

# Labour market contributions of UK and foreign-born PhD holders: implications for visa, immigration and tax policy<sup>1</sup>

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## Summary

The UK Government seeks to retain its status as a ‘Science Superpower’ and to increase spending on Research and Development (R&D) to 2.4% of GDP. The presence and contribution of PhD holders in the UK workforce and particularly those in Science, Technology, Engineering, Maths and Medicine (STEMM), is important for achieving this aim. The ability to hire skilled workers in these fields is also important for businesses looking to invest in the UK, and to the remit of the Department for Business and Trade.

The UK’s visa regime offers foreign-born holders of a STEMM PhD preferential routes to living and working in the UK. These include lower salary thresholds under the ‘Skilled Worker’ visa; eligibility for and longer leave to remain under the ‘High Potential Individual’ and ‘Graduate’ visa routes; and the ‘Global Talent’ visa for which a PhD is advantageous. However, these routes are either for specific jobs or recent graduates. This limits their usefulness for prospective startup founders.

The United States has similar approaches within its ‘specialty occupation’ (H-1B) system. Under the system, additional visa quotas are allocated to foreign workers graduating with a Masters or higher from US universities. The system excludes foreign workers employed at US

universities and non-profit or public research institutions from this cap altogether. These measures, other de-facto paths to residence and citizenship, and the strength of US university education in STEMM have all helped the US attract and retain highly trained workers in its STEMM sector (Hanson and Slaughter, 2017), and achieve higher rates of business startups among foreign than native-born PhDs (Kahn *et al.*, 2017).

In a different approach, Netherlands and Austria offer tax advantages to scientists relocating from abroad. Any similar reforms, which aim to attract and retain non-native PhDs to the UK, must be considered through a wider picture of promoting the UK as attractive place for innovative STEMM work and greater funding support for R&D.

In this explainer, we document the labour market outcomes of UK-born and foreign-born PhDs who are resident in the UK (but could have gained their PhDs either in the UK or abroad). Our findings suggest that:

- The UK is competing poorly with the United States for the services of the best STEMM PhD holders
- It is very difficult for foreign-born PhD holders to start businesses and create jobs under the current system

We then explore policies to attract and retain PhD holders in the UK, and enable them to employ other people.

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# Method

We use data from the UK Labour Force Survey from 2011 to 2022. We keep data from respondents aged 26 and older when first interviewed, and only one interview for each person (their first). This yields 732,000 observations, of whom 4,140 are UK-born PhDs (0.7% of the UK-born population) and 1,311 are foreign-born PhDs (1.3% of the foreign born population).

We use Ordinary Least Squares Regression to document the labour market outcomes of UK and foreign-born PhDs relative to each other, and relative to those with lower educational qualifications, controlling for other factors such as age and ethnicity.

For all descriptive statistics and regressions, we used weights provided by the Office for National Statistics, to ensure the sample is representative of the relevant population.

# Findings

## UK-and foreign-born PhD holders have higher earnings than those with lower qualifications, but PhD holders from the EU or North America earn significantly less than natives with a PhD degree

Figure 1 shows the other-things-equal earnings premia and penalties, for UK- and foreign-born workers with different education levels. Separately among UK and foreign-born workers, higher qualifications are always associated with higher earnings, with PhD-educated workers from both groups earning around 20 percentage points (pp) more than a UK-born, Bachelors-educated worker. Within education level, the wage penalty for being foreign-born is smaller for those with a PhD (approx. 4pp) than Masters and Bachelors (approx. 8pp).

Figure 2 shows that foreign-born Ph.D. holders from an EU 27 country and from North America both earn around 12 pp less than natives with the same qualification. The positively-signed and large magnitude

coefficients for Other Europe, South Asia, and South East Asia mean that UK-resident PhD-educated workers from these regions are all earning significantly more than UK-resident PhD-educated workers from the EU 27 or North America.

## UK- and foreign-born PhD holders make up a disproportionate share of the UK's STEMM workforce, but less so for those from North America

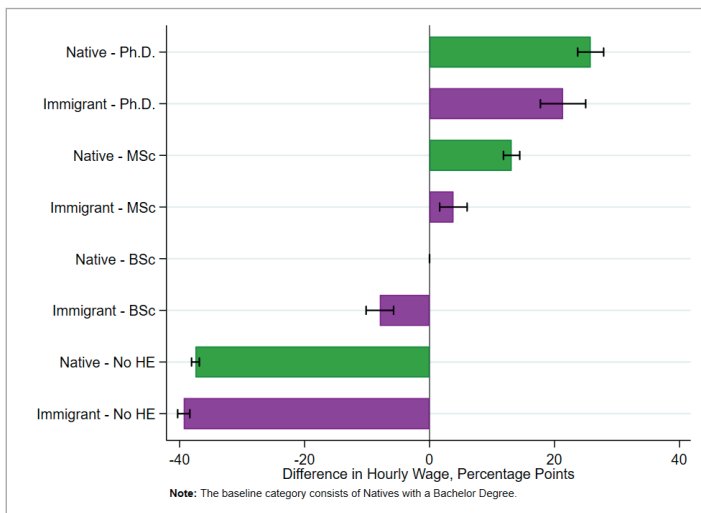
Figure 3 shows that native and foreign-born PhDs are more likely to be working in STEMM than their lower-educated counterparts, and that within education level the foreign-born are more likely to be in STEMM than UK-born. Figure 4 again shows variation by region of origin among foreign-born PhDs. Those from North America are 18 pp less likely than UK-born, but those from Europe outside the EU, South Asia, and South-East Asia all 14-21 pp more likely.

The resulting share of foreign-born workers among the Masters and PhD-educated STEMM workforce is, at 28% and 26% considerably smaller than in the United States, where 43% and 58% of the Masters and PhD-educated STEMM workforce was foreign-born in 2013 (Hanson and Slaughter, 2016).

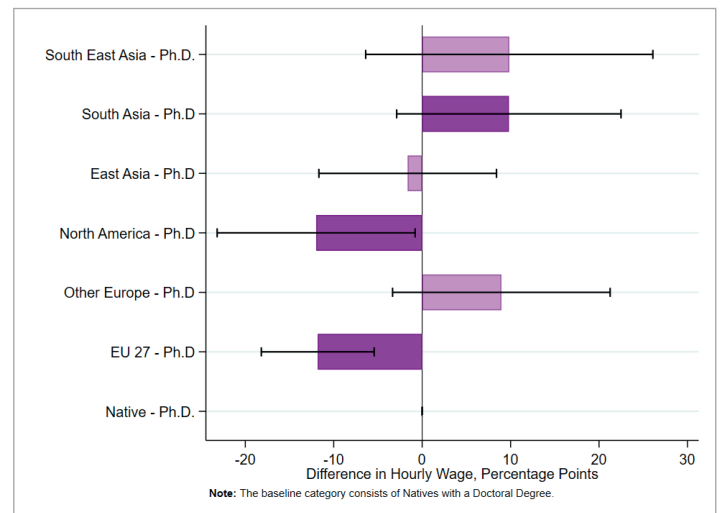
## UK-and foreign-born PhD holders are less likely to be employing other people than those with lower educational qualifications, especially those from Europe outside the EU, from North America and from East Asia.

Figure 5 shows that, other things equal, UK and foreign-born PhD holders are less likely to be employing other people than their counterparts with lower educational qualifications (though the gap between Masters and PhD-educated UK-born is not statistically significant). Figure 6 shows that PhD holders from the EU and South Asia are similarly likely to be employing others than native PhDs, but those from Europe outside the EU, from North America and from East Asia all significantly (with at least 90% confidence) less likely.

**Figure 1 Earnings gaps, by education and country of birth, compared with UK-born with a Bachelors' degree**

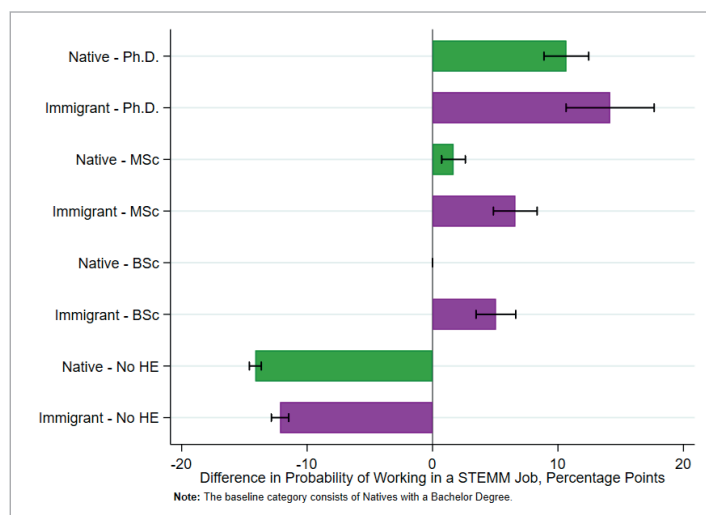


**Figure 2 Earnings gap for PhD holders by region of origin, compared with UK-born PhD holders**



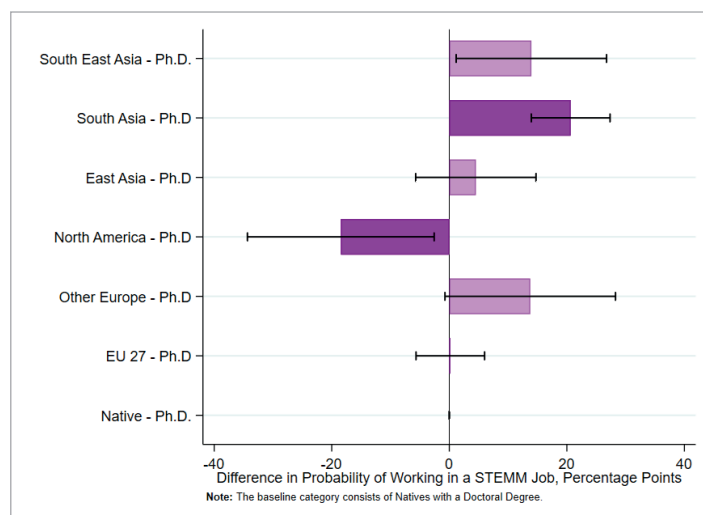
**Notes** Both figures derived from regression models with N=242,428 observations, responses weighted to profile of UK population. 95% confidence intervals shown. Additional controls: age, sex, region of UK of residence, year and season of response, ethnicity

**Figure 3 Gaps in probability of working in STEMM, by education and country of birth, compared with UK-born with a Bachelors' degree**

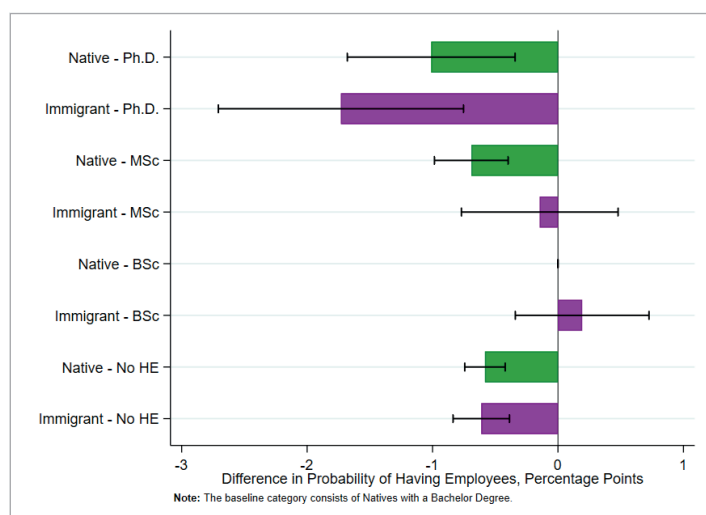


**Notes** Both figures derived from regression model with N=376,480 observations, responses weighted to profile of UK population. 95% confidence intervals shown. Additional controls: age, sex, region of UK of residence, year and season of response, ethnicity

**Figure 4 Gaps in probability of working in STEMM, for PhD holders by region of origin, compared with UK-born PhD holders**

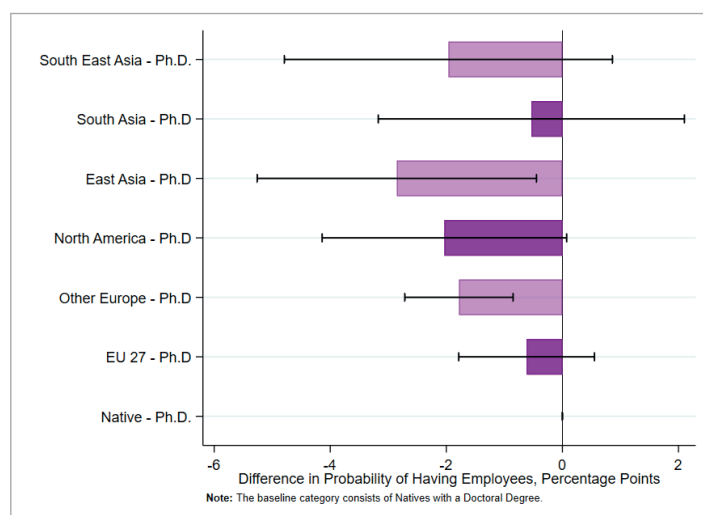


**Figure 5 Gaps in probability of employing other people, by education and country of birth, compared with UK-born with a Bachelors' degree**



**Notes** Both figures derived from regression model with N=376,001 observations, responses weighted to profile of UK population. 95% confidence intervals shown. Additional controls: Age, sex, region of UK of residence, year and season of response, ethnicity

**Figure 6 Gaps in probability of employing other people, for PhD holders by region of origin, compared with UK-born PhD holders**



## Discussion

The results of this paper represent a description of the relative outcomes of UK-resident PhD-educated population, resulting from immigration and education policies in the UK and elsewhere for the last 20 years or more. Two themes stand out:

- The **differences in earnings and employment-of-others** between those with restrictive immigration control (non-EU) and not (EU)
- The **differences in earnings and STEMM participation** between those from North America and rest of the world

The highest-earning foreign-born UK-residents with PhDs are for those from Europe outside the EU, South Asia, and South East Asia. All do significantly better than native

PhDs. This contrasts with those born in the EU27, who do similarly or worse than UK-born PhDs. We suggest that this finding reflects differences in selection:

- Non-EU groups face restrictive immigration control. They usually require a highly-paid job offer or entry through the 'High Potential' or 'Global Talent' scheme meaning those present in our dataset are typically those we would expect to perform well in any labour market
- Those from the EU27 had freedom of movement for the majority of the period studied here, so may include many graduates who would not have gained entry via a high-paying job offer had they come from elsewhere

Among UK-resident PhDs, STEMM participation and earnings are lowest for those born in North America. This group also faces restrictive immigration controls,

which ought to lead to positive selection. We believe our finding reflects the United States' own effort and success in retaining those who gain PhDs within its borders, and regaining citizens who achieve PhDs overseas, even amid concerns over the attractiveness of the US migration regime for skilled workers.

## Policy implications

**The UK's immigration system needs reform if it is to attract and retain non-native PhD holders.** Any reforms must be considered through a wider picture of promoting the UK as an attractive place for innovative STEMM work to occur, combined with greater funding support for R&D.

### Attractive and preferential immigration routes for PhD holders, especially in STEMM

Increasing the PhD-educated share in the population, whether through training more UK or foreign-born workers here, or through preferential immigration routes, seems likely to increase the size of the STEMM workforce and skilled share of the population. Attracting overseas PhD holders would be a cheaper option for the UK Government if these people gained their PhD abroad, and more profitable for UK universities if they receive funding from their home country to study in the UK.

### Differential tax policy

The absence of any significant differential in earnings of UK-born and foreign-born PhD holders suggests that the inequity of preferential tax treatment for foreign-born PhD holders, as implemented in the Netherlands, cannot be defended on the grounds of the efficiency of a higher overall tax take. However, such a policy might serve as a tool to attract such individuals to the UK, alongside a more attractive immigration route, with modest costs.

### Reforming visa routes to make the UK attractive to entrepreneurs, especially for high-tech startups

Both native and foreign-born PhDs are less likely to be employing other workers than their Bachelors-educated counterparts. This contrasts with the US, where foreign-born PhDs are more likely to start a business than native-born (Kahn *et al.*, 2017). This might be because the UK is unattractive to the most entrepreneurial, or that concerns about, or explicit conditions of, visas inhibit such individuals from setting up businesses (Roach and Skretny, 2019).

We propose a reform to the visa routes to avoid losing out on high-tech startup formation in the UK. The UK

Government could consider a reform to the visa routes involving business formation, by specifically targeting STEMM PhD holders. The 'Innovator Founder' visa route launched on 12 April 2023 effectively merges the 'Innovator' and 'Startup' routes. It contains some measures that may make the formation of a business easier, such as the removal of the requirement under the Innovator visa to invest a minimum of £50,000 into the new business.

However, the 'Innovator Founder' visa route does not distinguish between STEMM and non-STEMM related businesses or qualified founders. The requirement under all these routes to create a novel and innovative business may nevertheless indirectly favour STEMM-related businesses. The 'Global Talent' visa route may also present a more straightforward option for PhDs who have not made a final decision between a career in academia or business.

## References

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## About this analysis

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The Open Innovation Team is a cross-government unit that works with experts to generate analysis and ideas for policy. [The fellowship](#) enables officials to access academic expertise in quantitative social science data and analysis to answer a defined policy question. Fellows receive guidance, mentorship and research assistance from world-leading quantitative social scientists based at MiSoC.

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