportunity here means that either education is free/affordable compared to the sending country or it serves as a gateway to a successful professional career after the graduation. Guhlich (2017) notes that a locally educated person betters the chance of getting employed than the person who came with overseas education.

Provision of extended visas for non-EEA nationals upon their university graduation in the EEA member state may reinforce the likelihood of remaining in the country of destination. The extension of visas is particularly designed to allow foreign graduates to look for a job. One such provision is implemented by France. Graduates of Master's degree in France have the possibility to stay an additional 12-months in the country to seek employment (Facchini & Lodigiani, 2014).

3.2. Hypotheses

In order to see whether the theory above helps answer the research question, we develop and test three hypotheses.

First hypothesis: *higher public spending on tertiary education in the receiving country leads to an increase in the admissions from tertiary educated international students at its Higher Educational Institutions.*

Second hypothesis: *higher public spending on tertiary education in the receiving country leads to an increase in the number of highly educated migrants in that country*

Third hypothesis: *the more affordable the higher education in the receiving country (perceived by affordable or no tuition fees), higher the likelihood of admissions from tertiary educated international students/migrants at its Higher Educational Institutions.*

Testing these hypotheses help investigate the effect public spending on tertiary education has on highly skilled migration, as any change we observe in both variables may reveal potential relationship between them, hence answer the posed research question.

Moreover, other confounding explanations of highly skilled migration in the receiving country (welfare system, unemployment rate) will be used as control variables.

4. RESEARCH DESIGN

To determine the effect of subsidized education on highly skilled migration, the research relies on longitudinal study or panel data. It consists of information about public spending

on tertiary education as a % of GDP of 26 EEA countries for the period of 2004-2017. To measure highly skilled migration, the research uses the flow of tertiary-educated international students entering EEA member state during 2013-2017 and flow of tertiary educated migrant population as a % of the foreign population of EEA member states during 2004-2017. This study helps evaluate the differences and/or similarities of subsidized education in the EEA over a longer period of time, and across countries. The following subsections explain in more details the ways of testing the proposed hypotheses, case selection and research methods.

4.1. Operationalization

To test the first hypothesis, the research demonstrates a relationship between public spending for tertiary education as a % of the GDP of EEA countries (Independent Variable) and the number of tertiary-educated international students at the time of their university enrollment in EEA countries (Dependent Variable). Panel data covers the period between 2013-2017.

To test the second hypothesis, the research demonstrates a relationship between public spending for tertiary education as a % of the GDP of EEA countries (Independent Variable) and the number of tertiary-educated migrant population (Dependent Variable). Panel data covers the period between 2004-2017.

To test the third hypothesis, the research demonstrates a relationship between public spending for tertiary education as a % of the GDP of EEA countries (Independent Variable) and the number of tertiary-educated international students/migrants conditioned by the presence/absence of tuition fees paid by the international non-EEA students (Dependent Variable).

4.2. Case Selection

The unit of analysis is a country. The unit of observation is public spending on tertiary education as a % of GDP and national policy on tuitions fees implemented by Public Universities in each EEA country. The population is member states of European Economic Area (please refer to the Appendix 1 for a full list of countries covered in the research). Cases are selected based on an independent variable. Criteria for selection is to capture all countries that belong to the EEA region for which data is available. The selected region EEA includes countries, among others, three differing levels of tuition fees applied to international students in accordance with OECD Education at a Glance 2020 classification (OECD, 2020g): countries with no tuition fees (ex. Germany, Austria, Norway); countries with moderate tuition fees (ex. France, Spain, Italy); countries with high tuition fees (ex. Netherlands, Denmark, Sweden).

4.3. The Data

The research requires collection of main and auxiliary data. Main data is: a) public spending on tertiary education as a % of GDP; b) tuition fees charged to international students at public universities of the EEA member states; c) number of foreign students with tertiary education prior to their arrival at the EEA member state; and d) number of migrant populations with tertiary education prior to their arrival to EEA member state.

Auxiliary data serve as control variables and an instrument (discussed in the "Methodology" section below). It consists of: a) social expenditure as a % of the GDP of EEA countries; b) unemployment rate in % in EEA countries; c) private spending on tertiary education as a % of the GDP of EEA countries.

The data collection strategy is to solely rely on official sources that are easily accessible to general public. The data needed for this research is available on digital platforms of the European Commission - Eurostat, Organisation for Economic Co-operation and Development - OECD, The United Nations Educational, Scientific and Cultural Organization - UNESCO and its Institute for Statistics – UIS and World Bank Open Data. Together, these three sources are called UOE data – abbreviated from UNESCO, OECD and Eurostat. It is a joint effort of three parties in collecting internationally comparable information on education system, student mobility, foreign students in particular, and government financing of education (Eurostat, 2016).

Data on 'public spending on tertiary education as a % of GDP' comes from Eurostat (Eurostat, 2020 d, e, f). Where data is limited for certain countries, the approach is to fill the missing gap by incorporating additional data from World Bank Open Data. It is compatible with Eurostat's data, demonstrated by the similarity of its indicators on public spending for tertiary education for listed countries in the dataset (The World Bank, 2020 a, b).

The overall aim and challenge of this research is to find reliable information sources on the flow of foreign students who previously attained tertiary education prior to crossing the national borders of the EEA member state. Eurostat provides this kind of data, particularly allowing to compile a dataset of students of Master's and PhD programs (Eurostat, 2020 b, c). This data covers the period of 2013-2017 and is composed of 130 observations. Together with data on public spending on tertiary education as % of GDP, it serves to test the first hypothesis (Eurostat, 2020 b, c).

Data reporting the 'number of migrant populations with tertiary education prior to their arrival to the EEA member state' comes from Eurostat and covers the period between 2004-2017. Data contains 364 observations (Eurostat, 2020 g) and serves to test the second hypothesis.

Data on tuition fees is based on OECD Education at a Glance annual publication and covers the period between 2007-2017 (OECD, 2020 b, g). The data serves to test the third hypothesis.

OECD is the source of all auxiliary data, providing indicators on social expenditure as a measure of welfare generosity of the country (OECD, 2020e), unemployment rate (OECD, 2020a) and private spending on tertiary education as a % of the GDP of EEA countries (OECD, 2020f). All data covers the period between 2004-2017.

Each of these data source is described in more details in the following sub-sections.

Dependent Variables

Two dependent variables are employed in this research: 1) the number of foreign students with tertiary education prior to their arrival to EEA and 2) the migrant population with tertiary education prior to their arrival to EEA member state.

The dataset used to construct the first dependent variable serves to test the first hypothesis and comes from Eurostat's "Learning Mobility" indicator. It provides statistics on the 'Mobile Students from Abroad enrolled by education level, sex and country of origin'. The data captures the number of foreign students from 227 countries enrolled in Master's and PhD programs by higher educational institutions in the EEA. *Mobile students* are defined as foreign students who have crossed a national border and relocated from the country of origin to the country of destination with the objective to study. As per the Eurostat metadata, *"The status as a mobile student is dependent on the crossing of a border motivated by education*". This category of students can be classified as 'highly skilled migrants' since they meet the minimum requirements set by the Council Directive 2009/50/EC, 2009. As per the definition of European Commission's 2009/50/EC Council Directive, highly skilled migrants are individuals who are in possession of tertiary education equivalent to 3-4 years bachelor's degree program (European Commission, 2009b). Although the above definition stipulates the intention as "employment seeking", our logic here is to extrapolate this category of people to those who are seeking employment after graduation from university in the receiving country.

According to the directive, member states have a discretion to add further requirements to the classification of 'highly skilled migrant' category. In this regard, Belgium and Italy require work experience in addition to the educational qualification. All other member states classify tertiary educated persons as highly skilled migrants regardless of their professional background. It should be noted that the case of Italy is twofold. Though Italy requires professional experience, researchers and exchange program participants are exempt from this requirement (EU Immigration Portal, 2020; BMAFJ, 2020). Since only 2 out of 30 EEA countries require professional experience to determine highly skilled

migration, this research uses only 'tertiary education' as a necessary requirement to categorize an individual as "highly skilled migrant", skipping the professional experience condition. Hence, mobile students from abroad with prior tertiary education arriving in the EEA to pursue Master's and PhD programs are considered highly skilled migrants.

Statistics on mobile students for the period of 2013-2017 is presented in the graph below. For clarity, if an Italian and South Korean student move to Germany for study purposes, they are both considered mobile students.

Graph 1. Mobile students from abroad enrolled in Master and PhD programs in EEA member states, including EEA countries except for the reporting country.

Source: Eurostat. Online data code: EDUC_UOE_MOBS02

The graph displays stable trend in the admission of mobile students across the EEA member states, except for Austria, Cyprus, Denmark, Italy, Latvia and Portugal, where admissions steadily went up. Portugal in particular saw a sudden increase in the level of mobile students among its total population. Slovakia and Hungary show a declining trend. One can infer that the changes in the admissions rate is due to educational policies that are in place, rather than the changes unique to local conditions. It is to be noted that Austria, Luxembourg and Germany have the highest proportion of foreign students as a % of total population among other EEA countries.

The Eurostat data enables to refine the origin of mobile students, thus allowing to select foreign students from non-EEA countries. This feature gives a better reflection of students who face more stringent rules of crossing the border, who require visa and financial guarantee[4]. Data on foreign students who come from all countries excluding EEA member states for the period of 2013-2017 is reported in the Graph 2. Unfortunately, the data is completely missing for Germany. Netherlands and Slovenia have no data for the period of 3 years. Greece and Spain miss the data of 2 years. Italy is missing the data for one year only.

Graph 2. Mobile students from abroad enrolled in Master and PhD programs in EEA member states, excluding EEA and the reporting country.

[4] Many universities in EEA countries require that university applicants from non-EEA countries have minimum amount of money deposited in their bank account in order to be issued an invitation, and eventually a student visa.

Source: Eurostat. Online data code: EDUC_UOE_MOBS02

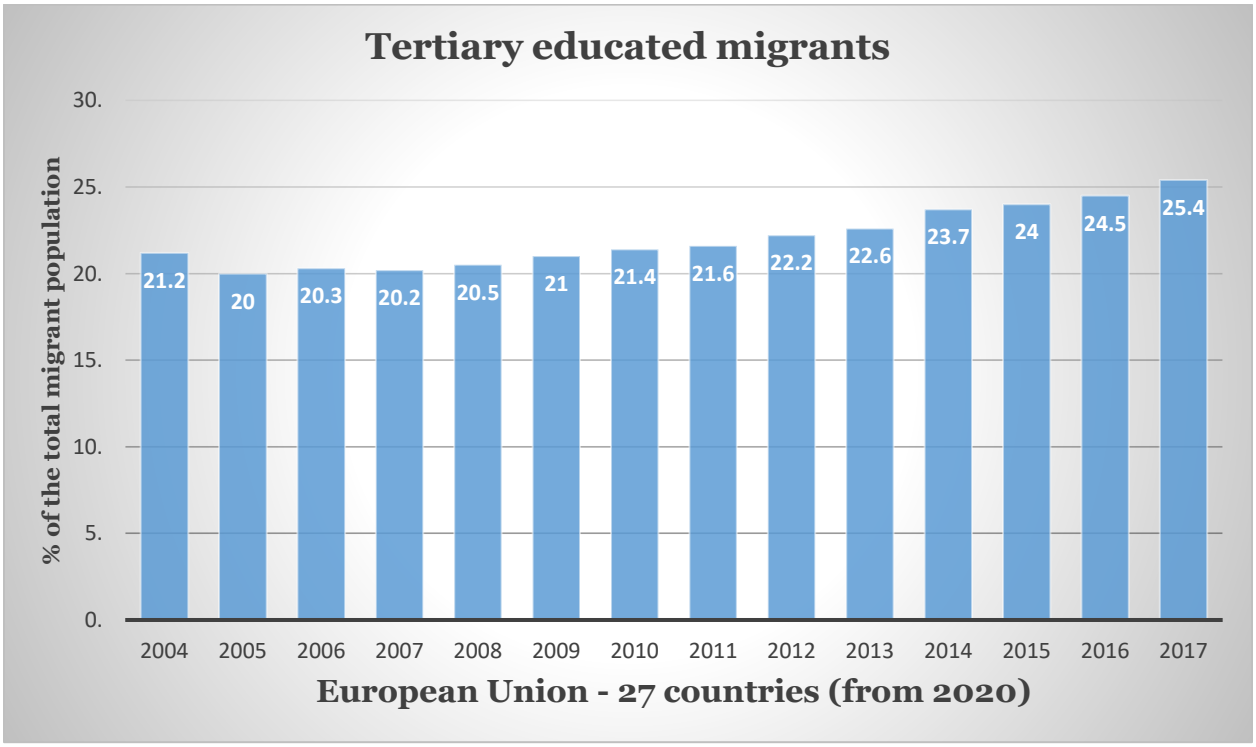
Graph 2 illustrates that the majority of EEA member states have not seen any change in the number of international non-EEA students enrolled in Master's and PhD programs. Only Malta experienced a drastic upward trend, while Ireland saw the opposite. Netherlands has reported a steady increase in the number of foreign students throughout 2013-2015, however the graph is misleading in showing a sharp decline. This is due to missing data for the period of 2016-2017.

Both data categories, that is: 1. mobile students from abroad including EEA countries other than the reporting country and 2. mobile students from abroad excluding EEA countries deserve to be analyzed as dependent variables. The datasets aim to illustrate the origin of migration for education: local/regional vs intercontinental and are used to test the first hypothesis.

To test the second hypothesis, the research uses Eurostat's data on 'population of migrants by their educational level as a percentage of overall migrant population in the

host country'. This data provides information on migrants with tertiary education prior to their arrival in EEA member state. The data has two different categories, one category provides information on migrants based on the country of birth and the second one is based on citizenship. The research uses the category based on citizenship, as 'birth' category includes persons who are born overseas but currently hold EU citizenship. Therefore, the data contains persons with foreign citizenship excluding all EEA countries. Migrants will be chosen based on their educational attainment at the time of arrival in the EEA country. Thus, migrants with tertiary education are included in this research. Tertiary education is bachelor's degree certificate as per the ISCED 2011 international classification level 5-8 (Eurostat, 2020 c, g). Additional feature of this data is the possibility to select migrants based on age category. The dataset provides many different options of age groups. This research uses the age category of 25-64 with the assumption that this age category resembles a group that have a completed tertiary education at a bachelor's degree level. To note, there is another option of choosing an age category of 30-34, but this category limits the coverage of other highly skilled migrants who are 29 years old and/or 35-45 years old. The data is missing for Romania and has very limited information about Bulgaria, Lithuania and Slovenia. Graph 3 presents pooled statistics on this variable for EEA countries.

Graph 3. Population of migrants with tertiary education at the time of arrival in EEA member state.



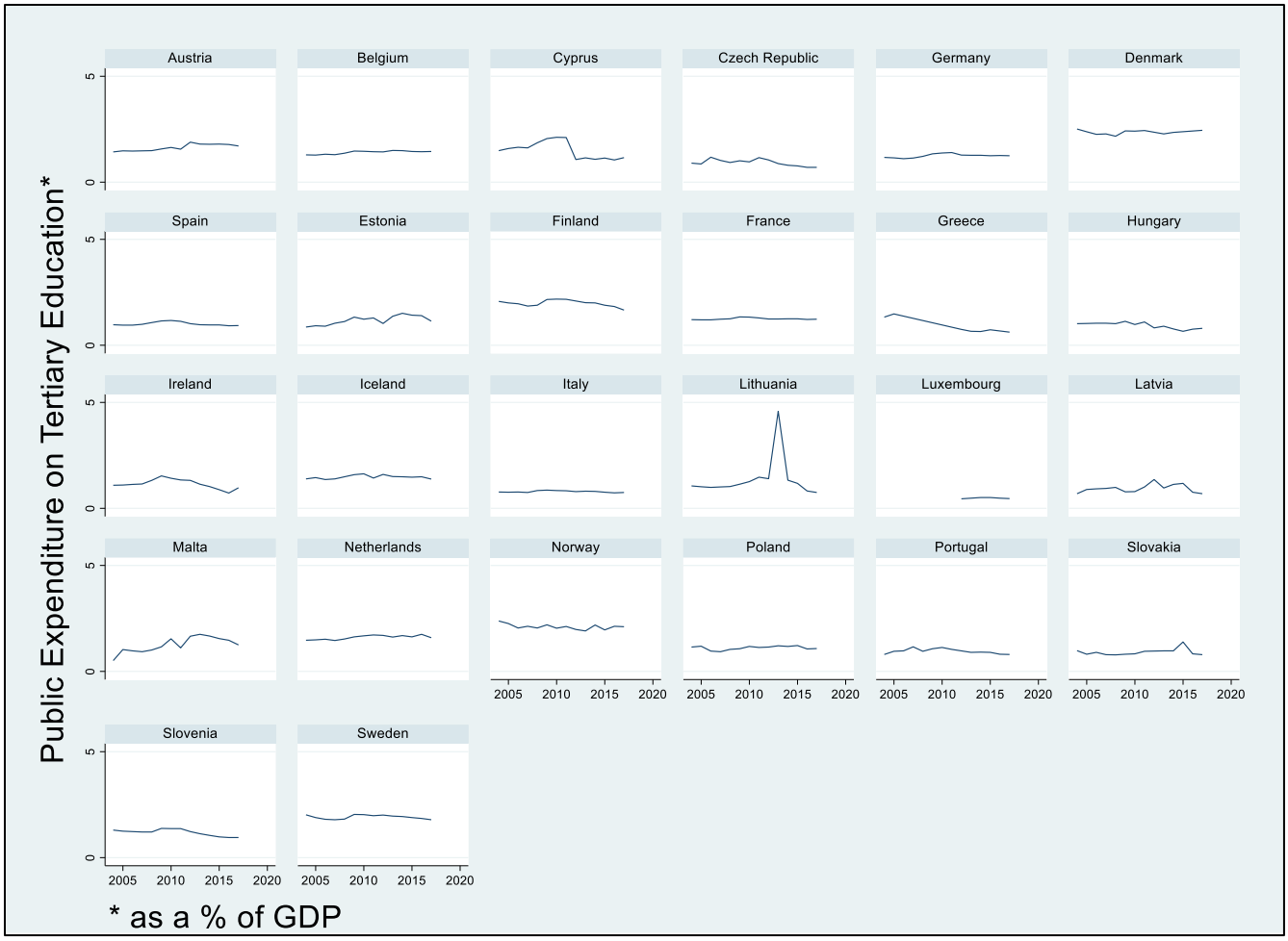
Source: Eurostat. online data code: EDAT_LFS_9911

The Graph 3 illustrates the trends in tertiary educated migrants of EEA countries. Overall, there is an upward trend in migration of tertiary educated individuals into EEA region. When looking at country trends (Appendix 2 presents the same statistics per EEA member state), Ireland and Poland have the highest proportion of tertiary educated migrants among the migrant population in the country. Lithuania and Luxembourg have seen great increase in the number of migrants with higher education. Denmark and Sweden experienced steady increase while Iceland, Latvia and Slovakia saw a decline. The rest of the countries maintained the same level of educated migrants throughout the reporting period 2004-2017.

Independent Variables

The research uses two different independent variables. First variable is the 'Public Expenditure on tertiary education as % of GDP'. The data is provided by Eurostat and serves to test the first and second hypotheses. Eurostat database enables to separate the information pertaining to tertiary education expenses, covering the period of 2001-2011 (Eurostat, 2020d) and 2012-2017 (Eurostat, 2020e). Not only does it report the data regarding public expenditure on tertiary education, but also its source of origin. Only expenditures coming from the government and not from the private entities (local and/or central government) are selected to compile a dataset. The statistics on public spending on tertiary education is provided graphically below:

Graph 4. Public Expenditure on tertiary education as a % of GDP in EEA member states.



Source: Eurostat. Online data code for dataset that covers 2001-2011: EDUC_FIGDP. Online data code for dataset that covers 2012-2017: EDUC_UOE_FINE06

The Graph 5 illustrates that majority of the countries were consistent in their spending behavior. Lithuania experienced a sharp increase and immediate decrease in public spending for tertiary education between 2010-2015. We notice steady decline in Finland, Greece, Ireland, Slovenia and Sweden.

The second independent variable is tuition fees charged to foreign non-EEA students. This data serves to test the third hypothesis. The data is based on OECD Education at a Glance annual publication which contains information on annual average tuition fees charged by tertiary institutions to national and international students in OECD countries, including 16 EEA member states. Data on the remaining 10 EEA countries that are part of this research, but not covered in OECD source, come from official informational web-portals of Ministry of Education[5] of the respective EEA country. OECD data covers the period between 2007-2017. It differentiates between tuitions fees charged by different

[5] For example, Federal Statistical Office of Germany in conjunction with DAAD – German Academic Exchange Service compiles information on tuition fees for all types of students.

levels of education programs: bachelor's, master's and PhD. It also distinguishes between tuition fees charged at public and private institutions. This research uses the data on tuitions fees charged to non-EEA students at public institutions (OECD, 2020 b, g).

Table 1. Annual average tuition fees charged by public tertiary institutions to international non-EEA students

No tuition fee	Moderate[6] tuition fees	Full[7] tuition fees
France	Austria	Sweden
Germany	Latvia	Finland
Greece	Portugal	Ireland
Italy	Hungary	Netherlands
Norway	Lithuania	Slovenia
Slovakia	Luxembourg	Cyprus
Spain	Poland	Czech Republic
		Estonia
		Malta

Source: OECD (2020g)

Auxiliary Data

Regarding the datasets that are used as control variables and an instrumental variable in this research - the first one is OECD Social Expenditure indicator (SOCX) that has been developed in order to serve as a measure of social policy. We use this measure to indicate welfare generosity of a country. The indicator includes reliable and internationally comparable statistics on public and private social expenditure. It covers 37 OECD countries, including EEA member states for the period 1980-2017/18. The indicator consists of expenditure on old age, survivors, incapacity-related benefits, health, family, active labor market programs, unemployment benefits, housing and other social policy areas. SOCX does not record spending related to tertiary education. However, it does record spending on early childhood education and care (OECD, 2019, Annex I.1.4,).

The second control variable is unemployment rate provided by OECD based on labor force surveys (LFS). OECD estimates unemployment rate by calculating number of unemployed people as a % of the labor force. Unemployed people are defined as those who are of working age (above 15 years old), currently not employed, ready to undertake a work and have taken specific measures to find a job. The labor force is defined as the sum of unemployed and employed (OECD, 2020a).

[6] Moderate tuition fees mean that country charges tuition fees equivalent to the statutory fee paid by native students. The range is between 750-4500. This threshold is set taking into account minimum and maximum amount charged to non-EEA countries. Reference year: 2017/2018

[7] Full tuition fee means that non-EEA students pay full tuition fee, approximately 9000 EUR on average per academic year.

Last variable is private spending on education as a % of the GDP and serves as an instrumental variable in this research. Private spending consists of direct expenditure on educational institutions (schools, universities) by households (students and their families) and other private entities (business, charitable organizations, non-profit organizations). The data is divided into primary, primary to post-secondary, non-tertiary and tertiary levels. It excludes any public subsidies for education (OECD, 2020b, f).

4.4. Methodology

To answer the research question of whether subsidized higher education impactshighly skilled migration, we use panel data and econometric methodology that includes Ordinary Least Squares (OLS) regression analysis, fixed effects, interaction effects and instrumental variable.

Panel data is a cross sectional and time-series data that enables evaluation of the variability of dependent, independent and control variables over time and across countries. We use panel data to run multiple regression analysis. Since regression model postulates a linear relationship, we should be observing a linear relationship between the public spending on tertiary education and highly skilled migration. The econometric task is to estimate the slope of this linear relationship. This is done using OLS (Stock & Watson, 2015). The Panel Data Regression equation is written as:

$$\boldsymbol{HSM_{it} = \alpha_i + \beta Cost_{it} + \varepsilon_{it}} \qquad \boldsymbol{(1)}$$

where, ***HSM*** stands for highly skilled migration; ***Cost*** is public spending on tertiary education; subscript $\boldsymbol{i}$ denotes the index for cross-section, i=1, 2, 3, …., 26; subscript $\boldsymbol{t}$ denotes the index for time-series, t=1,2,3….14[8]; α= intercept; β= slope or coefficient of independent variable (public spending); ε=error term.

The equation aims to explain how intercept $\boldsymbol{\alpha}$ changes and how change in $\boldsymbol{\beta}$ coefficient affects the coefficient of highly skilled migration (HSM) through public spending on tertiary education (Cost).

OLS model assumes: a) linearity – there is a linear relationship between dependent and independent variable(s) and the error term; b) exogeneity – error term conditional mean is zero. It should not correlate with any independent variables; c) error term should have the same variance (homoskedasticity) and should not relate with one another (non-autocorrelation); d) error terms are normally distributed; e) there should not be exact linear relationship among independent variables (no multicollinearity); and f) independence - independent and dependent variables are independently and identically distributed. However, because we are using panel data, we should be concerned that

[8] Since we cover two different time periods in this research, the testing of 1st hypothesis involves only 5 years, therefore, t=5. The 2nd hypothesis involves 14 years, hence t=14

independent variable may be correlated with an error term, potentially violating the exogeneity assumption ($E(\varepsilon_{it}|Cost_{it}) \neq 0$). We can address this issue using fixed effects model described below (Stock & Watson, 2015).

Fixed effects

In panel data, there is a possibility that independent variable is correlated with one of the components of the error term, and that is time-invariant error term. This time-invariant error term is called unobserved omitted variable which differs across countries, but not over time. We add this unobserved omitted variable to the regression equation (1):

$$\boldsymbol{HSM_{it} = \alpha_i + \beta Cost_{it} + \gamma Z_i + \varepsilon_{it}} \qquad \boldsymbol{(2)}$$

where $\boldsymbol{Z_i}$ denotes an unobserved variable that changes from one country to another, but stays constant over time and γ is its slope. $\boldsymbol{Z_i}$ may represent community perception of migration in general that stays constant over longer period of time. We are interested in estimating $\boldsymbol{\beta}$, holding constant the unobserved country characteristic $\boldsymbol{Z_i}$. Because $\boldsymbol{Z_i}$ varies across countries, the fixed effects regression model will have different intercepts for each country. We write this as $\boldsymbol{\varphi_i = \alpha + \gamma Z_i}$ and equation (2) becomes the fixed effects regression model:

$$\boldsymbol{HSM_{it} = \beta Cost_{it} + \varphi_i + \varepsilon_{it}} \qquad \boldsymbol{(3)}$$

where $\boldsymbol{\varphi_i,\ldots, \varphi_n}$ are unknown intercepts of each country that needs to be estimated. The slope coefficient on public spending doesn't change (Stock & Watson, 2015).

Panel data poses the problem of correlation of the error term across observations. This happens because the data consists of repeated observations on the same unit (country) over time. This leads to serial correlation in the error term. The result however does not create inconsistency or bias in OLS estimates but violates the independence assumption. This problem affects the variance of the fixed effects estimator and the computation of standard error. We use clustered standard errors in our estimations to correct for this problem (Stock & Watson, 2015).

The error terms are rarely homoscedastic and normally distributed. It is suggested to use heteroskedasticity-robust standard errors to fix the problem of OLS assumption 'c' (Kennedy, 2008; Stock & Watson, 2015). We use robust standard errors in our estimations to correct for this.

Threats to internal validity

According to Stock and Watson (2015), there are many reasons why the OLS estimator of multiple regression coefficients might be biased. Among them: 1) omitted variables, 2) misspecification of the functional form of the regression function, 3) imprecise measurement of the independent variables ("errors in variables"), 4) missing data and sample selection, and 5) simultaneous causality. For simplicity, we assume that the relationship between the dependent and independent variables is linear, discarding the second problem. There is no known measurement error while collecting observational data on main variables, hence we skip the third problem. Data is missing only for certain countries that resulted in their exclusion from the research. As well, there is no sample selection bias in this research as we do not rely on any random selection methods. We are left with problems 1 and 5 which we address below.

In order to mitigate possible omitted variable bias, we need to identify other determinants of highly skilled migration, other than the public spending on tertiary education, and control them in our analysis. In line with earlier propositions of prominent social scientists, factors such as welfare generosity of a country and employability rate may partially influence the decision of highly skilled people to migrate. Welfare generosity may influence both highly skilled migration and propensity of the country to finance its higher education (OECD, 2020e). Welfare generosity may indicate greater public spending on social services to which highly skilled migrants have access. In this case, welfare system acts as a pull factor. Unemployment rate affects highly skilled migration and public spending. High unemployment rate may deter highly skilled migration, reduce tax revenues to the government, leading to lower public funds to finance the education (OECD, 2020a). Using the methodology of Toschkov (2009) and Stock and Watson (2015), we include these two variables as controls to isolate the effect of welfare generosity and unemployment rate on highly skilled migration (OECD, 2020 a, e). As reported in the next section "Empirical findings", the additional covariates are statistically significant. Following Stock and Watson (2015), we keep the additional covariates in the base regression specification. The corresponding regression equation takes the following format:

$$HSM_{it} = \beta Cost_{it} + \delta Unemployment_{it} + \zeta Welfare_{it} + \varphi_i + \varepsilon_{it} \qquad (4)$$

where, δ-slope of unemployment rate and ζ- slope of welfare generosity.

There is always the possibility of further omitted variables that can correlate with public spending and migration which have not been included in the current regression analysis. The only way of eliminating this problem is conducting a natural experiment. Since we deal with the observational study, the problem of omitted variable bias persists throughout the research. Using panel data and fixed effects model gives us the

opportunity to at least control for unobserved omitted variables as long as they don't change over time (Stock & Watson, 2015).

Inclusion of additional variables may help mitigate omitted variable bias; however, it can also increase the variance of the estimator of main coefficient β. The increase in variance leads to the increase in standard deviation and low t-statistics. This has a direct impact on the p-value, reducing the significance level of the main coefficient of interest[9] (Stock & Watson, 2015). Therefore, we interpret the results with caution and take into account the effect control variables may have on the main coefficient of interest - **β.**

The next problem is the simultaneous causality, which means that the relationship between the independent and dependent variables runs in a reverse direction (Stock & Watson, 2015). This indicates that there is a high chance highly skilled migration (our measure of dependent variable) impacts the decision of the government to spend more on tertiary education (our dependent variable), opposite to what this research suggests. In our case, any random increase in highly skilled migration may be due to the positive error term, and not the result of public spending on tertiary education. Increase in the value of highly skilled migration increases the value of public spending. This results in simultaneous causality that leads to correlation between the independent variable and the error term, creating bias and inconsistency of OLS estimator. This problem is also known as endogeneity issue and could be addressed using instrumental variable approach (Stock & Watson, 2015), the method discussed below.

Instrumental Variable.

Instrumental Variable (IV) strategy is used to address the reverse causality (Leszczensky & Wolbring, 2019). Main criteria for IV is to find a variable – an instrument, that will be exogenous and relevant. Exogenous means that the instrument should not directly impact the dependent variable and relevant means that instrument should be strong, that it should have sufficient variation in our independent variable (Stock & Watson, 2015).

It is challenging to find such an instrument that satisfies both exogeneity and relevance assumptions. However, one potential candidate could be the private expenditure on tertiary education. The selection of this instrument rests on the following arguments - first of all, tertiary education expenditure is composed of private and public funds. Even though the public portion of it dominates in many EEA countries, the reliance on private funding is growing in some countries (OECD, 2020g, Table 3.3.). For example, the share of private spending on tertiary education increased by 5 percentage points between 2012-2017 in some EEA countries, while the public share declined by the same amount. Some countries instead saw the reverse trend: increase in public funding followed by a decrease

[9] To note, control variables (unemployment rate, welfare generosity) may also be affected by the dependent and/or independent variables. One potential way to address this problem is to use lagged dependent variable.

in private financing of education. This mixed trend is observed across many EEA countries (OECD, 2020g). Therefore, private spending on tertiary education impacts the public spending on education. This argument supports the relevance assumption. Second, an increase in public spending in tertiary education may create additional study opportunities for native as well as international non-EEA students. This can be explained by the decrease in a student-teacher ratio which leads to hiring more teaching staff as a result of either population growth or increased demand for tertiary education (OECD, 2020g, Annex 3). Increase in the opportunity to study in a tertiary institution means that more students (native and international) can be recruited to meet the demand for education. Since most EEA countries do not discriminate against other nationals in terms of allocating university seats to student applicants, that is, no pre-defined quota restrictions are present for non-EEA student applicants (OECD, 2020g), international students have the same chance of using educational opportunity created by higher public spending on education, thus leading to higher admissions rate. Third, once additional education opportunity is created, be it via increase/decrease in public or private share of expenditure on tertiary education, the new status quo persists for a certain period of time which leads to the increase/decrease in the flow of student migration (within EEA and intercontinental). Overall, there is a growth in student admission rates across EEA public tertiary institutions, reported in the Graph 1 and 2 of section 'Dependent Variables'. Lastly, education expenditure reported by OECD is related to education related fees only, such as tuition or administrative fee. These fees are entirely borne by private individuals (students and their families) and concerns only the nationals of EEA countries. It does not concern international non-EEA students. The research, therefore, assumes that this instrument – private spending of EEA nationals on tertiary education – doesn't impact migratory behavior of international non-EEA students.

Now that we identified potential instrumental variable, we reflect it our OLS estimation. As mentioned, the instrument is used to address the problem of endogeneity – where endogenous variable is correlated with an error term. The endogenous variable in our case is public spending on tertiary education denoted as $\boldsymbol{Cost_{it}}$ in equation (1). Exogenous variable – the instrument is used to explain one part of the variation in the endogenous variable that is uncorrelated with an error term. That exogenous variation captures the movement of $\boldsymbol{Cost_{it}}$ and estimates the coefficient $\boldsymbol{\beta}$. It can be estimated using IV estimator called two stage least squares (TSLS). Following Stock and Watson (2015), we decompose the endogenous variable into following equation:

$$\boldsymbol{Cost_{it} = \psi_0 + \psi_1 Private\_Spending_{it} + \nu_{it}} \qquad \boldsymbol{(5)}$$

where $\boldsymbol{\psi_0}$ is an intercept, $\boldsymbol{\psi_1}$ is the slope, Private_Spending is the instrument, $\boldsymbol{\nu_{it}}$ is the error term.

Interaction effects

Interaction effect occurs when the relationship between the dependent and independent variable depends on the presence of a third variable. To see if *tuition fees* charged to non-EEA students moderates the relationship between *public spending on tertiary education* and the *highly skilled migration*, we use interaction effect between continuous variable (public spending) and indicator variable (tuition fees). The indicator variable takes on 3 values indicating different levels of tuition fees charged to non-EEA students by public tertiary institutions of EEA countries, where 1 denotes a country that doesn't charge any tuition fees, 2 if country applies moderate tuition fees and 3 if country charges high/full tuition fees. The OLS regression equation takes the following format:

$$\boldsymbol{HSM_{it} = \alpha_i + \beta Cost_{it} + \mu\ Tuition_i + \upsilon\,(Cost * Tuition) + \varepsilon_{it}} \qquad \boldsymbol{(6)}$$

where μ is the coefficient of tuition fees – it measures the effect tuition fees has on highly skilled migration holding public spending on tertiary education constant; ***Tuition*** – is tuition fee charged to international non-EEA students; υ is the coefficient of a new variable that consists of interaction between public spending on tertiary education (***Cost***) and countries that charge tuition fees to non-EEA students (***Tuition***). This interaction term creates different slopes for variables. Different slopes in turn help us see the difference in the effect of an additional public spending for countries that charge moderate/high tuition fee versus countries that don't charge any tuition fee. We introduce the same interaction term to the equation with all control variables and derive the following equation:

$$\boldsymbol{HSM_{it} = \alpha_i + \beta Cost_{it} + \delta Unemployment_{it} + \zeta Welfare_{it} + \mu\ Tuition_i + \\ + \upsilon\,(Cost * Tuition) + \varepsilon_{it}} \qquad \boldsymbol{(7)}$$

5. EMPIRICAL FINDINGS

5.1. First hypothesis testing

We look at the relationship between the mobile students from abroad and public spending on tertiary education. The dataset consists of students coming from 227 countries, EEA member states, but excludes the reporting country. Table 1 reports regression estimates.

Table 1. Relationship between highly skilled student migration and public spending on tertiary education. Regression Results

Dependent Variable: International students enrolled in Master's and PhD programs at EEA public institutions (including EEA countries, excluding the reporting country) for the period of 2013-2017.

	OLS		Fixed Effects		Interaction effect		
Independent Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Public Spending on tertiary education as a % of GDP	-0.0114 (0.0107)	-0.0300 (0.0156)	-0.0012 (0.0021)	0.0002 (0.0018)	-0.0114 (0.0095)	-0.0901*** (0.0235)	-0.0058 (0.0083)
Unemployment rate		-0.0049*** (0.0014)		-0.0009 (0.0023)		-0.0069*** (0.0017)	
Welfare generosity		0.0043** (0.0013)		0.0019 (0.0014)		0.0057*** (0.0013)	0.0052*** (0.0014)
*Group 2 countries**					0.0244 (0.0350)	-0.0709 (0.0419)	0.0504 (0.0319)
*Group 3 countries***					0.0178 (0.0266)	-0.0540 (0.0418)	0.0667* (0.0322)
Public Spending x Group 2					0.0148 (0.0279)	0.0961** (0.0296)	0.0088 (0.0219)
Public Spending x Group 3					-0.0089 (0.0157)	0.0409 (0.0258)	-0.0408* (0.0193)
Intercept	0.0873*** (0.0154)	0.0554 (0.0283)	0.0744*** (0.00266)	0.0336 (0.0225)	0.0742*** (0.0148)	0.106* (0.0509)	-0.0603 (0.0345)
Summary Statistics							
N	126	116	126	116	126	116	116
R^2	0.008	0.162	0.001	0.010	0.077	0.319	0.189
Adj. R^2	-0.000	0.139	-0.008	-0.016	0.039	0.275	0.145
rmse	0.0693	0.0661	0.0160	0.0153	0.0679	0.0606	0.0659

Source: Eurostat (2020 b, d, f, g). OECD (2020, b, g). All values are in percentage points.
Migration flow to EEA region.
International students in this research are individuals in possession of tertiary education prior to arrival to EEA country for the purpose of studying at Master's and PhD program.
*Group 2 is an interaction term that represents EEA countries charging moderate tuition fees to non-EEA students
**Group 3 represents EEA countries charging high/full tuition fees to non-EEA students.
Group 1 represents EEA countries which don't charge any tuition fees to non-EEA students. This group serves as a reference group in interaction effect and corresponding coefficient is reported under model (5) as the main coefficient. Standard errors are reported in parenthesis below the estimated coefficients.
* p<0.05, ** p<0.01, *** p<0.001

Our regression analysis shows a negative relationship between the public spending on tertiary education and migration of tertiary educated students. The β coefficient of -0.0114 reported with negative sign indicates that unit increase in public expenditure in tertiary education is likely to decrease the student migration by 0.01 percentage points. However, this relationship is not strong enough. The inclusion of control variables in the regression, such as unemployment rate and welfare generosity only marginally reinforce the coefficient, but the result is still statistically insignificant and therefore not sufficient to reject the null hypothesis that β is zero. Welfare system and unemployment rate seems to correlate with student migration, each showing statistically significant coefficients at the 1% level. Welfare system is likely to attract student migration by 0.0043 percentage points, while unemployment is likely to deter it by a slightly higher percentage point.

Models (3) and (4) report OLS regression with fixed effects. The results show that coefficients remain negative and statistically insignificant.

Regression in models (5), (6) and (7) introduces an interaction term to the OLS. The interaction term represents 3 different groups of EEA countries. Group 1 is the reference country and consists of EEA member states that don't differentiate between native and non-EEA students, and therefore don't charge any tuition fee, except for administrative fees charged to both natives and internationals that range between 60-250 EUR per student per semester (OECD, 2020, b, g). Group 2 countries apply moderate tuition fees up to <4500 EUR per academic year. The amount <4500 EUR is based on minimum and maximum tuition fees charged by Group 2 and 3 countries. On average, full tuition fee amounts to approximately 9000 EUR per non-EEA student per year in EEA countries. Group 3 represents countries that apply full tuition fee, that is >4500 EUR per student per year. While model (5) doesn't report any significant values of interest, model (6) shows negative and statistically significant relationship between public spending on tertiary education and highly skilled migration moderated by tuition fees. According to the results, migration is likely to decrease by 0.0901 percentage points due to a unit increase in public spending in countries with no tuition fee payment. This result is statistically significant at the 1% level. However, since none of the interaction terms reported in model (5) show any individual significant values to support the claim of model (6), it casts some doubts on the findings. To confirm the results, we run another regression reported under model (7) and realize that main coefficient in model (6) picked up the effect of unemployment rate. Indeed, exclusion of unemployment rate returns the findings of interaction effect to insignificant value. We conclude that none of the techniques show significant values of interest. Graphical representation of the relationship between public spending on tertiary education and student migration is provided in the Appendix 3.

As a next step, we exclude all students coming from EEA countries from the pool of students, that only non-EEA students are now left in the dataset.

Table 2. Relationship between highly skilled student migration and public spending on tertiary education. Regression Results

Dependent Variable: International students enrolled in Master's and PhD programs at EEA public institutions (excluding nationals of EEA countries) for the period of 2013-2017.

	OLS		Fixed Effects		Interaction effect			
Independent Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Public Spending on tertiary education as a % of GDP	0.0012 (0.0012)	0.0007 (0.0017)	-0.001 (0.0006)	-0.0008 (0.0006)	0.0036* (0.0014)	0.0021 (0.0023)	0.0027* (0.0012)	-0.0009 (0.0026)
Unemployment rate		-0.0002 (0.0001)		-0.0003 (0.0002)		-0.0001 (0.0002)		-0.0004 (0.0002)
Welfare generosity		-0.0009*** (0.0001)		0.0011** (0.0003)		-0.0008*** (0.0001)	-0.0008*** (0.0001)	
*Group 2 countries**					0.0044* (0.0014)	-0.0006 (0.0044)	0.0003 (0.0023)	-0.0022 (0.004)
*Group 3 countries***					0.0159*** (0.0046)	0.0098 (0.0074)	0.0107* (0.0049)	0.0095 (0.0062)
Public Spending x Group 2					-0.0033* (0.0016)	-0.0018 (0.0034)	-0.0024 (0.0022)	0.0013 (0.0028)
Public Spending x Group 3					-0.0061* (0.0028)	-0.0038 (0.0045)	-0.0044 (0.003)	-0.0017 (0.004)
Intercept	0.0053** (0.0017)	0.027*** (0.0004)	0.008*** (0.0008)	-0.0129 (0.0006)	-0.0008 (0.0012)	0.0219** (0.0073)	0.0207*** (0.0004)	0.0087 (0.0056)
Summary Statistics								
N	129	124	129	124	129	124	124	129
R^2	0.004	0.337	0.019	0.094	0.155	0.421	0.420	0.174
Adj. R^2	-0.004	0.320	0.011	0.072	0.121	0.386	0.390	0.134
rmse	0.0105	0.0088	0.0028	0.0027	0.0098	0.0084	0.0083	0.0097

Source: Eurostat (2020, b, d-g). OECD (2020, b, g). All values are in percentage points.
Migration flow to EEA region.
International students in this research are individuals in possession of tertiary education prior to arrival to EEA country for the purpose of studying at Master's and PhD program.
*Group 2 is an interaction term that represents EEA countries charging moderate tuition fees to non-EEA students
**Group 3 represents EEA countries charging high tuition fees to non-EEA students.
Group 1 represents EEA countries which don't charge any tuition fees to non-EEA students. This group serves as a reference group in interaction effect and corresponding coefficient is reported under model (5) as the main coefficient.
Standard errors are reported in parenthesis below the estimated coefficients.
* p<0.05, ** p<0.01, *** p<0.001

Excluding EEA students from this regression analysis didn't cause any change in the main coefficient of OLS estimate in models (1) and (2), except for the relationship between the variables reported earlier now turns positive (0.0012), but still statistically insignificant.

As a matter of fact, after we remove EEA students from this analysis, the number of international non-EEA students becomes quite negligible, accounting for only 5% of overall mobile students coming from abroad in 2017. This suggests that major trend in migration of students happens within the EEA region, rather than in inter-continental form. If welfare generosity was likely to attract student migrant in an earlier regression, it is now likely to deter non-EEA students from coming to study, although by a very negligible amount - 0.0009 percentage points.

Models (3) and (4) reporting fixed effects don't yield significant results either. Main coefficients show negative relationship between student migration and public spending on tertiary education.

Models (5) through (8) report interaction effects. Model (5) shows that increase in public spending is likely to increase student migration by 0.0036 percentage points provided that non-EEA students are not obliged to pay tuition fees. Group 2 countries that charge moderate tuition fees increase the chance of student migration only marginally compared to reference Group 1. Both results are statistically significant at the 5% level. Being a country from Group 3 though changes the whole picture. Contrary to the hypotheses 3, countries that charge full tuition fees increase student migration by 0.0159 percentage points – a higher rate than the other groups combined. This coefficient is statistically significant at the 1% level. This result supports the argument put forward by Beine et al (2014) that universities charging higher tuition fees are likely to attract more students than universities that charge less or none, as the price for education symbolizes its quality.

Model (6) includes control variables that seem to affect the main coefficients which have turned insignificant in this estimation. We employ the same technique of previous regression analysis and exclude unemployment rate from the estimation of model (7). But we see no correlation between the main coefficient of interest and unemployment rate. Exclusion of welfare generosity from model (8) turns the coefficient to insignificant.

5.2. Second and third hypothesis testing

We look at the relationship between public spending on tertiary education (Independent variable) and migrant population with tertiary education (Dependent variable) holding constant control variables, using fixed effects and interaction effects.

Table 3.	**Regression Results of flow of tertiary educated migrants on public spending of tertiary education.**					
Dependent Variable: population of migrants with tertiary education						
	OLS		**Fixed Effects**		**Interaction effect**	
Independent Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Public Spending on tertiary education as a % of GDP	4.963*** (1.295)	5.551** (1.759)	-1.507 (1.761)	-2.802** (0.944)	17.98*** (1.440)	17.52*** (2.055)
Unemployment rate		-0.244 (0.163)		-0.283* (0.133)		0.0847 (0.160)
Welfare generosity		-0.653*** (0.133)		0.266 (0.281)		-0.507*** (0.142)
Group 2 countries					31.50*** (4.518)	28.71*** (4.525)
Group 3 countries					23.61*** (3.885)	16.88** (5.656)
Public Spending x Group 2					-21.55*** (3.456)	-20.37*** (3.098)
Public Spending x Group 3					-15.05*** (2.301)	-11.29*** (3.278)
Intercept	22.92*** (2.039)	38.74*** (3.552)	31.52*** (2.342)	29.52*** (5.828)	3.359 (2.231)	15.33** (5.748)
Summary Statistics						
N	323	296	323	296	323	296
R^2	0.045	0.126	0.008	0.044	0.196	0.225
Adj. R^2	0.042	0.117	0.004	0.034	0.184	0.206
rmse	11.03	10.97	4.257	4.177	10.18	10.40

Source: Eurostat (2020 a, d-g) and OECD (2020 a, e)
*Group 2 is an interaction term that represents EEA countries charging moderate tuition fees to non-EEA students
**Group 3 represents EEA countries charging high tuition fees to non-EEA students.
Group 1 represents EEA countries which don't charge any tuition fees to non-EEA students. This group serves as a reference group in interaction effect and corresponding coefficient is reported under model (5) as the main coefficient.
Standard errors are reported in parenthesis below the estimated coefficients.
* p<0.05, ** p<0.01, *** p<0.001

The model (1) and (2) reports the estimates of OLS regression. The results show positive and highly significant relationship at the 1% level, indicating that public spending is more likely to increase the number of economic migrants with tertiary education – our measure of highly skilled migration. For one unit increase in public expenditure in tertiary education, the total number of highly skilled migrants is expected to increase by 4.96 percentage points. The inclusion of control variables in model (2) reinforces the effect. Among the control variables, only the welfare generosity is statistically significant at the

1% level, indicating that one unit increase in social expenditure reduces highly skilled migration by 0.653 percentage points. This result supports the claims of Razin and Wahba (2015) on likely deterrence effect of welfare system on migration of skilled professionals.

Model (3) and (4) report fixed effects results. Main coefficient turns negative and statistically insignificant in model (3). Addition of control variables in model (4) changes the main coefficient to negative and statistically significant at the 1% level, perhaps driven by the effect of control variables. The reported coefficient implies that a unit of increase in public expenditure is likely to decrease the flow of migration by 2.802 percentage points, holding constant unemployment rate and welfare generosity. Unemployment rate seems to be the only control variable correlated with highly skilled migration. The coefficient predicts that 1 unit increase in unemployment rate reduces migration flow by 0.283 percentage points, statistically significant at the 5% level.

Model (5) and (6) introduces an interaction term to the OLS regression. Omission of tuition fee in regression (1) results in a striking change: once we introduce tuition fee in model (5), the main coefficient triples and becomes statistically significant at the 1% level. The coefficient 17.98 indicates that a unit increase in public spending is likely to cause an increase in highly skilled migration by 17.98 percentage points provided that non-EEA students are not charged any tuition fees. Group 2 and 3 countries are likely to increase migration be even higher rate when compared to the reference Group 1 that do not charge any tuition fee. All coefficients of model (5) are significant at the 1% level. This provides some evidence that the effect of public spending on highly skilled migration is different for countries that charge differing tuition fees. Addition of control variables doesn't have much impact on the main coefficient. The results are still large and statistically significant at the 1% level.

5.3. IV Results

To estimate IV regression, we use two independent variables: non-EEA students of Master's and PhD degree programs reported under columns (1) and (2) and migrant population with tertiary education under the columns (3) and (4). Two stage least squares results are presented in the table 4.

Table 4. IV Regression Results of highly skilled migration.

	Non-EEA Students with tertiary education		Highly skilled migrants	
Independent Variable	**(1)**	**(2)**	**(3)**	**(4)**
Two-Stage Least Squares				
Public Spending on tertiary education as a % of GDP	-0.00 (0.01)	-0.06 (0.71)	-30.32 (51.51)	--58.24 (156.7)
Unemployment rate		0.00 (0.02)		-0.90 (2.44)
Welfare generosity		0.00 (0.00)		1.43 (4.15)
Intercept	0.00 (0.02)	0.02 (0.55)	70.22 (69.99)	84.08 (144.7)
N	68	68	194	194
First Stage for Public Spending in tertiary education				
Private Spending on tertiary education as a % of GDP	0.28 (0.17)	0.21 (0.17)	-1.248*** (0.238)	-0.73*** (0.25)
Unemployment rate		-0.03** (0.01)		-0.033*** (0.00)
Welfare generosity		0.00 (0.01)		0.02* (0.01)
Intercept	1.21*** (0.09)	1.55*** (0.35)	1.63*** (0.06)	1.44*** (0.18)
N	68	68	207	207
R^2	0.04	0.14	0.12	0.21
Adj. R^2	0.03	0.10	0.11	0.20
F-statistic	2.76	3.52	27.55	18.52
Ordinary Least Squares				
Public Spending on tertiary education as a % of GDP	0.0012 (0.0012)	0.0007 (0.0017)	4.963*** (1.295)	5.55** (1.75)
Unemployment rate		-0.0002 (0.0001)		-0.24 (0.16)
Welfare generosity		-0.0009*** (0.0001)		-0.65*** (0.13)
Intercept	0.0053** (0.0017)	0.027*** (0.0048)	22.92*** (2.03)	38.74*** (3.55)
N	129	124	323	296

Source: Eurostat (2020, a, d-g) and OECD (2020, a, e, f)
For a comparison of results, we replicate the results of OLS estimates from Table 2 and 3.
Standard errors are reported in parenthesis below the estimated coefficients.
* p<0.05, ** p<0.01, *** p<0.001

Our instrumental variable is an aggregate private spending of EEA students on tertiary education as a % of GDP. First of all, we look at the first-stage relationship between public and private spending in tertiary education as a way of testing the validity and relevance of the instrument. Reported F-statistic serves as an indicator to tell whether the instrument employed in this regression is weak or strong. Generally accepted practice is to regard an instrument as strong if the F-statistic is above 10. *Adj.* R^2, coefficients with their corresponding p-values help interpret the results of this regression (Stock & Watson, 2015).

The instrument doesn't pass the test of validity and strength for the regression (1) and (2) where we use non-EEA students of Master's and PhD programs as the dependent variable. Reported F-statistic is way below 10 and instrument doesn't seem to explain much of the variation in our endogenous variable – public spending for tertiary education. As well, the coefficients are not statistically significant. Second stage of IV regression – a two-stage least squares, confirms that instrument is irrelevant. Therefore, the results of these 2 regression estimates are not of much interest.

The instrument is quite strong for the regression (3) and (4) where we use highly skilled migrants as the dependent variable. The F-statistic is 27.55, and 18.52 when controlled for additional covariates. The instrument explains 11% variation in our measure of public spending and 20% when controlled for additional covariates. As predicted, an increase in the private share of expenditure on tertiary education is associated with the decrease in the public share of those expenditures. According to the estimates, one percentage point increase in private spending is likely to cause a decrease in public spending by 1.248 percentage points. The coefficient is statistically significant at the 1% level. This finding confirms the OECD findings on education finance trends, where increase in private share of education finance is accompanies by the decrease in the public share.

When additional control variables enter the regression (4), the coefficient drops to 0.73, however it remains statistically significant at the 1% level. We see that unemployment rate is highly correlated with the public spending. Unit increase in unemployment rate likely to reduce the public spending on tertiary education by 0.033 percentage points. This is a very small effect, but still statistically significant result at the 1% level. Perhaps the explanation lies in the decision of the governments to allocate more funds in unemployment benefits rather than in education. If more people become unemployed, they automatically get benefits and rely on them until they find a job. Increased demand for unemployment benefits raises the expenditure on social services, perhaps simultaneously leading to the reduction in the budget allocated for the education. Our estimates seem to provide some evidence for it.

The results of two-stage least squares indicate that we cannot reject the null hypothesis that the instrument is exogenous. The coefficients are not statistically significant. This

signals that there is still an endogeneity issue. Although the instrument works quite well explaining the first stage relationship between public and private spending, it fails to further explain the relationship. We conclude that the instrument is weak and irrelevant for this estimation.

6. ANALYSIS

This thesis proposes three hypotheses based on the postulates of migration theory. According to the theory, push and pull factors have tendency to attract/deter migration. Our proposition is that subsidized higher education serves as a pull factor for highly skilled migration. To test the hypotheses, the research uses 3 different econometric techniques: OLS, OLS with fixed effects and OLS with interaction effect. The results presented in Table 2 show that only OLS regression with interaction effect strongly supports the 1st hypothesis that higher public spending on tertiary education is associated with increased migration of tertiary educated non-EEA students to the EEA region. One percentage point increase in public spending is likely to lead to an increase in non-EEA student migration by 0.0036 percentage points provided that students don't pay any tuition fees. On contrary to what we expected, countries that charge full tuition amount had higher likelihood of attracting highly skilled students compared to countries that charge no tuition fees or moderate tuition fees. This finding supports the earlier proposition of Beine et al (2014) that higher tuition fee signals the quality of education and therefore increases international student migration. At the same time, the findings refutes the 3rd hypothesis of this thesis.

Next, we hypothesized that higher public spending on tertiary education is associated with higher inflow of tertiary educated migrants. The results of OLS regression with interaction effect reported in Table 3 supports this idea. It shows positive correlation between the public spending on tertiary education and highly skilled migration. A unit increase in public spending on tertiary education likely to lead to an increase in highly skilled migration by 4.96 percentage points. Controlling for additional covariates positively impacted the results. In fact, the public spending became more powerful in explaining the highly skilled migration.

Finally, the last hypothesis stating that the effect of public spending on highly skilled migration is different for countries that charge differing tuition fees to non-EEA students receives some support the results of OLS regression with interaction effects. However, countries that charge full tuition fee are likely to experience higher flow of migration compared to countries that don't charge any fee. This is in stark contrast to the 3rd hypothesis.

Overall, OLS with interaction effect seems to be the only estimation technique that supports the claims of this thesis. Other techniques used, such as fixed effects model that controls for correlation between the public spending and time-invariant error-term component, scrutinizes the outcome of simple OLS regression by producing negative and statistically insignificant results. This raises the question of correlation≠causation, potentially refuting the proposed hypotheses that suffers from endogeneity bias.

Instrumental variable approach was not successful in addressing the reverse causality problem, thus further weakening the findings of the research. The results of regression estimates can be summarized in the table below:

Table 5. Summary of estimation techniques.

Dependent Variables:	OLS	FE	IF	IV
Highly skilled students including students from EEA countries	(-) correlation	(-) correlation	(-) correlation	Not estimated
Highly skilled non-EEA students	(+) correlation	(-) correlation	(+)* correlation Supports the hypothesis 1	Weak instrument F<10
Highly Skilled Migrants	(+) correlation	(-) correlation	(+)*** correlation Supports the hypotheses 2 and refutes the hypothesis 3	1st stage (+) 2nd stage (-)

Independent Variable is Public Spending on tertiary education.
OLS – ordinary least squares
FE – fixed effects
IF – interaction effect (tuition fees)
IV – instrumental variable (private spending on education by EEA nationals
* p<0.05, ** p<0.01, *** p<0.001

Although weak, results of OLS estimates with interaction effect corresponds with the theoretical expectations of this research. There is a positive correlation between public spending on tertiary education and highly skilled migration, inferring that subsidized education may serve as a pull factor. However, the results should be treated with great

caution as OLS cannot entirely explain the relationship between the main variables of interest. It suffers from the omitted variable bias.

All in all, it would be ideal to see how datasets of this research would respond to other estimation techniques.

7. CONCLUSION AND SUGGESTIONS

Conventional view has dictated that highly skilled migration is a movement of individuals with professional qualification who use labour corridors to move from country of origin to the country of destination. However, there is another potential way of highly skilled migration – and that is a movement of highly educated students whose initial purpose is not to work, but to study, and eventually get employment in the destination country.

Current academic literature related to highly skilled migration does not feature the movement of these students, especially the ones who came to study Master's and PhD degree programs. The lack of these literature was the main motivation to conduct this empirical analysis. That is, the thesis aimed to uncover one of the determinants of highly skilled student-migration and that was the subsidized higher education. The migration theory predicted that based on micro level analysis, migrants choose the destination country calculating costs and benefits of relocation. Based on this premise, the research assumed that students would choose a country with affordable education, which will lead to higher migration flow in countries where students don't pay for education. With this aim, the research examined public spending on tertiary education and juxtaposed it with the flow of highly skilled student-migration.

The research focused only on EEA region which receives inflow of migrants from 227 countries. The research used panel data for the period between 2004-2017. Main estimation techniques consisted of OLS regression, fixed effects, interaction effects and instrumental variable. OLS estimates using interaction effect confirmed two out of three hypothesis and demonstrated positive and statistically significant correlation between public spending on tertiary education and highly skilled migration. Furthermore, the research found that countries charging full tuition fees (approximately 9000EUR per academic year) have higher likelihood of attracting highly skilled students and migrants, potentially refuting the hypothesis 3. However, these results are weak and cannot be interpreted as causal.

The research used an instrumental variable to address the reverse causality, but failed to do so due to weakness of the instrument in explaining the main variable of interest.

In order to further explore the research topic in highly skilled student-migration, the research proposes to examine student retention rate in the country where they acquired

tertiary education, as this indicator would show whether students use educational opportunity as a gateway to the labor market of the destination country. At the moment, there is no data reporting on such indicator. One potential way of collecting information on the retention rate is through qualitative analysis such as surveys, interviews or questionnaire.

The research admits the lack of further robustness checks. Additional covariates could be included in the main regression analysis as a way of supporting the hypothesis and addressing omitted variable bias. Such covariates are: 1. wage; 2) university ranking; 3) partisanship; 4) immigration rules (strict or not); 5) integration activities (naturalization, citizenship); 6) cost of living (rent and food expenses).

In sum, educational policies differ across EEA countries. The range of tuition fees at higher educational institutions varies greatly, starting from 60 EUR per semester to 18,000. EUR per academic year. While some EU countries implement free education policies, others adopt more affordable options or charge substantial fees to international students. Due to free movement in EU, international graduates from subsidized universities may end up in the labor market of other EU countries where education is not subsidized. This can adversely impact the EU country that heavily invests in human capital development and positively impacts the EU country that uses different approach.

LIST OF ABBREVIATIONS

EEA – European Economic Area
EU – European Union
HEI – higher educational institution
HSM – highly skilled migration/migrant
IT – Information Technology
LFS – Labour Force Survey
OECD – Organization for Economic Co-operation and Development
SOCX - OECD Social Expenditure Database

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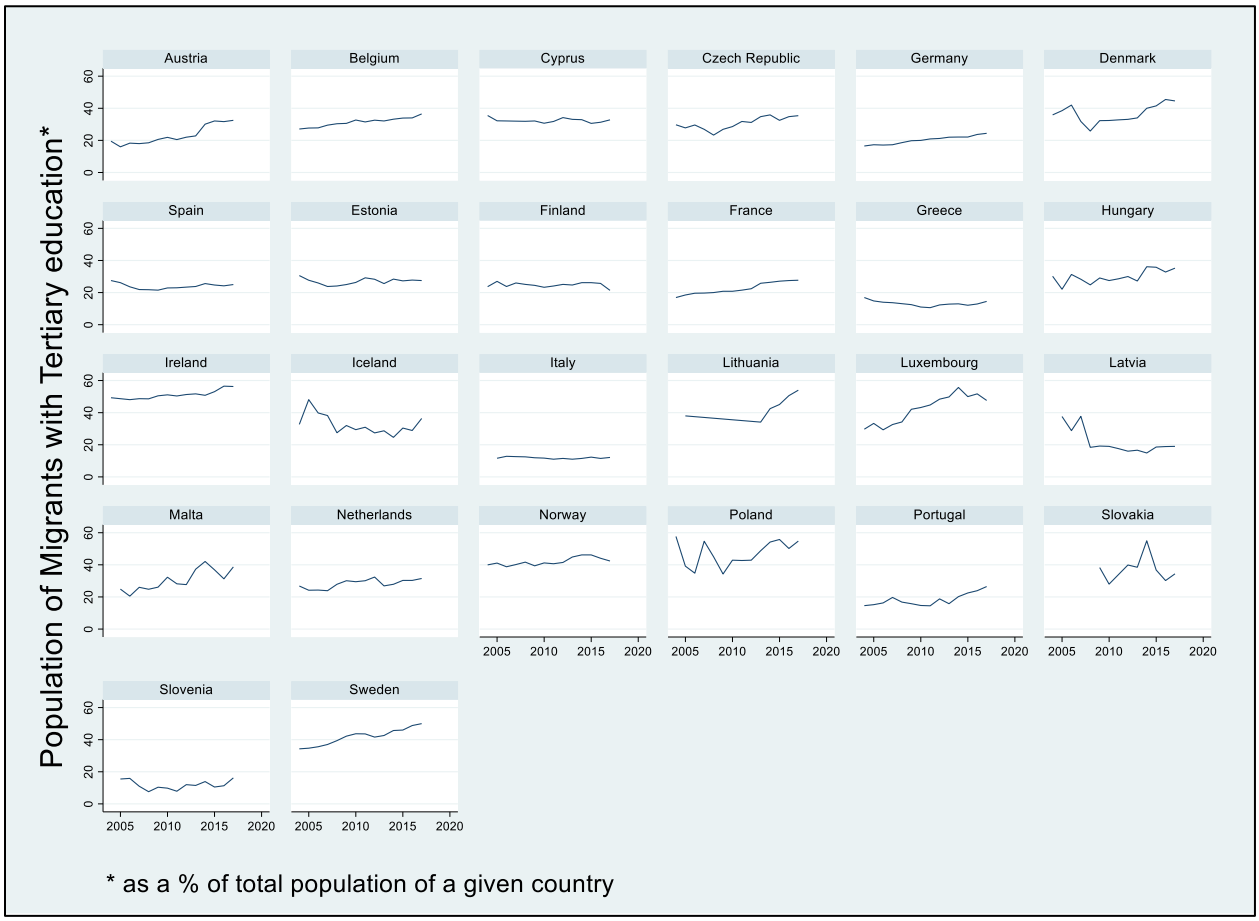
Appendices

A1: List of EEA member states

List of EEA Countries that are covered in this research		List of EEA Countries dropped from this research	
1.	Austria	27	Bulgaria
2.	Belgium	28	Croatia
3.	Cyprus	29	Liechtenstein
4.	Czech Republic	30	Romania
5.	Germany		
6.	Denmark		
7.	Spain		
8.	Estonia		
9.	Finland		
10.	France		
11.	Greece		
12.	Hungary		
13.	Ireland		
14.	Iceland		
15.	Italy		
16.	Lithuania		
17.	Luxembourg		
18.	Latvia		
19.	Malta		
20.	Netherlands		
21.	Norway		
22.	Poland		
23.	Portugal		
24.	Slovakia		
25.	Slovenia		
26.	Sweden		

A2. Population of migrants with tertiary education

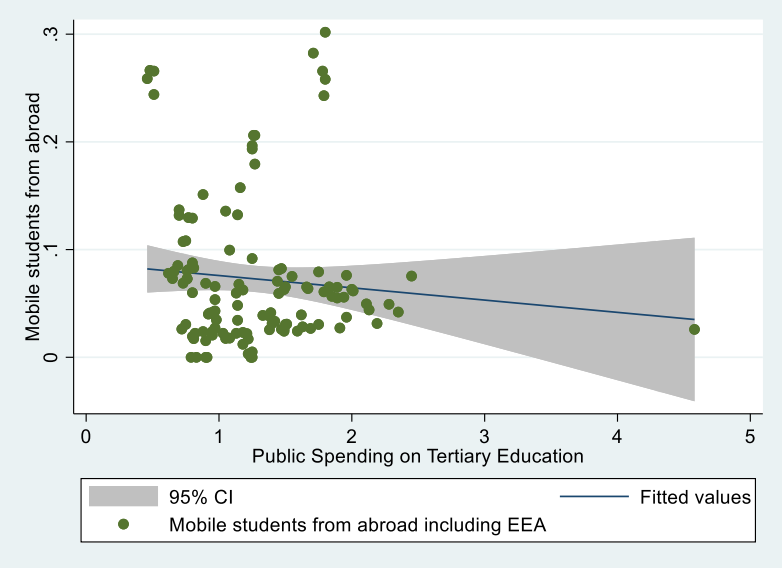
Country trends for the period of 2004-2017



Source: Eurostat. online data code: EDAT_LFS_9911

A3. Public spending on tertiary education and student migration

The dataset includes 227 plus EEA member states.



Source: Stata results based on the datasets of Eurostat (2020 b, d, f).