Oxford Review of Economic Policy, Volume 33, Number S1, 2017, pp. S31–S44

The economic impact of Brexit-induced reductions in migration

Jonathan Portes* and Giuseppe Forte**

Abstract: We analyse the determinants of migration flows to the UK, and the impact of restrictions on free movement post-Brexit, in both the short and long term. We then provide plausible, empirically based estimates of the likely impacts on growth and wages using relationships from the existing empirical literature. We find that Brexit-induced reductions in migration are likely to have a significant negative impact on UK GDP *per capita* (and GDP), with marginal positive impacts on wages in the low-skill service sector.

Keywords: Brexit, EU, GDP, immigration, wages

JEL classification: J110, J610, J680

I. Introduction

Two issues dominated the UK's Brexit referendum debate: immigration and the economy. But the nature of discussion of these two topics was very different, and to a large extent compartmentalized. During the campaign, there was extensive discussion of the economic impact of Brexit on the UK economy. Detailed projections, under different scenarios for the post-Brexit UK–EU relationship, were produced by HM Treasury, the International Monetary Fund (IMF), and the Organization for Economic Cooperation and Development (OECD), among others (HM Treasury, 2016; IMF, 2016; Kierzenkowski *et al.*, 2016).

However, none of these projections incorporated the economic impact of changes in migration to the UK; they focused on trade (and to some extent investment) impacts. As one of us pointed out at the time, there was little or no analytical justification for this omission (Portes, 2016*a*). The purpose of this paper is to make progress towards filling that gap, using a broadly analogous methodology and approach to that used in the trade-based analyses. Our results are therefore, at a high level, comparable. We analyse the impact of Brexit on migration flows to the UK from the EU, produce scenarios for

* King's College, London, e-mail: jonathan.portes@kcl.ac.uk

** King's College, London, e-mail: forteg100@gmail.com

This work was supported by Jonathan Portes' Senior Fellowship of the 'UK in a Changing Europe' programme, financed by the Economic and Social Research Council. It was produced while both authors were, respectively, Fellow and Research Assistant at the National Institute of Economic and Social Research. Giuseppe Forte would in addition like to thank Jesús Fernàndez-Huertas Moraga for his kind advice on the estimation process.

doi:10.1093/oxrep/grx008

© The Authors 2017. Published by Oxford University Press.

For permissions please e-mail: journals.permissions@oup.com

future flows, and provide plausible, empirically based estimates of the likely impacts on growth, employment, and wages. The paper is structured as follows.

- We estimate the determinants of migration from other EU countries to the UK.
- We construct illustrative scenarios (not forecasts) for the impact of Brexit on migration to the UK over the medium to longer term, taking into account macroeconomic drivers and the impact of both the prospect of Brexit and future modifications to free movement.
- We briefly summarize the literature on the economic impact of migration to the UK on employment, wages, and (using cross-country evidence) growth.
- Using this existing literature, we provide estimates of the economic impacts of Brexit-induced reductions in migration.

II. The impact of Brexit

As explained in Portes (2016*b*), even before Brexit results in any changes to UK immigration policy or law (that is, while the UK remains a member of the EU and free movement continues as now), some fall in net migration from the EU appears likely, for several reasons.

- Even before the referendum, employment growth in the UK had slowed (whether as a result of Brexit-related uncertainty or, perhaps more likely, of other factors). Meanwhile unemployment is falling both in the EU as a whole, and in the Eurozone.
- Moreover, for some countries at least (in particular Romania and Bulgaria), the very high levels of recent inflows is likely to reflect the impact of the lifting of transitional controls: this seems likely to run its course. So even if there had been no referendum, it is plausible that immigration would have fallen back somewhat from its peak earlier this year.
- The referendum could make this fall much sharper, both through the overall economic impact of Brexit on growth, output, and employment, and because migration from some EU countries appears to respond to exchange rate changes.
- There are legal and psychological factors, relating both to uncertainty about future rights for EU citizens currently resident, and the more general political and social climate. This is not merely a matter of perceptions: it also reflects the fact that while EU citizens' rights will not change in the short term, they are likely to be considerably less in the long term, and rational decision-makers will take this into account.

Over the longer term, the impact of the 23 June vote on migration will depend on the migration system adopted by the UK after Brexit. As set out in Portes (2016*b*), it is helpful to divide the open questions along two dimensions.

- Will the new system give a considerable degree of preference to European Economic Area (EEA) citizens, even if not full free movement, compared to those outside the EEA, or will it treat all non-UK citizens equally (with the possible exception of Irish citizens, not discussed here)?

– Will the new system be relatively liberal—accepting perhaps an increase in skilled migration from outside the EEA and at the same time reducing EU migration—or will it be restrictive, with the overarching objective still being to hit the government's target to reduce net migration to the tens of thousands?

The government has been careful to avoid committing itself to specifics. However, recent comments by the Prime Minister, Chancellor, and Home Secretary suggest that the current direction of travel is for a system that does maintain some degree of 'European preference' for highly skilled workers and (possibly) incorporates sector-specific schemes for some other sectors where employers would struggle to fill the gaps left by the end of unrestricted free movement. However, this system would be accompanied by a continued commitment to substantially reducing overall migration and maintaining (or even tightening) the current restrictions on migration from outside the EU. *Ex ante*, it is impossible to say how a mixed system, with some preferences for EU nationals, would impact migration flows.

III. Forecasting migration to the UK

In Forte and Portes (2017, forthcoming) we estimate the economic determinants of migration to the UK from a number of the largest source countries for economic migration, as proxied by quarterly National Insurance number (NINo) registrations. As would be expected, high-level macroeconomic developments (the evolution of GDP in both the UK and source countries, changes in unemployment rates, and the bilateral exchange rate) and the existence of free movement of workers are significant determinants. In particular, the coefficient on a dummy variable indicating that citizens of the country in question have free movement rights to come to the UK under the EU (or EEA) implies that free movement results in an increase over time of almost 500 per cent—that is, by a factor of six— using our preferred estimator.[1] A brief description of the methodologies employed both for estimating the impacts of these determinants and for forecasting future flows is set out in the Annex, section (i).

Coupled with the National Institute of Economic and Social Research (NIESR)'s November 2016 economic forecasts (Hacche *et al.*, 2016), our results allow us to produce scenarios for quarterly NINo registrations by country between now and 2020. The resulting forecasts suggest that, even before taking account of the impact of the referendum, NINo registrations of EU nationals for the countries in our sample (which constitute approximately 99 per cent of the EU total[2] and 67 per cent of the world total) would fall back somewhat from their recent very high levels to something closer to the 2010–15 average

This estimate incorporates only changes in economic conditions. We wish, however, to incorporate estimates both of the wider 'psychological' impact of the Brexit vote and, in due

[1] It is perhaps instructive to compare this with estimates of the impact of EU membership on trade flows, which typically find that EU membership increases bilateral trade flows by perhaps 40–60 per cent. The disparity presumably reflects the fact that—absent free movement—barriers to labour mobility between countries are much higher than trade barriers.

[2] Our sample includes all of the current 28 EU member states with the exception of Croatia and Cyprus as well as Switzerland and Norway.

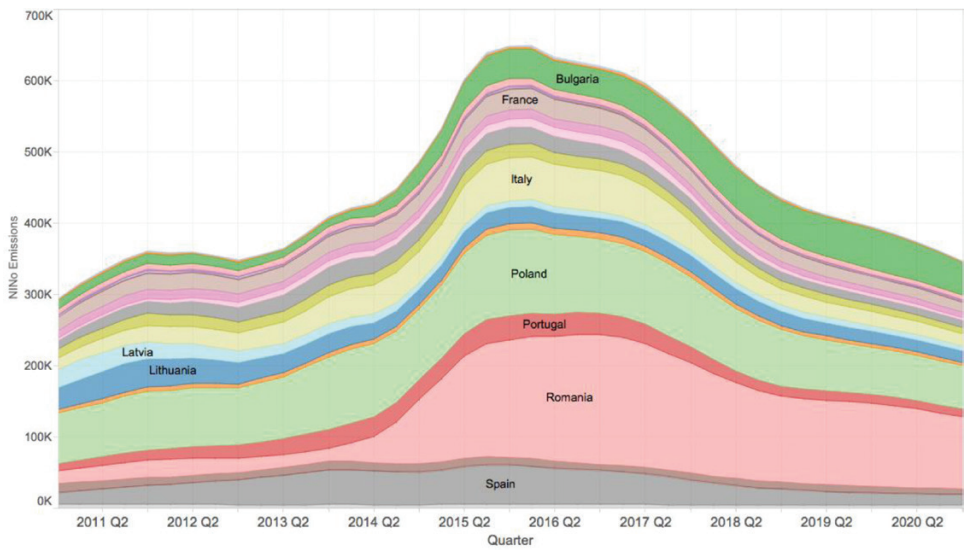
course, that of changes to free movement after Brexit. The first is inevitably somewhat speculative, while the second is, as set out above, unknown, since neither the timing of changes to free movement post-Brexit nor the parameters of a new system are defined as yet.

We do, however, have empirically based estimates of the direct impact of free movement, and we use these to construct illustrative scenarios. In the first, we assume that, over the period between now and 2020, the combination of these factors is equivalent to reversing half of the impact of introducing free movement in the first place; in the second, we assume that it is equivalent to reversing the entire effect of free movement. In both cases, we assume (given the lack of information on timing of any policy changes) that these impacts occur gradually over the period. We regard the first scenario as our central scenario; the second is best viewed as an extreme case of what might happen in the case of a 'hard Brexit' with no 'European preference' post-Brexit; this seems quite unlikely at present, albeit not impossible. Of course, Brexit is likely to have other important impacts as well, particularly on the broader economic and trading relationship between the UK and the EU, which may in turn impact migration flows: our stylized approach to constructing these scenarios cannot hope to incorporate these more complex interactions.

As shown in Figures 1 and 2 below, the resulting falls are quite large; in the central scenario, NINo registrations average about 443,000 over the 2016–20 period, falling to 327,000 by 2020, while in the extreme scenario they average about 350,000, falling to 140,000 by the end of the period. While this may seem implausibly steep, recall that as recently as 2003 NINo registrations for EU nationals totalled about 100,000, even with free movement in place for the EU15.

Note that our estimates are for reductions in NINo registrations. For the purposes of our analysis, we need to translate these into reductions in net migration, and then into the impact on the working age population. ONS (2016*b*) suggests that until 2014, approximately 50 per cent of EU national NINo registrations represented short-term

Figure 1: Forecasts assuming Free Movement Coefficient[3] slopes to 50%



[3] For the definition of the 'Free Movement Coefficient' please see Annex.

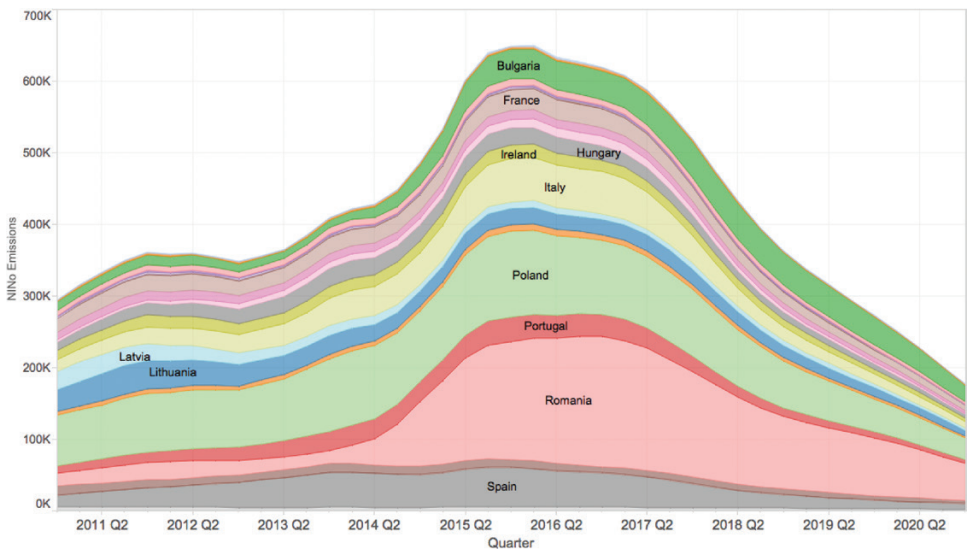
(less than 1 year) immigration. Since then, the proportion appears to have been somewhat higher, reflecting in particular strong growth in the number of Bulgarian and Romanian registrations, which did not translate into a corresponding increase in measured immigration; it is unclear if this reflects some under-recording or a structural shift in the nature of migration to the UK (Portes, 2016*c*). In addition, our estimates do not take account of emigration (since NINo registrations only record new arrivals). It is likely that Brexit and economic developments will also increase emigration in the short-term; however, with inflows falling, this will over the longer term result in a fall in emigration. Assessing the interaction of these various factors is complex.

Below, we assume that falls in NINo registrations translate into a fall in net migration on a proportional basis (that is, that a fall in NINo registrations of X per cent translates into a corresponding fall in net migration for the EU). While this is unlikely to be the case from quarter to quarter, it may be a reasonable rule of thumb over a longer time period. In Forte and Portes (2017) we will extend our analysis to forecasting net migration, as measured by the official yearly Long-term International Migration statistics, and we will be able to revisit this issue at that point.

On this basis, then, our scenarios imply that net EU migration could fall by up to 91,000 on the central scenario, and up to 150,000 on a more extreme scenario, over the period from now to 2020.

How does this compare with existing estimates? Vargas-Silva (2016) estimates that 19 per cent of people born in EU countries and working in the UK are in a skilled (at least graduate level) job earning more than £20,000 per annum; the share of those who have arrived in the last 5 years meeting these criteria is only 12 per cent (note that our estimate implies that without free movement flows would be at about 16 per cent of current levels). Using a broadly similar approach, Migration Watch (2016) argues that applying the same migration rules to EEA nationals as currently apply to non-EEA ones, but with some more general loosening, could reduce net migration by about 100,000. This is close to our central scenario. Together, these estimates—prepared using

Figure 2: Forecasts assuming Free Movement Coefficient slopes to 0%



completely different methodologies to our approach—give us a degree of comfort that our estimates are not unreasonable.

IV. Migration impacts: existing evidence

In order to translate these scenarios of the impact of Brexit on migration flows into impacts on economic variables, we now turn to the existing empirical evidence. Over the last decade the UK resident population originally from other EU member states has more than doubled, to more than 3 million, and continues to rise rapidly. The primary motivation for migration was work, and most new migrants are in employment, with employment rates for intra-EU migrants well above rates for natives (ONS*a*). One notable feature of migrants from the new member states was that, although they were not necessarily low skilled, they moved primarily into low-skilled employment in the UK, and were concentrated in certain sectors (for example, construction, retail, hospitality, domestic work, food processing, and agriculture) (MAC, 2014).

There is a now a considerable literature analysing the impact of recent migration on the UK labour market.

- On employment, a comprehensive literature review by the UK government (Home Office and Department for Business and Skills, 2014) found that 'To date there has been little evidence in the literature of a statistically significant impact from EU migration on native employment outcomes'. This is also the case when focusing on specific groups who might be expected to be most adversely affected, such as young people (see, for example, Wadsworth, 2014).
- On wages, there is an emerging consensus that recent migration has had little or no direct impact overall, but possibly some small or negative impact on low-skilled workers (and perhaps some positive impact on skilled workers). The most robust recent analysis, Nickell and Salaheen (2015), finds that a 10 percentage point rise in the immigrant share leads to approximately a 1.5 per cent reduction in wages for native workers in the semi/unskilled service sector.

Estimates of the impact on overall growth and GDP *per capita* rely—very much as with the empirical analysis on the relationships between trade and growth used for analyses of the macroeconomic impact of Brexit—on cross-country evidence. As with trade, there is strong evidence that migration has a positive impact on productivity and GDP *per capita*. Again, as with trade, these positive impacts must result from indirect impacts of migration ('spillovers') since they are too large to simply be driven by compositional impacts. Indeed, the theoretically plausible channels are likely to be very similar; both trade and migration might enhance productivity by increasing competition (in labour and product markets) and by facilitating the growth of high-productivity clusters. Indeed, as regards the latter, they are very likely to be complementary.

Relatively few papers produce useful quantitative estimates of the likely impacts. Ortega and Peri (2014) examine the impact of both immigration and trade; they find that while openness to trade and migration both boost (*per capita*) income, migration has considerably larger impacts than trade. This suggests that analyses of the impact of Brexit on growth which—as with the analyses cited above—focus only on trade impacts may be missing an important channel.

However, for the purposes of this paper, Ortega and Peri (2014) is unlikely to be a useful guide to estimating the quantitative impact of migration on UK growth and productivity: it is based on a very large cross-country dataset, which includes mostly developing countries, and it does not distinguish between low- and high-skilled workers. More useful in this context are Boubtane *et al.* (2015) and Jaumotte *et al.* (2016). While both are cross-country analyses, both focus on advanced economies; both also incorporate data on the skill composition of migration.

Boubtane *et al.* (2015) find that migration in general boosts productivity in advanced economies, but by varying amounts; for the UK, the estimated impact is that a 1 percentage point in the migrant share of the working-age population leads to a 0.4–0.5 per cent increase in productivity. This is higher than in most other advanced economies and reflects the relatively high skill levels of migrants to the UK. Their data set, however, only runs up to 2006.

Jaumotte *et al.* (2016) find that a 1 per cent increase in the migrant share of the adult population results in an increase in GDP *per capita* and productivity of approximately 2 per cent. This result is consistent across a variety of empirical specifications. Perhaps surprisingly, the estimated aggregate impacts of high- and low-skilled migration are not significantly different (although the distributional implications are). One possible, partial explanation is that low-skilled migration appears to increase labour force participation among native women (a result also found in individual country studies, cf. Barone and Mocetti (2011)). This is one example of the type of complementarity or spillover effect by which migrants might indirectly increase productivity and output.

We therefore have a significant body of quantitative empirical evidence with which to assess the impact of a reduction in migration to the UK. This literature suggests that reducing worker inflows would reduce overall employment (more or less one for one, since there would likely be no significant impact on native employment), would increase (by small amounts) wages for some low-paid groups, and would significantly reduce overall GDP *per capita* and productivity.

Note that estimates considering spillovers differ fundamentally from those that simply look at the impact on growth and productivity resulting solely from the direct arithmetic impact of migration on the size of the UK labour force (OBR, 2016) or compositional impacts (Lisenkova and Sanchez-Martinez, 2016); by construction, the models used in these papers omit any indirect or spillover effect on productivity. For example, the Office for Budget Responsibility (OBR) forecast that Brexit-induced reductions in migration will reduce trend output growth by 0.3 per cent per year is based solely on the impact on the growth in the labour force—it is assumed that there is no impact on productivity.

V. Economic impacts

We now assess the impacts of Brexit-induced reductions in migration on the UK economy. We focus on two outcomes of policy concern: the impact on overall growth in GDP and GDP *per capita*, and the impact on wages for low-paid workers, in particular those in the low- and medium-skilled service sector.

(i) Growth and productivity

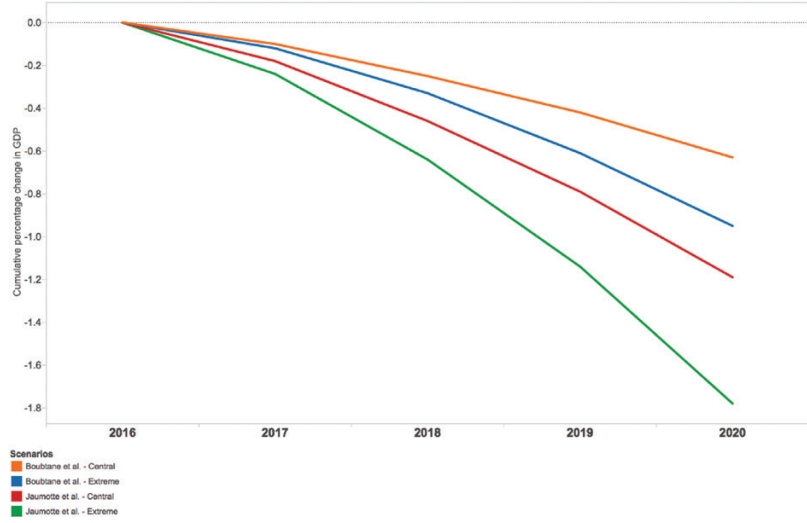
The UK working age population is 42 million, while the adult population is just over 50 million. The vast majority, but not all EU migrants to the UK are adults; a reduction in net migration of 100,000 results in total population falling by 0.15 per cent and the migrant share of the working age population by 0.20 per cent. Using the estimates of Boubtane *et al.* (2015), this would reduce GDP *per capita* by about 0.1 per cent, and GDP by about 0.3 per cent. Using those of Jaumotte *et al.* (2016), GDP *per capita* would fall by about 0.4 per cent, and GDP by about 0.55 per cent.

We can now estimate the possible impact of falls in EU migration on GDP and GDP *per capita* growth between now and 2020, the same time period used for the Treasury analysis, compared to a counterfactual where EU migration remains constant. Note that while the main impact here comes from Brexit, especially over the medium- to long-term impact, the short-term forecast also reflects economic developments in the UK and other EU countries, so is not strictly attributable exclusively to Brexit. We conclude that, on our central scenario, the impact would be to reduce GDP by about 0.63 to 1.19 per cent (see Figure 3), while GDP *per capita* (Figure 4) would be reduced by about 0.22 to 0.78 per cent. On the more extreme scenario, the hit to GDP *per capita* would be up to 1.16 per cent. Note that the OBR assumed reductions in migration which—arithmetically—reduced GDP growth by 0.2 per cent annually, or about 0.8 per cent over the period.

In order to facilitate comparison with the estimates produced by the Treasury and others of the long-term impacts of Brexit, we also calculate the impact on GDP *per capita* out to 2030, assuming that migration remains flat at these reduced levels after 2020. Here, as Table 1 shows, the impact on GDP *per capita* ranges from a fall of 0.92 to 3.38 per cent under the central scenario, and from 1.53 to 5.36 per cent under the extreme scenario.

It is worth comparing—both quantitatively and qualitatively— these estimates of the impact of reduced migration on GDP with estimates of the impact of reduced trade. From a methodological point of view, the two approaches are very similar: regression-based predictions are made of trade or migration flows, with or without free movement/

Figure 3: Scenarios of GDP dynamics



EU membership (the impact of which is captured in the regression as a dummy variable). These estimates are then translated into GDP impacts using relationships established in the existing literature between trade as a proportion of GDP, or migrants as a share of the labour force, and productivity. In this conceptual sense, our approach is almost identical to that adopted by HM Treasury, the IMF, and OECD. The Treasury's central estimate, for example, estimated a reduction in GDP from Brexit of 6 per cent.

Of course, the reliability of quantitative estimates generated by this methodology depends crucially on the empirical validity of the two steps described above. Here, our estimates of the impact of Brexit on migration are probably more reliable than those of the impact on trade. Notably, the top-down analyses referenced above appear broadly consistent with our estimates, based on bottom-up empirical analysis. For trade, however, estimates of impacts are entirely model-based. However, the estimates of the growth impact of migration are probably less reliable than those of the growth impact on trade, since the literature is more recent and less extensive.

One possible objection to our approach—less relevant for trade—is that Brexit might lead to a shift in the composition of migration, with a disproportionate reduction in unskilled migration. This assumption is in itself open to question (Portes, 2016*b*), as it ignores the fact that EU migrants to the UK are already relatively skilled, and changes to free movement may well reduce the attractiveness of the UK to highly skilled, mobile workers. As noted above, Jaumotte *et al.* (2016) find that unskilled migration has almost

Figure 4: Scenarios of GDP *per capita* dynamics

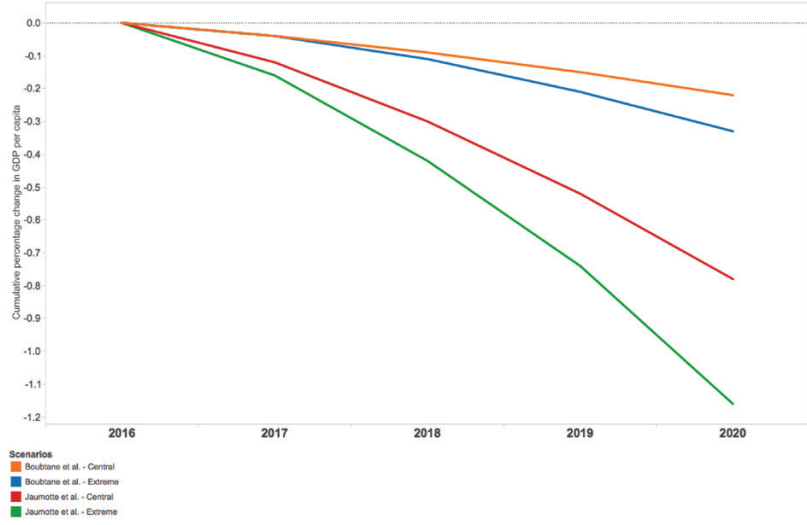


Table 1: Cumulative effects to 2030 (% fall; increase for wages)

	Scenario	GDP (%)	GDP *per capita* (%)	Wages (%)
Model 1	Central	2.73	0.92	0.51
	Extreme	4.35	1.53	0.82
Model 2	Central	5.19	3.38	0.51
	Extreme	8.18	5.36	0.82

as large a positive impact as skilled. Boubtane *et al.* (2015) suggest that an improved skills mix would mitigate, but not eliminate, the negative impacts.

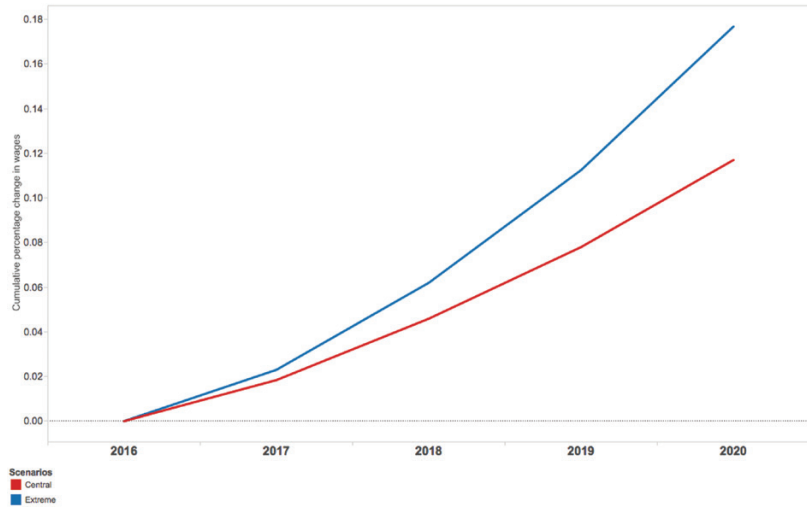
(ii) Wages

Given the focus during the referendum campaign on the labour market impacts of EU migration, and in particular the impact on low-skilled or low-paid British-born workers, we also make quantitative estimates of the impact of migration on wages using the estimates from Nickell and Salaheen (2015). This exercise, the results of which are shown in Figure 5, finds that a 1 percentage point increase in the proportion of migrants working in the low- to medium-skilled service sector reduces wages by just under 0.2 per cent. This is partly compositional, so the impact on the wages of natives in this sector is closer to 0.15 per cent. Since EU migrants, in particular, are much more likely to be working in this sector than in other sectors, reductions in migration result in a significantly larger reduction in this sector than in the working-age population as a whole. Taking account of this, we therefore calculate the (positive) impact on wages of a reduction in EU migration; in the central scenario, the resulting wage increase is 0.12 per cent by 2020 and 0.51 per cent by 2030. Of course, this does not mean such workers would be better off over all; that would depend on how the wider economic impacts of Brexit affected them.

VI. Conclusion

In this paper we have outlined the first empirically based analysis of flows of EU migrants to the UK and set out possible scenarios for the longer-term impact of Brexit on migration flows. This work is preliminary; in forthcoming work we will extend this analysis both to non-EU countries and to alternative measures of immigration flows.

Figure 5: Scenarios of wage dynamics



Using a methodology broadly analogous to that employed by mainstream economic forecasters to model the impact of Brexit-induced reductions in trade on productivity and growth, we also project the impact on *per capita* GDP and on the wages of those in the low-skilled service sector, particularly strongly impacted by EU migration. The broad scenarios (not forecasts) we depict imply that the negative impacts on *per capita* GDP will be significant, potentially approaching those resulting from reduced trade. By contrast, the increase in low-skilled wages resulting from reduced migration is expected to be, if at all, relatively modest.

A number of caveats apply. First, our scenarios for future migration flows are, as with any such exercise, dependent on a number of assumptions, relating both to our methodology and to the inherent uncertainties over future policy. They will, inevitably, prove to be inaccurate. Nevertheless we believe they are useful for illustrative purposes. Second, while the theoretical basis for the view that reductions in migration will translate into reductions in productivity is (as with trade) clear, and supported by the empirical evidence, using quantitative estimates based on historical cross-country data to construct scenarios for the impact on the UK economy going forward is inevitably speculative (again, just as it is for trade and investment flows). As with other analyses of the long-term impact of Brexit, these estimates should be viewed as an indication of the sign of the likely impact—as with trade, almost certainly negative—and of the plausible rough order of magnitude of the possible impacts, rather than a point estimate.

Annex

(i) Data and estimation

For the purpose of the study, we obtained the quarterly NINo series from Stat-Xplore, the online portal of the Department of Work and Pensions, while historical series and forecasts of the macroeconomic indicators for each country analysed are derived from NiGEM, NIESR's Global Econometric Model. While NiGEM contains a large quantity of data on many countries, variable transformation implied the loss of some countries for which specific information is unavailable.

The specification we employ in the estimation of the coefficients presented is as follows

$$ninopm_{it} = \beta_0 + \beta_1 ninopm_{it-1} + \beta_2 diffrgdp_{it} + \beta_3 diffemrate_{it} + \beta_4 exchrate_{it} + \beta_5 inEU_{it} + \epsilon_{it} \quad (1)$$

where $ninopm_{it}$ is the logarithm of NINo allocations to country i at time t per million inhabitants; $ninopm_{it\text{-}1}$ its first lag; $diffrgdp_{it}$ the difference between the logarithm of UK and Origin GDP *per capita*; $diffemrate_{it}$ the difference between the logarithm of Origin and UK employment rate; $exchrate_{it}$ the logarithm of the exchange rate of Origin currency with the British pound (GBP); $inEU_{it}$ a dichotomous variable taking the value 1 if free movement (thus the associated coefficient is referred as the 'Free Movement coefficient' in the text) applies between the origin country and the UK (that is, for the EU15, EEA countries, and Switzerland, throughout the period covered; for the new member states which joined in 2004, from1 May 2004; and for Bulgaria and Romania, from 1 January 2014 (that is, after the expiry of the transitional arrangements under which free movement did not apply for most workers), 0 otherwise.

In line with Bertoli and Fernández-Huertas Moraga (2013), in which the authors use the Pooled Common Correlated Effects Estimator (CCE) developed in Pesaran (2006) and apply it to a dataset in many ways similar to ours, we estimate the above equation with to the Dynamic Pooled CCE estimator developed in Chudik and Pesaran (2015). Put simply, this estimator entails augmenting the equation above with (lagged) cross-sectional averages of each term interacted with dummy variables for N–1 countries, and then estimating the augmented equation by Fixed Effects. Table 2 below displays the results (we also report the results of the heteroskedaticity- and cross-sectional-correlation-consistent FE estimator for comparison.)

(ii) Forecasting

While for estimation it makes sense to make use of the CCE estimator, such methodology cannot be employed in prediction as it defines the dependent variable at any time as a function of its contemporaneous cross-sectional average ($Y_{it} = f(\bar{Y}_t)$) which makes linear prediction impossible unless a first arbitrary step in the prediction of $\bar{Y}_t$ is taken. We explore one such 'two-step' method in producing the forecasts for future flows: first, we predict future values of migration flows via a heterogeneity- and autocorrelation-consistent FE estimator; second, we apply our preferred DCCE specification to the prediction-augmented sample to obtain cross-sectionally consistent fits. This methodology, while tentative, yields what we believe are reasonable estimates of future flows for all countries but one, Bulgaria (we will look into analysing this anomaly in the upcoming paper).

Table 2: Regression estimates

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**DCCEP**	**DCCEP**	**DCCEP**	**FE (HC)**	**FE (HC)**	**FE (HC)**
NINo registrations last quarter	0.306***	0.306***	0.297***	0.691***	0.742***	0.701***
	(0.0250)	(0.0251)	(0.0253)	(0.0595)	(0.0464)	(0.0571)
Difference in GDP *per capita*	0.809**	0.819**	0.655*	–0.223*	–0.146	–0.0442
	(0.372)	(0.373)	(0.379)	(0.118)	(0.0918)	(0.0347)
Difference in employment rate	2.723***	2.713***	2.902***	1.973***	1.782***	1.876***
	(0.625)	(0.625)	(0.630)	(0.518)	(0.434)	(0.446)
Exchange rate with GBP	0.399***	0.394***	0.458***	–0.0718	–0.0789	–0.613***
	(0.141)	(0.141)	(0.146)	(0.106)	(0.0945)	(0.187)
Free Movement dummy	1.763***	1.764***	1.774***	0.727***	0.624***	0.665***
	(0.0752)	(0.0754)	(0.0758)	(0.163)	(0.132)	(0.150)
Observations	1,537	1,537	1,537	1,653	1,653	1,653
R-squared	0.997	0.997	0.997			
CD test	–0.648	–1.192	–1.239	29.020	24.141	26.905
P value	0.517	0.233	0.215	0.0	0.0	0.0
Countries	29	29	29	29	29	29
Quarter FE	NO	YES	YES	NO	YES	YES
Year FE	NO	NO	YES	NO	NO	YES

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

References

Barone, G., and Mocetti, S. (2011), 'With a Little Help from Abroad: The Effect of Low-skilled Immigration on the Female Labour Supply', *Labour Economics*, **18**(5), 664–75.

Bertoli, S., and Fernández-Huertas Moraga, J. (2013), 'Multilateral Resistance to Migration', *Journal of Development Economics*, **102**, 79–100.

Boubtane, E., Dumont, J. C., and Rault, C. (2015), *'Immigration and Economic Growth in the OECD Countries 1986–2006'*, CESifo Working Paper Series No. 5392, available at https://ssrn.com/abstract=2622005

Chudik, A., and Pesaran, M. (2015), 'Common Correlated Effects Estimation of Heterogeneous Dynamic Panel Data Models with Weakly Exogenous Regressors', *Journal of Econometrics*, **188**(2), 393–420.

Forte, G., and Portes, J. (2017), *'Macroeconomic Determinants of UK Immigration, with an Exercise in Forecasting'*, forthcoming.

Hacche, G., Carreras, O., Kirby, S., Liadze, I., Meaning, J., Piggot, R., and Warren, J. (2016), 'World Overview', *National Institute Economic Review*, **238**(November), F9–F16.

HM Treasury (2016), 'Analysis of the Long Term Economic Impact of EU Membership and Its Alternatives', CM 9250, available at https://www.gov.uk/government/publications/hm-treasury-analysis-the-long-term-economic-impact-of-eu-membership-and-the-alternatives

Home Office and Department for Business and Skills (2014), 'The Impacts of Migration on UK Native Employment: An Analytical Review of the Evidence', available at https://www.gov.uk/government/publications/impacts-of-migration-on-uk-native-employment-an-analytical-review-of-the-evidence

IMF (2016), *'United Kingdom: Selected Issues'*, Washington, DC, International Monetary Fund, available at http://www.imf.org/external/pubs/cat/longres.aspx?sk=43980

Jaumotte, F., Koloskova, K., and Saxena, S. C. (2016), *'Impact of Migration on Income Levels in Advanced Economies', Spillover Task Force*, Washington, DC, International Monetary Fund, available at: http://www.imf.org/~/media/files/publications/spillovernotes/spillovernote8

Kierzenkowski, R., *et al*. (2016), *'The Economic Consequences of Brexit: A Taxing Decision', OECD Economic Policy Papers*, No. 16, Paris, OECD Publishing.

Lisenkova, K., and Sanchez-Martinez, M. (2016), 'The Long-term Macroeconomic Effects of Lower Migration to the UK', NIESR Discussion Paper 460, available at http://www.niesr.ac.uk/sites/default/files/publications/dp460.pdf

MAC (2014), *Migrants in Low-Skilled Work*, Migration Advisory Committee, available at https://www.gov.uk/government/publications/migrants-in-low-skilled-work

Migration Watch (2016), 'UK Immigration Policy Outside the EU', available at http://www.migrationwatchuk.org/briefing-paper/371

Nickell, S., and Saleheen, J. (2015), *'The Impact of Immigration on Occupational Wages: Evidence from Britain'*, Bank of England, Staff Working Paper No. 574, available at http://www.bankofengland.co.uk/research/Pages/workingpapers/2015/swp574.aspx

OBR (2015), 'Fiscal Sustainability Report', Office for Budget Responsibility, available at http://budgetresponsibility.org.uk/fsr/fiscal-sustainability-report-june-2015/

— (2016), 'Fiscal Sustainability Analytical Paper: Population Projections and Pensions Spending Update', Office for Budget Responsibility, available at http://budgetresponsibility.org.uk/fsr/fiscal-sustainability-analytical-papers-july-2016/

ONS (2016*a*), 'EMP06: Employment by Country of Birth and Nationality', Office of National Statistics, available at http://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/employmentbycountryofbirthandnationalityemp06

— (2016*b*), 'Note on the Difference between National Insurance Number Registrations and the Estimate of Long-term International Migration', Office of National Statistics, available at https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/articles/noteonthedifferencebetweennationalinsurancenumberregistrationsandtheestimateoflongterminternationalmigration/2016

Ortega, F., and Peri, G. (2014), 'Openness and Income: The Role of Trade and Migration', *Journal of International Economics*, **92**, 231–51.

Pesaran, M. (2006), 'Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure', *Econometrica*, **74**(4), 967–1012.

Portes, J. (2016*a*), 'The Treasury's Brexit Analysis and Immigration', National Institute of Economic and Social Research Blog, available at http://www.niesr.ac.uk/blog/treasurys-brexit-analysis-and-immigration

— (2016*b*), 'Immigration after Brexit', *National Institute Economic Review*, **238**(November), R13–R21.

— (2016*c*), '(Under)counting European Migrants in the UK', National Institute of Economic and Social Research Blog, available at http://www.niesr.ac.uk/blog/under-counting-europeans-uk

Vargas-Silva, C. (2016), *'Potential Implications of Admission Criteria for EU Nationals Coming to the UK', Migration Observatory Report*, COMPAS, University of Oxford.

Wadsworth, J. (2014), *'Immigration, the European Union and the UK Labour Market', CEP Policy Analysis, CEPPA015 Science*, London, Centre for Economic Performance, London School of Economics and Political Science.