Optimising for our Openness

The Economic Effects of Visa Auctions in the UK

By Duncan McClements and Dr. Bryan Cheang

EXECUTIVE SUMMARY

- The current UK visa system is complicated and inefficient, contributing to anaemic growth, stagnant living standards, and a rising tax burden;

- Employers should be allowed to buy visas for prospective workers from overseas by auction, selecting the immigrants who will bring the greatest benefit to Britain;

- Work visa auctions are the most efficient way of admitting any given level of immigration, but some visas could be reserved for professions with high social value, small businesses or particular regions if deemed necessary, and separate routes would be left open for students and family.

- This could hold the overall level of immigration constant while raising £59 billion in direct government revenue (equivalent to a 11p in the pound reduction in the basic rate of income tax) and an additional £27.4 billion in additional tax revenue that would compound for each year the scheme was implemented;

- We also suggest the Tier 1 visa be revived in auction form. We find the revenue maximising quantity of visas to auction to be 338, leading to forecast annual revenue of £73.5 million;

- Finally, we put forth a novel proposal to trial issuing 1000 visas every year by exam to boost innovation and productivity;

- All of these policy proposals are modular – and could be implemented separately or in conjunction.

ABOUT THE AUTHORS

Duncan McClements is a student at King's College London Mathematics School.

Dr Bryan Cheang, is Assistant Director and Research Fellow at the Centre for the Study of Governance & Society at King's College London.

Immigration holds tremendous, untapped gains for the UK economy and the public. As has been shown theoretically and empirically, immigrants have increased the wages of native workers through comparative advantage (Ottaviano and Peri 2012), reduced the per-capita public good expenditure of the state, reduced the median age of the population which therein alleviates in the UK's dependencyratio, and plethora less trackable benefits.[1] We also believe that immigration's connections to freedom make reform a moral imperative (Kukathas 2021).

However, as recent polling indicates, the public believes there are too many immigrants (Blinder and Rickards 2020). This makes significant increases in the number of immigrants unlikely. This policy paper, therefore, provides novel quantitative estimates of the revenue of visa auctions for work visas and the revenue-maximising cost for Tier 1 visas. We then provide an innovative new policy proposal to boost UK and global innovation by issuing a small number of visas through an exambased system. We finally note that, because they target different policy goals and immigrant demographics – workers, investors, and scientists respectively – all thedescribed policies are modular, and can therefore be implemented in combination or independently.

2. WORK VISA AUCTIONS

2.1 The problem

Currently, the UK government issues 34 separate visas for work (gov.uk n.d.c), all with separate eligibility requirements, conditions, and lengths. This presents a problem: the government lacks information about the economy to plan which workers are needed in such a level of detail. Every year, the UK grants over 320,000 work visas, which has brought tremendous benefit to the UK economy. An opportunity exists to dramatically increase the benefits of migration to the UK population and economy without increasing the number of migrants admitted.

2.2.1 Core proposal

We propose to distribute the 320,000 work visas that the UK currently issues through an auction system. We further suggest changing and standardising the benefits of such visas. Specifically, companies that wish to hire workers from overseas would bid for work visas. The visas would grant any worker a five-year work and residency permit and the opportunity to apply for UK permanent residency and eventually citizenship if they were employed for the majority of the initial 5 year period. Workers would be tethered for one year to the company that is sponsoring their visa, i.e. their visa would be terminated should they decide to leave that

---

1 The benefits of immigration documented are too numerous to name, additional ones include: the increase in immigrant incomes by a factor of 2-3 (Hendricks and Schoellman 2017), higher business formation rates, reduced native unemployment through higher occupational mobility in recessions (Cadena and Kovak 2016), increased innovation rates (Gagliardi 2015), and institutional improvements (Nowrasteh and Powell 2021).

company, but, for the remaining four years, they would face no such conditions.

2.2.2 Implementation

The UK government would implement this visa system as a Vickrey-Clarke-Groves auction, which this paper will model (see justification below), held every 3 months with an equal number of visas sold at each interval. In our case, all participating employers will submit a sealed (blind) price for as many work visas for which they wish to bid. All bids are ranked, and then all of those above the nth bid would pay the value of the nth bid, – in this case, the winning bidders of the 80,000 visas issued at each quarterly auction would all pay the 80,000th bid. If deemed desirable for professions with high social value, separate visa auctions could be held with only certain professions eligible - however, this would be less efficient than a subsidy of the profession's wage to take into account this social value and would reduce the revenue provided by the scheme.[2] Workers would receive full access to UK government services such as the NHS for the duration of the visa. To ensure that workers would not be exploited upon arrival, their visa would last for four years longer than they were obliged to work for the sponsoring company, giving them ample time to seek redress from the company for any violation of contract that occurred during their employment.

2.3 Benefits

We have decided to propose a Vickrey-Clarke-Groves auction, because it is the most efficient system to admit any fixed quota of immigrants.[3] Intuitively, this is because under such an auction employers are incentivised to bid the true amount that they are willing to pay for the visa. For example, if an employer valued the visa at £40,000, because the worker is producing £40,000 more in output for the employer compared to the next best alternative, they would be incentivised to bid £40,000 because they would benefit by buying at all prices below £40,000 and lose if they purchased it at any higher price. This ensures that the employers who do value a visa the most will receive it.[4] A secondary benefit is that the government would receive information on the marginal counterfactual gain to the UK at all possible levels of migration, and can adjust the number of visas granted in the years following accordingly.

2.4 The Model

What would the price of the work visas be, and how much revenue would this scheme generate? Under a Vickrey-Clarke-Groves auction, this is equivalent to

---

2 Similar solutions - either reserving a number of visas or subsidising their price - with similar economic efficiency disadvantages could also be used to solve concerns regarding small business access to the scheme (Orrenius and Zavodny 2020) or regarding all regions benefitting from the scheme.

3 Specifically, we define efficiency to mean: maximise the counterfactual productivity increase between the immigrant and the native worker who would have otherwise taken their role if the role existed. Because immigrants increase both demand and supply of labour, it is well established (Okkerse 2008) that such a replacement will not harm native employment.

4 Under an English auction, whereby every winning market participant pays the value of the bid they make, this is not necessarily the case. This leads to uncertainty, because everyone who makes a profit can only do so from the difference between their true value of the visa and what they bid.

asking, what does the company that pays the 320,000[th] visa value that visa at? What
don't we know about likely 2050 energy costs?

2.4.1.1 The Intuition

The first way that we can go about answering this question is by estimating the price that a company is willing to pay: the difference between the productivity of the immigrant (how much value the immigrant is producing) and their wage. We can expect the marginal company (the company that experiences the gain from the immigrant that is only just greater than the price) to bid and pay almost exactly 100% of this difference, with all other firms bidding their true value but paying the same as the marginal firm. Furthermore, we can expect immigrants to be willing to accept extremely low wages in the first year because they will benefit from the expected large increases in future income.[5] To illustrate this increase, a minimum-wage job in the UK pays a salary approximately 20% less than a simple estimate of the ***top 1%*** of salaries in Africa.[6] Low wages would be the case in the first year because immigrants can leave their sponsoring company subsequently and receive the high market wage that their productivity implies.

2.4.1.2 Formal Model

In the most simple case, the price of the work visa is exactly equivalent to the difference between the productivity of the immigrant in the first year and their real wage for that year.[7] Note that for the remainder of this section, all wages referred to are real wages, ie. adjusted for purchasing power parity, and evaluated post-tax.

The productivity of the immigrant in the first year is the wage that they command on the market, W^{II}.[8] This is because the price of an input to production, such as a worker, is the value of the marginal contribution to production.

To estimate their wage for that year, profit-maximising companies will pay the minimum amount that they can to an immigrant, which is the minimum that the immigrant is willing to accept. We can model this by looking at whether potential immigrants would move or not at a given wage level.

First assume workers are earning wage in their country of W origin. From before, W^{I} is the wage received in the first year, the number we are trying to calculate, W^{II}

---

5 If the goal of the policy was revenue maximisation the optimal policy would likely be to admit as many immigrants as possible subject to an additional levy on their wages, because the government (due to factors such as factoring in the welfare of future generations) and individuals have different discount rates so can mutually benefit from reductions in immediate term payments in exchange for a rise in longer term levies (which will show up in the model as a reduction in W'' but a boost in W'). However, wage levies are incapable of providing a rank order of which migrants will bring the greatest benefit, meaning that, if immigrant numbers are constrained, visa auctions are a superior policy due to providing such information.

6 This estimate comes from taking a simple average of the income shares of the top 1% of all countries for which the UNDP has data and multiplying it by the average income in sub-Saharan Africa.

7 A good approximation of this is simply to take the difference between the salary that the 320,000th immigrant would command on the market and the minimum wage salary.

8 In reality, immigrants likely place some non-zero value on the non-PPP wage in addition to the real wage due to the average immigrant sending 15% of their income home as remittances, and this is determined by the non-PPP not PPP wage.

and is the wage that the immigrant would command on the market. Workers face some subjective cost σ σ to moving (eg. being away from family), and some pecuniary cost γ (eg. tickets and logistics), but receive benefit due to UK institutions of β (eg. UK government provision of services after post-tax income, such as the NHS or other public goods). Workers would only move if

$W^I > W + σ + γ - β$ if the visas only lasted a year, but as workers residing in the UK have a path to residency and citizenship they will permanently receive annual net benefit $W^{II} - W + β$ in all future years. This means workers would actually move if,

$$W + \sum_{i=1}^{L_W - A} r_a^i (W" - W + β) > W + σ + γ - β, r_a$$

is their pure time preference discount rate (the rate at which the future is viewed as inherently less valuable than the present, in excess of income effects) and

$$L_W - A L_W - A$$

is their remaining years in the workforce.[9] This additional term,

$$\sum_{i=1}^{L_W - A} r_a^i (W" - W + β)$$

is the present value of the expected gain from migration in all years after the first. This implicitly assumes β, W, W^I and W^{II} all grow at the same rate in the future

$$(\frac{\mathring{w}}{w} = \frac{\mathring{w}'}{w'} = \frac{\mathring{w}"\mathring{w}}{w"w} = \frac{\mathring{w}'}{w'} = \frac{\mathring{w}"}{w"}).$$

Therefore, this, $W^{II} - W^I$, is a simple model for estimating the price of a visa. We can make this model more accurate by accounting for the expected length of time the worker will stay with the company, t, the rate at which the company discounts, r_f, (usually equal to interest rates) and the additional search costs to attract overseas employees, $ç$, (translating advertising into foreign languages etc.) Therefore, employers receive present value gain

$$\frac{1 - (1 - r_f)^t}{r_f} (W" - W) - ç \frac{1 - (1 - r_f)^t}{r_t}$$

and would be willing to pay up to this gain in the visa auction. Absent the minimum wage, rational employers would thus be willing to pay up to

$$\frac{1 - (1 - r_f)^t}{r_f} (-σ - γ + \sum_{i=0}^{L_W - A} r_a^i (W" - W + β)) - ç$$

substituting the minimum value for W^I.

2.4.2 Parameter Estimation

We wish to prove two things in our parameter estimation. First, that the inequality,

$$W + \sum_{i=2}^{L_W - A} r_a^i (W" - W + β) > W + σ + γ - β$$

---

9 Implicitly this ignores welfare following retirement: if individuals remain in the UK following retirement they experience the institutional benefits for longterm while if they return to their origin countries then the purchasing power effects mentioned above mean that they place greater values on W'' than the PPP value would imply. Either effect underestimates the value immigrants place on moving, rendering the estimate conservative.

holds with W^I as the minimum wage, and secondly to make point estimates for each of the other parameters, which should give us a final price of the visa.

2.4.2.1 Inequality

First, let us try and estimate or limit all the parameters in order:

1. L^W: This is assumed to be 67 years, the UK retirement age.

2. A : Global median age is 30 years.

3. r_a : $1 - r_a$ is estimated to eb 0.34 adjusted for publication bias, but different methods produce 0.17, 0.2, 0.22 and 0.3 (Matousek, Havranek and Irsova 2019), producing a geometric mean estminate of 0.24.

4. W^{II}: We note that 34 million individuals have the UK as their first choice destination globally, and 300 million an Anglophone country as first preference with 750 million wishing to migrate globally (Esipova, Phliese and Ray 2018). Desire to migrate is positvely correlated with income in developing countries[10] : an increase in individual income by a factor of e ($\cong$ 2.718) increased the probability of wanting to migrate by 22% holding a variety of confounders constant (Langella and Manning 2021). This renders using the incomes of the top 1% of the UK as a baseline - with the 320,000 work visas issued annually roughly equal to 1% of 34 million - a very conservative assumption. But W^{II} is thus estimated at £204,000 once employers National Insurance is accounted for[11] (HM Revenue and Customs 2022a) (gov.uk n.d.a)

5. W : Global average annual income is $12,235 (World Bank 2021c)

6. β: We assume β is 0, but in reality is is almost certainly positive for migrants from most countries, and the UK has institutional qualities such as a large welfare state that means both living standards in the UK are higher than per capita post-tax incomes imply, and that this effect is larger than in countries such as the US.

7. σ and γ: We are trying to bound here. In 2019, the US diversity visa program, a program to admit immigrants by lottery from certain countries, received 23,182,554 applicants, of which 55,000 would eventually be admitted. We can use this to estminate σ, the subjective moving costs, and γ, the pecuniary moving costs, because we know W^{II} and W in the US case, and we expect that σ and γ to stay constant for anglophone countries.

---

10 It is inversely correlated in developed countries, but as citizens of these will likely not experience substantial wage gains by moving to the UK they are not the individuals which this policy mechanism (with profit equal to the difference between the minimum wage and the market wage) would reap the gains detailed above from.

11 This is deducted from pay before employees view it, meaning that effective employee total compensation is just under 13.8% higher than pre-tax incomes.

$$\sum_{i=0}^{L_W-A} r_a^i(W'' - W + \beta) = \frac{23,182,554}{55,000}h$$ on the margin with h as the value of one hour, and so with β conservatively at 0,[12] W^{II} at US average disposable income of \$46,782 (Federal Reserve of St Louis 2023), the average global working week at 35 horus (Kulakov 2022) and the labour share of income at about 0.6 worldwide (Guerriero 2019), and the rest of the variables as above, $\sigma + \gamma$ evaluate to \$126,997 for an individual of global average income.

This provides a figure for $\sum_{i=1}^{L_W-A} r_a^i(W'' - W + \beta)$ of \$553,916 for a proposed migrant to the UK[13]: considerably greater than the value for $\sigma + \gamma$ of \$61,521. This means that, absent the minimum wage, immigrants would even be willing to accept negative salaries in the first year of employment in the UK alone. However, the existence of the minimum wage thus means that immigrants admitted under this scheme would be paid that salary for the first year in which they were tethered to the sponsoring company. The average American worker in the top 10% works about 5% longer than the mean (Burge Mathisen and Ang 2022), so assuming this ratio holds for the UK, the working week of said worker is 38.3 hours (Clark 2022) and a minimum wage of £9.50 (gov.uk n.d.b) thus gives W^I as £18,193.

2.4.2.2 Employer Gains

Using the above values, additional parameter estimations are as follows:

1. t: We assume this is 1, which means that the immigrants will leave the company the moment the visa expires, which is a conservative assumption due to labour market frictions.

2. r_f: This is equivalent to interest rates, which are 3.5%.

3. ς: Because average turnover times are nine years (CIPD 2019), there are likely to be no turnover costs in excess of those employers who would regardless pay, and so any additional search costs come from promotional activities, which we can conservatively assume as £1000 per position.

This gives $\dfrac{1-(1-r_f)^t}{r_f}(W''-W') - \varsigma$ and thus the price as £184,392,

and total revenue as £59 billion.

---

12 Treating this as zero is conservative because as the value is likely higher in the UK than the US for reasons explained above this will understate the difference between the UK and US on this measure.

13 This uses post-direct-tax incomes for the UK and US: if indirect taxes are higher in the UK this may be a slight overestimate of the ratio. Such adjustments are not made for global incomes due to a paucity of data on post-tax incomes in much of the developing world, overestimating both numbers by the same amount but also slightly overestimating the ratio.

2.4.3 Tax Revenue

We also anticipate a result of this scheme to be higher tax revenue. This is because the immigrants selected under this scheme are comparatively higher skilled. An individual in the top 1% of UK earners pays £61,000 in direct taxes annually (HM Revenue and Customs 2022A), while the average foreign-born individual currently has a net income of £30,000 per annum (Fernández-Reino and Rienzo 2022). This implies the average immigrant currently pays £4,100[14] in direct taxes (HM Revenue and Customs 2022a), and thus we expect the scheme to increase direct tax revenue per immigrant by £56,900. However, increases in indirect tax payments and employers' national insurance are not accounted for there, but will also be substantial[15]: a gain of £10,980[16] and £24,000 with a loss of £3,500 and £2,900 respectively (ONS 2022) (gov.uk n.d.a), providing a total annual tax change of £85,500. This results in a total tax revenue of £27.4 billion, which could fund a further 5p reduction in the basic rate. Importantly, this effect arises from the first year of immigration under this scheme, while future revenue has not been modelled.[17]

2.4.4 The Results

In section 2.4.2.1, we show that immigrants would still experience a net subjective gain from migrating even if they are paid the minimum wage for the first year. Usingthe parameters in employer gains, the price of a visa evaluates to £184,392, which can be captured in government revenue as £59.0 billion. This could, itself, fund a decrease in the basic rate of income tax by 1p per pound of income (HM Revenueand Customs 2022b). When accounting for the additional tax paid by immigrants, a compounding £27.4 billion would be raised every year, enough to reduce the basic rate of income tax by a further 5p.

Investment Visas

In 1994, the UK government introduced a Tier 1 investment visa scheme which, by 2022 (when the program was terminated), stipulated that if investors spent £2 million on government bonds or other assets, they could gain UK residency after 5 years of holding the assets. This period could be shortened to 2 years if £10 million was invested. A 2014 Migration Advisory Committee report found the benefit from the scheme to UK citizens was likely minimal. They said this was

---

14 The UK's progressive tax structure means that treating all current immigrants as having the same income understates the total tax take: as all immigrants admitted under this scheme, at least initially, will be at the highest thresholds of tax only this effect will not apply, meaning that the actual loss is larger. However, this effect is likely smaller than us not accounting for property taxes.

15 Any number of other effects, such as a potential increase in property or stock prices could also increase tax revenue as a result of the scheme: however, these will not be considered here.

16 Median income households pay an average of 13.7% of their income in indirect levies while those on high incomes pay an average of 9% of their income, meaning that the levies themselves are mildly regressive, adding 0.038 to the Gini Coefficient, although the redistribution they fund is sufficiently progressive to override this effect (ONS 2022).

17 We can expect future years to have reduced revenue from direct sales, however, because there are only a limited number of high-skilled workers. However, this does not reduce the benefits from the early market participants continuing to pay more in tax in allowing broad-based tax reductions. Because the dramatic increase in government revenue allows for a reduction in taxes, we expect that the net additional tax revenue from immigrants will decrease over time as the tax burden on the entire population falls. This can be mitigated by concentrating tax reduction on those with low incomes.

because investors were free to sell the underlying asset at the end of the period, and most investment went towards less risky government bonds rather than assets that could directly improve UK productivity. They recommended auctioning visas to combat this (Migration Advisory Committee 2014).

To calculate the revenue-maximising number of visas to auction, we need to understand the relationship between price and quantity demanded for purchased visas.

There are currently 13 countries with citizenship by donation options (Imidaily 2022)[18], of which 9 have sufficient data for our use[19]. We tested several different factors that may influence whether a given investor would purchase such a citizenship, and only price was statistically significant (p<=.5). In other words, individuals may not be buying such citizenships to gain access to other countries, but instead as a potential secondary location as insurance against domestic political or economic volatility. Supporting this hypothesis, the number of countries visa-free access was provided to, the population and GDP per capita of the destination country were all found to be statistically insignificant.[20]

The regression provides a forumula of visa quantity:

$$Quantity = 4549.712208 - 337.624174 \ln{(Price)}$$

As revenue is Price x Quantity[21], given this relationship, the revenue -optimising price is $261,888 with 338 visas issued every year. This provides total revenue of $88.5 million or £73.5 million annually. The previous Tier 1 scheme was terminated because of national security and corruption concerns for those who were purchasing such visas. However, limits could be put in place on individuals purchasing residency under this renewed scheme, or even blanket bans placed on entrants from an entire country. Even with such restrictions implemented, the scheme would still represent a significant increase in the freedom of movement of individuals looking to migrate. This would, however, potentially reduce the revenue and thus the benefit to current UK citizens from the scheme.

Concluding, this proposal to revive Tier 1 visas with an auction system may increase government revenue by £73.5 million annually.[22]

---

18 A larger number of countries have programmes resembling the former UK Tier 1 Investor scheme whereby residency is granted after ownership of an asset such as property, a business or government bonds for a sustained period of time.

19 Bulgaria's scheme has been discontinued since the website was last updated, Malta does not have **easily** accessible breakdowns between investment and donation options and the programmes of neither Montenegro nor Egypt appear to have run long enough to produce sufficient data. North Macedonia had as of April 2022 not yet granted any citizenships as part of its scheme.

20 The data is in the appendix

21 $F(1, 6) = 7.11$, $p = .037$, $R^2 = 0.54$, $R^2adj = 0.47$

22 if previously the £600 million increase in quantity demanded for government debt the individuals previously provided was equivalent to a 1% reduction in interest rates for the debt they held over the 5 years for which it was held and the currency risk was equivalent due to their risk aversion to losing 5% of the value of the investment in expectation then this provides total cost to the buyers of ~£60 million and revenue to the government of ~£30 million: we are here offering a slightly better product without the currency risk so getting revenue only slightly above the previous total cost to applicants is plausible.

Currently, employers are not able to pay and coordinate to account for all innovation externalities, or improvement in technology. Current positive externalities of innovation exist today, meaning that the market will under-provide basic research. Scientists are currently the most important factor for basic research. Importantly, any given individual's opportunity to conduct research varies dramatically across countries. Beyond the funding differences found amongst rich countries, in less developed countries many of those with the capacity to make fundamental advances instead toil away in poverty or low-paying menial jobs, because of several factors,including economic hardship, inequality, and corruption.

Therefore, one final option for partial immigration reform that this paper considers is a novel visa by exam system. The UK government would issue a relatively small number of visas, for example an arbitrary trial of 1000 visas every year within this scheme. The following requirements will be set: at least half must go to under25s every year and another 20% of those going to those with personal or familial incomes below the World Bank's extreme poverty-line.[23] Applicants of all ages and all countries will be eligible, although we anticipate that, because of practicalities and logistics, applicants may have to travel to other countries. We propose a novel exam structure which will consist of multiple, increasingly difficult sections. Specifically, the first section will be a basic English literacy test in multiple-choice form, and, as the exam progresses, the questions will get harder and the questions will become more time-intensive to mark. To minimise test marking expenses, applicants must pass all previous sections for the subsequent section to be marked.[24]

Similar to the existing Chevening visa programme, the top 1,000 applicants will be given a grant to fully-fund their university education if they have not yet completed it and/or research.

We anticipate that such a scheme will have a variety of direct and indirect benefits. Primarily, this would allow the UK and global economy to benefit from the increased output of these additional researchers who would have not contributed significantly otherwise. Secondly, though it may be unlikely, given enough applicants taking the test this has the potential to become a standardised global method for employers to judge the quality of different candidates, favouring those especially who have not had the opportunity to demonstrate the ability through other means such as going to university. The scheme could finally increase global incentives to study science and mathematical subjects, as well as boost the importance of the UK's grant-making process and soft power.

Some worry mathematics examinations of this kind may not be a suitable predictor for scientific success. Empirically, this seems to be untrue. Of the last 22 mathematicians to win a Fields Medal, a prize awarded to two, three, or four

---

23 With judging income, applicants, as is common practice for many selective programs, would claim a certain income and age and, if ultimately selected, will have to submit proof of such claims.

24 To make the cost of running this predictable, this boundary will be adjusted given the total performance of all applicants such that the number of papers that reach the final section marking, which we anticipate to be the most costly, would be roughly constant every year.

mathematicians under 40 years of age, 12 were former medallists in the International Mathematics Olympiad (IMO). The data for humanities examinations such as through essaywriting is less well-studied as a predictor for research ability, however, universities continue to employ such methods to select students from undergraduate to graduate level programs.

Others might express concern that examinations of these stakes and wide scale implementation would be prone for cheating. One method of addressing this is making all candidates sit the examination at the same time, regardless of timezone, and setting alarms on each box of papers. These alarms would only be released one hour before that section of the paper was sat - so later sections would only be released after candidates were already being monitored during the opening sections, removing the possibility of cheating absent invigilator-candidate collusion on the scale of an entire test centre.

We have also attempted to minimise the cost of running these examinations. We are using a tiered system to minimise marking expenses – the first sections could be marked entirely automatically, greatly reducing the number of papers that need specialist markers. Secondly, with regards to infrastructure costs, we could allow first examination entry to be free of charge but, for applicants that had not cleared the preliminary sections, subsequent exam retaking would require a small fee. Finally, we target talent in developing countries, having set a quota of 20% of these visas to go to those in extreme poverty every year.

Concluding, this policy has the potential to considerably boost basic research and find much of the world's underutilised talent, while simultaneously establishing the UK as a global centre for innovation.

Conclusion

In this paper, we propose three immigration reforms – work visa auctions, the revival of Tier 1 visas and visa entrance by exams. For the first two reforms, we provide novel quantitative estimates and propose visa entrance by exams for the first time, to our knowledge. We argue that these three policy proposals can substantially boost economic efficiency, government revenue and UK innovation respectively, with the additional benefit of £59 billion in direct sale revenue and a compounding £27.4 billion in tax revenue in the first case. The proposals avoid any substantial increases in the absolute number of immigrants admitted every year, increasing political tractability and public acceptance greatly, and can be implemented separately or in conjunction. UK immigration policy has great potential for improvement, and all policies we detail provide an innovative first step towards realising that.

Appendix

Country	Price for a family of 4	Numbers	Time to Citizenship	Visa-Free Access	Population	GDP per Capita
St Kitts and St Nevis	195,000	435	0.375	137	53,199	18,230.13
Antigua and Barbuda	100,000	473	0.2917	150	97,929	14,900.8
Dominica	100,000	1,048	0.375	143	71,986	7,559.98
St Lucia	150,000	313	0.375	146	183,726	9,571
Vanuatu	180,000	595	0.375	98	314,464	3,127
Grenada	211,500	303	0.2917	144	112,523	9,928.62
Cambodia	250,000	262	0.2917	53	16,950,000	1,590.96
Jordan	750,000	69	0.375	50	10,270,000	4,405.84

BIBLIOGRAPHY

Agarwal, Ruchir, and Patrick Gaule. n.d. 'Talent Matters: Evidence from Mathematics'.

Blinder, Scott, and Lindsay Richards. 2020. 'UK Public Opinion toward Immigration: Overall Attitudes and Level of Concern'. Migration Observatory. 20 January 2020. https://migrationobservatory.ox.ac.uk/resources/briefings/uk-public-opinion-toward-immigration-overall-attitudes-and-level-of-concern/.

Burge Mathisen, Ruben, and Carmen Ang. 2022. 'Charted: The Actual Working Hours of Different Income Levels'. Visual Capitalist. 20 September 2022. https:// www.visualcapitalist.com/cp/charted-actual-working-hours-of-different-incomelevels/.

Cadena, Brian C., and Brian K. Kovak. 2016. 'Immigrants Equilibrate Local Labor Markets: Evidence from the Great Recession'. American Economic Journal: Applied Economics 8 (1): 257–90. https://doi.org/10.1257/app.20140095. CIPD. 2019. 'Megatrends: is work in the UK really becoming less secure?' CIPD. https://www.cipd.co.uk/Images/7904-megatrends-insecurity-report-final_tcm18-61556.pdf.

Federal Reserve of St Louis. 'Real Disposable Personal Income: Per Capita (A229RXO)'. March 2023. https://www.statista.com/statistics/280763/average-working-hours-uk/.

Esipova, Neli, Anita Pugliese, and Julia Ray. 2018. 'More Than 750 Million Worldwide Would Migrate If They Could'. Gallup.Com. 10 December 2018. https://news.gallup.com/poll/245255/750-million-worldwide-migrate.aspx.

Fernández-Reino, Mariña, and Cinzia Rienzo. 2022. 'Migrants in the UK Labour Market: An Overview'. Migration Observatory. 6 January 2022. https:// migrationobservatory.ox.ac.uk/resources/briefings/migrants-in-the-uk-labour-marketan-overview/.

Gagliardi, Luisa. 2015. 'Does skilled migration foster innovative performance? Evidence from British local areas'. Papers in Regional Science 94 (4): 773–94. https://doi.org/10.1111/pirs.12095.

gov.uk. 2022. 'National Minimum Wage and National Living Wage Rates'. GOV. UK. 30 December 2022. https://www.gov.uk/national-minimum-wage-rates.

———. 2023a. 'National Insurance Rates and Categories'. GOV.UK. 4 January 2023. https://www.gov.uk/national-insurance-rates-letters.

———. 2023b. 'Work in the UK - GOV.UK'. GOV.UK. 5 January 2023. https:// www.gov.uk/browse/visas-immigration/work-visas.

Guerriero, Marta. 2019. 'The Labor Share of Income Around the World: Evidence from a Panel Dataset'. In Labor Income Share in Asia: Conceptual Issues and the Drivers, edited by Gary Fields and Saumik Paul, 39–79. ADB Institute Series on Development Economics. Singapore: Springer. https://doi. org/10.1007/978-981-13-7803-4_3.

Hendricks, Lutz, and Todd Schoellman. 2018. 'Human Capital and Development Accounting: New Evidence from Wage Gains at Migration*'. The Quarterly Journal of Economics 133 (2): 665–700. https://doi.org/10.1093/qje/qjx047.

HM Revenue and Customs. 2022a. 'Percentile Points from 1 to 99 for Total Income before and after Tax'. GOV.UK. 16 March 2022. https://www.gov.uk/ government/statistics/percentile-points-from-1-to-99-for-total-income-before-andafter-tax.

———. 2022b. 'Direct Effects of Illustrative Tax Changes Bulletin (June 2022)'. Gov.uk. GOV.UK. 16 June 2022. https://www.gov.uk/government/statistics/ direct-effects-of-illustrative-tax-changes/direct-effects-of-illustrative-tax-changesbulletin-june-2022.

Home Office. 2020. 'A Review of Evidence Relating to the Elasticity of Demand for Visas in the UK'. Home Office. https://assets.publishing.service.gov.uk/ government/uploads/system/uploads/attachment_data/file/872608/review-evidencerelating-to-elasticity-horr114.pdf.

Huffman, David, Raimond Maurer, and Olivia S. Mitchell. 2019. 'Time Discounting and Economic Decision-Making in the Older Population'. Journal of the Economics of Ageing 14: 100121. https://doi.org/10.1016/j.jeoa.2017.05.001.

Imidaily. 2022. 'Cambodia Citizenship by Investment Program'. Investment Migration Insider (blog). 2022. https://www.imidaily.com/cambodia-citizenship-byinvestment-program/.

Kukathas, Chandran. 2021. Immigration and Freedom. Princeton University Press. https://press.princeton.edu/books/hardcover/9780691189680/ immigration-andfreedom.

Kulakov, Mike. 2022. 'Average Working Hours: Breakdown by Countries [2023 Update]'. Everhour Blog (blog). 17 November 2022. https://everhour.com/blog/ average-working-hours/.

Langella, Monica, and Alan Manning. 2021. 'Income and the Desire to Migrate'. Centre for economic performance. https://cep.lse.ac.uk/pubs/download/dp1794. pdf.

Matousek, Jindrich, Tomas Havranek, and Zuzana Irsova. 2022. 'Individual Discount Rates: A Meta-Analysis of Experimental Evidence'. Experimental

Economics 25 (1): 318–58. https://doi.org/10.1007/s10683-021-09716-9.

Migration Advisory Committee. 2014. 'Tier 1 (Investor) Route: Investment 17 Thresholds and Economic Benefits'. Migration Adivsory Committee. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/285220/Tier1investmentRoute.pdf.

Nowrasteh, Alex, and Benjamin Powell. 2021. Wretched Refuse? The Political Economy of Immigration and Institutions. Cambridge studies in economics, choice and society.

Okkerse, Liesbet. 2008. 'How to Measure Labour Market Effects of Immigration: A Review'. Journal of Economic Surveys 22 (1): 1–30. https://doi org/10.1111/j.1467- 6419.2007.00533.x.

ONS. 2022. 'Effects of Taxes and Benefits on UK Household Income - Office for National Statistics'. Ons.Gov.Uk. 29 July 2022. https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/theeffectsoftaxesandbenefitsonhouseholdincome/financialyearending2021.

Orrenius, Pia M, and Madeline Zavodny. 2018. 'Prices Not Points: A Post-Brexit Immigration Solution'. Adam Smith Institute, March. https://static1.squarespace.com/static/56eddde762cd9413e151ac92/t/5aa944c3ec212dd645785a0b/1521042633528/Immigration1.pdf.

Orrenius, Pia M, and Madeline Zavodny. 2020. 'An Auctions Approach to Immigration Policy'. Institute of Labour Economics, no. 151. https://docs.iza.org/pp151.

Ottaviano, Gianmarco I. P., and Giovanni Peri. 2012. 'Rethinking the Effect of Immigration on Wages'. Journal of the European Economic Association 10 (1): 152–97.

Statista. 2022. 'U.S. Disposable Income per Capita 2021'. Statista. 30 September 2022. https://www.statista.com/statistics/710215/us-disposable-income-per-capita/.

Sumption, Madeleine, and Walsh William Peter. 2022. 'Net Migration to the UK'. Migration Observatory. 20 December 2022. https://migrationobservatory.ox.ac.uk/resources/briefings/long-term-international-migration-flows-to-and-from-theuk/.

U.S. Department of State Bureau of Consular Affairs 2022. 2023. 'Electronic Diversity Visa Program'. Https://Dvprogram.State.Gov/. 2023. https://dvprogram.state.gov/.

World Bank. 2021a. 'GDP per Capita (Current US$) | Data'. Data.Worldbank.

Org. 2021. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD.

———. 2021b. 'GDP per Capita (Current US$) - United Kingdom | Data'. Data. Worldbank.Org. 2021. https://data.worldbank.org/indicator/NY.GDP.PCAP. CD?locations=GB.

———. 2021c. 'GDP per Capita (Current US$) - United States | Data'. Data. Worldbank.Org. 2021. https://data.worldbank.org/indicator/NY.GDP.PCAP. CD?locations=US.