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Measuring and assessing
talent attractiveness
in OECD countries

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Measuring and Assessing Talent Attractiveness in OECD Countries

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Abstract

This paper introduces a new set of indicators aimed at benchmarking how OECD countries fare in attracting talented migrants. Three different profiles of talent are considered: workers with graduate (master or doctorate) degrees, entrepreneurs, and university students. After providing a definition of the notion of talent attractiveness, this paper develops a conceptual framework for the study of the phenomenon, and discusses the variables used to construct the composite indicators. Sensitivity analysis is performed in order to make sure the indicators are robust to several statistical checks. Finally, the paper documents the attractiveness of OECD countries to the different profiles of talented migrants.

Résumé

Ce document présente un nouvel ensemble d'indicateurs visant à comparer la manière dont les pays de l'OCDE parviennent à attirer des migrants talentueux. Trois profils de talents différents sont considérés: les travailleurs titulaires d'un diplôme de master ou doctorat, les entrepreneurs, et les étudiants du supérieur. Le document propose une définition de la notion d'attractivité des talents, développe un cadre conceptuel pour l'étude du phénomène et examine les variables utilisées pour construire les indicateurs composites. Une analyse de sensibilité est effectuée, basée sur plusieurs contrôles statistiques, afin de s'assurer que les indicateurs sont robustes. Enfin, le document décrit l'attractivité des pays de l'OCDE vis-à-vis des différents profils de migrants talentueux.

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1. Introduction

1. As human capital is becoming increasingly central to economic development and growth, access to talented and skilled individuals is an important determinant of countries' future prosperity (Becker, 1994^[1]; Silvano and Ryan, 2014^[2]). Talent mobility is key for enterprises and governments to fill skills shortages, while at the same time creating new employment opportunities for people already resident. As a result, employers compete globally to attract skilled workers – particularly in the fields of science and technology – and many countries have adopted immigration policies or programmes favouring importation of skilled foreign labour (Ortega and Sparber, 2016^[3]) (see Box 1.1 for some examples of recent national initiatives promoting talent attractiveness in OECD countries). For people with managerial, professional or high-level technical skills and work experience, the job market is global, if they choose to see it as such.

2. Skills mobility is gaining importance, notably at regional level, so the capacity to attract and retain talent will only become more important in the future. The attractiveness of individual countries as well as of main economic areas will depend not only on the openness of their migration policies to skills of different origin and types, but also on the capacity to recognise and reward them. Importantly, attractiveness is not limited to economic factors: people also want to feel at ease in their new country. Therefore, even the overall environment for highly skilled workers and their family counts in migrants' destination choice.

3. Initiated by a mandate given to the OECD by the 2014 High Level Policy Forum on Migration, the *OECD Indicators of Talent Attractiveness* are an innovative measure of talent attractiveness, that allows countries to place themselves on the map for different types of talented migrants and elaborate effective policies and programmes aimed at increasing their appeal to specific high-skilled migrant groups. This benchmarking quantitative tool offers invaluable information for both potential migrants and employers as well as for policy makers.

4. The *OECD Indicators of Talent Attractiveness* are composed of seven sub-indices, each representing a distinct aspect of talent attractiveness, to which is added an overarching dimension of country accessibility in terms of migration policies. The seven sub-indices are formed by between 22 and 24 variables providing detailed information on the main drivers of talent mobility across both economic and non-pecuniary factors. Indicators are based on a solid theoretical framework that encompasses the several dimensions influencing the decision-making process of highly skilled migrants.

5. This technical paper documents in details the construction of the *OECD Indicators of Talent Attractiveness*. Its reminder is structured as follows. It starts with an overview of the existing international initiatives on measuring talent attractiveness, stressing their composition and limitations. The section that follows focuses on building a conceptual framework for the study of talent attractiveness. In particular, it proposes a theoretical background of the determinants of talent mobility which clearly identifies the structure of the composite index and the criteria for the correct weighting of the indicators. Section 4. then turns to the practical construction of the *OECD Indicators of Talent Attractiveness*, looking at data selection, normalisation, and weighting. Sensitivity analysis is also performed to test the robustness of the *OECD Indicators of Talent Attractiveness* to several

statistical checks. A portrait of the talent attractiveness of OECD countries is finally presented in Section 5. A summary of the paper concludes.

Box 1.1. Recent national initiatives promoting talent attractiveness

The growing competition for talent has brought the diffusion of a plethora of national policies and programmes to attract high-skilled migrants. Remarkable examples are the recent “Talent Boost” programme in Finland, which aims at raising awareness of Finland and make it more attractive to international talents (OECD, 2018^[4]). Measures include developing both private and public services to support international recruitment, as well as the establishment in large cities of international schools and English-speaking early childhood education and care. The Netherlands’ “Expatercenter Procedure” is another well-established example of easier entry procedure designed for “knowledge migrants”, whereby dedicated desks help high-skilled foreign workers and their families to have a smooth integration into their new localities (OECD, 2016^[5]).

Countries have also become more innovative in their branding and talent recruitment. For instance, in 2010 Chile established the “Start-up Chile” programme in order to attract foreign entrepreneurs to develop projects over a six-month period in the country. The initiative offers selected candidates USD 40 000 equity-free seed capital and a short-term work visa, and has benefitted projects from over 70 countries (OECD, 2013^[6]). Similarly, the “GoAustria” programme is a funding scheme established in 2015 to attract entrepreneurs from outside of Europe to locate their businesses in Austria. Since 2015, the French government established the programme “French Tech Ticket” to attract international start-ups by providing them a financial support of EUR 45 000, a fast-track procedure for team members to obtain a residence permit, a dedicated desk to help with administrative procedures, and regular coaching sessions (OECD, 2017^[7]).

2. A review of the main initiatives on measuring talent attractiveness

6. Given the key role played by talent mobility for a better grasp of the future of our economies, some initiatives have been put in place over the last decade attempting to define and measure talent competitiveness (see Box 2.1 for a discussion on the strengths and limitations of composite indicators). Four main efforts to create a comparative ranking need particularly to be mentioned: (i) the *Global Talent Pyramid*, produced by the World Economic Forum; (ii) the *Global Talent Index*, produced by the Economist Intelligence Unit (EIU) and Heidrick & Struggles; (iii) the *IMD World Talent Ranking*, produced by the Institute for Management Development (IMD); and (iv) the *Talent Competitiveness Index*, jointly developed by INSEAD, the Adecco Group, and the Human Capital Leadership Institute (HCLI). The key features of these indices are described in Table A.1.

2.1. Global Talent Pyramid Model

7. Prior to this review of the available evidence on international competition for talents, the first major attempt of cross-country analysis was included in the Global Information Technology Report 2008-2009 of the World Economic Forum (Dutta and Mia, 2009^[8]). A simple conceptual framework – called the *Global Talent Pyramid Model* (GTPM) – was constructed in order to get an initial approximation of the ability of a country to attract talents internationally. Three pillars, or sub-indices, were identified: “talent usage” (i.e., the attractiveness of the national ecosystem vis-à-vis local and foreign talent), “talent availability” (i.e., the existence of a critical mass in the national talent pool), and “environmental variables” (i.e., the overall efficiency/quality of the economy and society). Table A.1 shows the indicators/variables that are assigned to each pillar. Importantly, the attempt was only theoretical, and the final index was not reported, nor countries were benchmarked – only the examples of India and Singapore were described as case studies. In contrast, the main purpose of the exercise was to suggest that each country should build its own talent pyramid in order to understand the challenges and advantages that it will face in the near future.

2.2. Global Talent Index

8. The first major composite index of talent attractiveness was produced in 2011 by the Economist Intelligence Unit and published by Heidrick & Struggles (EIU, 2011^[9]). The *Global Talent Index* (GTI) benchmarked 60 countries on their capacity for developing, attracting and retaining talent. Data were collected for 2011 and projected to 2015. Overall, 30 variables were grouped into 7 sub-indices, which were chosen as to measure a country’s potential to produce talent (“demographics”), a country’s ability to develop talent (“compulsory education” and “university education”), the conditions for a skilled labour force (“quality of the labour force” and “talent environment”), and the propensity to foster competitive and internationally-oriented business (“openness” and “proclivity to attracting talent”). Several data sources were collected, although most of the indicators came from an EIU survey of 441 business executives. The ranking found the United States to be the best performer in both 2011 and (projected) 2015, given the excellence of its universities, the high overall quality of its existing workforce and a meritocratic environment. Nordic countries, as well as Australia and Singapore, were also prominent in the top performing countries.

2.3. IMD World Talent Ranking

9. Drawing from data from the International Institute for Management Development (IMD) World Competitive Yearbook, in 2014 the IMD World Competitiveness Center published the *IMD World Talent Ranking* (WTR), an index whose goal is to assess the ability of countries to attract and sustain the talent pool available for enterprises. Access to the Center's comprehensive repository of historical data allowed IMD to construct the ranking retrospectively to 2005. The number of countries included in the exercise therefore changes according to information availability, from 50 countries in 2005 to 63 countries in the latest 2017 edition of the ranking. The index is structured according to three factors: (i) the investment in and development of home-grown talent ("investment and development factor"); (ii) the ability of a country to attract highly skilled foreign labour ("appeal factor"); and (iii) the availability of skills and competencies to sustain the economy's talent pool ("readiness factor"). As in the case of the GTI, also the *IMD World Talent Ranking* heavily relies on executive opinion surveys and subjective information. The 2017 ranking indicates Switzerland as the leader in talent competitiveness, followed by Denmark and Belgium. Similarly to the GTI, other Nordic countries (such as Finland, Norway and Sweden) enter in the top 10 (IMD, 2017^[10]). Conversely, the United States, which was occupying the first place in the GTI, results only 16th in the WTR.

2.4. Global Talent Competitiveness Index

10. Perhaps the ranking that received the most attention by both media and academia is the *Global Talent Competitiveness Index* (GTCI), produced annually since 2013 by INSEAD, Adecco Group and the Human Capital Leadership Institute. The index follows an input-output model, combining an assessment of what countries do to produce and acquire talents (input) and the kind of skills that are available to them (output). Overall, three main indices are computed: (i) the talent competitiveness input sub-index, which aggregates 46 variables to describe the policies, resources and efforts that a country can harness to foster its talent competitiveness; (ii) the talent competitiveness output sub-index, which aggregates 19 variables to measure the quality of talent in a country; and (iii) the *Global Talent Competitiveness Index*, which is computed as the direct arithmetic average of the sub-indices. While in its first year, the GTCI covered 103 countries, the 2018 edition covers 119 countries. The latest ranking shows somewhat similar trend to the GTI and WTR: Switzerland appears the best performer, followed by Singapore, and the United States (Lanvin and Evans, 2017^[11]). Sweden, Denmark, Finland and Norway are again included in the top 10.

2.5. Main drawbacks of existing indicators of talent competitiveness

11. Notwithstanding the aforementioned efforts to measure talent attractiveness, however, important challenges hamper their soundness. Both conceptual and measurement concerns can be raised. First, no solid theoretical framework is provided to justify the selection criteria used to identify sub-indices and single variables. As a result, the list of indicators selected appears opportunistic and mostly based on data availability. Moreover, the lack of a conceptual background makes inevitable that important considerations in the global mobility of talents are ignored. For instance, the GTCI is very much business-oriented (e.g. new business density, FDI, foreign ownership, ease of business establishment, business government relation) and largely ignores available evidence regarding employment and career opportunities. Conversely, the IMD WTR includes more

relevant information on labour market conditions but only looks at past outcomes rather than employment/career opportunities. Although the WTR intends to inform about international migration opportunities, it does not include any information on migration policies and implicitly uses migrant stock data (adult migrant stock, international students, and perception of brain drain) to estimate the facility of international recruitment. None of these indices includes specific information on labour market outcomes of immigrants (such as unemployment, earnings, and over-qualification) or takes into account the tax system and social benefits of the destination country.

12. As a consequence of the lack of a solid theoretical background, several previous indices of talent attractiveness include outputs (rather than inputs) among their drivers of talent attractiveness. For example, the *Global Talent Index* looks at the adult literacy rate, while the *Global Talent Competitiveness Index* includes a country's high-value exports. All these variables are outcomes of what the indices aim at assessing, and their inclusion in the composite index may be questioned. Even more importantly, the former indices are supposed to apply to all potential migrants, regardless of their skill level (managerial or technical occupations), age (students and workers) and family situation, which seriously cast doubts on the relevance of the information they encompass.

13. Concerning the measurement issues of existing talent rankings, the various sources have heavily relied on qualitative subjective data. For instance, the *Global Talent Index* greatly depends on the qualitative assessments from the Economist Intelligence Unit's network of country analysts and local contributors. The *World Talent Ranking* also exploits subjective information contained in the annual IMD Executive Opinion Survey to provide a scoring of numerous indicators, such as whether "worker motivation in companies is high" or whether "foreign high-skilled people are attracted to the country's business environment". Remarkably, the GTCI uses the World Economic Forum's Executive Opinion Survey to gather information on a third of its variables (22 out of 65). Subjective surveys of individuals' (often executives') opinions, while not inherently incorrect, may not properly depict a country's situation, thereby leading to measurement error bias.

14. An additional caveat of the former composite indices of talent mobility is the large numbers of indicators included. For example, the *Global Talent Competitiveness Index* includes 68 indicators to construct its final rankings. Clearly, given the large numbers of indicators involved, there is room for correlation concerns, and worries that the existing composite indices are counting similar elements twice or more (thereby giving them more weights in the final aggregation). For instance, the GTI includes pupil-teacher ratios in primary and in lower-secondary education among its 30 variables. In a similar vein, the WTR looks at both the total public expenditure on education as percentage of GDP and the total public expenditure on education per pupil as percentage of GDP per capita. Cases of highly correlated variables in the GTCI are even more frequent, such as the inclusion of both tolerance of immigrants and tolerance of minorities, and both workforce with secondary education and population with secondary education.

15. Finally, the way variables are aggregated in these indices is often unsupported by specific background modelling, generating a rigid and unjustified weighting approach. Both *Global Talent Competitiveness Index* and *World Talent Ranking* consider all dimensions equally, thereby implicitly assigning greater weights to the variables with larger variance and higher correlation with each other. On the other hand, the *Global Talent Index* adopts a series of default weights deemed appropriate for the overall index calculation by experts at the Economist Intelligence Unit. As a result, heavier weights are assigned to the "University education" and to the "quality of the labour force" categories.

Box 2.1. The strengths and limitations of composite indicators

Composite indicators are convenient tools that provide simple comparisons between countries involving complex issues. They are easier to interpret than numerous separate indicators pointing at common trends, and they are extremely useful in benchmarking country performances (Saltelli, 2007^[12]). Yet – if poorly constructed – composite indicators can be misleading, and lead to simplistic policy implications. The literature on the analytic concerns of even well-known indicators (such as the Human Development Index by UNDP or the Doing Business Indicators by the World Bank) is abundant, and – albeit not reviewed here – should be taken into consideration. Yet, for any useful policy index, some compromises must be made (Haq, 1995^[13]), and, if done correctly, attempting to count what is difficult to count is still better than ignoring it.

Composite indicators are indeed helpful means of capturing the multi-dimensional determinants of the attractiveness of OECD countries for talented migrants. A single indicator of, say, economic stability would reflect only one aspect of talent mobility, while a composite indicator of talent attractiveness would reduce the visible size of numerous indices without losing the underlying information base. As such, the interpretation of composite indicators is clearly easier than the one of a set of various separate variables. Given such ease of interpretation, findings from composite indicators are simple to be communicated with a wide audience, thereby enabling the general public to compare the complex issue of talent attractiveness effectively, and place country performances at the centre of the debate.

Nevertheless, the construction of composite indicators owes more to craftsmanship than to universally accepted scientific rules (OECD, 2008^[14]), and their limitations should be acknowledged. In fact, the selection of variables to be included in the composite indicators, as well as the weights to assign them, could be subject to dispute. Moreover, if their construction process is not transparent and sound, composite indicators may be misused to, for example, endorse a desired policy or support the overlook of an area of action.

3. Towards a conceptual framework of talent attractiveness

3.1. What do we mean by “talent”?

16. In spite of the substantial attention that talent mobility has received during the last few years, there is still a lack of precision on the meaning of the term “talent”. Indeed there are multiple – and all appropriate – ways in which talent may be defined. It is however important to have a “common” definition of the concept not only for the practical scope of constructing composite indicators of talent attractiveness, but also for well-coordinated and integrated migration policies. This section thus briefly reviews the various definitions of talent used in the literature and provide an explanation of the definition chosen for the *OECD Indicators of Talent Attractiveness*.

17. There is a large difference between studies attempting to assign a qualitative and a quantitative meaning to “talent”. Among the former, psychologist François Gagné identifies as talented people those individuals having “the ability to perform an activity to a degree that places their achievement within at least the upper 10% of their peers who are active in that field” (Gagné, 2006^[15]). In a similar vein, management specialists Thorne and Pellant (2007^[16]) argue that a talented individual is “someone who has ability above others and does not need to try hard to use it. They excel with ease and grace. A talented person has a certain aura in their ability that others wish to emulate and from which lesser mortals draw inspiration”. In short, talent refers to those individuals who have the potential to reach high levels of achievement (Tansley, 2011^[17]), and who have abilities that cannot be easily replaced (Kang, Sato and Ueki, 2017^[18]).

18. In contrast, economists and statisticians have usually identified talented people with high-skilled people (Adler, 1985^[19]; Kerr et al., 2017^[20]). Particularly concerning migrants, there are three main ways to further define high-skilled. First, the educational attainment of migrants is the most ubiquitous measure used in the literature, given its readily availability – see for example Dumont et al. (2010^[21]) and Artuç et al. (2015^[22]), where bilateral migration stock data are provided by education level. Using this approach, talented high-skilled individuals are defined as those having completed at least a year of tertiary education (Kerr et al., 2016^[23]). Another way to identify high-skilled migrants often adopted in the Americas is through their overall salary (Parsons et al., 2014^[24]). This is also reflected in some of the existing migration policies, which adopt income thresholds to assess whether job positions can give migrants the eligibility for a work permit – see for instance the EU Blue Card and the Danish Pay Limit Scheme among the numerous examples. Finally, some studies have identified talented and high-skilled people according to their occupation. For example, Solimano (2008^[25]) distinguishes three types of talent mobility: directly productive talents (such as entrepreneurs and engineers), academic talents (scientists, scholars and international students), and talent in social and cultural sectors (such as health professionals, journalists and musicians). D’Costa (2008^[26]), instead, combines both education and occupation information in order to define “technical talent”, that is individuals working under the broader category of “human resources in science and technology” (HRST) with at least 4 years of tertiary education.

19. Taking a mixed approach, the *Talent Attractiveness* project distinguishes three profiles of talented migrants (Figure 3.1). First, in line with the majority of the social science literature, the project identifies as talent those individuals with tertiary education. This decision is made not only to make results more comparable to previous studies, but

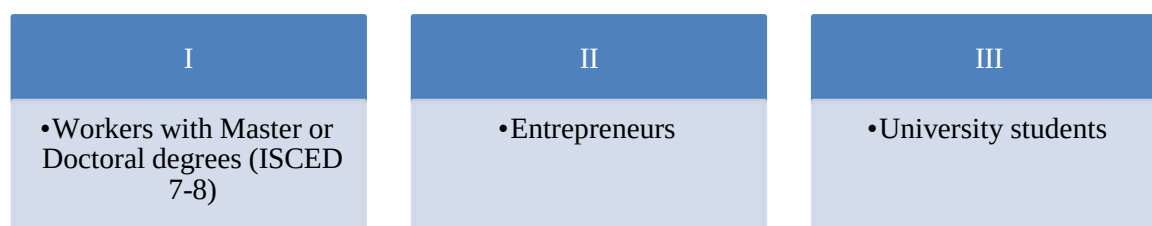
also because the easily availability of data on education levels of migrants allows to better combine the *OECD Indicators of Talent Attractiveness* with other measures of international migration. Yet, we distinguish between foreign workers with short-cycle tertiary education (ISCED 5) or bachelor degrees (ISCED 6), and foreign workers with master or doctoral level (ISCED 7 and 8). This distinction is important not only because the competencies involved with undergraduate and graduate workers can vary widely, but also because OECD countries have often in place different migration policies for the two groups. For example, countries such as the Netherlands and the United Kingdom have special visa programmes for exceptionally skilled migrants (respectively, the “Knowledge Migrant Scheme” and the “Tier 1 Exceptional Talent” visa). For the scope of the *OECD Indicators of Talent Attractiveness*, the first profile of talented migrants include only graduate-degree holders.

20. However, skills and talent are not limited to those with tertiary educational qualifications. A third profile of talented migrants consists of entrepreneurs. Indeed, across the OECD area the need for more entrepreneurs as a driver of economic growth is widely recognized (OECD, 2011^[27]). For instance, the EU Entrepreneurship 2020 Action Plan (adopted in 2012) foresees migrants as an important pool of potential talent. Recognizing that migrant entrepreneurs’ contributions to the host economy are not limited to job creation, but also innovation and trade, numerous countries have already put in place national policies to attract foreign entrepreneurs.

21. In line with the rationale of the *Talent Attractiveness* project, the migrant profile of entrepreneurs includes active investors, i.e. those foreign individuals who actively manage businesses in which they have invested in the destination countries. In contrast, passive investors – such as homebuyers, shareholders or bond purchasers – are not considered as talented migrants, although they still may be the target of specific migration policies from the viewpoint of receiving countries.

22. The competition for talent also concerns international enrolment in higher education, which has reached record levels in absolute terms and as a share of total enrolment. There are more than 3.5 million international students in OECD countries. 6% of all students in tertiary education in OECD countries are international students, and the figure rises to 12% for masters and 27% for PhDs. More than half of PhDs in science are international students. International students are increasingly seen as a resource to retain, a boost to the educated population and a stimulus to higher education institutions. As such, most OECD countries have explicitly developed national strategies to attract international university students.

23. This distinction of three different profiles of talented migrants is an important innovation in respect to previous benchmarking exercises. In fact, the attractiveness of countries for different types of talent varies widely, thereby making fundamental the differentiation between workers with master or doctoral qualifications, entrepreneurs, and university students. Countries that are particularly attractive for a group of talented migrants may not position themselves as well as for other categories of talent.

Figure 3.1. Profiles of talented migrants

Source: OECD Secretariat.

3.2. Determinants of talent mobility

24. It is possible to identify two major groups of determinants that motivate skilled individuals to relocate to another country: on the one side, employment and earnings opportunities; on the other side, non-pecuniary motivations and amenities. Both groups of drivers are affected by the individual characteristics (such as age, gender, and education) of the prospective migrant: indeed, individuals respond differently to incentives according to their personal situation, the experience they had in the past, and their expectation on the future. In addition, there are pair-wise determinants, such as geographical distance or trade networks, which however, being tied to the relative position of the destination country to each specific origin country, cannot be included in an overall index of talent attractiveness, but should be taken into account on a case-by-case basis.

25. Adapting the conceptual framework of Solimano (2008^[25]), and Silvanto and Ryan (2014^[2]), seven clusters of factors influencing migrants' decision-making process on the choice of destination can be defined (Figure 3.2). It is possible to distinguish two sets of pecuniary determinants – quality of opportunities, income and tax – three sets of non-pecuniary drivers – skills environment, inclusiveness, quality of life – and two dimensions that lies in-between – future prospects and family environment. In addition, the accessibility of countries in terms of migration policies should be taken into consideration. In fact, even if countries are exceptionally attractive in terms of job/study opportunities or quality of life, immigration policies may constrain migrants' access, and hence heavily undermine their attractiveness (refer to Section 3.3 for a complete discussion on the role of migration policies on talent mobility). Overall, this structure of factors gives a comprehensive picture of the complex phenomenon of talent mobility, and, from a host country perspective, of talent attractiveness.

26. As stressed by a broad range of migration studies, employment and study opportunities are one of the most apparent and influential determinants of human mobility (DaVanzo, 1978^[28]; Greenwood, 2014^[29]). Individuals migrate where opportunities are. For high-skilled persons, the quality of the opportunities abroad is particularly important, given that their employment prospects at home are already relatively high. Indeed, talented individuals' decision to relocate in a foreign country is linked with their desire to improve employment conditions (Bartolini, Gropas and Triandafyllidou, 2017^[30]).

Figure 3.2. Determinants of talent attractiveness

Source: OECD Secretariat.

27. In a similar vein, economic returns and differences in wages are the other major magnets of migrant attractiveness (Sjaastad, 1962^[31]; Graves and Linneman, 1979^[32]; Mayda, 2010^[33]). Indeed, if the expected income differential between earnings at home and earnings at destination are greater than the costs of moving across border, then international mobility is largely encouraged. Moreover, the cost of living at destination might also factor in the migration decisions of highly skilled individuals, since prospective migrants may be reluctant to move in a destination country where prices are by far higher, and hence their earnings are consumed quickly.

28. In an income maximisation perspective, high-skilled migrants are also attracted by the tax and welfare systems of destination countries (Borjas, 1999^[34]; Giulietti and Wahba, 2013^[35]). Recent studies have suggested that prospective migrants are significantly influenced by tax rates when choosing where to locate (Kleven, Landaís and Saez, 2013^[36]; Akcigit, Baslandze and Stantcheva, 2016^[37]). Benefits often complement or replace earnings, and hence can be another component of expected income (Gelbach, 2004^[38]; Fiva, 2009^[39]; Geis, Uebelmesser and Werding, 2013^[40]). Nonetheless, talented migrants looking for employment opportunities abroad would not necessarily be the group most influenced by minimum support benefits, which instead are more appealing to low-income workers. As such, there should be no concern of creating incentives for highly skilled immigrants to take advantage of generous institutions.

29. An individual's migration decision – about both relocating to and remaining in a destination country – depends on his beliefs about the future economic situation of the foreign country. This explains why high-income countries with stagnating economies are often found to be less attractive destinations for talented migrants than booming middle-income economies with pulsating economic prospects (Czaika, 2015^[41]). In addition to economic considerations, potential migrants are also attracted by the long-term integration and political participation prospects, such as easiness of status change and access to citizenship (Bertocchi and Strozzi, 2008^[42]).

30. Joining or accompanying a family member is the most important reason for migration in the OECD area: indeed, family migrants accounted for almost 40% of all permanent entries in 2015 (OECD, 2017^[43]). As such, prospective migrants may prefer to relocate in those countries where opportunities for family members are greater, both in terms of entry laws and labour market integration. Childcare costs and educational quality all matters for prospective migrants with dependent children.

31. In order for talented migrants to fully exploit their potential and realize their personal and professional goals, the skill environment, facilities and infrastructure of the

destination country are crucial. Indeed, a dynamic and transformative economy provides additional motivation to prospective migrants in search of development and career advancements. Talented people are attracted by other talented people. High-skilled occupations in fact display agglomeration effects: individual productivity is boosted by synergies with other skilled workers, thereby generating the multiplier effect that is at the base of innovation breakthroughs and development (Fu and Gabriel, 2012^[44]; Kerr et al., 2017^[20]). Factors such as research investments and skills development are all important determinants of talent attractiveness (Mahroum, 2000^[45]; Chen and Rosenthal, 2008^[46]).

32. In recent years, a large body of migration research has increasingly put the accent on non-pecuniary factors as main motivation of migrants' choices of destination. It has been remarked that this is particularly the case for skilled and talented workers, who, living already a fairly decent lifestyle back home compared to compatriots with lower levels of human capital, are particularly attracted by amenities and social policies at destination (Glaeser, Kolko and Saiz, 2001^[47]; Florida, 2002^[48]; Scott, 2010^[49]). The degree of diversity and inclusiveness of a country are one of the main non-pecuniary determinants of talent mobility stressed by the literature. Indeed, high earnings or strong economies may not be enough to attract high-skilled individuals to engage in cross-border migration if prospective migrants do not envision a life for themselves and their families at destination. Although the highly skilled may on average face lower discrimination (see Box 3.1), the perception of intolerance of minorities and xenophobia are still crucial drivers of their destination choices (Doomernik, Koslowski and Thränhardt, 2009^[50]).

33. Finally, a whole range of host country's amenities should also be included in the determinants of talent mobility. For instance, the quality of life and the environmental conditions at destination constantly rank among the top reasons for migration in surveys (Rodríguez-Pose and Ketterer, 2012^[51]; Khoo, 2014^[52]). The overall value of public and private services is also essential to ease in-country adjustment. Indeed, the quality of the health system (Geis, Uebelmesser and Werding, 2013^[40]) and the quality of education (Beine, Noël and Ragot, 2014^[53]) are important institutional factors entering the expected utility function of prospective migrants. As the 2013 HSBC Expat Survey shows, countries such as Canada and Spain largely benefitted from the ease for expatriates to organize quality schooling for their children (Silvanto and Ryan, 2014^[2]).

34. In sum, the proposed framework suggests to augment the classical model of migration decisions in order to take into full consideration the multidimensional nature of high-skilled migration and the large heterogeneity in patterns across OECD countries. The resulting framework of talent attractiveness proposes seven groupings of factors: quality of opportunities, income and tax, future prospects, family environment, skills environment, inclusiveness, and quality of life. It is important to stress, however, that this effort aims at facilitating the construction of composite indicators of talent attractiveness and should not be regarded as rigid and unconnected factors. In fact, there are important linkages and overlap between the aforementioned sub-groups that need not to be disregarded.

Box 3.1. Attitudes towards high-skilled migrants across the OECD

On average, statistics from the Transatlantic Trends survey of 2011 suggest that people are twice as more likely to support immigration of highly educated migrants compared to immigration of low-skilled migrants in both the United States and in the five largest European countries (France, Germany, Italy, Spain, and United Kingdom). Yet, the majority of respondents prefer that governments favour a lower educated immigrant with a job offer to a highly educated immigrant with no job offer.

More detailed empirical studies examining people's attitudes towards high-skilled migrants are scarce. Due to a lack of granular information, most of the literature has looked at the overall perception of migration. However, there are at least two (contrasting) reasons to believe that opinions on high-skilled migrants might be different from those on the low-skilled. On the one side, labour market competition may result in natives opposing immigration of those foreign workers who have similar skill levels and hence are direct competitors in the labour market (Scheve and Slaughter, 2001^[54]). On the other side, natives may fear that immigrants take advantages of their welfare systems, thereby increasing the perceived benefits of skilled immigration, given that they contribute to the tax system to a larger extent than the unskilled.

Exploiting 2008 experimental data from the United States, Hainmueller and Hiscox (2010^[55]) challenge the labour market competition hypothesis and find an overall preference towards high-skilled immigrants regardless of the educational level of the respondent native. Another experimental online survey was conducted in Switzerland in 2011 to test the two aforementioned hypotheses (Helbling and Kriesi, 2014^[56]). Results reject the labour market competition model, and, concerning the welfare state model, they suggest that rich natives from low tax cantons prefer high- to low-skilled immigrants, whereas poor natives or individuals in high tax cantons do not have differential preferences. In contrast, Facchini and Mayda (2012^[57]) use the 2002–03 round of the European Social Survey and show that low-skilled natives are more in favour of skilled immigrants than their skilled counterparts. Skilled foreigners, however, are perceived to be more desirable than non-skilled ones by individuals who are concerned about security and by those who value traditions and customs.

3.3. The accessibility of countries to potential migrants: the role of policies and practices for admission

35. Even if prospective migrants were able to obtain a job offer in any destination country, immigration policies may still constrain their access. Indeed, opportunity is about more than just income: the tightness of entry laws is a crucial component in the destination choice of migrants (see Ortega and Peri (2013^[58]), among others, for a detailed discussion on the role of migration policies as drivers of international migration). Just because migrants want to work or study in a specific destination country, that country may not be more attractive in practice due to high barriers to admission. In order to construct a theory of talent attractiveness, it is important to acknowledge that migration policies are not just an additional sub-group of drivers of talent mobility, but they cover a key and separate role.

In fact, if a country does not admit a specific migrant category, then its attractiveness for the prospective migrant under other measures is of little importance.

36. In almost all the countries examined, a channel exists for each of the categories considered. However, it is necessary to take into account the probability of getting the visa. Quantifying policies and practices in terms of restrictiveness or openness is no easy task. Over the course of the last decade, efforts at measuring migration policies have gained momentum, and a number of migration policies indices have been produced. Noteworthy examples of indices which look at admission and residence policy are the DEMIG index by the International Migration Institute, the academics-led International Migration Policy And Law Analysis (IMPALA) database, and the Migration Governance Index by the IOM and the Economist Intelligence Unit. Although these indices provide a wealth of information on migration policies, several concerns may emerge on their construction.

37. On the one hand, migration policies and visa programmes are numerous both across and within countries, thereby making it difficult to compute a synthetic measure of a destination's tightness of admission policies. Countries have not only different migration policies for different areas such as labour migration, family reunification and international protection, but also within each area there are usually a plethora of visa programmes (e.g. channels specifically designed for high-skilled migrants, for seasonal workers, for intra-company transfer, for investors, etc.), as well as variable conditions within each programme. On the other hand, laws are not always effectively implemented, and practices may be more or less restrictive than legislation would indicate. A normative approach based on coding legislation risks incorrectly representing the true accessibility of countries to potential migrants.

38. In particular, the researcher attempting to quantify the opportunity for migration under admission policies faces numerous crossroads, such as:

- Should it be assumed that potential migrants already have a job offers in hand or not? If so, are these job offers matching migrants' education level or should migrants be considered systematically overqualified?
- Should the most equivalent permit channels (selecting for example only temporary visa programmes) be compared or the most-favourable-possible visas (which however may include permanent migration programmes), or rather the most prevalent and widely used visas?
- Should the indicators take the country of destination perspective or the individual migrant perspective (i.e., channels *meant* for the specific group of migrants under study or channels *actually used* by these individuals)?
- Should processing obstacles and costs such as visa fees, complexity and processing time be taken into consideration when evaluating migration opportunity?

39. For the purpose of these indicators, the *Talent Attractiveness* project considers the case where the prospective migrant already has a job offer in hand by a company based in a destination country and such offer is well-matched with the skill level of the individual. This assumption helps ensure the comparison of similar visa programmes across countries for the best possible case, that is the case in which the migrant is actually recruited by a foreign firm for an attractive occupation. When more than one visa for each migrant category (workers, entrepreneurs, students) exists in a country, the most widely used visa programme is selected. The rationale behind this is to measure the probability of entry for the channel that a migrant with a certain profile is most likely to use in each destination country. Temporary visa programmes are used rather than permanent programmes, since most permanent economic migrants were previously in the country on other grounds, as

well as because only a subset of OECD countries has permanent migration programmes in place (see Table A.2 in the Annex for a list of the visa programmes selected for the construction of the *OECD Indicators of Talent Attractiveness*). Note that intra-company transfer (ITC) migrants are not considered in the analysis, since their mobility is often based more on their employers' choices and requests, than on the individuals' free location preferences.

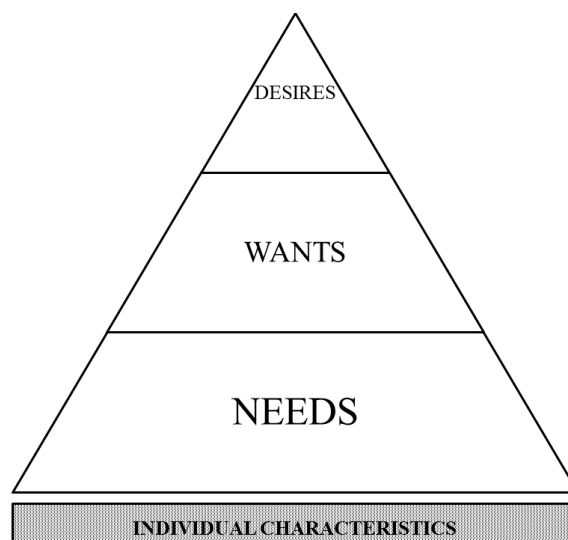
3.4. The talent mobility pyramid: *Needs, wants and desires*

40. Although the aforementioned clustering of talent mobility drivers nearly covers all the spectrum of possible factors influencing the destination decision-making of potential migrants, not all individuals consider such drivers equally important. The life-course and the personal characteristics of the prospective migrant are paramount for explaining the heterogeneity of preferences on place attractiveness. Indeed, age, gender, education, but also marital status and family background, country of origin and resource constraints, all matter in explaining the variety of migrants' destination choices. As a result, the attractiveness of individual countries for talented migrants is only relative, and countries that are attractive for certain migrants are not for others, and vice versa. A cascading migration model well represents the interlinkages between countries: talented migrants can leave certain countries, which in turn receive highly-skilled foreigners from other countries, leading to a cascade or a web of talented migrants that makes no country the absolute most attractive destination (OECD, 2007^[59]).

41. Inspired by the work by Maslow (1943^[60]) and Niedomysl (2010^[61]), Figure 3.3 suggests a pyramidal structure where three levels of talent mobility drivers can be distinguished. At the bottom of the pyramid are the *needs*, that are all those basic requirements on which prospective migrants are not willing to cede. If a country does not have the characteristics that the individual deem necessary for migration, then such destination is not selected. The following level consists of the *wants*: factors that should be fulfilled by a destination to be chosen which the prospective migrant may renounce. At the top of the pyramid lie the *desires*, which are those extras that make a destination more attractive, but which are also completely optional and negotiable. There is clearly a preference order in such demands scheme, with *needs* being the most important factors for talent mobility and attractiveness, *desires* being the least important, and *wants* being somewhere in the middle, depending on the individual preferences of the potential migrant. The extent to which a destination fulfils the *needs*, *wants*, and *desires* of a migrant constitutes the attractiveness of that country.

42. Importantly, individual characteristics are the foundations of the talent mobility pyramid, since they influence the weighting that each individual gives to the seven aforementioned main clusters of talent attractiveness: quality of opportunities, income and tax, future prospects, family environment, skills environment, inclusiveness, and quality of life. This is the reason why constructing composite indicators of talent attractiveness cannot overlook the complex linkages between place attractiveness and individual characteristics.

Figure 3.3. The talent mobility pyramid



Source: OECD Secretariat.

4. Constructing the *OECD Indicators of Talent Attractiveness*

43. The construction of the *OECD Indicators of Talent Attractiveness* follows four main steps. After defining the concept of talent attractiveness and developing a theoretical framework to provide a clear understanding of the phenomenon under study (in Section 3), the variables behind the composite indicators are carefully selected based on pre-determined selection criteria. The data are therefore normalised in order to be fully comparable and aggregated together in composite indicators.

4.1. Selecting the variables behind the composite indicators

44. The innovative approach taken by the *Talent Attractiveness* project is to develop indicators that are profile-specific, that is targeted to different talented migrant categories (workers, entrepreneurs, students). It follows that, on the one hand, variables behind the composite indicators are not always the same for all profiles, but they instead reflect the peculiarity of the migration determinants of each category; on the other hand, even when the variable itself is the same across profiles, its actual numeric value may change on the basis of the reference group. This ensures that the *OECD Indicators of Talent Attractiveness* do not overlook the heterogeneity among migrant categories, and are relevant for the different types of talented migrants.

45. In line with the OECD's expertise in the construction of composite indices (OECD, 2008^[14]; OECD, 2014^[62]), the variables of each dimension of the *OECD Indicators of Talent Attractiveness* have been selected based on the following four selection criteria:

1. *Conceptual relevance*: the variables should correctly measure an aspect of talent attractiveness and be closely tight to the conceptual framework sketched in the previous section.
2. *Distinction*: different variables should measure different aspects of talent attractiveness, thereby adding new information not measured by other variables.
3. *Statistical association*: different variables within a dimension should be statistically associated without being redundant
4. *Data quality*: the variables should come from reliable high-quality sources; ideally they should be standardised across countries and have full country coverage.

4.1.1. Quality of opportunities

46. This dimension is intended to capture the employment-related and study-related pull factors of destination countries. The variables included for each of the three profiles of talented migrants – as well as their full definitions, sources and year coverage – are detailed in Table 4.1.

47. For workers, two proxies of the labour market opportunities of highly-skilled migrants in host countries – unemployment rate of the foreign-born with education ISCED 7-8 and the percentage of foreign-born part-time workers with ISCED 7-8 educational attainment – are included. To capture the average job quality for the highly-qualified foreign-born at destination two measures are selected: the share of the ISCED 7-8 educated foreign-born with temporary contract and the over-qualification rate of the foreign-born with education ISCED 7-8. Note that the latter takes into account not only the quality of immigrants' jobs, but partly also the recognition of foreign qualifications in the host

countries. In fact, while degree recognition is an important determinant of talent mobility, there exists no cross-country data on recognition rates, and hence it is necessary to rely on overqualification rates to partially capture them.

48. For entrepreneurs, measures of the easiness of setting up a business, as well as the employment and product market regulations in destination countries are considered. Given the strong link between trade and migration (see Khoudour-Castéras (2010^[63]) and Campaniello (2014^[64]) among others), trade openness is taken into account.

49. For university students, it is important to note that the “quality of opportunities” sub-index measures the attractiveness of foreign study – rather than work – opportunities (the potential employment opportunities after graduation are considered under the “prospects” dimension). As such, only one variable is included, which itself is a composite index of other measures: the number of prestigious universities, which has been stressed as one of the major magnets for prospective students (Beine, Noël and Ragot, 2014^[53]).

Table 4.1. Variables included in the “Quality of opportunities” sub-index

VARIABLE	FULL DEFINITION	SOURCE	YEAR
Workers with master/doctoral degrees			
Unemployment rate of the foreign-born with education ISCED 7-8	Unemployment rate of the foreign-born with education ISCED 7-8	Computed from LFSs by OECD Secretariat	2017
Over-qualification rate of the foreign-born with education ISCED 7-8	Share of foreign-born workers with education ISCED 7-8 in low- and medium-skilled jobs	Computed from LFSs by OECD Secretariat	2017
Share of the ISCED 7-8 educated foreign-born with temporary contract	Share of the ISCED 7-8 educated foreign-born with temporary contract	Computed from LFSs by OECD Secretariat	2017
Share of foreign-born part-time workers with education ISCED 7-8	Share of foreign-born part-time workers with education ISCED 7-8, excluding those still in education	Computed from LFSs by OECD Secretariat	2017
Entrepreneurs			
Strictness of employment protection	Individual and collective dismissals (regular contracts)	OECD	2013
Product market regulation index	Product market regulation index	OECD	2013
Trade openness	Ratio of country's total trade (i.e., the sum of exports plus imports) to the country's gross domestic product	OECD	2016
Ease of doing business	Ease of doing business	World Bank	2018
University students			
Universities ranked in the World's top 500	Number of universities ranked in the World's top 500	ARWU	2017

Note: (1) Data for unemployment rate, over-qualification rate, temporary contract, and part-time work come from EU-LFS 2017 for all European countries, except Germany (EU-LFS 2013); Australia, Canada, Israel, Japan, Korea, and New Zealand: OECD (2018^[65]) (no distinction between ISCED 5-6 and 7-8); Chile: CASEN 2017 (no distinction between ISCED 5-6 and 7-8); Mexico: ENOE 2017, except for over-qualification rate, which comes from OECD (2018^[65]) (no distinction between ISCED 5-6 and 7-8); Turkey: LFS 2015; United States: CPS 2017. (2) Data for Canada and Japan for the variable “Over-qualification rate of the foreign-born with education ISCED 7-8” are missing, hence the “Jobs and job quality” sub-index for these countries is computed without taking into consideration this variable. (3) Data for Israel and the United States for the variable “Share of the ISCED 7-8 educated foreign-born with temporary contract” are missing, hence the “Jobs and job quality” sub-index for these countries is computed without taking into consideration this variable. *Source:* OECD Secretariat.

4.1.2. Income and tax

50. This dimension is intended to capture the salary-related and the tax and benefits pull factors of destination countries. The variables included for each of the three profiles of talented migrants – as well as their full definitions, sources and year coverage – are detailed in Table 4.2.

51. For all types of talented migrants, the average earnings of highly skilled workers (both foreign-born and native-born) are included, as well as the cost of living at destination – proxied by the price level index of individual consumption. To capture the possibility to earn a salary while enrolled in university programmes, the number of hours per week that international students are allowed to work during studies is added for the university student profile.

52. In order to take into account the tax and benefits system for workers, we include the tax wedge calculated by OECD (2018^[66]). While the OECD tax wedge results are based on eight model family types – which vary by marital status, number of children and economic status – for the scope of the *OECD Indicators of Talent Attractiveness*, only single taxpayers without children are considered. In particular, workers with master/doctoral degrees are assumed to earn 167% of the average wage. In contrast, for what concerns entrepreneurs, the corporate income tax rates are selected in order to proxy for the financial burden that firms have to pay in the host country. Finally for students, the differentiation in tuition fees between domestic and foreign university students is exploited.

Table 4.2. Variables included in the “Income and tax” sub-index

VARIABLE	FULL DEFINITION	SOURCE	YEAR
Workers with master/doctoral degrees			
Earnings of ISCED 7-8 workers	Actual annual earnings of full- and part-time workers with ISCED 7-8 education (USD constant prices)	OECD	2016
Price level index	Price level index – Actual individual consumption	OECD	2016
Tax wedge (167% of average wage)	Income tax plus employee and employer contributions less cash benefits as percentage of labour costs for a single worker (no children) with earnings equal to 167% of the average wage	OECD	2016
Entrepreneurs			
Earnings of ISCED 7-8 workers	Actual annual earnings of full- and part-time workers with ISCED 7-8 education (USD constant prices)	OECD	2016
Price level index	Price level index – Actual individual consumption	OECD	2016
Corporate tax	Corporate income tax rate	OECD	2017
University students			
Earnings of ISCED 5-6 workers	Actual annual earnings of full- and part-time workers with ISCED 5-6 education (USD constant prices)	OECD	2016
Price level index	Price level index – Actual individual consumption	OECD	2016
Differentiation in tuition fees between domestic and foreign university students	Differentiation in tuition fees between domestic and foreign university students	OECD	2018
Number of hours per week that international students are allowed to work during studies	Number of hours per week that international students are allowed to work during studies	Computed from migration policies by OECD Secretariat	2018

Note: (1) Data on earnings by educational attainment come from OECD (2018^[67]). Data for Italy, Japan, Spain and Turkey are for overall tertiary education. (2) Tax wedge data for Denmark, Finland, the Netherlands, and Sweden are deflated by a fifth – 20% – in order to take into account the fact that these countries have in place significant tax concessions for high-skilled migrant workers (see OECD (2011^[68]) for more details on the taxation of mobile high-skilled workers). (3) See Box 4.1 for a more detailed discussion on the codification of qualitative information.

Source: OECD Secretariat.

4.1.3. Future prospects

53. This dimension is intended to capture the prospect-related pull factors of destination countries. The variables included for each of the three profiles of talented migrants – as well as their full definitions, sources and year coverage – are detailed in Table 4.3.

54. Migrants take into account in their location choice decision what are the places where their longer-term prospects are the best. Consequently, the *OECD Indicators of Talent Attractiveness* include a measure of the easiness of status change from temporary to permanent migrants – or from study to temporary migration for what concerns international university students – computed qualitatively from migration policies (see Box 4.1 for a more detailed discussion on the codification of qualitative information). To complement this information, a measure of acquisition of nationality (i.e. the share of nationals among the foreign-born population who have resided in the host country for at least 10 years) is included. While not all foreign-born aim at obtaining the host country nationality, this variable still reflects the long-run integration of migrants in the political and social tissues of the destination countries. Lastly, the projected proportion of the dependent population (aged 0-14 and 65+) in 2050 is adopted as a proxy of the demographic change that all OECD countries are currently undergoing.

55. The talent migrant profile of university students also includes the number of months allowed to stay in the host country after graduation, which is very important determinant of the attractiveness of countries to students.

Table 4.3. Variables included in the “Future prospects” sub-index

VARIABLE	FULL DEFINITION	SOURCE	YEAR
Workers with master/doctoral degrees – Entrepreneurs			
Dependency ratio in 2050	Ratio of population aged 0-14 and 65+ per 100 population 15-64	UNDESA	2050
Acquisition of nationality	Share of nationals among the foreign-born with 10+ residence	OECD	2015/16
Ease of status change from temporary to permanent	Ease of status change from temporary to permanent	Computed from migration policies by OECD Secretariat	2018
University students			
Dependency ratio in 2050	Ratio of population aged 0-14 and 65+ per 100 population 15-64	UNDESA	2050
Acquisition of nationality	Share of nationals among the foreign-born with 10+ residence	OECD	2015/16
Ease of status change from study to temporary	Ease of status change from study to temporary	Computed from migration policies by OECD Secretariat	2018
Number of months allowed to stay in the country after graduation	Number of months allowed to stay in the country after graduation	Computed from migration policies by OECD Secretariat	2018

Note: (1) Data for the variable “acquisition of nationality” come from OECD (2018^[67]). For EU countries, values consider only third-country nationals. (2) Data for Japan, Korea, Mexico, and New Zealand for the variable “acquisition of nationality” are missing, hence the “Prospects” sub-index for these countries is computed without taking into consideration this variable. (3) See Box 4.1 for a more detailed discussion on the codification of qualitative information.

Source: OECD Secretariat.

4.1.4. Family environment

56. This dimension is intended to capture the opportunities opened to family members of potential migrants in the destination countries. The variables included for each of the

three profiles of talented migrants – as well as their full definitions, sources and year coverage – are detailed in Table 4.4.

57. For all types of talented migrants, the “Family opportunities” dimension includes three qualitative and three quantitative variables. Among the former there are policy-related variables concerning family reunification, working possibilities for spouses, and the easiness for immigrants’ children to access to the host country’s citizenship. Altogether these variables provide accurate information on the normative framework facilitating family migration. Quantitative variables include PISA test scores as proxy for the quality of the young-age education system, as well as the public expenditure on family benefits and the participation tax rate for a second earner parent entering employment.

Table 4.4. Variables included in the “Family environment” sub-index

VARIABLE	FULL DEFINITION	SOURCE	YEAR
<i>Workers with master/doctoral degrees – Entrepreneurs – University students</i>			
Right for spouse to join migrant	Right for spouse to join migrant	Computed from migration policies by OECD Secretariat	2018
Possibility for the spouse of migrant to work	Possibility for the spouse of migrant to work	Computed from migration policies by OECD Secretariat	2018
Easiness for children of migrants to get citizenship	Easiness for children of migrants to get citizenship	Computed from migration policies by OECD Secretariat	2016
PISA math test scores	PISA math test scores	OECD	2015
Public expenditure on family benefits	Public expenditure on family benefits (per head, PPP 2010)	OECD	2015 or latest
Participation tax rate for second earner parent entering employment	Participation tax rate for second earner parent entering employment	OECD	2016

Note: (1) Data for Mexico for the variable “participation tax rate for second earner parent entering employment” are missing, hence the “Family opportunities” sub-index for Mexico is estimate without taking into consideration this variable. (2) The “easiness for children of migrants to get citizenship” variable is based on the Global Database on Modes of Acquisition of Citizenship (GlobalCit) by the European University Institute. The variable looks at both the birthrights of children born in a country irrespectively of parents’ citizenship, and the acquisition rights of children born in a country after birth. (3) See Box 4.1 for a more detailed discussion on the codification of qualitative information.

Source: OECD Secretariat.

4.1.5. Skills environment

58. This dimension is intended to capture the skills infrastructures of destination countries. The variables included for each of the three profiles of talented migrants – as well as their full definitions, sources and year coverage – are detailed in Table 4.5.

59. A measure of internet access is included for all migrant profiles to proxy for the technological advancement and communication infrastructure of destination countries. In spite of what one may think, there is large heterogeneity across OECD member states in terms of the proportion of households connected to the internet: it spans from 34% in Mexico to 98% in Korea, with an OECD average of around 80%. In addition, the domestic expenditure on research and development and the number of patents issued are taken into consideration for workers and entrepreneurs, while for international students the attention is on tertiary education spending (both public and private). Finally, the average English proficiency in the country is taken into account, since regardless of the destination, English is often considered the *lingua franca* of high-skilled sectors (such as universities, multinationals, ICT, etc.).

Table 4.5. Variables included in the “Skills environment” sub-index

VARIABLE	FULL DEFINITION	SOURCE	YEAR
Workers with master/doctoral degrees – Entrepreneurs			
Internet access	Percentage of households who reported that they had access to the Internet	OECD	2015 or latest
English proficiency	EF English Proficiency Index	English First	2017
Gross domestic spending on R&D	Gross domestic spending on R&D (%)	OECD	2015 or latest
Patents	Total number of patents (IP5)	OECD	2013
University students			
Internet access	Percentage of households who reported that they had access to the Internet	OECD	2015 or latest
English proficiency	EF English Proficiency Index	English First	2017
Tertiary education spending	Expenditure as percentage of GDP for all public and private educational institutions	OECD	2014

Note: English proficiency is considered to be highest for English-speaking countries, namely Australia, Canada, Ireland, New Zealand, the United Kingdom, and the United States. English First does not produce the English Proficiency Index for Estonia, Israel, Latvia, and Slovenia, hence English proficiency for these countries is estimated using the median proficiency across the OECD area.

Source: OECD Secretariat.

4.1.6. Inclusiveness

60. This dimension is intended to capture the attitudes towards immigrants in destination countries, as well as their heterogeneity and inclusiveness. The variables included for each of the three profiles of talented migrants – as well as their full definitions, sources and year coverage – are detailed in Table 4.6.

61. For all types of migrants, we selected three variables, each measuring a different aspect of diverse societies. First, native-born’s attitudes towards immigration are considered in order to take into account the public opinion towards support for migrants. Second, the share of foreign-born in the corresponding population is considered, not only as a measure of the extent of heterogeneous societies in terms of ethnic background, but also as a proxy of migrants’ social networks at destination (Beine, Docquier and Özden, 2011^[69]). Finally, gender equality and less discriminatory gender norms have been proved to be important determinants of international migration, especially for women from more unequal countries (Ferrant and Tuccio, 2015^[70]).

Table 4.6. Variables included in the “Inclusiveness” sub-index

VARIABLE	FULL DEFINITION	SOURCE	YEAR
Workers with master/doctoral degrees			
Share of foreign-born in working age population with ISCED 7-8 education	Share of foreign-born in working age population with ISCED 7-8 education	Computed from LFSs by OECD Secretariat	2017
Attitudes towards immigration	Should immigration in this country be decreased (vs increased or kept at its present level)?	Gallup World Poll Survey	2015 or latest
Gender equality	Social Institutions and Gender Index - Restricted family liberties subindex	OECD	2019
Entrepreneurs			
Share of foreign-born in working age self-employed population	Share of foreign-born in working age self-employed population	OECD	2016
Attitudes towards immigration	Should immigration in this country be decreased (vs increased or kept at its present level)?	Gallup World Poll Survey	2015 or latest
Gender equality	Social Institutions and Gender Index - Restricted family liberties subindex	OECD	2019
University students			
Share of international students enrolled in tertiary education	Share of international students enrolled in tertiary education	OECD	2015
Attitudes towards immigration	Should immigration in this country be decreased (vs increased or kept at its present level)?	Gallup World Poll Survey	2015 or latest
Gender equality	Social Institutions and Gender Index - Restricted family liberties subindex	OECD	2019

Note: (1) Data for the share of foreign-born in working age population with ISCED 7-8 education come from EU-LFS 2017 for all European countries, except Germany (EU-LFS 2013); Australia, Canada, Israel, Korea, and New Zealand: OECD (2018_[65]) (no distinction between ISCED 5-6 and 7-8); Japan: DIOC 2011 (no distinction between ISCED 5-6 and 7-8); Chile: CASEN 2017 (no distinction between ISCED 5-6 and 7-8); Mexico: ENOE 2017; Turkey: LFS 2015; United States: CPS 2017. (2) Data for the share of foreign-born in working age self-employed population come from OECD (2018_[65]) for all countries. (3) Data for the share of international students enrolled in tertiary education come from OECD.Stat and it is computed as the ratio of tertiary education enrolment of international students over the total tertiary education enrolment.

Source: OECD Secretariat.

4.1.7. Quality of life

62. This dimension is intended to capture the amenities and quality of life of destination countries. For each of the three profiles of talented migrants, the OECD Better Life Index is exploited, given its proven effectiveness in measuring well-being and quality of life (Table 4.7). The Better Life Index is a composite index including 11 dimensions and 24 variables: dwellings without basic facilities, housing expenditure, rooms per person, household net adjusted disposable income, household net financial wealth, labour market insecurity, employment rate, long-term unemployment rate, personal earnings, quality of support network, educational attainment, student skills, years in education, air pollution, water quality, stakeholder engagement for developing regulations, voter turnout, life expectancy, self-reported health, life satisfaction, feeling safe walking alone at night, homicide rate, employees working very long hours, time devoted to leisure and personal care.

Table 4.7. Variables included in the “Quality of life” sub-index

VARIABLE	FULL DEFINITION	SOURCE	YEAR
<i>Workers with master/doctoral degrees – Entrepreneurs – University students</i>			
Better Life Index	Better Life Index	OECD	2017

Note: Following OECD (2013^[71]), the Better Life Index is constructed using equal weights. The choice of weights is for illustrative purposes only.

Source: OECD Secretariat.

Box 4.1. Assigning a score to qualitative variables

Whenever possible, the *OECD Indicators of Talent Attractiveness* adopt quantitative over qualitative information, due to their greater transparency and replicability. Yet, some of the variables at the basis of the indices are drawn from migration policies, and it is hence necessary to assign a score to such qualitative information. The variables under consideration are:

- Number of hours per week that international students are allowed to work during studies
- Number of months allowed to stay in the country after graduation
- Ease of status change from temporary to permanent (or from study to temporary for international students)
- Right for spouse to join migrant
- Possibility for the spouse of migrant to work
- Easiness for children of migrant to get citizenship

Quantifying the first two variables is straightforward, given that they involve easily measurable information. In particular, the variable “Number of hours per week that international students are allowed to work during studies” takes value 0 if work is not allowed; 0.25 if work is allowed for less than 10 hours per week or if there are restrictions on where work can be undertaken; 0.50 if work is allowed for 10-20 hours per week; 0.75 if work is allowed for 20 hours per week plus full-time during vacation; 1 if work is allowed full-time. Similarly, “Number of months allowed to stay in the country after graduation” takes value 0 (not allowed), 0.50 (from 1 to 12 months) and 1 (12 months or more).

“Ease of status change from temporary to permanent” is coded with four values: 0 if status change is not allowed; 0.33 if status change requires more than 6 years at destination; 0.67 if status change requires 3 to 5 years; 1 if status change requires less than 3 years, or it gives labour market test/quota exemptions or a lower salary threshold.

The other policy variables are coded such that value 0 means not directly allowed, 0.5 means allowed but with restrictions, and 1 means automatically allowed.

4.2. Normalising and aggregating the variables

63. A normalisation of the data is required given that variables often have different measurement units (e.g., some of them are in percentage and some in US\$). In line with a large proportion of existing composite indicators – such as the *Global Talent Index*, the

Global Migration Barometer, the *Sustainable Governance Indicators* and the *Human Development Index* – the approach chosen is the so-called “min-max” method. According to this approach, the normalisation of the original variables is calculated by subtracting the minimum value and dividing by the range of the indicator values. Otherwise said, each variable x is normalised using the following formula:

$$x = \frac{(x - \text{Min}(x))}{(\text{Max}(x) - \text{Min}(x))}$$

64. The resulting variables all have identical range [0, 1]. Yet, for some variables the scale goes from 0 being not attractive for talented migrants and 1 being extremely attractive (such as for actual earnings at destination), whereas for other variables the scale is reversed (such as for the tax burden). Thus, for this latter group of variables the scale is inverted so that higher data points (closer to 1) indicate better attractiveness and lower values (closer to 0) represent weaker pull factors. In other words, a value of 1 can be considered the goal, and the distance from 0 represents the extent of talent attractiveness.

65. Before aggregating the single variables into composite sub-indices, it is worth noting that combining variables that are highly correlated may lead to double counting certain elements. Although it is to be expected that there should be some positive correlation between the variables within the same dimension, a rule of thumb needs to be introduced to identify a threshold beyond which correlation becomes double counting. The Spearman’s correlation coefficient is a tool that can be used to test the association between variables, as explained in Box 4.2.

Box 4.2. Measuring associations between variables

Several tools exist to test the strength of associations between variables, including the Pearson correlation coefficient and the Kendall Tau b test. A common non-parametric test used to measure association between continuous and ordinal variables is the Spearman rank-order correlation coefficient. To discard a strong association between two variables, the non-rejection of the null hypothesis that the Spearman coefficient is equal to 0 – implying no association – is adopted at 1% significance level. Results for the *OECD Indicators of Talent Attractiveness* for workers with master or doctoral degrees are reported in Table A.3. Estimates show that within each dimension all variables are not too highly correlated, i.e. at 1% significance level.

66. The methodology described above ensures that variables are conceptually relevant, not collinear, in the same range [0, 1] and in the same direction (1 indicating high attractiveness). They can therefore be aggregated in dimensions (or sub-indices) according to the theoretical framework described in Section 3.2.

67. Several weighting techniques exist, and all are source of contention. The relative importance assigned to each variable in this aggregation step is fundamentally based on value judgements (OECD, 2008^[14]). Analysts may prefer to reward certain components deemed more influential based on their expert opinion, or may want to use weights determined by some theoretical factors, but at the other side of the spectrum other analysts may have different views and theories. While statistical approaches exist (such as factor analysis and polychoric principal component analysis), most composite indicators rely on

equal weighting, that is all variables within a dimension are given the same weight. This approach implies either that variables have the same relative importance in the composite or that there is no *a priori* knowledge about which (and by how much) variable counts more than others. The *OECD Indicators of Talent Attractiveness* conform to this strand of the literature. Each dimension of the composite indicators is therefore measured as the simple average of its sub-variables.

68. Within each dimension variables have the same relative importance (and hence equal weights), but across dimensions prospective migrants have different value judgments based on their personal (latent) characteristics. Yet, it is not possible to *a priori* measure the impact of individual characteristics of prospective migrants on their final weighting. Hence, in order to fully take into consideration the important contribution of individual characteristics, the *Talent Attractiveness* project allows the users of the final dataset to choose their own preferred weights through a dedicated online platform. In particular, two different weighting approaches are implemented.

69. First, the online data platform allows users to decide which of the seven main clusters of talent mobility drivers should be considered as their *needs*, *wants*, and *desires* for migration. In other words, users can choose the importance (on a three-step scale) that they assign to each of the seven dimensions of talent attractiveness identified by this paper.

70. Second, both for the scope of this paper and to provide users with a ready-made easily-accessible set of information on country attractiveness for the different profiles of talented migrants, baseline results are presented based on equal weighting. As previously stressed, in fact, equal weights have the advantage of being transparent and neutral, assuming that no dimension is more important than another for the average individual. Hence, for each of the three migrant profiles, the resulting composite indicator is calculated as the simple average of a linear function of the seven sub-indices.

4.3. Testing the robustness of the indicators

71. In this section, the robustness of the indicators is tested, in particular concerning the use of equal weights to aggregate together the seven dimensions of talent attractiveness. The objective is to show that the ranking of countries obtained through equal weighting does not lead to completely unrealistic results, nor it is driven by a statistical artefact. In other words, this section aims at reassuring the readership that the benchmark results based on equal weights that will be presented in Part 5. are robust to the use of other aggregating techniques.

72. The first test that is performed consists in grouping information on dimensions through Principal Component Analysis (PCA) rather than equal weights. This technique goes back to the beginning of the 20th century, and it has been widely used in the statistical literature to construct composite indicators. In practice, talent attractiveness can be defined as a complex unobserved phenomenon that has to be estimated using a number of observed proxies. PCA combines together these proxies in such way that they represent the unobserved phenomenon the best. Specifically, PCA extracts from the set of proxies those orthogonal linear combinations that measure the common information most precisely. Weights are defined based on the relative contribution made by the proxy to the variance of the composite index (i.e. variables that contribute to smaller proportions of variations are assigned smaller weights).

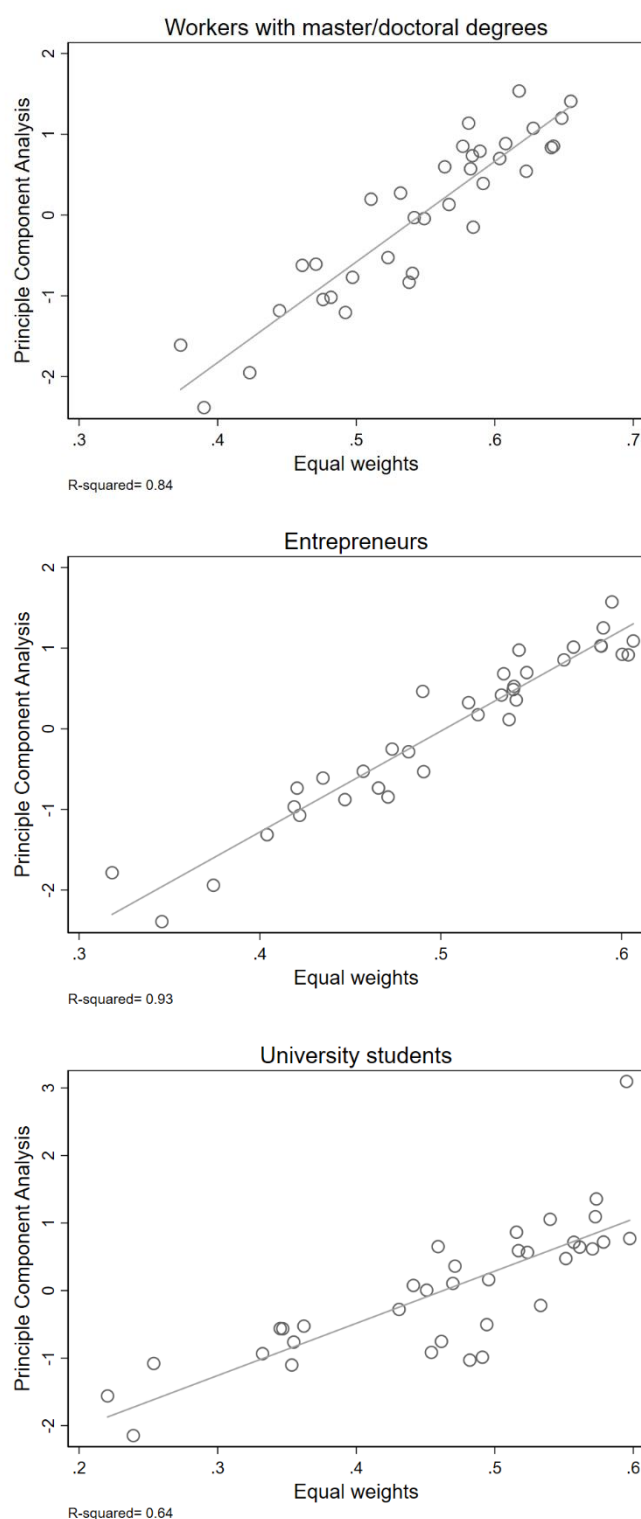
73. Figure 4.1 shows the relationship between the *OECD Indicators of Talent Attractiveness* constructed through equal weights (horizontal axis) and Principal

Component Analysis (vertical axis) for each migrant profile. Overall, the fit between the country rankings using the two approaches is tight: countries highly attractive according to the indicators constructed through equal weights remain highly attractive also in the PCA-based indicators. The r-squared is as high as 0.93 for the foreign entrepreneur category. This confirms that using a standard statistical technique – such as PCA – to combine the seven dimensions of talent attractiveness produces a similar country ranking of equal weighting.

74. Another way to test the robustness of the *OECD Indicators of Talent Attractiveness* is to rely on cluster analysis. The objective of cluster analysis is to reduce the dimensionality of a dataset by exploiting similarities and dissimilarities between cases. After applying a set of statistical algorithms, the result is a collection of clusters within which cases are more similar to each other than cases across clusters (Nardo et al., 2005^[72]). This technique can be used to check whether aggregating together the seven *Talent Attractiveness* sub-indices through equal weighting leads to a ranking of countries (in statistical terms, “cases”) similar to the grouping it would have been obtained using cluster analysis.

75. Take the case of the *OECD Indicators of Talent Attractiveness* for workers with master/doctoral degrees. Divide the sample of OECD countries in four quartiles based on the overall composite indicator of talent attractiveness obtained with equal weights, where the first quartile represents the least attractive countries and the fourth quartile represents the most attractive countries. Perform now cluster analysis on the overall sample of OECD countries – in particular, hierarchical tree clustering (i.e. the resulting classification has an increasing number of nested clusters, see Nardo et al. (2005^[72]) for a detailed technical discussion of cluster analysis). Figure 4.2 shows the dendrogram (cluster tree) of the *OECD Indicators of Talent Attractiveness* for workers with graduate degrees. Similarity between countries in the same cluster decreases as the distance – measured by the Euclidean distance with average linkages – increases. Results support the use of equal weighting: indeed, countries clustered together tend to belong to the same quartile (calculated through equal weights). Take for example the first smallest cluster on the extreme left of the dendrogram: it is formed by two countries both belonging to the fourth (i.e. most attractive) quartile. In contrast, the last cluster on the extreme right – as well as the adjacent ones – is composed by countries of the first (i.e. least attractive) quartile.

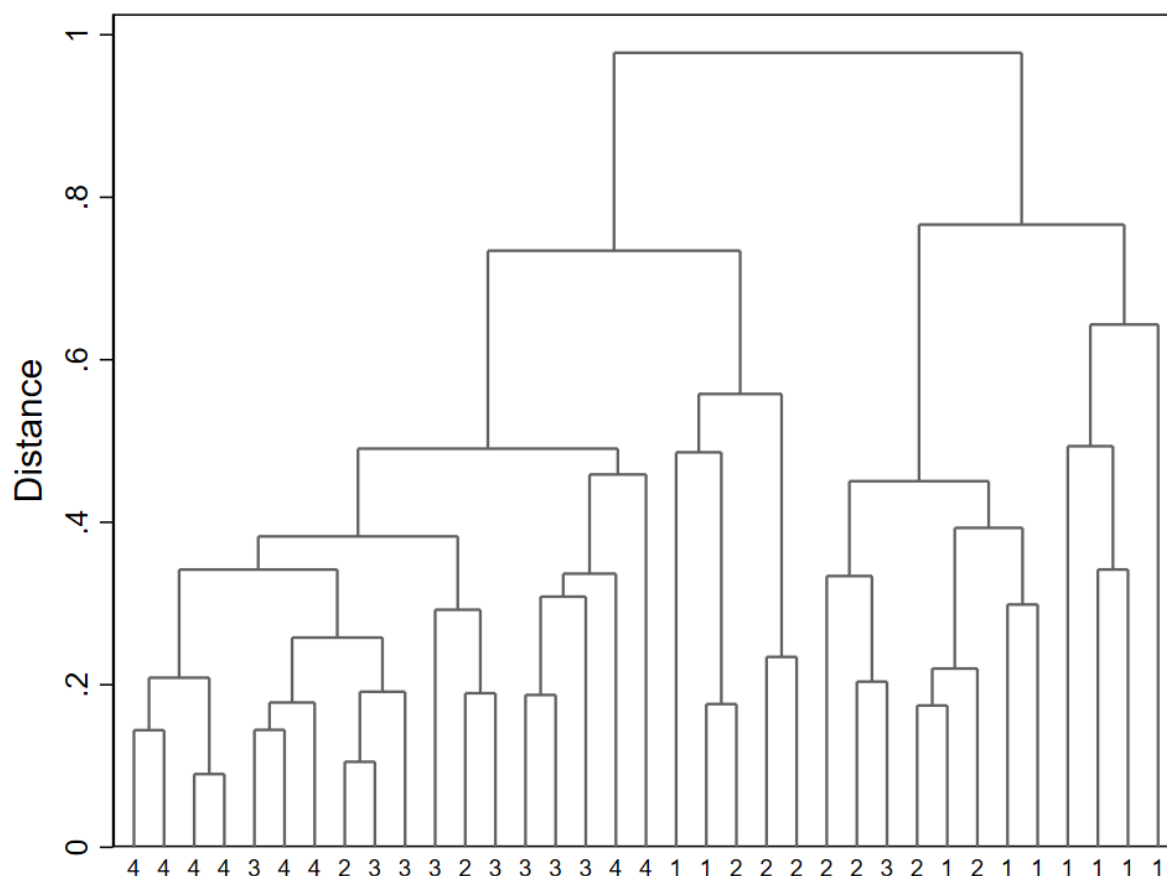
76. Overall the picture stemming from the cluster tree suggests that combining the seven dimensions of the *OECD Indicators of Talent Attractiveness* through equal weights results in a ranking of countries that is very similar to the one that can be found if countries were divided into groups through cluster analysis, i.e. without assigning any weights but solely on the basis of statistical algorithms. This confirms that using equal weights do not drive a false country ranking.

Figure 4.1. Relationship between the indicators constructed through equal weights and PCA

Note: The composite indices with weights obtained through PCA have by construction a mean of 0 and a standard deviation of 1.

Source: OECD Secretariat

Figure 4.2. Cluster tree of the *OECD Indicators of Talent Attractiveness* for workers with master/doctoral degrees



Note: Indicators for workers with master/doctoral degrees. Hierarchical average-linkage cluster tree (dendrogram) using Euclidean (L2) dissimilarity measure based on the cross-correlation measure.

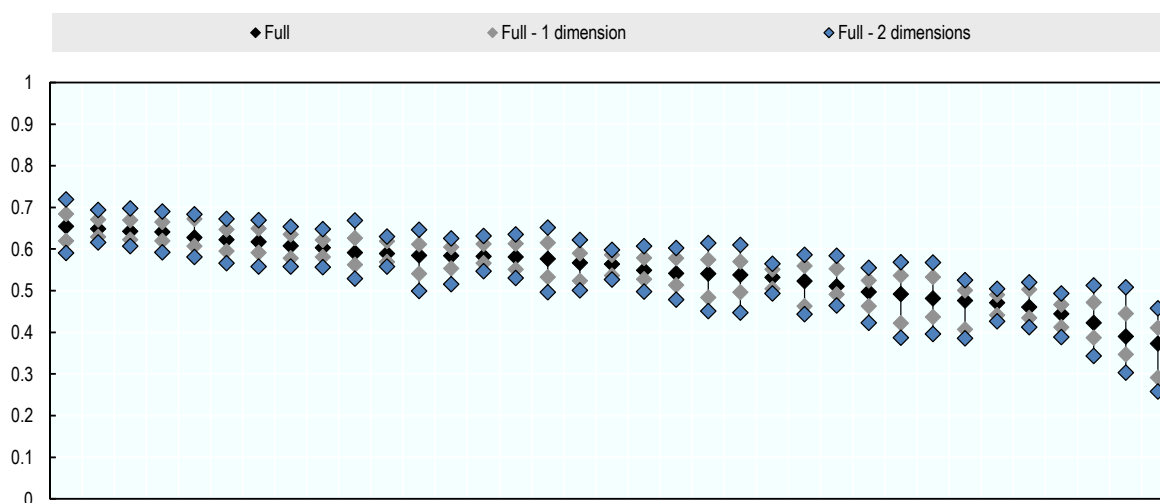
Source: OECD Secretariat

77. Another concern that might be raised is that the country ranking obtained through equal weighting is driven by extreme performances of OECD countries on certain dimensions. For instance, if a country is exceptionally attractive in a given dimension relative to the other countries, then using equal weights to aggregate the seven dimensions would inflate this country's latent talent attractiveness due to the outlier performance in that dimension. In order to test the robustness of the *OECD Indicators of Talent Attractiveness* to this potential bias, it is possible to randomly exclude one or two dimensions from the aggregate and see if the new composite indicator is particularly different from the original one obtained combining all seven dimensions.

78. For instance, Figure 4.3 presents the value of the composite indicator for workers with master/doctoral degrees using equal weights to aggregate all seven dimensions ("full"), as well as the minimum and maximum value obtained aggregating only six ("Full – 1 dimension") or five dimensions ("Full – 2 dimensions"). Results suggest that excluding up to two dimensions from the calculation of the composite index has only a little impact on the estimation of the overall talent attractiveness. This points at only a marginal role –

if any – of outlier performances of countries in one dimension on the construction of the composite indicator.

Figure 4.3. Minimum and maximum values of the *OECD Indicators of Talent Attractiveness* excluding one or two dimensions



Note: Indicators for workers with master/doctoral degrees.

Source: OECD Secretariat

79. Finally, Figure 4.4 examines which dimensions count the most for the attractiveness of OECD countries to each migrant profile. In particular, the figure shows the elasticities of the *OECD Indicators of Talent Attractiveness* to their seven underlying dimensions, obtained by regressing the indicators ranks (with equal weights) on the normalised dimensions. Interesting trends emerge. For workers with master and doctoral degrees, countries that perform relatively better on family environment and quality of life also perform relatively better on overall talent attractiveness. This is rather the opposite for university students, for which the skills environment results particularly important. The quality of opportunities also matters greatly for entrepreneurs.

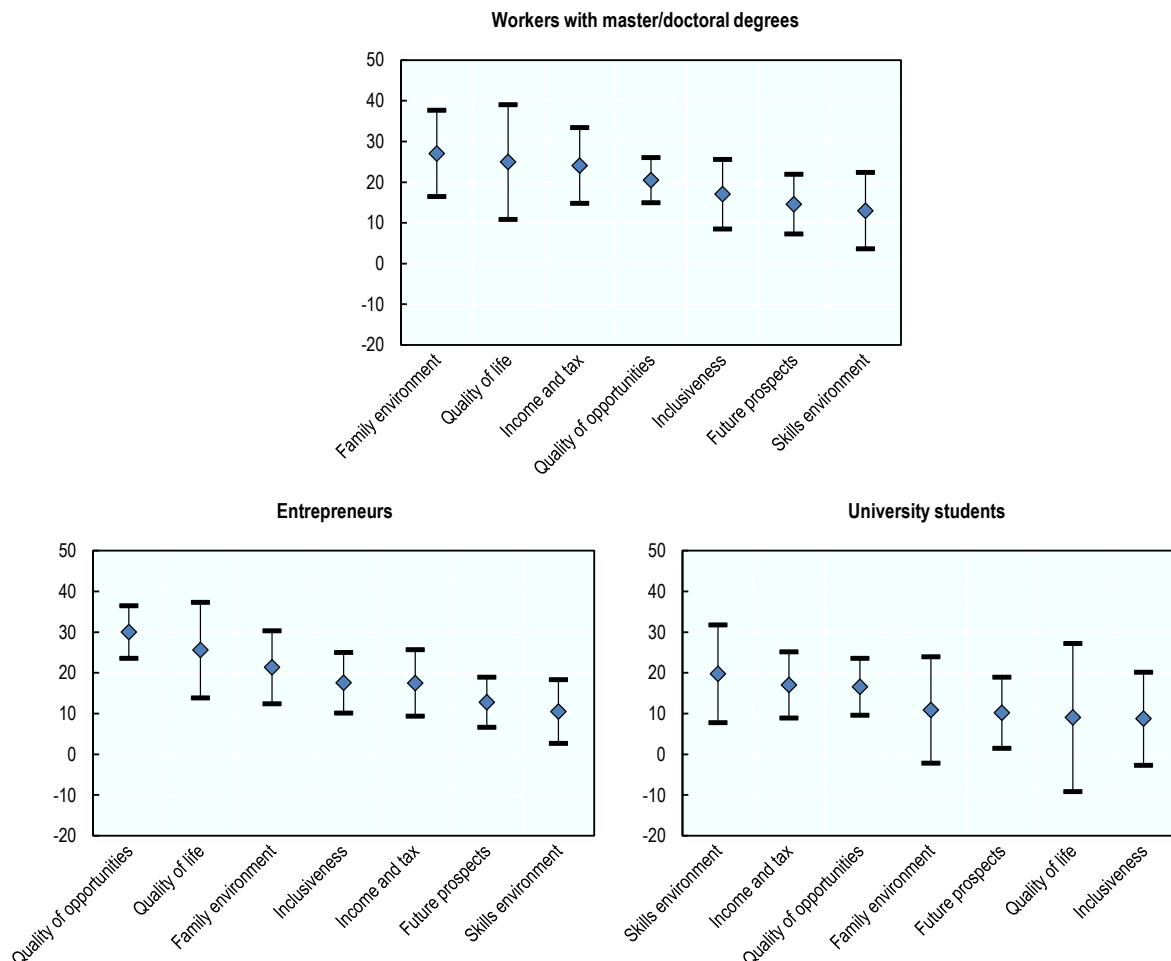
4.4. The accessibility of countries in terms of policies and practices for admission

80. Finding reliable and comparable information on the accessibility of migration systems across all OECD countries is no easy task. For workers with master and doctoral degrees, to ensure cross-country comparability, the *Talent Attractiveness* project relies on third-party data collected in each OECD country using a standard methodology. More specifically, restricted-access proprietary data from law firm Fragomen are exploited.

81. Fragomen is a leading international law firm specialized in immigration law services. It has over 40 offices around the world and its customer base comprises both corporate and individual clients. It has developed internal indicators allowing its experts to inform clients on the complexity and expected duration of work permit cases in different countries. These indicators are based partly on its case management data, and partly on assessments by its national legal experts. The internal indicators examine a number of dimensions, including the eligibility requirements for foreign nationals, the onerousness of

the labour market test, refusal rate, the duration of maximum stay, and government processing time and fees.

Figure 4.4. Which dimensions count the most for the attractiveness of OECD countries to each migrant profile?



Note: The figure shows the elasticities of the *OECD Indicators of Talent Attractiveness* to the seven talent attractiveness dimensions for each of the three migrant profiles. Elasticities are obtained regressing the *OECD Indicators of Talent Attractiveness* ranks (with equal weights) on the normalised dimensions. The diamond represents point estimates and the black dashes represent their 95% confidence intervals.

Source: OECD Secretariat.

82. The experience of a business migration law firm is necessarily different from that of individual users as the firm is able to advise clients on which cases are likely to be approved, and to submit complete and correct applications, leading to lower refusal rates. Further, its caseload may include many intracorporate transfers, rather than local hires, for whom the legislative framework is very different. Yet, Fragomen's database on migration policies captures the constraints faced by highly-skilled migrants, and provides an overall picture that closely resembles that of the best-case scenario in which a talented prospective migrant fills all the criteria to obtain a working visa in a given destination country. In fact, Fragomen's clients typically meet the criteria required by the destination country, thereby

allowing Fragomen to disentangle the tightness of entry laws of a country from the stringency of its immigration system. The variable of interest for the *Talent Attractiveness* project is the stringency, since its focus is how cumbersome is for prospective migrants to obtain a visa for a given destination country.

83. In particular, two indicators are selected, based not only on their conceptual relevance, but also because they are grounded in quantitative variables: the percentage of cases who got a refusal from the destination country, and the number of calendar days from when a prospective migrant initiates an immigration case for a host country to the date on which the individual is allowed to start working in the country. For OECD countries, the latter ranges from 39 days to 188 days. A third indicator is whether there are restrictive quotas on the visa programme under scrutiny, effectively limiting migration inflows. This variable is calculated by the OECD Secretariat directly from visa policies.

84. These three variables are used to weight the *OECD Indicators of Talent Attractiveness* for workers with master/doctoral degrees. Each policy variable represents a penalty of up to 5% to the final index. Hence, accessibility of countries in terms of migration policies accounts for up to a 15% penalty. Specifically, refusal rates below 1% yield to no penalty, refusals between 1% and 10% corresponds to a 2.5% penalty, and a refusal rate above 10% corresponds to a 5% penalty. A visa processing time of less than 3 months corresponds to no penalty, a processing time between 3 and 6 months corresponds to a 5% penalty, while one of more than 6 months corresponds to a 10% penalty. Finally the existence of a restrictive quota on the visa programme accounts for an additional 5% penalty.

85. For migrant entrepreneurs, the accessibility of OECD countries in terms of migration policies is proxied by two variables. In particular, all entrepreneur visa programmes have been screened to assess their requirements in terms of minimum capital that the individual has to invest and the minimum job creation of the incoming business in order to obtain the visa. Countries with no job creation requirement receive no penalty, while the existence of this requirements yields a 5% penalty. Similarly, if visa programmes do not have a minimum investment clause then countries get no penalty, if the minimum investment is below EUR 100 000, the penalty is 2.5%, and if it is above EUR 100 000, the penalty is 5%. Note countries that do not have any entrepreneur/investor visa programme in place are dropped from the analysis, given that there is no specific legal channel for this group of prospective migrants.

86. International university students face fewer obstacles to their relocation decisions, and can obtain a visa in virtually all OECD countries. Yet, in order to proxy their likelihood to get a visa at destination, we first exploit information on university tuition fees for foreign students, given that this is a major determinant of students' relocation choices (Beine, Noël and Ragot, 2014^[53]). Data on fees come from OECD (2018^[73]) and have been supplemented by information drawn from national education websites. Countries with university tuition fees for international students below EUR 2 000 get no penalty, those with fees between EUR 2 000 and EUR 10 000 get a 2.5% penalty, while the penalty reaches 5% in case fees exceed EUR 10 000. In addition, we construct a variable measuring the ratio between the share of international students in the total student population and the share of foreign-born individuals in the total population. This variable aims at capturing how easy it is to get a student visa given the likelihood of getting any type of migrant visa in a certain host country. OECD countries are then distinguished in quintiles based on the distribution of such variable. Penalties go from 0% to 5% depending on in which quintile a given country is.

5. A portrait of the talent attractiveness of OECD countries

87. The *OECD Indicators of Talent Attractiveness* are grounded on the user's preferences and on the assessment of the opportunities for the user – and their family – to migrate and settle. As remarked, the attractiveness of countries is a relative concept, and a plethora of factors influences destination choices. Benchmark indicators are here presented based on default equal weights across the seven dimensions of talent attractiveness. In the dedicated online platform, users are able instead to adjust the weights and obtain their personalised scores based on their own preferences.

5.1. Overview results for the *OECD Indicators of Talent Attractiveness*

88. For each of the three migration profiles identified in Section 3, Figure 5.1 and Figure 5.2 present the aggregated composite indicators of talent attractiveness, where higher values (i.e., closer to 1) denote greater attractiveness. The indicators represent the attractiveness of OECD countries to talented migrants, assuming that the prospective mover has a profile that enables her/him to fulfil the requirements of a visa programme. This assumption is important for comparing migration policies across countries. In addition, it circumvents the problem of language barriers: if a prospective migrant meets the criteria required by the destination to apply to a certain visa programme, it is implicit that she/he speaks – at least to a certain extent – the local language, or that jobs are available in the language the migrant speaks.

89. Figure 5.1 presents the raw *OECD Indicators of Talent Attractiveness* without taking into account opportunities for admission in terms of migration policies and practices. As shown in the figure, a country's overall attractiveness can be high for certain types of talented migrants while at the same time lower for others. For example, Germany is one of the most attractive destinations for international university students, but its rating for foreign workers with graduate degrees is just above average. Conversely, migrant skilled workers should find Ireland greatly attractive, in contrast to students, for whom Ireland does not appear to be a top choice. Furthermore, France's attractiveness lies around the mean for all migrant profiles except for university students, for whom it is a highly desirable destination. Cases of countries having a different appeal for different migrant categories are numerous and scattered throughout Figure 5.1, suggesting that on the one hand it is indeed important to study talent mobility in a disaggregated fashion, and on the other hand analyses of such type can provide governments with new and unique information about their performance in attracting foreign talent.

90. The set of top performers slightly changes in each migrant category. For instance, the five most attractive destinations for workers with master or doctoral degrees (before taking into account accessibility in terms of migration policies) include the United States, Australia, New Zealand, Canada and Sweden. Switzerland and Ireland takes the place of Australia and Sweden for what concerns the attractiveness to entrepreneurs, while the set of top performers slightly changes when looking at the attractiveness to international university students: Norway, United States, Switzerland, Canada and Australia.

91. There is a relatively fixed set of countries that are the least attractive to talented migrants. This is particularly the case of Turkey, Mexico, Greece and Israel. Italy also underperforms in the attractiveness of workers with graduate degrees, while it appears more

attractive for international university students. The opposite case is Hungary, which is not included among the bottom-performers for any talent profile but university students.

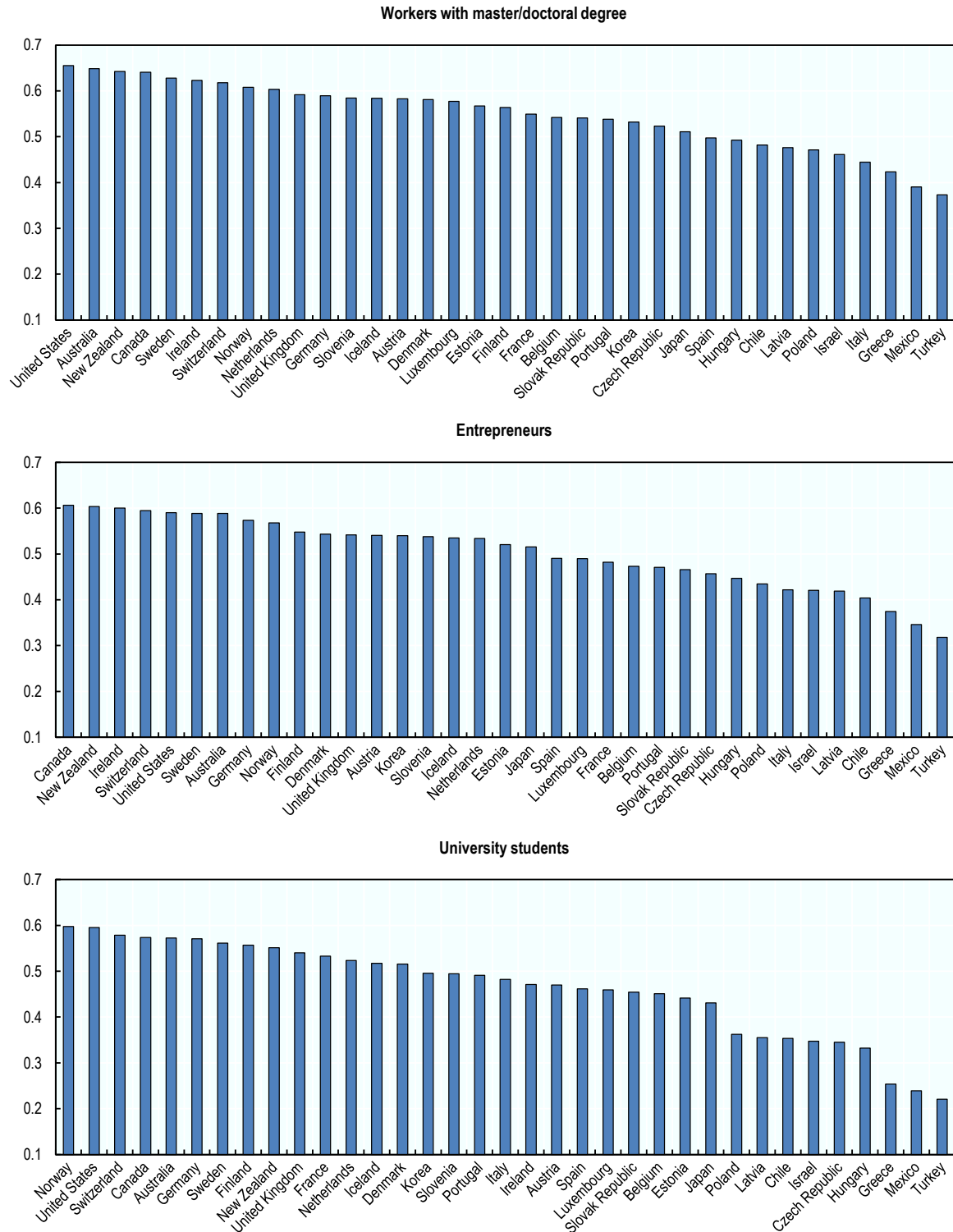
92. Weighting the *OECD Indicators of Talent Attractiveness* by the admission policies and practices dimension as discussed in Section 4.4 modifies the attractiveness of most OECD countries (Figure 5.2). For workers with master or doctoral degrees, including refusal rates, visa processing time and stringent quotas in the calculation makes Switzerland enter in the top five, while the United States lose ground. This is mostly due to Switzerland's low refusal rates for highly-skilled migrant workers and average visa processing time of just above one month. Denmark, Luxembourg and Slovenia fall in a similar case, increasing their attractiveness for graduates thanks to low refusal rates and quick processing time. In contrast, countries with high refusal rates and slower visa processes – such as Austria and Norway – become less attractive. At the extreme end of the spectrum lies the United Kingdom, which sees a large drop in its attractiveness to foreign talent due to a more restrictive migration system.

93. In terms of the attractiveness of OECD countries to foreign-born entrepreneurs, once controlling for the accessibility of countries in terms of policies and practices for admission, the United States and Ireland drop from the top five most attractive countries, replaced by Sweden and Norway. Both Germany and the Netherlands improve their attractiveness for entrepreneurs once their accessibility in terms of migration policies is taken into account thanks to lower requirements for entrepreneur visas. Interestingly, all Nordic countries (Sweden, Norway, Finland and Denmark) improve their attractiveness thanks to low visa requirements for entrepreneurs. Iceland – in spite of being theoretically attractive for foreign businessman (see its placement in Figure 5.1) – drops from the analysis since it has no specific visa programme for entrepreneurs.

94. Including proxies on the likelihood of getting a study visa penalizes the United States, Canada, Australia and New Zealand. In contrast, given the relatively low university tuition fees for third-country nationals, countries such as France, Switzerland and Iceland improve their overall attractiveness to international students. The least attractive countries for foreign university students are Turkey, Mexico, Greece, Israel and Chile.

95. Overall, there is a positive relationship between the composite indicators of talent attractiveness and GDP per capita (Figure 5.3). In general, richer countries are more appealing to high-skilled migrants, although the relationship is far from being 1 to 1. In econometric terms, the r-squared of how much of the total variation in the *OECD Indicators of Talent Attractiveness* is explained by GDP per capita is as low as 15% for entrepreneurs. For instance, countries like Australia, Canada and New Zealand are amongst the top performers in spite of their income per capita lying just above the middle of the OECD distribution. In contrast, the highest-income Luxembourg is far from being the most attractive destination for all types of talented migrants.

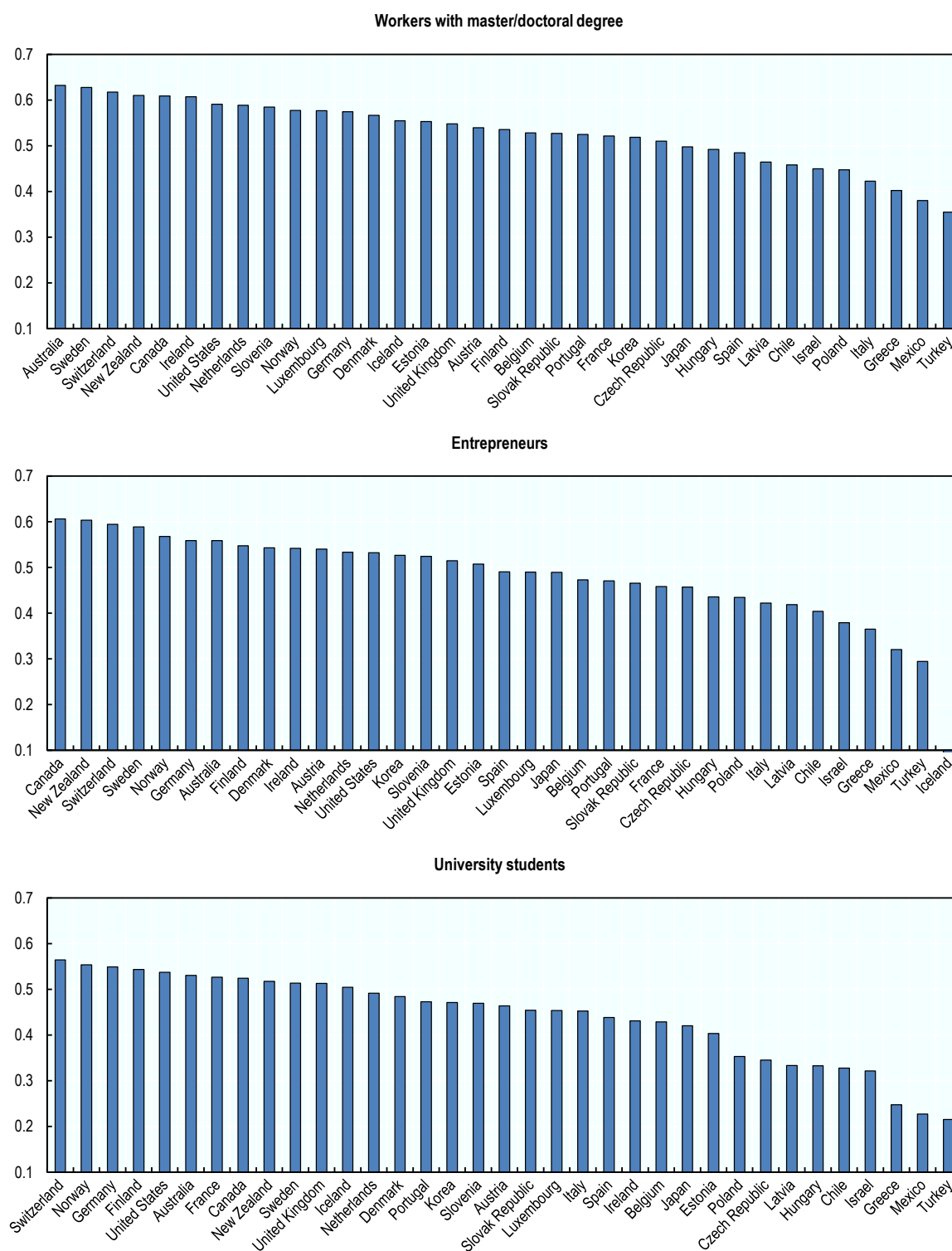
Figure 5.1. Benchmark OECD Indicators of Talent Attractiveness based on default equal weights before accounting for policies and practices for admission



Note: Values closer to 1 (0) represent higher (lower) attractiveness.

Source: OECD Secretariat.

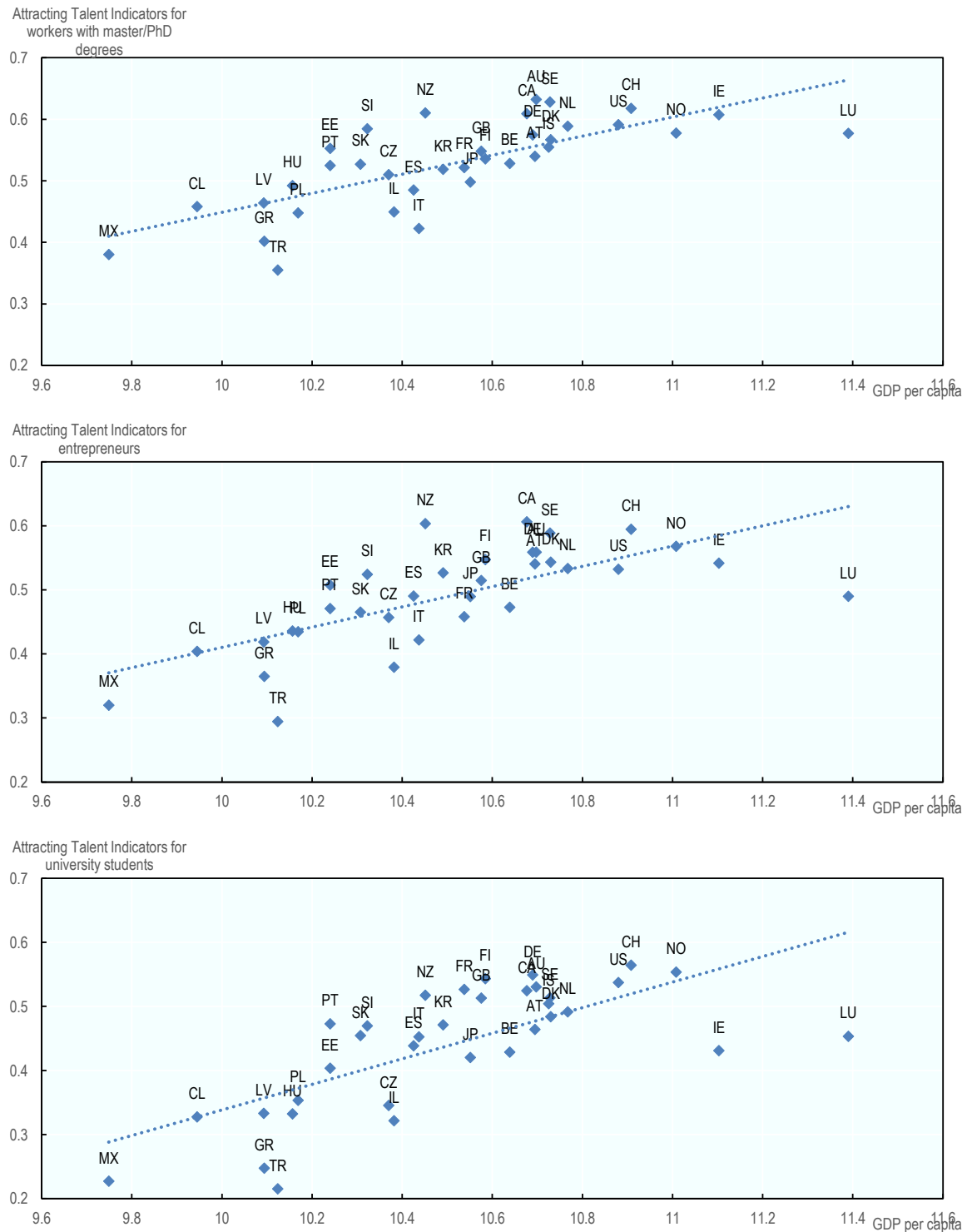
Figure 5.2. Benchmark OECD Indicators of Talent Attractiveness based on default equal weights after accounting for policies and practices for admission



Note: Values closer to 1 (0) represent higher (lower) attractiveness.

Source: OECD Secretariat.

Figure 5.3. Correlation between the OECD Indicators of Talent Attractiveness and GDP per capita



Note: GDP per capita is measured in 2017 and expressed in PPP\$ and log. *OECD Indicators of Talent Attractiveness* include the “policies and practices for admission” dimension.

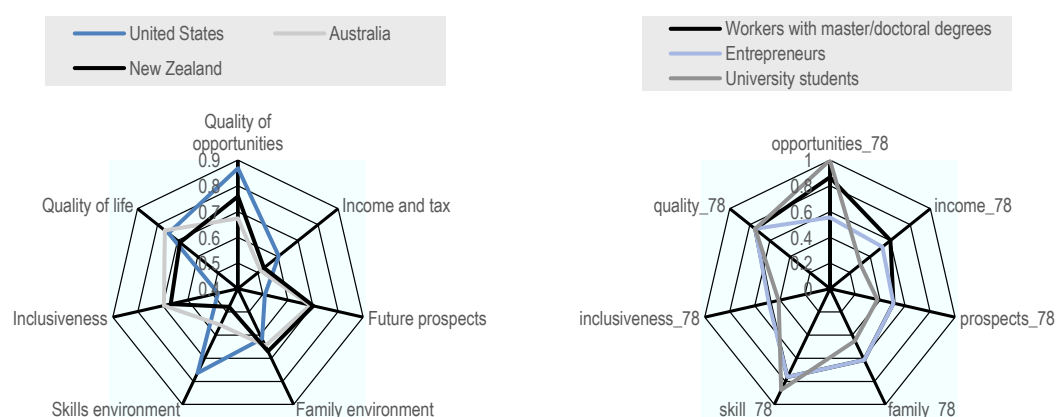
Source: OECD Secretariat

5.2. Countries' relative strengths and weaknesses by dimension

96. Although countries may perform similarly in their aggregate attractiveness to talented migrants, similar averages may hide different performances by dimension. Take for example the top three countries – before the policy weighting – in the *OECD Indicators of Talent Attractiveness* for workers with master and doctoral degrees. The United States, Australia and New Zealand have an overall attractiveness of around 0.65. Despite this similar aggregate values, the United States performs better in the quality of opportunity and skills environment dimensions, New Zealand outperforms the others on future prospects, and Australia have the highest value for the inclusiveness dimension (left panel of Figure 5.4).

97. The contribution of the different dimensions to talent attractiveness varies not only across countries, but also across migrant profiles in the same country. For instance, before taking into account its accessibility in terms of migration policy, the United States results one of the most attractive countries for all three talented migrant profiles. Yet such high attractiveness is driven by different dimensions depending on the profile under scrutiny (right panel of Figure 5.4). Workers with graduate degrees should find “income and tax” in the United States particularly appealing, whilst entrepreneurs may be drawn by its family environment. Its top-notch quality of opportunities in universities is a main determinant of Canada’s attractiveness for international students.

Figure 5.4. Strengths and weaknesses in talent attractiveness vary across countries



Source: OECD Secretariat.

98. In order to fully understand what drives the overall *OECD Indicators of Talent Attractiveness* results of Figure 5.1, it is necessary to disaggregate the composite indicators of talent attractiveness into the seven dimensions that form them. For each dimension, countries are divided into four groups (quartiles), depending on their aggregate score relatively to the score of the other countries. Different shading implies different levels of talent attractiveness.

99. Figure 5.5 presents the *OECD Indicators of Talent Attractiveness* for different categories of talented migrants. As expected, the picture stemming from Panel A of Figure 5.5 for foreign workers with master or doctoral degrees is one of great heterogeneity, suggesting that countries are not undisputed winners or losers in the global competition for talent, but they rather perform well in some dimensions while at the same time being

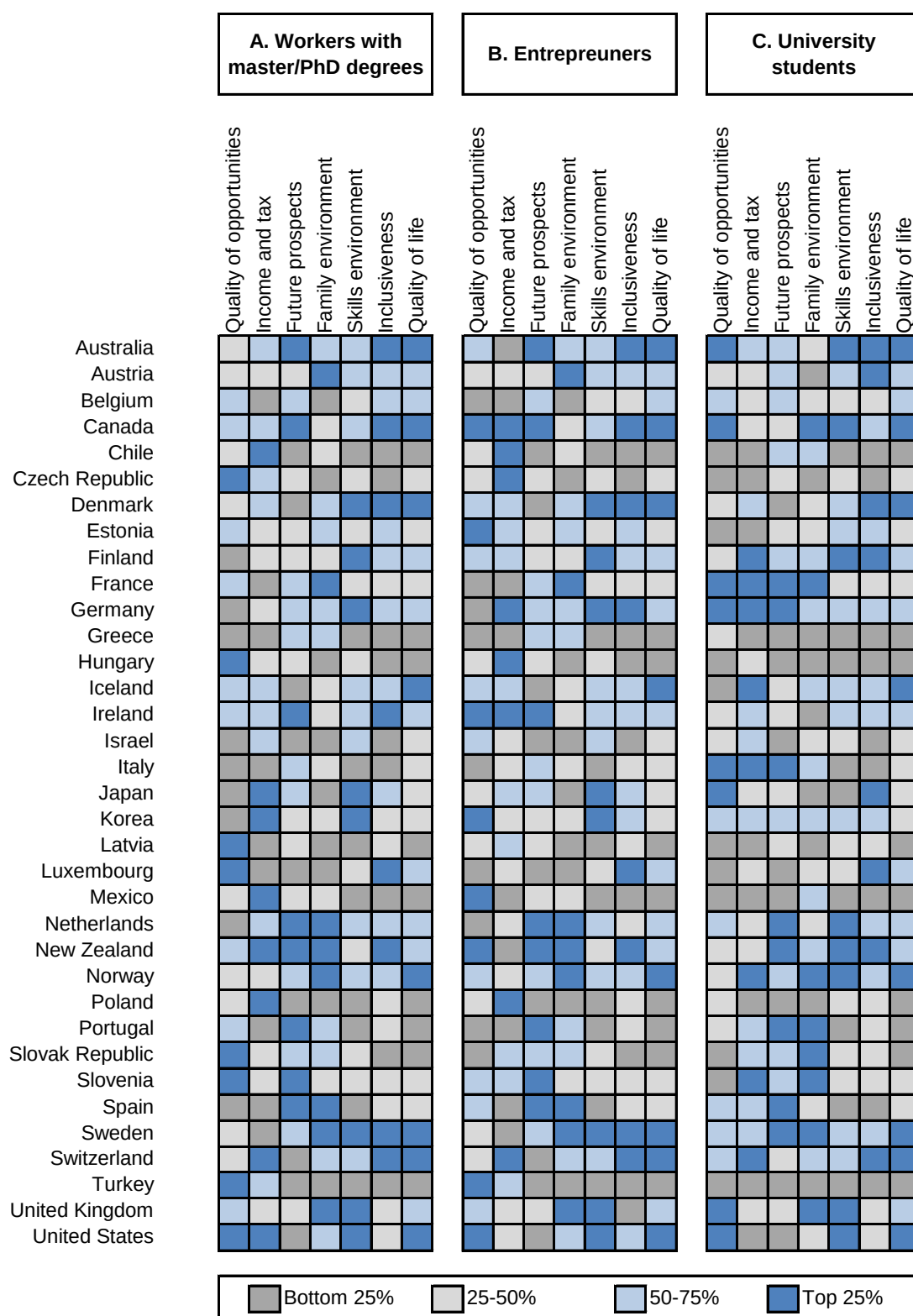
relatively less attractive in others. For example, Turkey – which in the aggregate appears among the least attractive OECD countries for talented workers – results actually highly appealing in the “quality of opportunities” dimension. By contrast, the United States shows great results across all dimensions, but yet performs poorly in the “future prospects” dimension (mostly due to lower easiness of status change).

100. Interesting regional trends emerge. For instance, Southern Europe – Portugal, Spain, Italy and Greece – are all in the bottom quartile in terms of the “skills environment”. Indeed, both their gross domestic spending on R&D and the number of patents filed are among the lowest of the OECD area. In contrast, Central Europe – Czech Republic, Hungary and the Slovak Republic – tends to have low scores for their “inclusiveness” dimension. This dimension reflects the homogeneity of highly-skilled worker populations and overall attitudes towards immigration. On the opposite side of the spectrum, the Nordic countries of Denmark, Iceland, Norway and Sweden are among the top OECD countries in terms of quality of life, whereas Australia and New Zealand are the most diverse and inclusive.

101. OECD countries outside Europe are particularly attractive for foreign entrepreneurs (Panel B of Figure 5.5). In fact, the top quartile of countries for quality of opportunities include Canada, the United States, Korea and New Zealand, but also a European country that over the years has streamlined its efforts towards the inflows of foreign firms and investors, Ireland. Yet long-run prospects and the overall family environment for foreign entrepreneurs are often best in countries which are less attractive in terms of quality of opportunities, such as Portugal and Spain for prospects and France and the Netherlands for family environment. Chile and Poland are interesting for entrepreneurs in terms of potential income, tax and benefits.

102. Finally, international university students are attracted by a different set of countries (Panel C of Figure 5.5). With the exception of Ireland, countries where English is widely spoken (Australia, Canada, United Kingdom, New Zealand and United States) dominate the “skills environment” dimension, because of English language use as well as their tertiary education spending. Future prospects are greater in countries like France and Italy, whereas countries that do not allow students to work during studies (e.g. Chile and Turkey) appear among the bottom quartile for what concerns the “income and tax” dimension.

Figure 5.5. OECD Indicators of Talent Attractiveness by dimension



Note: Different shading implies different levels of talent attractiveness.

Source: OECD Secretariat.

6. Conclusions

103. This document provides technical guidelines on the construction of composite indicators of talent attractiveness across OECD countries. Building on the expertise of the OECD in migration policies and cross-country measurement, it introduces a new set of indicators aimed at benchmarking how OECD countries fare in attracting talented migrants. In particular, it examines three different profiles of talent: workers with a master or doctoral degree, entrepreneurs, and university students.

104. Four main steps for the construction of composite indicators are outlined and detailed: (1) definition of the concept of talent attractiveness; (2) development of a theoretical and conceptual framework for the study of the phenomenon; (3) selection of the variables behind the composite indicators on the basis of predetermined selection criteria; (4) normalisation and aggregation of the variables into composite indicators. Sensitivity analysis is also performed in order to test the robustness of the indicators.

105. Finally, the document discusses the cross-country portrait stemming from the first edition of the *OECD Indicators of Talent Attractiveness*. The message that comes out from the analysis is one of great heterogeneity of the concept of talent attractiveness. Indeed, countries are not undisputed winners or losers in the global competition for talent, but they rather have different degrees of appeal for different types of talented migrants as well as for different dimension of talent mobility. Overall, it is important to take into account that a plethora of drivers influences highly-skilled individuals' decision to relate in a foreign country, including both pecuniary (quality of opportunities, income and tax), non-pecuniary (skills environment, inclusiveness, quality of life), and mixed factors (future prospects, family environment). In addition, host countries' policies and practices for admission and the likelihood of getting a visa play a key role in the location choice of prospective migrants.

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Annex A. Additional tables and figures

Table A.1. Selected international indicators measuring talent attractiveness

Year coverage	Country coverage	Sub-index	Indicator
Global Talent Pyramid --- Produced by the World Economic Forum			
2009	*	Talent usage	Time required to start a business
			Venture capital availability
			FDI inflows (% of GDP)
			Networked Readiness Index
		Talent availability	Availability of scientists and engineers
			Quality of scientific research institutions
			Quality of math and science education
			Quality of the educational system
			Local availability of specialized research services
			University-industry research collaboration
			Total expenditure on R&D (% of GDP)
		Environment variables	Gross tertiary enrolment
			Human Development Index
			Rule of law
			Control of corruption
Global Talent Index --- Produced by Heidrick & Struggles, EIU			
2011	60	Demographics	Population aged 20-59
			CAGR population aged 20-59 (%)
		Compulsory education	Duration of compulsory education
			Current education spending (% of GDP)
			Current education spending per pupil (% of GDPpc)
			Secondary school enrolment ratio (%)
			Expected years of schooling
			Adult literacy rate
		University education	Pupil-teacher ratio (primary)
			Pupil-teacher ratio (lower secondary)
			Gross enrolment ratio ISCED 5&6
			University ranked in World's top 500
			Total expenditure for tertiary education (% of GDP)
		Quality of the labour force	Researchers in R&D (per m pop)
			Technicians in R&D (per m pop)
			Quality of the workforce
			Language skills of the workforce
			Technical skills of the workforce
			Local managers
		Talent environment	R&D (% of GDP)
			Degree of restrictiveness of labour laws
			Wage deregulation
			Protection of intellectual property
		Openness	Protection of private property
			Meritocratic remuneration
			Hiring of foreign nationals
			Average stock of FDI (% of GDP)

			Openness of trade (% of GDP)
Proclivity to attracting talent			Personal disposable income per capita
			Employment growth
IMD World Talent Ranking --- Produced by IMD World Competitiveness Center			
2005-16	61 in 2016	Investment and development factor	Total public expenditure on education
			Total public expenditure on education (per pupil)
			Pupil-teacher ratio (primary)
			Pupil-teacher ratio (secondary)
			Apprenticeship
			Employee training
			Female labour force
			Health infrastructure
			Cost of living
		Appeal factor	Attracting and retaining
			Worker motivation
			Brain drain
			Quality of life
			Foreign skilled people
			Remuneration in services professions
			Remuneration in management
			Effective personal income tax rate
			Personal security and private property rights
		Readiness factor	Labour force growth
			Skilled labour
			Finance skills
			International experience
			Competent senior managers
			Educational system
			Science in schools
			University education
			Management education
			Language skills
			Student mobility inbound
			Educational assessment - PISA
Global Talent Competitiveness Index - Produced by INSEAD, Adecco Group, HCL			
2013-17	118 in 2017	Regulatory Landscape	Government effectiveness
			Business-government relations
			Political stability
			Regulatory quality
			Corruption
		Market Landscape	Competition intensity
			Ease of doing business
			Cluster development
			R&D expenditure
			ICT infrastructure
			Technology utilisation
		Business and Labour Landscape	Ease of hiring
			Ease of redundancy
			Labour-employer cooperation
			Professional management
			Relationship of pay to productivity
		External Openness	FDI and technology transfer

	Prevalence of foreign ownership
	Migrant stock
	International students
	Brain gain
Internal Openness	Tolerance of minorities
	Tolerance of immigrants
	Social mobility
	Female graduates
	Gender earnings gap
Formal Education	Business opportunities for women
	Vocational enrolment
	Tertiary enrolment
	Tertiary education expenditure
	Reading, maths, and science
Lifelong Learning	University ranking
	Quality of management schools
	Prevalence of training in firms
	Employee development
Access to Growth Opportunities	Use of virtual social networks
	Use of virtual professional networks
	Delegation of authority
	Personal rights
Sustainability	Pension system
	Taxation
	Brain retention
Lifestyle	Environmental performance
	Personal safety
	Physician density
	Sanitation
Mid-Level Skills	Workforce with secondary education
	Population with secondary education
	Technicians and associate professionals
	Labour productivity per employee
Employability	Ease of finding skilled employees
	Relevance of education system to the economy
	Availability of scientists and engineers
	Skills gap as major constraint
High-Level Skills	Workforce with tertiary education
	Population with tertiary education
	Professionals
	Researchers
	Senior officials and managers
	Quality of scientific institutions
	Scientific journal articles
Talent Impact	Innovation output
	High-value exports
	New product entrepreneurial activity
	New business density

Note: * The GTP was a more conceptual framework than an actual ranking, and no data collection was undertaken.

Source: Secretariat's compilation based on Dutta and Mia (2009^[8]), EIU (2011^[9]), IMD (2017^[10]), and Lanvin and Evans (2017^[11]).

Table A.2. Visa programmes selected for the OECD Indicators of Talent Attractiveness

	Workers with master/PhD degrees	Entrepreneurs
Australia	Temporary Business Long Stay	Business innovation and Investment (Provisional) visa (subclass 188) - Entrepreneur Stream
Austria	Rot-Weiss-Rot Card	Settlement permit for self-employed key workers (Art. 24 Aliens Employment Act)
Belgium	B Permit	Long-term stay visa for the purpose of self-employment
Canada	Temporary Foreign Worker Program (High-Wage Stream)	Entrepreneurs (one of three Business Class sub-categories, under the Economic category)
Chile	Work Permit	Temporary Resident Visa for Investors or Merchants
Czech Republic	Employee Card	Long-term visa for self-employment
Denmark	Pay Limit Scheme	Residence and work permit for the purpose of self-employment and to operate a company
Estonia	EU Blue Card	Temporary residence permit for business
Finland	Residence Permit for Specialist	Residence permit for self-employed person
France	Passport Talent	Exceptional economic contribution residence permit
Germany	EU Blue Card	Residence permit for the purpose of self-employment: to set up a business
Greece	EU Blue Card	Residence permit for the purpose of exercising an independent economic activity
Hungary	Work Permit	Hungary Entrepreneur Residence Program (HER)
Iceland	Residence Permit	n/a
Ireland	Critical Skills Employment Permit	Business permission
Israel	B-1 Work Visa Process	Innovation Visa
Italy	Work Permit	Permit for the purpose of exercising an independent economic activity
Japan	Highly Skilled Professional	Status of residence Investor/Business Manager
Korea	E-7 (Specially Designated Activities)	Corporate / Foreign Investor Visa (D-8)
Latvia	Skill-Threshold based Work Permit	Temporary Residence Permit (self-employed)
Luxembourg	EU Blue Card	Residence permit for independent worker
Mexico	Temporary Resident: Lucrative Activity	Temporary Resident: Lucrative Activity (Migration Law)
Netherlands	Knowledge Migrant Scheme	Residence permit for labour as self-employed
New Zealand	Skilled Migrant Category	Long Term Business Visa / Entrepreneur and Entrepreneur Plus Visas
Norway	Skilled Worker Permit	Residence permit for self-employment
Poland	Work Permit	Residence permit to conduct an economic activity beneficial to the national economy
Portugal	Residence Visa Work Permit	Residence permit for an independent professional activity
Slovak Republic	Work Permit	Temporary Residence for the Purpose of Business
Slovenia	Personal Work Permit	Work permit for self-employment of a foreigner
Spain	Work Permit	Residence permit for self-employment
Sweden	Work Permit (Highly Skilled)	Residence permit to start and operate a business (business owner)
Switzerland	Work Permit	Work permit
Turkey	Work Permit (Highly Skilled)	Turquoise Card
United Kingdom	Tier 1 High Skilled Worker	Tier 1 Entrepreneur subcategory
United States	H-1B Visa	EB-5 Immigrant Entrepreneur Visa

Source: OECD Secretariat.

Table A.3. Spearman rank-order correlation coefficient for OECD Indicators of Talent Attractiveness for workers with master/doctoral degrees

	Unemployment rate	Overqualification rate	Temporary contract		
Overqualification rate	0.0405				
Temporary contract	0.2924	0.2355			
Part-time work	0.1643	0.1113	0.2621		
	Earnings	Price level			
Price level	-0.8367*				
Tax wedge	0.184	-0.1653			
	Dependency ratio	Acquisition of nationality			
Acquisition of nationality	-0.2949				
Ease of status change	-0.2344	0.3206			
	Children citizenship	Right for spouse to join migrant	Possibility for spouse to work	PISA math test scores	Expenditure on family benefits
Right for spouse to join migrant	0.0401				
Possibility for spouse to work	-0.0815	0.0102			
PISA math test scores	-0.3606	0.1576	-0.116		
Expenditure on family benefits	0.2258	0.2155	-0.112	0.2359	
Tax rate for second earner	-0.0104	-0.2784	0.003	-0.1168	-0.283
	Internet access	English proficiency	R&D spending		
English proficiency	0.5681*				
R&D spending	0.4353*	0.2082			
Patents	0.1835	0.0869	0.6462*		
	Share of FB in population	Attitudes towards migrants			
Attitudes towards migrants	0.2251				
Gender inequality	0.1877	0.6364*			

Note: * = significant at 1%.

Source: OECD Secretariat.