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THE GREEK BRAIN DRAIN: THE NEW PATTERN OF GREEK EMIGRATION DURING THE RECENT CRISIS

Sophia Lazaretou*
Economic Analysis and Research Department

1 INTRODUCTION

The role of human capital and knowledge in economic growth is a key element in the theory of "endogenous growth", as formulated by Romer (1986, 1989), Lucas (1988), Azariadis and Drazen (1990) and Becker (1993).[1] The main argument is that an economy that accumulates high-quality human capital and deploys it in the production process reaps the fruits of technological advancement, improves its productivity and competitiveness, and achieves high and sustainable growth rates. It is not by chance that the term "knowledge-driven or knowledge-based economy" (OECD 1996) has prevailed since mid-1990s, thereby confirming a link between market economy and knowledge. Knowledge, in the sense used here, contributes to the creation of new products and services, to a more efficient combination of labour and physical capital, and to innovation. The main carrier of knowledge is human capital. One of the State's top priorities is to create, maintain and safeguard the country's human capital.

2007 was the last year when the Greek economy posted a positive GDP growth rate. Ever since, the country has been experiencing a protracted recession, which is due not only to the impacts of the global financial crisis of 2008, but also to its serious and long-standing endogenous weaknesses. Following a short-lived recovery in 2014, the Greek economy fell back into recession in 2015 and, as suggested by the latest available forecasts, is expected to remain on a recessionary path through 2016.[2] The factors behind the recession relapse were the political instability over the past year, the protracted negotiations with the country's creditors in the first half of 2015 which led to the imposition of capital controls, as well as the new economic adjustment measures that were adopted in the context of the third financial assistance programme for Greece, to help the country achieve the revised fiscal targets.[3] Besides, the long delays in the completion of the review of the programme and in the signing of a new agreement blocked the disbursement of financial assistance over a prolonged period, increased investor uncertainty and exacerbated the economic downturn.

A direct implication of the prolonged international and domestic adverse macroeconomic environment is soaring unemployment, especially among the youth, at unprecedented levels. Mass unemployment has inevitably led to a loss of human capital, which manifests itself in two different forms: first, as skills atrophy, either as a result of a long period of inactivity and idleness or because of brain waste, and, second, as brain drain, i.e. a mass exodus of the healthiest and most productive part of Greece's workforce from the country.

Human capital is defined as all the knowledge, abilities, skills and training obtained through education and work experience. It can be quantified as the current value of expected returns throughout one's work life. It is known both in

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1 The "new theory of economic growth" is opposed to the neoclassical theory, which overstates the role of physical capital as a key driver of growth. See also Mankiw et al. (1992) and Jones (2002). Its modern formulation is based on earlier studies by Arrow (1962), Uzawa (1965), Nelson and Phelps (1966) and Welch (1970).

2 In 2014, annual GDP growth turned slightly positive (0.7%) for the first time since 2007. In the second half of 2015, the economy sank once again into recession (-1.9%), and the annual rate of decline in real GDP stood at -0.2%. A mild recession of around -0.3% is projected for 2016. See European Commission, *Spring 2016 Economic Forecast*, 3 May.

3 On the basis of developments in stock and flow variables, the level of economic prosperity in Greece has worsened visibly. Between 2008 and 2014, net national disposable income shrank by 27%, household final consumption decreased by 19%, national saving as a percentage of GDP turned even more negative, dropping further from -6% to -9.5%, and households lost one third of their net total wealth (property values, financial assets, liquid assets). See ELSTAT, Eurostat, OECD, as well as Credit Suisse (2015).

theory and in practice that when labour demand declines, i.e. when the labour demand curve shifts downwards and to the left for a given level of labour supply, the labour market clears at a lower point which combines lower average wages and lower employment, thus resulting in higher unemployment. In conditions of weakening labour demand, the issue of unemployment intensifies in terms of both magnitude and persistence. This leads to economic migration, which entails a mass shift of high-skilled unemployed persons towards the economies that are characterised by strong labour demand and better expected returns/earnings. As a rule, emigration concerns that part of the workforce which has obtained high-quality educational qualifications in the country of origin, prior to the start of the migration flow, and is highly specialised. In other words, it concerns the most competent and productive part of the domestic workforce.

Nowadays, in the context of our globalised economy and society which is marked by an unrestricted and free movement of goods, services and capital, human capital flows across countries have picked up, although their size and direction continue to be largely determined by factors that are directly linked with the international and/or local culture and macroeconomic conjuncture, as well as by the migration policies that are pursued in host countries (quotas, special labour arrangements) and in origin countries (incentives for stay or repatriation, taxation of incomes acquired abroad).[4]

In crisis-ridden Greece, the phenomenon of human capital flight, commonly known as "brain drain", has grown to large proportions. Between 2008 and 2013, almost 223 thousand Greek residents aged 25-39 left the country permanently for more advanced economies, in search of employment, better pay and better social and economic prospects. This is the generation that was hit the hardest by the crisis, also known as "generation E" (expats) or "generation G" (young, talented and Greek) or "generation We". The escalating Greek brain drain has received frequent, almost daily, coverage by international and domestic media. Over the last two years, several sample surveys have been conducted, attempting to investigate the phenomenon and its qualitative characteristics (see EUI 2013, ICAP Group 2015 and 2016, Endeavor Greece 2014, Labrianidis and Vogiatzis 2013, Damanakis et al. 2014, Labrianidis and Pratsinakis 2016). A common finding of this research is that the new wave of migration concerns young, single and high-skilled persons. The most important underlying factors have been found to include high unemployment, the current difficult economic situation and a lack of policy focus on promoting excellence and providing opportunities for advancement.

The intensity and strong dynamics of the phenomenon point to an urgent need, first, to delineate its various aspects and patterns and map its characteristics; second, to explore the reasons why the Greek brain drain has emerged at the current juncture; and, third, to identify its impacts on the domestic economy. This paper attempts to answer these questions and derive a minimum set of six policy implications that could help contain the phenomenon.

2 MODERN GREEK EMIGANTS

Emigration and poverty are unquestionably the two most pernicious social by-products of a protracted economic crisis. According to the latest available statistics, in 2013 the number of Greek emigrants aged 15-64 almost tripled relative to 2008, exceeding 100 thousand. On a cumulative basis, during the 2008-2013 crisis, 427 thousand Greek residents left the country

4 Between 1990 and 2013, the number of migrants worldwide increased by 50%, reaching 232 million (see United Nations 2013 and OECD 2015), with six out of ten living and working in advanced economies and three out of ten in Europe. In OECD countries, the number of migrants aged 15 and above exceeded 100 million, with three out of ten being tertiary education graduates. This latter group accounts for 11% of the population of host countries. More specifically, in 2010-2011, more than one third of those migrants originated from European countries, representing the third highest percentage of tertiary educated migrants after Africans and Latin Americans (5.3%, against 10.8% and 7.4%, respectively. See Arslan et al. 2014).

permanently.[5] In addition, between 2010 and 2013, nearly 209 thousand emigrants were Greek citizens and almost 187 thousand emigrants were non-Greek citizens but permanent and legal residents of Greece. In 2014, the estimated total outflow was 106.8 thousand people (ELSTAT).

In more detail, according to web traffic data on the UK job site CV-library, the number of Greek visitors looking for jobs in the UK doubled in July 2015, year-on-year, recording an average weekly increase of 26%, whereas historical data typically point to a normal decline over the summer months across countries.[6] On the basis of statistical data from the European Centre for the Development of Vocational Training (CEDEFOP), in 2014 the number of visits from Greece associated with Europass website activity remained elevated (310.5 thousand), close to the 2013 level (327.4 thousand), while in the first seven months of 2015 it fell to 190.5 thousand, but still remained almost double compared with 2008 as a whole. Besides, the results of a survey conducted by Endeavor Greece (2014) show that 46% of young respondents aged 18-34 consider relocating abroad and 33% are ready to relocate within the next year. Against this backdrop, it becomes apparent that the Greek economy and society is once again faced by a new wave of mass emigration.

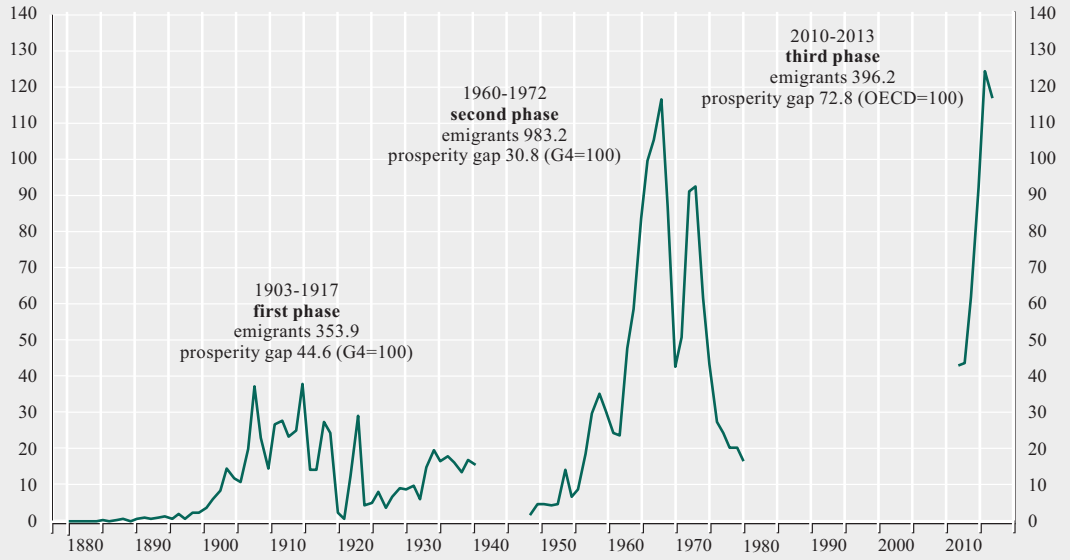
Historically and traditionally, Greece is among the countries with a rich experience from emigration. As illustrated in Chart 1, over the past 100 years, Greece has experienced three major phases of mass emigration. Of course, the third phase is still underway, but the two previous phases reveal three salient features of the phenomenon: (a) its long duration (persistence);[7] (b) its intensity, as measured by the size of the outflow; and (c) a time lag of over two years, on average, after a soaring unemployment rate has been recorded.

For the purposes of the present analysis, an *emigration phase* starts in the year which sees an abrupt and sharp year-on-year increase of at least 50% in the flow of emigrants, following at least two consecutive years of low and stable outflows. The phase ends in the year when the flow of emigrants falls by at least 50% year-on-year, followed by two consecutive years in which the size of the outflow remains unchanged at the new low level. On the basis of this criterion,[8] it is easy to identify three major phases of emigration, as shown in Chart 1: 1903-1917, 1960-1972 and 2010-2013. The factors underlying each wave of Greek emigration were several and different, but economic factors were predominant.[9] It is no coincidence that all three phases occurred after a serious recessionary disruption which widened the country's prosperity gap vis-à-vis the more advanced countries and triggered a mass exodus of, mainly young, people seeking new career and advancement opportunities. It is worth drawing a comparison between the earlier two emigration waves and the current migration outflow in terms of their qualitative characteristics. During the first wave, the main destination countries were the so-called "transoceanic countries" (US, Australia, Canada, Brazil and South Africa). Seven out of 10 emigrants were aged 15-44, less than 2 in 10 were women and the vast majority were unskilled workers and farmers, of a low educational level, who mainly worked in host countries as domestic servants and industrial workers. For a thorough analysis of the qualitative characteristics of the first emigration wave, see Tastsoglou and Stubos (1992). The second phase of emigration mainly concerned young people, aged 20-34 (7 out of 10), 5 in 10 reported to be manual workers, while 4 in 10 had no work experience or professional qualifications. Six out of 10 moved to Germany and Belgium, finding jobs as industrial workers. By contrast, the current outflow concerns young

5 Data (based on census statistics in the countries of origin and residence) refer to the estimated migration outflow of Greek residents.
6 See CV-library press release, 21 July 2015.
7 In each phase, the migration outflow continued to rise for an average period of 10 years.
8 The criterion, albeit ad hoc, describes adequately both historical emigration waves in 1903-1917 and 1960-1972. Any isolated peaks in the migration outflow, which however do not last for more than one or two years in a row, are probably associated with major political and national developments, such as in 1920-1921 and 1955-1956.
9 The second wave of emigration, in 1969-1971, was partly due to political reasons (imposition of the military junta in 1967).

Chart 1 Emigration phases

(migration outflow in thousand persons)



Sources: Calculations based on data from ELSTAT, Statistical Yearbook (digital library); Eurostat, Emigration Statistics; OECD; Kostelenos et al. (2007); SEEMHN SEE Macro History Database (2014); NBER Historical Database; and Maddison (2003).
Notes: Emigrants: Greek residents, all age groups. Referring to legal or permanent residents who left the country and stayed abroad for over a year. Seamen, visitors-tourists and commercial representatives are not taken into account. For the period 1932-1938, both new emigrants and remigrants (i.e. those who returned for a limited period of time and left again) are included. Until 1924 only the transoceanic countries are included, for the period 1932-1938 all "migration countries" (transoceanic, European and Mediterranean countries), for the period 1946-1954 all non-European and non-Mediterranean countries, and from 1955 onwards all countries. In 1977 the collection of data was discontinued. Prosperity gap in terms of GDP per capita in US dollars, PPP for the years 1990 and 2008. 1903-1917 and 1963-1972: % of G4=100 (US, UK, France and Germany), 2010-2013: % of OECD=100 (34 countries).

educated people having at least two years of work experience in Greece, who are mainly headed for Germany, the UK and the United Arab Emirates.[10]

Flows

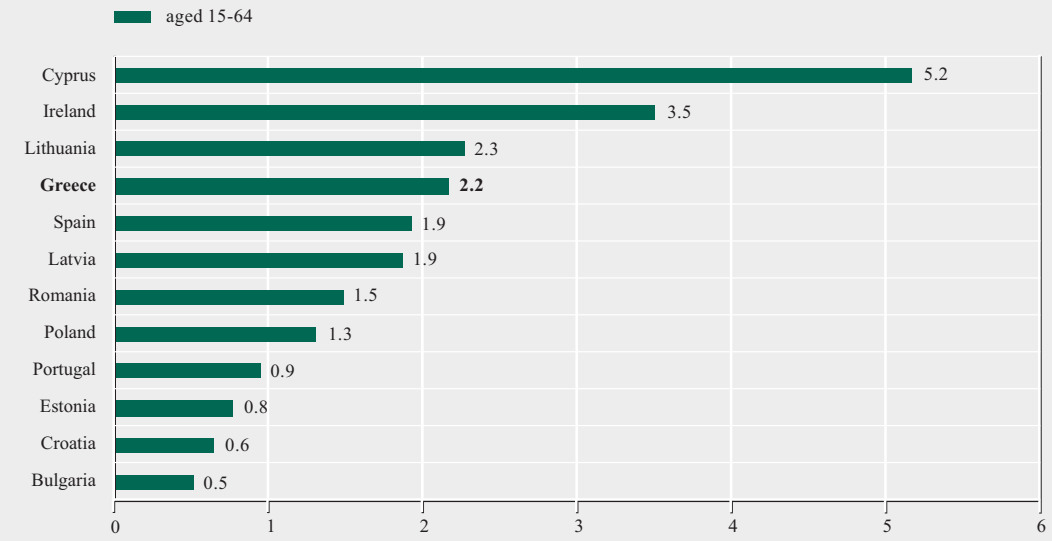
Migration is typically driven by a nexus of economic, social and political factors existing in the country of origin (push factors) and/or in the country of destination (pull factors). High unemployment, political instability, deprivation of fundamental human rights, armed conflict, lack of physical safety, socio-economic backwardness, and lack of opportunities for advancement and prosperity constitute push factors usually from a developing country to a developed one. Pull factors include academic and career opportunities, better pay, better prospects for research and business activity, good working conditions, and political and economic stability. Traditionally, the Atlantic economy (i.e. the US and Europe) has attracted the bulk of migrants. Nevertheless, the relative economic prosperity and a developed welfare state, along with prospective strong labour demand on account of ageing population, make the EU economy the most attractive destination.

In 2013, almost 3.4 million people migrated to an EU Member State.[11] At the same time, at least 2.8 million emigrants moved from one EU country to another or outside the EU. Although most EU countries saw their migration inflows increase after a modest drop during the recession, Greece (as well as Bulgaria, Ireland, Spain, Cyprus, Croatia, Poland, Por-

10 Triandafyllidou and Gropas (2014), ICAP Group (2015) and Labrianidis and Pratsinakis (2016).
11 Eurostat. Of these people, 1.4 million originated from non-EU countries and 1.2 million from another EU Member State.

Chart 2 Emigrants by origin country (2013)

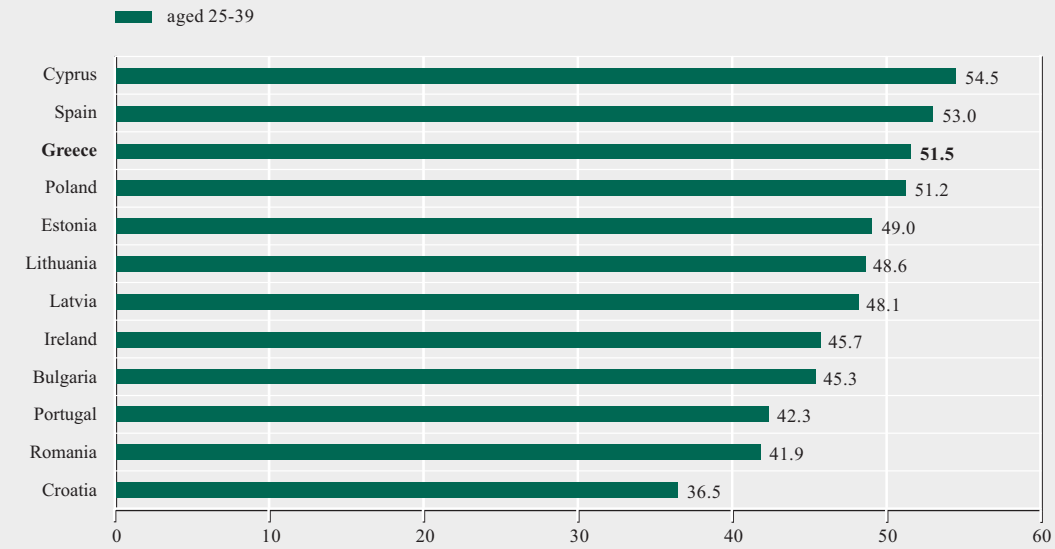
(total, flow, % of labour force)



Source: Calculations based on data from ELSTAT and Eurostat, Emigration Statistics.
Notes: Long-term emigrants who left their origin country permanently and resided in another country for a period of 12 months or more. Labour force refers to the economically active population (employed and unemployed).

Chart 3 Young emigrants by origin country (2013)

(flow, % of total emigrants)



Source: Calculations based on data from ELSTAT and Eurostat, Emigration Statistics.

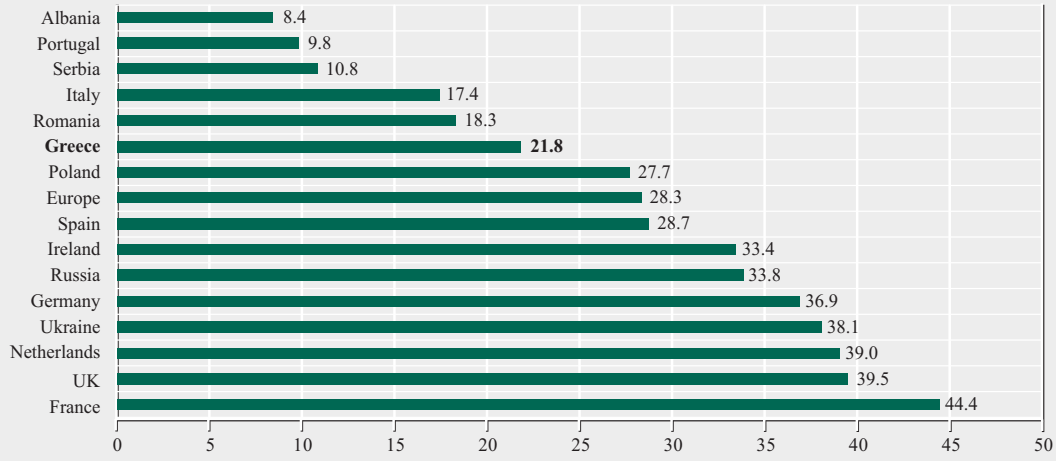
tugal, Romania, Estonia, Latvia and Lithuania) had net outflows.

As shown in Charts 2 and 3, among the 12 EU Member States with net migration outflows,

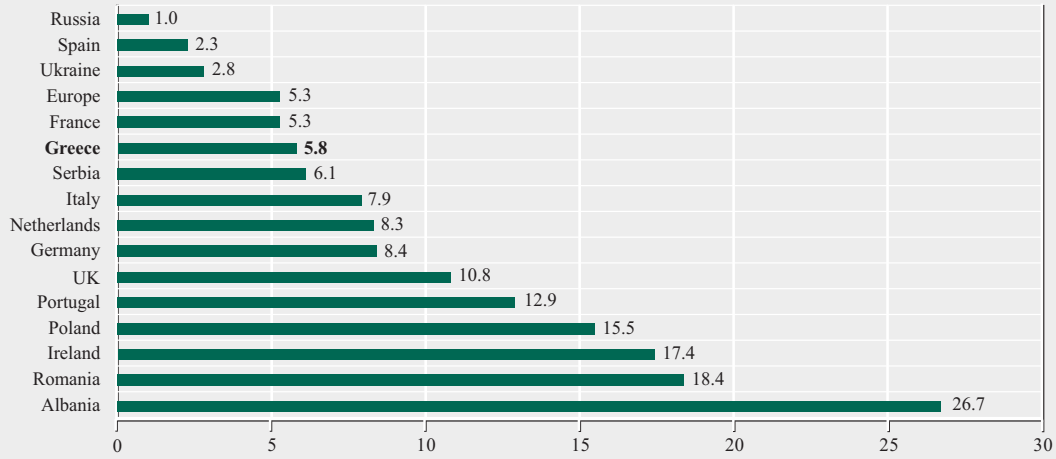
Chart 4 Migration of European tertiary education graduates (2010-2011)

(%)

A. As a percentage of the respective country's total emigrants (15+)



B. As a percentage of the respective country's labour force



Source: Calculations based on data from OECD-UNDESA (2015), OECD (2015), DIOC 2010/11, and Barro and Lee (1993).
Notes: Long-term emigrants (who stayed abroad for a period of 12 months or more), tertiary education=levels 5-8, ISCED 2011, short-cycle tertiary education, Bachelor's, Master's and Doctoral or equivalent level, stock, by country of birth. Labour force refers to the economically active population (employed and unemployed).

Greece in 2013[12] had the fourth largest outflow of residents as a percentage of its worforce, after Cyprus, Ireland and Lithuania, and the third largest share of young emigrants, after Cyprus and Spain. Specifically, emigrants aged 15-64 corresponded to more than 2% of the country's workforce, while the share of young people at the most productive age of 25-39 exceeded 50% of total emigrants.

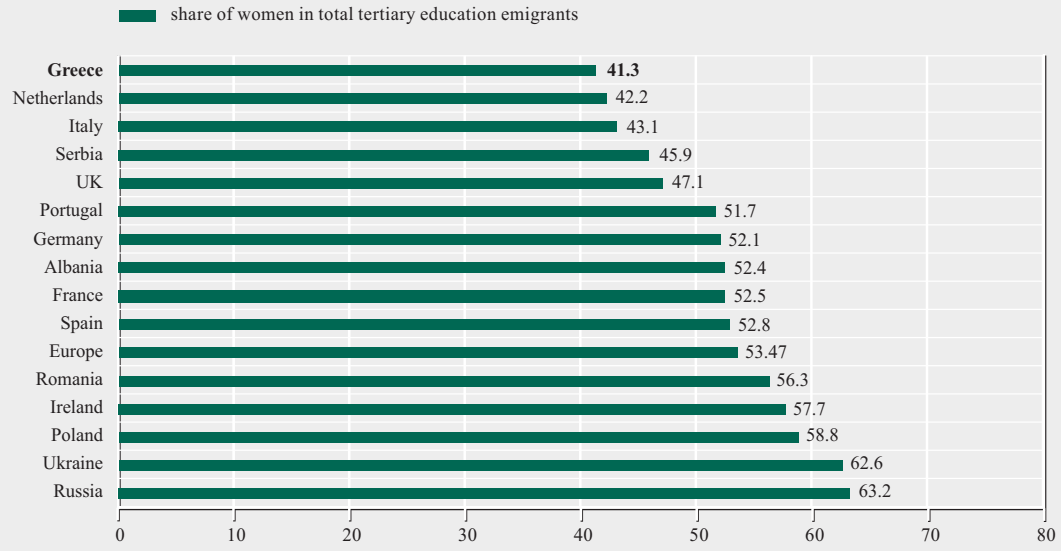
Stock

According to the 2010-11 census, the percentage of Greek tertiary education graduates who are currently residing in another OECD country was much lower than the respective average for a sample of 15 European countries and

12 The last year for which comparative data are available.

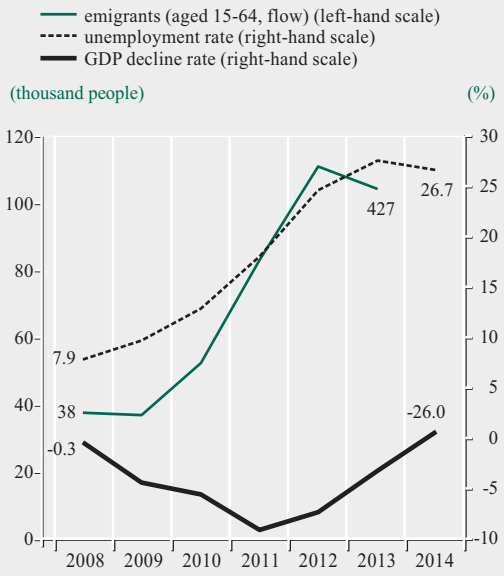
Chart 5 Migration of European tertiary education female graduates (2010-2011)

(%)



Source: Calculations based on data from ELSTAT and Eurostat, Emigration Statistics.

Chart 6 Migration, unemployment and recession (2008-2014)



Source: Calculations based on data from ELSTAT and Eurostat, Emigration Statistics.
Note: The number of emigrants in 2013 and the recession rate in 2014 are expressed on a cumulative basis.

almost half the French and UK percentages (see Chart 4). Besides, the respective percentage of female tertiary education graduates was the lowest among the 34 OECD countries (see Chart 5). This suggests that, on the basis of the latest census data that capture the stock variable, the mobility of highly educated Greek residents until 2010 was rather low. Satisfactory wages, the one-digit unemployment rate of tertiary education graduates, high public sector employment and the beneficial effects of the welfare state in Greece were inhibiting factors for the mobility of Greeks, compared with other advanced economies during the pre-crisis period.[13] However, this picture changed dramatically after 2010.

Chart 6 plots the evolution of unemployment and GDP contraction (rate of recession) against the course of migration outflows dur-

13 See European Commission (2010). According to Eurostat data, the unemployment rate of tertiary education graduates as a percentage of total active population (aged 15-64), in average annual terms, was 8.5% and 7.9% in 2007 and 2008, respectively, while for the age group of 25-39 it stood at 9.9% and 9.7%, respectively.

ing the crisis. Two points are readily apparent from the chart: first, although the number of observations is rather small, all three variables appear to co-move. In other words, it seems that the Greek economy and society "invested" in emigration to cope with soaring unemployment and a deep plunge into recession and poverty. A stable outflow of roughly 38 thousand people in 2008 and 2009 more than doubled in only two years (2010-2011) and exceeded 104 thousand in 2013[14], implying a cumulative outflow of almost 427 thousand overall between 2008 and 2014. Second, both emigration and unemployment, as social phenomena, lag behind GDP developments and are persistent. Although the Greek recession started in 2008, when GDP first contracted, and escalated in 2009 when the unemployment rate rose by two percentage points relative to 2008, the migration outflow remained virtually unchanged. With a lag of more than one year relative to the peak of unemployment, the migration outflow embarked on a steep upward path from 2010 onwards and persisted in the following years in spite of a gradual easing of the recession after 2012.

3 THE CURRENT PHENOMENON OF "BRAIN DRAIN" IN GREECE

3.1 DEFINITION

Perhaps the oldest and most common debate in economic science is why some economies are rich and others are poor, and which policies a poor country should pursue to develop out of poverty. Economic theory explains that the educational level and quality of the workforce determine the economic development and prosperity gaps across countries. Thus, it suggests that poor countries which lag behind in terms of economic development should channel resources into upgrading education at all levels, as better education can raise the per capita income of those countries. However, it is not uncommon that talented and well-educated citizens of poor countries, after graduating from a university in their home country, choose to work in a rich, advanced economy.

The term "brain drain" or "human capital flight/exodus" was popularised in the 1960s in the UK, when it was widely used to describe the influx of Indian scientists, notably doctors and engineers (see Cohen 1977), as well as in the 1990s in the US, to depict the mass inflow of healthcare professionals from Africa and Latin America. Ever since, the term "brain drain" has increasingly appeared in interational literature and can be defined as "a situation in which large numbers of educated and very skilled people leave their own country to live and work in another one where pay and conditions are better" (see Cambridge Advanced Learner's Dictionary and Thesaurus, Cambridge University Press).

Apart from the exodus of people, the term is also used to denote the social and economic losses entailed for those countries of origin that channel, on average, large amounts of public funds into education and skills. A direct effect of this phenomenon is that investment in education fails to deliver faster growth rates if a critical part of the country's high-skilled workforce moves afield. Furthermore, any efforts to address the emerging skill shortages through improved education are pointless, unless they are accompanied by strong disincentives to emigration (see Alpha Bank 2015, 2016, and Trachana 2013).

The losses sustained by the national economy can become clear using a static equilibrium model, as illustrated in Figure 1. It is widely accepted that skills and talents are not evenly distributed across a population; as a result, it is the specific skills of an individual that ultimately determine the expected return to education, whereas the cost remains unchanged. If migration is not possible or if there are no migration incentives, the expected return to education is determined by domestic wages:

14 In 2013, 4 in 10 people were women and more than 1 in 2 were young, aged 25-39.

Expected return $= W_D$

Otherwise, it is determined by wages in the destination country, i.e.

Expected return $= p\ W_F + (1\text{-}p)\ W_D$

where p is the probability of skilled migration $(0 \leq p \leq 1)$, measured by the share of migrants in total domestic skilled labour force and determined endogenously, as it is conditional upon the immigration policy of the host country, e.g. numerical quotas restricting entry. Probability p is assumed to be equal across the more able and the less able groups; in other words, skilled migrants are randomly selected among the skilled population.

If $p=0$, then *expected return* $= W_D$ and determines a level of quality $Q^* < Qmax$ (see Figure 1) with an average level of quality $(Q^* < Qmax)/2$, where $Qmax$ is the maximal level of labour force quality.

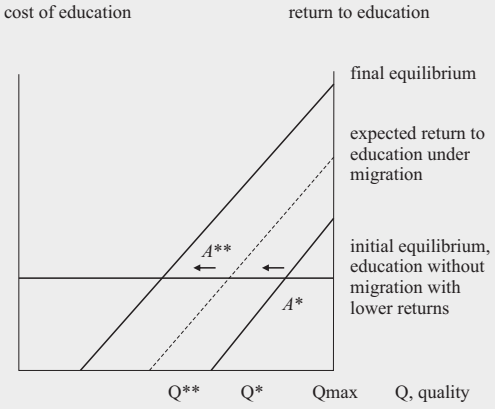
If $0 \leq p \leq 1$, i.e. during the period in which the migration of more educated and able people occurred, the expected benefit of education is the weighted average of wages in the origin and host countries:

Expected return $= p\ W_F + (1\text{-}p)\ W_D$

determining a level of quality of the remaining domestic skilled labour force $Q^*(Q^{**} < Q^* < Qmax)$ by an average level $(Q^{**} < Qmax)/2$, which is lower than in the case of no migration, since $(Q^{**} < Q^*)$. Therefore, any change in terms of quality $(Q^{**}\text{-}Q^*)/2$ is negative and the final outcome is a lower stock of human capital.

The investigation of the brain drain dynamics reveals that during the first period of migration the expected gain is substantial, thus leading to increased demand for education and to a rise in the number of educated people in the following period (equilibrium A^*). Yet, these increases are short-lived: as migration takes on mass proportions, the probability of migration decreases as a result of stricter numerical quotas and less-than-expected wages on the back of increased supply of skilled people in the host country. This in turn leads to lower demand for education along with a decline in the quality of the labour force (equilibrium A^{**}). In the long run, the economy is in equilibrium at a smaller size and worse quality of human capital (equilibrium to the left of A^{**}).[15]

Figure 1 Static equilibrium of an economy with migration and education



Sources: Commander et al. (2004) and Schiff (2006).

It is worth noting that after the second phase of Greek emigration in the 1960s and 1970s, which mainly concerned unskilled workers and farmers amid excess supply of cheap labour,[16] the phenomenon of brain drain was unknown to post-1974 Greece, as the young people who left the country for tertiary-education studies in the 1980s and 1990s tended to repatriate, lured by the positive growth rates that were recorded from mid-1990s onwards, as well as by the favourable working conditions which were comparable to those in advanced European countries. In this case, the economic benefits to the home country are straightforward, as the repatriated young sci-

15 For empirical evidence of the negative impact of mass migration on education and the growth rate, see Beine et al. (2003) and Lucas (2005).

16 As a result of the generation of the so-called Baby boomers, as well as the low average educational level.

entists made a major contribution to the economy, by increasing the domestic stock of scientific knowledge and expertise and serving as a vehicle for the transfer of technology and managerial know-how.

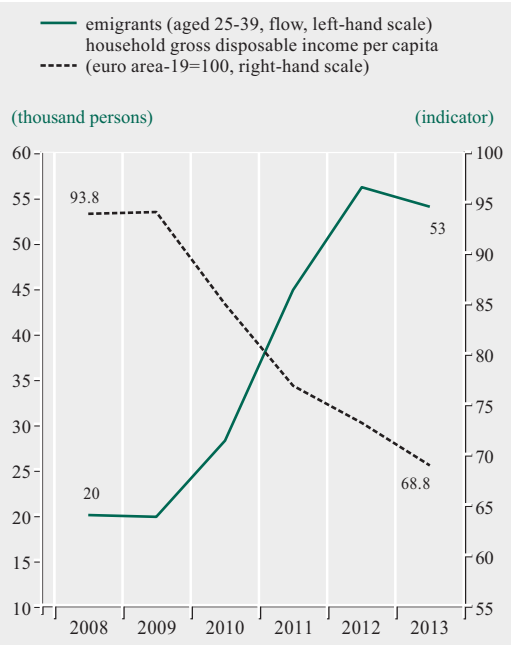
It was only after 2012 that the domestic version of the phenomenon started to attract the attention of international and domestic media.[17]

3.2 QUANTITATIVE DOCUMENTATION

A quantitative documentation of the phenomenon requires comparable statistical data, which will enable not only to capture the phenomenon and monitor its evolution over time, but most notably to grasp its underlying factors. This is the only way to ensure appropriate policy design and implementation for effectively containing or even reversing the brain drain. For the purposes of the present analysis, we use the statistical databases of ELSTAT, Eurostat and OECD recording migration flows in the home and host country, respectively. Data on the qualitative characteristics of emigrants is derived from three surveys conducted by the University of Macedonia (Regional Development and Policy Unit, June 2015), the European University Institute in the context of the EUI Global Governance Programme (2013) and the University Research Institute EPI (2015, HO Survey), respectively.

Assuming that the value of human capital can be quantified using as a proxy the present value of workers' expected future earnings during their economically active lives, the declining path of per capita disposable income (see Matsaganis 2013) can be considered a strong motive for emigration. As shown in Chart 7, the two variables move in the opposite direction. The annual flow of Greek emigrants aged 25-39 increased from 20 thousand in 2008 to 53 thousand in 2013, while on a cumulative basis almost 223 thousand people of the same age group left the country permanently.[18] Over the same period, the gross disposable per capita income of Greek households declined from

Chart 7 Youth migration and disposable income (2008-2013)



Source: Calculations based on data from ELSTAT, Eurostat, Emigration Statistics, and OECD.
Note: Disposable income in US dollars in terms of PPP, relative to the EA-19 average.

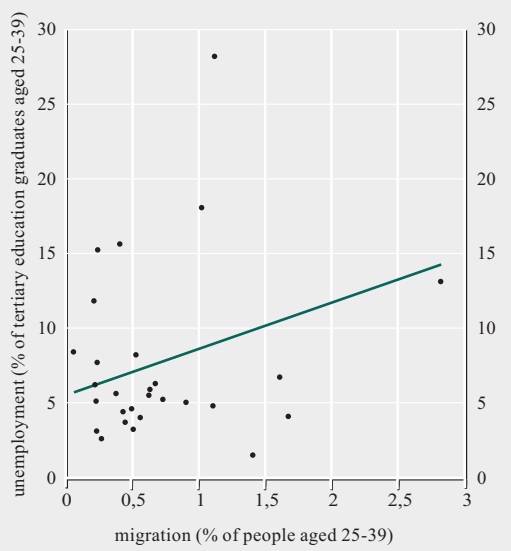
93.8% of the euro area-19 average in 2008 to just 68.8% in 2013, confirming the divergent path of the Greek economy vis-à-vis the euro area economy.

Another strong motive for emigration is protracted high unemployment. As shown in Chart 8, which plots the unemployment rate of young tertiary education graduates in the EU-28 for 2013 against the emigration rate of the same age and education group, the correlation between the two variables is positive and statistically significant. In Greece, almost 4 in 10 were unemployed, among whom 7 in 10 were

17 The size and intensity of the outflow is evidenced by the fact that the term "Greek brain drain" is extensively used in international media reports. See Euronews, 24.4.2014; *Der Spiegel*, 10.4.2013, BBC News, 29.5.2013; *The Economist*, 10.7.2015.

18 For a better understanding of the outflow size and its future implications for the domestic economy, it suffices to note that, on the basis of data from ELSTAT, the number of those who obtained a university degree, a master's degree or a PhD at the end of the academic year 2012-2013 stood at 42,852, while the number of active enrolments across all tertiary levels of education was 224,715.

Chart 8 Unemployment and migration (EU-28, 2013)



Source: Calculations based on data from ELSTAT and Eurostat.

long-term unemployed. Nearly 4 in 10 unemployed persons were tertiary education graduates, while more than 7 in 10 unemployed tertiary education graduates were aged 25-44. Although statistical data on the educational level are scarce, 88% of those who left the country permanently were Greek university graduates, 60% had a master's degree acquired abroad or in Greece, and 11% had a PhD acquired mostly abroad (see Triandafyllidou and Isaakyan 2014). The bulk of those who chose a European country as their destination headed for the UK, Germany and the Netherlands.

4 EDUCATION, HUMAN CAPITAL AND BRAIN DRAIN

The level of public spending on education is often seen as the key determinant of a country's educational level and hence of human capital formation, which constitutes a critical explanatory factor of economic growth rates. The view that has prevailed in the new economic growth theory suggests that poor developing countries can accelerate their growth rates by investing in human capital. Besides, people in these countries are highly motivated to study, as a higher educational achievement is typically associated with higher earnings. As shown in Chart 9, in Greece tertiary education graduates in 2013 were the best-paid among all educational attainment groups. The average earnings of a graduate across all tertiary levels of education and across age groups, albeit lower than the respective OECD average, was 1.4 times higher than the average earnings of an upper secondary or post-secondary non-tertiary education and almost double the earnings of lower secondary (compulsory) education graduates.[19]

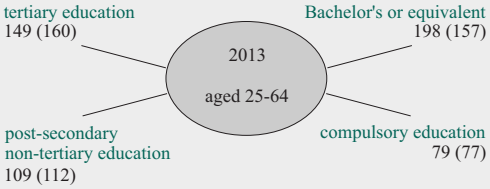
Nevertheless, one should not overlook the importance of the quality of education offered, hence of the human capital generated. The link between education and production, the timely recognition of ongoing changes in the global labour market, the incentives provided to young graduates for entering and remaining in the domestic labour market and the adaptability of this market, as well as the willingness to implement business-friendly policies, all determine the qualitative characteristics of the existing stock of human capital. Although it is generally accepted that the unprecedented surge in youth unemployment is a symptom of the crisis and is due to a broad-based lack of demand for labour, the examination of the qualitative characteristics of unemployment and the education system is necessary for an in-depth understanding of the factors behind the current migration phase.

Until 2008, when the lowest unemployment rate was recorded both in Greece and in the EU, higher education attainment was largely associated with lower unemployment for tertiary education graduates. As shown in Chart 10, in 2008 the unemployment rate of tertiary education graduates in Greece was the lowest

19 For the role of the level of earnings as an incentive for participation in tertiary education in Greece, see Papapetrou (2007), Mitrakos, Tsakloglou and Cholezas (2010) and Livanos and Pouliakas (2011).

Chart 9 Wages and educational level (2013)

(indicator, secondary education graduates=100, Greece)



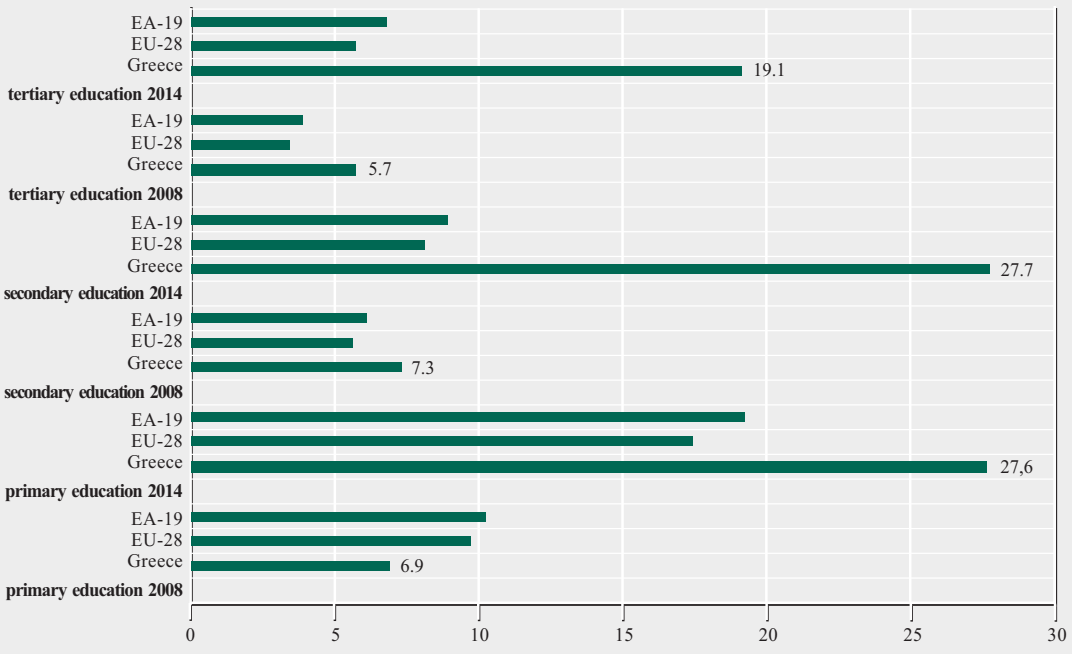
Source: OECD, *Education at a glance 2015, OECD Indicators: Greece*, Table A61a.
Notes: The average wages of the respective group in 34 OECD countries for the same year are given in brackets, on the basis of the 2011 International Standard Classification of Education (ISCED): compulsory education 0-2, upper secondary and post-secondary non-tertiary education 3-4, tertiary education (Bachelor's, Master's, Doctoral or equivalent levels) 5-8. There are no detailed data on postgraduate degree and PhD degree holders (levels 7-8).

across educational levels, albeit higher by more than 2 percentage points than the respective EU and euro area averages for the same year.

However, as depicted in Chart 11, education does not appear to have greatly helped bring down the unemployment rates of educated young people over the pre-crisis period. In 2008, in Greece the unemployment rate of educated young people aged 25-39 was by 2 percentage points higher (9.7%) than the overall rate of unemployment (7.7%) and more than double the EU average for the same age group and educational level (4.3%). Yet, what is indicative of the quality of education offered is the fact that, unlike what was the case in Greece, the unemployment of educated young people in the EU and in the euro area both prior to the crisis (in 2008) and after the crisis (in 2014) was more than 2 percentage points lower than the overall rate of unemployment for total population and across educational levels. In quantitative terms, the stock of human capital, as measured by the present value of expected earnings in Greece, tended to converge with the

Chart 10 Unemployment and educational attainment (2008 and 2014)

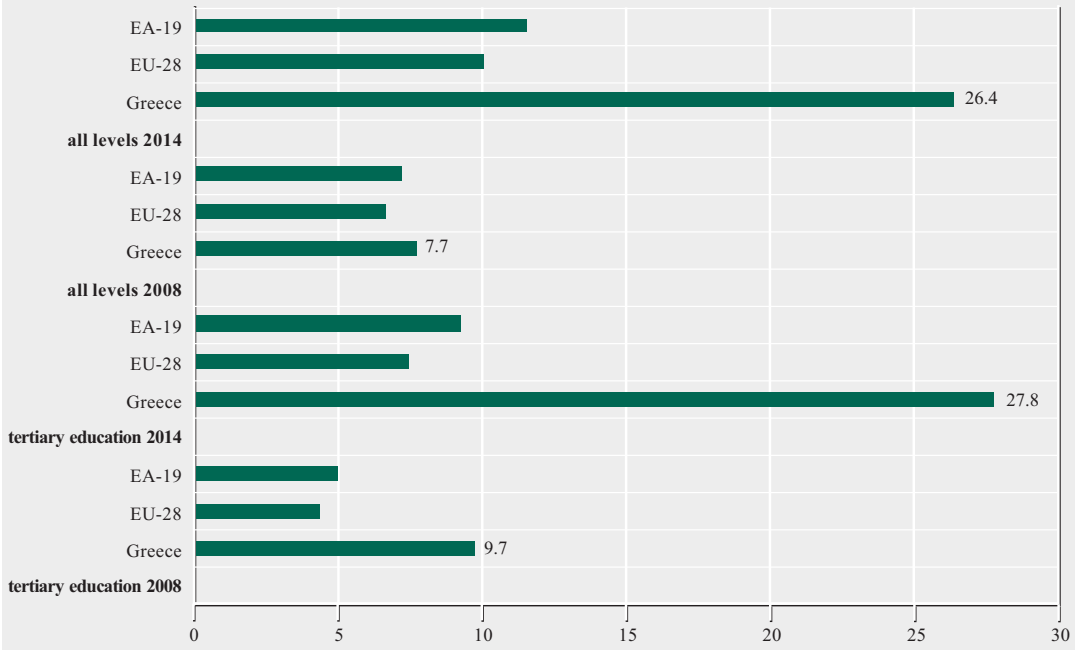
(%)



Source: Eurostat, Unemployment Statistics.
Notes: Unemployment rate by educational level, aged 25-64. Primary 0-2, secondary 3-4, tertiary 5-8, 2011 ISCED.

Chart 11 Youth unemployment and educational attainment (2008 and 2014)

(%)

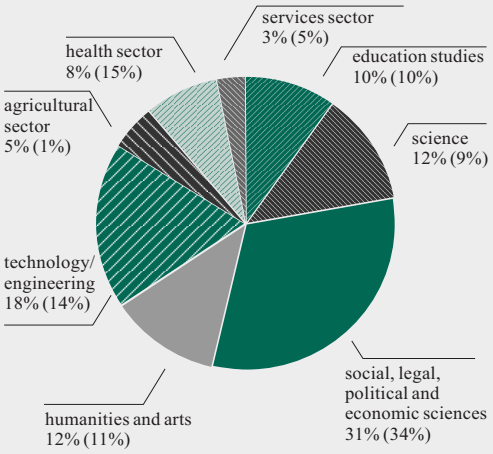


Source: Eurostat, Unemployment Statistics.
Note: Unemployment of young people aged 25-39.

EU average, but diverged in terms of quality. Comparative statistics are provided in Table 1. Three conclusions can be reached. First, although the share of tertiary education graduates in total active population grew considerably between 2010 (25%) and 2014 (28%), approaching the OECD average (34%), it continues to fall short of that average. Besides, a breakdown of graduates by field of study (see Chart 12) shows that social, political and economic studies, and science and technology account for the majority (6 in 10), a proportion that is significantly above the OECD average. Against this backdrop, the main reason for young people's propensity to migrate should be sought in the inherent inability of the domestic productive mechanism to absorb young graduates. Second, data focusing on the size of the human capital stock alone should be treated with extreme caution, as its qualitative features also need to be examined thoroughly. According to data from Table 1, it is evident that in Greece in 2014 the bulk of tertiary education graduates (accounting for 28% of people aged 25-64) concerns bachelor's degree holders (23%), against 16% in OECD countries, of whom only one in 10 has a master's degree (3% of people aged 25-64). The respective proportion in OECD countries is overwhelmingly higher, i.e. one in 2. This implies that the orientation of the domestic economic model towards the services sector and, most notably, towards the public sector was the key determinant of mass absorption of bachelor's degree holders prior to the crisis. A statistical mapping of employment for university graduates corroborates this finding. In 2014, more than 7 in 10 university graduates aged 25-64 were employees and, among them, 2 in 10 worked for the public sector,[20] while 3 in 10 civil ser-

20 In 2010 the ratio was 3 in 10.

Chart 12 Breakdown of graduates by field of study in Greece (2014)



Source: OECD.
Notes: All levels of tertiary education 5-8, % of total graduates. In 2014, the share of tertiary education graduates in total active population aged 25-64 was 28%. The respective averages of 34 OECD countries are given in brackets.

vants were university graduates.[21] Furthermore, the very small share of master's degree holders reflects an inherent failure of the domestic production mechanism to generate new products and develop research and technology, which suggests that the Greek economy under the current production model can compete in world trade only through lower prices rather than through better quality of its output.

Third, assuming that the quality of human capital is a positive function of expenditure on research and innovation, Greece ranks in the 5th lowest place among EU countries on the basis of this criterion. Even though this expenditure increased as a percentage of GDP between 2010 and 2014, it continues to fall short of the EU average, being 2.5 times lower. The number of those who either completed university studies in science and technology or are employed in the S&T sector is

21 Eurostat and Greek Civil Servant Census.

Table 1 The human capital in Greece in numbers

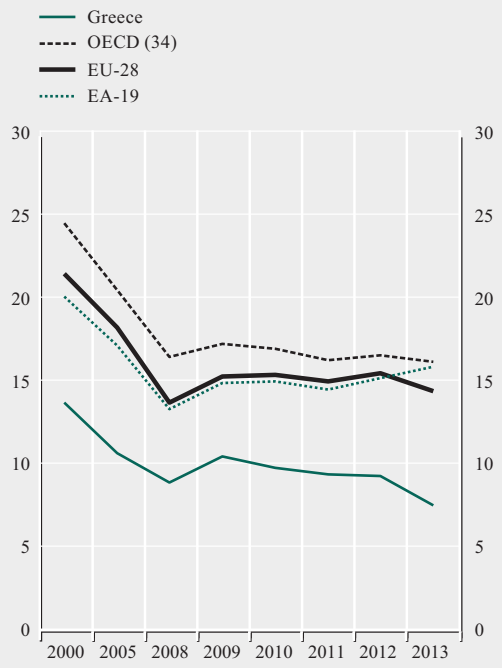
(2010 and 2014)

Indicators	2010	2014
A. Tertiary education graduates (% of people aged 25-64)	25 (30)	28 (34)
– Bachelor's		23 (16)
– Master's		3 (12)
B. Tertiary education graduates (% of people aged 25-34)	31 (37)	39 (41)
C. R&D spending (% of GDP)[1]	0.6 (1.93) (1.99)	0.83 (2.03) (2.11)
D. Human capital in science and technology sectors (% of people aged 25-64)[2]	32.5 (40.5)	35.4 (44.4)
E. Number of patent applications (per million residents, 2012)[3]	7.28 (112.6) (139.4)	

Note: In cases A and B, the respective values for OECD (34) are given in brackets. In cases C, D and E, the respective values for EU-28 and EA-19 are given in brackets.
Sources: OECD (2015), Eurostat and World Bank.
1 Total (public and private) spending by all stakeholders (public and private bodies, corporations, non-profit organisations, universities). Covering spending on basic and applied research and experimental development.
2 Who either have completed university studies or are currently employed in the S&T sector.
3 Number of applications to the European Patent Office (EPO), irrespective of the outcome.

Chart 13 Exports of goods with high R&D intensity[1]

(% of total manufactured exports)



Source: World Bank, World Development Indicators (November 2015).
1 Aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.

also significantly lower,[22] representing 35.4% of total active population (aged 25-64) in 2014, compared with 44.4% in the EU. Lastly, the number of patent applications is also small: 19 times lower than the EU average and the 7th lowest among euro area countries.

This points to the country's failure to attract, deploy and retain talent, which would enable it to gradual reverse the brain drain. Table 2 provides relevant data. On the basis of the Global Talent Index for 2015, Greece scores a mere 45.7 points on a 100-scale and ranks 33rd among a total of 60 countries, i.e. 10 places down from its previous ranking in 2011.[23] This low ranking can be explained by a number of factors, including a lack of incentives for excellence in pre-tertiary education, the declining quality of Greek universities and technological institutes by international standards, barriers to labour market entry, weak expectations of improving personal prosperity among young people, lack of economic openness, and the limited opportunities for developing talent.

Although the country is ranked among the top 10 OECD countries with the highest teacher/student ratio and has the highest gross enrolment ratio for all educational levels, the worsening of its overall talent index score is mainly due to the drastic cuts in research and technology spending, the stagnant quality of the labour force and the reduced openness of the domestic economy (see Table 2).

The poor performance in terms of the quality of the human capital stock is mirrored in the downward path of the country's high-technology export activity. Chart 13 depicts the evolution of Greek exports of goods with high R&D intensity, relative to OECD countries, the EU and the euro area. Between 2000 and 2013, these exports as a percentage of manufactured exports followed a downward course and declined by 6 percentage points, coming to a level more than two times lower than the EU, euro area and OECD averages.

5 BRAIN DRAIN: A COST-BENEFIT ANALYSIS

In the "brain drain" literature, it has been argued that the origin country may reap substantial benefits from the migration outflows of labour force: *(a)* the expected return to education increases, as it is the educated people who typically have better prospects of advancement in host countries; as a result, *(b)* demand for education as well as education spending increase, which leads to *(c)* a rise in the origin country's wealth and prosperity (see Beine et al. 2003, Stark 2004, Carrington and

22 They have either successfully completed tertiary education studies (HRSTE, ISCED 2011 levels 5-8) or work in those sectors without having attained a higher education level but are specialised as technicians or professionals (HRSTO, ISCO-08, major groups 2 and 3).
23 Among the countries with the best scores, five are European countries. In 2015, Greece, dropping by 10 places, is ranked after Russia and before Argentina in the global ranking and, along with Bulgaria and Azerbaijan, is among the three countries that suffered the heaviest losses.

Table 2 Global Talent Index

(Greece, 2011 and 2015, on a 0-100 scale where 100=best)

Indicators	2011	2015
Ability to develop talent	42.7	34.0
Quality of the labour force	49.3	49.0
Researchers in R&D	27.6	27.4
Technicians in R&D	50.0	50.0
Language skills	50.0	50.0
Adult literacy rate	95.6	96.9
Quality of university education	54.1	48.9
Gross enrolment ratio	92.4	85.5
Total expenditure (% of GDP)	60.8	53.8
Universities ranked in world's top 500	4.6	2.9
Quality of compulsory education	75.3	70.7
Spending per pupil (% of GDP per capita)	52.3	24.2
Enrolment ratio	97.4	97.1
Pupil/teacher ratio (compulsory – lower secondary)	98.0	95.1
Pupil/teacher ratio (upper secondary)	98.6	96.8
Openness	34.3	33.9
Talent environment	50.0	62.5
Personal disposable income per capita	57.3	53.4
Employment	23.3	8.1

Source: Economist Intelligence Unit, *The Global Talent Index Report, The Outlook to 2015* (January 2015).
1 Openness is the composite index of of three sub-indices: foreign direct investment (% of GDP), openness of trade (% of GDP), hiring of foreign nationals.

Detragiache 1998, Docquier and Marfouk 2004). To those benefits one should add the growth of trade with destination countries, the inflow of workers' remittances, the transfer of know-how and expertise, and increased foreign productive investment flows to the origin country (Lucas 2005, Javorcik, Saggi and Spatareanu 2004).

Although it is too early to determine the measurable impact of brain drain on macroeconomic aggregates, there are strong arguments that the net effect is ultimately negative (Schiff 2006). This is so because, *first*, the brain drain affects countries with negative demographic trends and mainly concerns single young people, both men and women.[24] This not only has an adverse effect on the already weak birth rates, but also increases the burden on the social security system, by depleting the country's employable human resources.

Second, higher education and specialisation in Greece is exclusively provided by the government through public universities, which are mainly financed by taxpayers' money. Average government spending on education remains relatively high (4.5% of GDP, compared with 5% of GDP for the EU-28 in 2013).[25] To this we should add the expenditure of the average family, which continues to finance higher-level studies in Greece and abroad.[26] Thus, taking into account the high total national expendi-

24 40% are women.
25 Source: ELSTAT.
26 In 2006, private spending on education accounted for 0.3% of GDP. On the basis of overall (public and private) education expenditure per student (USD 4,479) in PPP terms, Greece ranks 16th in the EU-28 (USD 5,930). See Eurostat, *Education Statistics*.

ture on education, both the flight of scientific human resources that were trained in Greece and their stay abroad after the completion of their studies constitute a heavy loss.

Third, human capital flight concerns mainly the most competitive, able and ambitious part of a country's labour force. Its productive utilisation by a foreign country causes a permanent damage to the origin country, as the average quality of the remaining human capital stock deteriorates. This leads to understaffing for lack of skilled workforce, which is necessary to underpin the growth process.

Fourth, people with lower skills and educational attainment also emigrate, which limits the benefit from the expected higher return to education, since a shortage of labour supply relative to demand creates expectations of higher earnings in the source country, and weakens any incentives for education and improvement of the quality of the labour force.

Fifth, the high expected return to education is surrounded by high uncertainty, given that it is conditional upon unpredictable factors such as the possibility to migrate, employment opportunities in the destination country, changes in the destination country's immigration policy (stricter numerical quotas) and unfavourable developments in the host country's economic environment which affect the level of expected wages.

Sixth, migrants are usually overqualified and underpaid. As a result, the brain waste and income loss pose an extra burden on the source country.[27]

Seventh, increased education spending deprives public funds from other sectors, such as public infrastructure and healthcare, which also have a positive multiplying effect on economic growth. If increased education spending is financed through taxation, the resulting decline in disposable income will weaken demand for education, thereby leading to a negative net final outcome. Besides, cuts in other investment expenditures, e.g. in infrastructure or in healthcare, also have first-round adverse effects on the growth process as well as on the quality of the labour force. The latter has multiplying negative second-round effects, as returns to physical capital decrease, if a given stock of physical capital has to be combined with lower-quality labour inputs in the production process.[28]

Eighth, human capital loss also implies sizeable fiscal losses in terms of tax revenue, since, as a rule, highly skilled workers demand, and succeed in obtaining, higher wages and pay more taxes due to their higher taxpaying capacity.

Ninth, the exodus of the most talented and educated people, when manifesting itself with such magnitude and duration, brings about a feeling of resignation and pessimism among large parts of the population, which translates into mistrust in the country's future outlook.

6 SYNOPSIS AND POLICY IMPLICATIONS

The main findings of our research are four. First, the phenomenon of brain drain, as a symptom of the recent crisis, has developed strong dynamics in terms of size, intensity and duration. Second, according to the information available so far on its qualitative characteristics, the emigration flow concerns that part of the domestic workforce which is young, healthy, well-educated and skilled, highly mobile and employable. Third, although the deep and prolonged recession has triggered the manifestation of the phenomenon, its root causes should be sought not only in the recent negative macroeconomic environment, but also in the long-standing weaknesses of the domestic production paradigm. Fourth, as additional explaining factors, one should not overlook the lagging behind of the domestic education system in terms of generating high-quality human

27 According to the results of the survey of the ICAP Group (2015), 60.8% of respondents (Greek migrants) had non-managerial jobs in the destination country, while more than half of them were relatively low-paid (annual gross earnings of up to €40,000).

28 For a theoretical general equilibrium analysis of the entailed welfare loss, see Schiff (2006).

capital and the inability of the domestic economy to attract and retain talent.

The flight of domestic workforce deserves to become the subject of a constructive dialogue. The starting point for any efforts to provide better education and more career opportunities should be mutual understanding and cooperation among all stakeholders: the government, educational institutions and businesses. In the following, we conclude with six policy recommendations, as a minimum set of actions which should be implemented without delay.

First, *a shift in the growth model of the Greek economy towards more productive sectors and a link between education and production*. Coordinated efforts should be made to support those sectors in which the domestic economy has and can maintain and expand, or can obtain, a comparative advantage in the global division of labour and wealth. To this end, it is necessary to identify the types and forms of scientific and vocational skills available and needed, with a view to reducing the current demand-supply mismatches. Linking tertiary education to the labour market is instrumental in this respect.[29]

Second, *development of a skills database*, which would support the compilation of statistics and the quantitative and qualitative study of the brain drain phenomenon and, at the same time, serve as a platform connecting domestic businesses to skilled and experienced expatriate staff, with the potential of ultimately leading to their repatriation.[30]

Third, *initiatives to support entrepreneurship*. This could take the form of meeting points liaising creative and ambitious young people with the business community.[31] The observed shift of employment away from the public sector towards the private sector, as well as the appealing image of entrepreneurship among educated young people are encouraging steps in this direction. 61% of educated young people who participated in the Endeavor Group 2014 survey wish to work in the private sector, even with the same earnings as in the public sector, while 52% would like to start their own business.

Fourth, *strengthening excellence, transparency and meritocracy*. Although the economic crisis has reinforced the great exodus of young graduates, it has not been the only factor behind mass migration. In relevant surveys, current or prospective/potential migrants cite as the major push factors: (a) lack of meritocracy and of transparency in recruitment processes; (b) mediocracy, corruption and nepotism; (c) inefficient and ineffective public administration; (d) lack of career and professional development opportunities; (e) lack of incentives to entrepreneurship; and (e) the economic crisis and the prevailing uncertainty about the country's future.[32] Among pull factors, respondents cite meritocracy, availability of promising career opportunities at managerial positions, more flexibe labour markets with less barriers to entry, as well as the desire to live in more progressive societies. The policy implication is that, in order to halt the outflows

29 In a survey conducted among young people (Endeavor Greece 2014), 82% of respondents expressed the view that the education system in Greece does not provide students with the necessary skills to match market needs.

30 Along these lines, the web-based initiative BrainGain is designed to bring together skilled Greek expatriates and, through concrete actions, pave the way for their return home (see www.braingain.gr).

31 2015 saw several such initiatives launched by the Greek business sector in collaboration with non-profit and voluntary organisations without however any involvement of the State. Such initiatives included: (i) the 2015 Startup Safary Athens, which through 90 events offered young people the opportunity to obtain useful information, meet in person, talk with and be inspired by entrepreneurs; (ii) the Mindspace initiative (December 2015) focusing on technology entrepreneurship; (iii) the Entrepreneurship School that was launched in Athens for the first time (30 November-4 December 2015) by the non-profit organisation Think Young and enabled students to be taught directly by entrepreneurs rather than professors; and (iv) Impact Hub Athens, funded by Greek firms and part of the global network Social Impact Awards, which supports youth entrepreneurship. Mention should also be made to the "ReGeneration" programme, designed by the Global Shapers Athens Hub in the context of the World Economic Forum. This paid internship programme enables ambitious and talented persons to benefit from professional development opportunies and businesses to build capacities. In the same vein, the Google LaunchPad, a 4-day boot camp for startups, was organised in Athens for the first time (7-10 October 2015), bringing together 80 software programmers and entrepreneurs. Lastly, the SFEE Innovation Project implemented jointly by the Hellenic Association of Pharmaceutical Companies and Industrydisruptors.org as part of the Disrupt Startup ScaleUP event is another case in point.

32 This is a common finding of almost all the surveys and studies conducted so far (see EUI 2013; ICAP Group 2015, 2016; Endeavor Greece 2014; Theodoropoulos et al. 2014; Triandafyllidou and Gropas 2014; Labrianidis and Pratsinakis 2016).

and even more so to reverse them, it is important to ensure transparency in recruitment processes and career development, reward excellence and promote equal opportunities for talent to flourish. The regular holding of competitions, with the support of both professional associations and the government, with awards in the form of prizes and/or subsidies for prospective employers, as a reward for innovative ideas and as an incentive for participation, would provide tangible proof that excellence is valued and nurtured and meritocracy is safeguarded. Besides, the institution of competitions is an optimal practice that is successfully implemented by all advanced countries for several years.

Fifth, *an expansion of apprenticeship and traineeship opportunities* would help to keep at home talented young professionals or graduates with little or no work experience. In the current circumstances of low demand and downsized production, Greek firms are able to cope with short-term skill shortages; in the longer term however, once the economy enters an upward phase of the business cycle, they are likely to face serious problems associated with low productivity and lack of innovation.[33]

Sixth, *a business-friendly environment*. Based on the World Economic Forum competitiveness indices for 2015 and 2016, Greece holds one of the top places in terms of availability of scientists and engineers. It ranks 36th in a total of 144 countries worldwide in technological readiness and 43rd in the quality of higher education and training. However, its overall Global Competitiveness Index score brings it to the 81st place, with a stagnant trend, due to its weak performance in other domains (pillars), such as macroeconomic environment, institutions, labour market efficiency, financial market development, innovation and business sophistication.[34] This score is the lowest among euro area countries. Furthermore, although 90% of the population has internet access, the country holds one of the bottom places (26th out of the 28 Member States of the EU) in terms of digital literacy. Doing business in Greece would therefore greatly benefit from an institutional environment that includes, as essential ingredients, less red tape, a business-friendly attitude on the part of the State, as well as lower social security contribution and tax rates for startups until they become profitable.[35] Significant gains are also expected from flexible forms of bank financing, as well as from the utilisation of the European Investment Bank's special financial instruments.

Finally, a worrisome issue which is not directly related with the phenomenon of brain drain but negatively affects the quality of the domestic workforce is the very high percentage of young people not in education, employment or training (NEET); at more than 19% of population aged 15-24 in 2014, this rate is the third highest in the EU. Young people who are NEET often feel abandoned by the State and socially and economically sidelined.[36] This issue needs to be addressed by a holistic and cohesive strategy, building on best practices successfully followed in advanced economies which, despite the global crisis and recession, have experienced only small rises in youth unemployment.[37] Such practices are based on

33 For an overview of on-the-job-training, see Nicolitsas (2011).
34 Switzerland, Singapore, the United States and Germany have the highest scores.
35 According to the results of a recent survey on 2,222 students from 30 Greek universities, 81% of the respondents have a favourable view of entrepreneurship, 53% consider that internship and start-ups are the most effective tools for fostering entrepreneurship, 63% cite red tape as an inhibiting or even prohibiting factor, 45% believe that the Greek State is business-unfriendly and 48% call for an improvement of the institutional framework. See the survey *Entrepreneurship through young eyes. Something is changing*, conducted by the Athens University of Economics and Business, Endeavor Greece, EY and the American-Hellenic Chamber of Commerce, December 2015.
36 According to the latest PwC survey (2015), Greece ranks last among 34 OECD countries in developing the economic potential of young people in 2014. More specifically, on the basis of the PwC Young Workers Index, which is a weighted average of 8 indicators (unemployment, employment, part-time employment, long-term unemployment, educational enrolment rates, school drop-out rates, relative unemployment ratio (youth/adult, 15-24/25-54), NEET rates) and reflects the participation of youth under 25 in the labour market, education and training, the country's performance is judged as disappointing, which implies that young people in Greece not only represent an unlocked potential but also face social exclusion.
37 In Germany, the second best performer in the global ranking, youth unemployment rates have fallen since 2006 and now stand at below 8%, compared with 50% in Greece. Besides, the German NEET rate was 6.4%, i.e. three times lower than the respective Greek rate. These top performances of the German economy are due to the successful implementation of the programme "EU Youth Strategy", aimed at addressing multi-faceted issues for young workers such as education, health and social inclusion.

a set of initiatives developed by the government, in conjunction with businesses and educational institutions of all levels and forms, and are aimed at increasing apprenticeships and internships, vocational training and specialisation programmes, so as to support the transition of young people from school to the world of work, bolster the institution of second chance schools and provide incentives to prevent drop outs.[38]

38 A few examples are the UK programme "Employer Ownership of Skills", which aspires to create 3 million new apprenticeships by 2030, the German programme promoting long-term company internships for young people, as well as the programme "School Drop Out – A second chance", which aims to reintegrate students who are at risk of not completing qualifications due to high levels of truancy.

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