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The Fiscal Effects of Immigration to the UK

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Abstract:

In this paper, we investigate the fiscal impact of immigration on the UK economy, with a focus on the period since 1995. We provide estimates for the overall immigrant population for the period between 1995 and 2012, and for more recent immigrants who arrived since 2000, distinguishing between immigrants from European versus non-European countries. Overall, our findings indicate that EEA immigrants have made a positive fiscal contribution, even during periods when the UK was running budget deficits. This positive contribution is particularly noticeable for more recent immigrants that arrived since 2000 in particular from EEA countries.

Keywords: Immigration, Fiscal Impact, Welfare State.

JEL Codes: J61, J68, H20

1. Introduction

Much of the economic literature over the last two decades has focussed on immigration's possible impact on native workers' wages and their employment (see e.g. Altonji and Card (1991), Borjas (2003), Card (1990, 2001), Dustmann, Fabbri and Preston (2005), Dustmann, Frattini and Preston (2013), Manacorda, Manning and Wadsworth (2012), Ottaviano and Peri (2012)), in response to concerns about the impact of immigration on labour markets. However, a possibly even larger concern in the public debate on migration is whether immigrants contribute their fair share to the tax and welfare systems. Indeed, in their analysis of attitudinal data, Dustmann and Preston (2007) provide strong evidence that this concern is more important for individuals' assessments of immigration policies than concerns about wages or employment. Such worries about the negative fiscal effects of immigration are also reflected in survey responses. For instance, when asked in the 2008 European Social Survey whether immigrants receive more or less in social benefits than they contribute in taxes, 44% of European citizens responded that immigrants receive more than they contribute, with only 15% believing that they receive less. In this same survey, only 8% of European citizens agreed that immigrants should have the right to receive social benefits and services immediately upon arrival in the host country, 38% favoured to grant this right only after working and paying taxes for at least one year, 37% supported it only after acquiring citizenship of the host country, and more than 8% believed that immigrants should never obtain the same rights as natives. There is also solid evidence that policy makers react to such common beliefs and public concern about immigration by restricting welfare access¹. For example, the labour government under Tony Blair opened UK labour markets to the new Central and Eastern European community member states in 2004 but restricted access to the welfare system². Similar restrictions are also being discussed as part of the current debate in the UK on this very issue in regard to Bulgaria and Romania. It is thus surprising that there is so little research that provides substantive evidence on immigrants' fiscal contribution.

¹ See also Boeri (2010).

² Citizens of new EU member states gained access to income-related benefits (income support, pension credit, jobseeker's allowance, housing benefit and council tax benefit) only after 12 months of continuous employment in the UK.

In this paper, we study the fiscal impact of immigration to the UK, a country in which concerns about immigration seem frequently articulated³, by examining UK immigrants' net fiscal contribution over the period from 1995 to 2011. In doing so, we distinguish between all immigrants who resided in the UK in the years from 1995 onwards, and immigrants who arrived since 2000. In what follows, we will refer to the latter group as “recent immigrants”. We further distinguish two groups, immigrants from countries that are not part of the European Economic Area (EEA) and immigrants from EEA countries. This is a decidedly meaningful distinction given the current debates about free labour movement between the UK and other European countries, and given the radical shift in immigration from predominantly Commonwealth countries to European countries, particularly Eastern and Central European countries.

By assigning individuals their share of cost for each item of government expenditure and identifying their contribution to each source of government revenues, we are able to provide precise estimates for each year since 1995 (2001 for recent immigrants) on both the overall expenditure on the respective immigrant populations and the revenues they have produced in comparison to native born workers. Thus, although our approach is “static” in the sense that we do not compute the hypothetical life cycle contributions for each immigrant at one point in time, it is also dynamic in that we provide a clean picture of the UK immigrant populations' net contribution to the tax and benefit system over 17 years. It is this calculation that we believe is important for the public debate on the fiscal effects of immigration.

Our analysis not only builds on but goes substantially beyond previous studies of the fiscal effects of immigration for the UK, which are more limited in scope. Several such studies, for example, focus on all immigrants irrespective of migration seniority and address only specific years (see e.g. Gott and Johnston (2002), Rowthorn (2008) and Sriskandarajah, Cooley and Reed (2005)). Whereas some analyses concentrate only on the difference between direct taxes paid by immigrants, including social security contributions, and the social transfers they receive (OECD 2013), others investigate only certain sub-populations, such as immigrants from the eight Central

³ According to the Autumn 2012 Eurobarometer, 24% of UK citizens, as opposed to an average 8% of EU residents, believe that immigration represents one of the two most important issues facing the country. (http://ec.europa.eu/public_opinion/archives/eb/eb78/eb78_publ_en.pdf)

and Eastern European countries that joined the EU in May 2004, and that came to be collectively known as A8 immigrants (see Dustmann, Frattini and Halls (2010))⁴.

Although our analysis requires a number of important assumptions – detailed more fully in the next section of this paper – when faced with an option about alternative ways of allocating fiscal costs to immigrants we have chosen throughout the paper to calculate a “worst case” scenario, from the immigrants’ standpoint, in the sense that the net fiscal impact of migrants is most likely to be more positive than our estimates suggest.

Besides providing analysis on the net fiscal impact of immigrants to the tax- and welfare system for these different groups, and for the period since 1995, we also provide additional analysis based on particular sets of questions in the British Labour Force Survey (LFS) that ask respondents about receipt of state benefits and tax credits or social housing. These responses allow for an additional assessment on these particular transfers, and allow us to illustrate receipt of such transfers for the different immigrant populations, and how these transfers have evolved over time, in comparison to natives.

The perhaps most important finding of our analysis is that immigrants are overall less likely than natives to receive state benefits or tax credits, and similarly likely to live in social housing as natives in the same region. Some differences do emerge, however, between immigrants from the European Economic Area (EEA) and those from outside Europe (non-EEA). Whereas EEA immigrants have made an overall positive fiscal contribution to the UK, the net fiscal balance of non-EEA immigrants is negative, as it is for natives.

Recent immigrants, i.e. those who arrived since 2000, are less likely to both receiving benefits and living in social housing than natives. Furthermore, recent immigrants, both those from EEA and non-EEA countries have made a positive net contribution to the UK fiscal system despite the UK’s running a budget deficit over most of the 2000s.

⁴ See Barrett and McCarthy (2008) and Drinkwater and Robinson (2013) for related studies on the welfare participation of immigrants in the UK.

We also show that, if the marginal cost of providing fixed public goods to immigrants is (close to) zero, then immigration, by sharing their provision costs among a larger pool of people, allows substantial implicit savings to the native population. Overall, therefore, our analysis draws a positive picture of fiscal effects immigration has had on the UK. In particular those immigrants who arrived since 2000, and here especially those from the EEA countries, have – through their positive net fiscal contribution – helped to reduce the fiscal burden for native workers.

The paper unfolds as follows. In the next section, we provide a detailed discussion of our conceptual framework, the assumptions made and our measures for the expenditures and revenues that underlie our analysis. Section 3 outlines our data, section 4 provides a brief assessment of UK migration over the period studied, section 5 reports our results and section 6 concludes the paper.

2. Conceptual Issues and Measurement

2.1 Conceptual issues

The assessment of the fiscal contribution of immigrants typically assigns to each individual the estimated tax revenue that this individual contributes, and the expenditures in terms of benefit payments and public services that this individual receives. To achieve this requires detailed data on the various items of government revenues and expenditures, which is not always available. Moreover, it requires the researcher to credibly estimate for all items the amount which is attributable to each individual or group of individuals. This estimation exercise has to rely on rich survey data on the population of interest, complemented by administrative data sources. We describe in the next section how precisely we compute these numbers, and how we deal with incomplete information.

But even if there were no deficiencies in the underlying data, there are a number of conceptual issues that arise, in particular in relationship to how contributions of, and expenditures on immigrants should be allocated (see Rowthorn (2008) for further discussion). For example a first important issue that has to be resolved is how to allocate the cost of education. As primary and secondary education in most countries is heavily subsidised, precisely how the cost of education

of immigrant children is allocated across populations will be important, in particular when fertility of immigrants is higher than that of natives. A related question has to do with the education immigrants bring with them, the cost of which has been borne by the country of origin. Similarly, how should public goods be allocated that are “fixed” in supply, i.e. goods where the provision does not increase with population growth. In this section, we discuss how we deal with these challenges. Overall, we will take a very cautious approach, in the sense that any of the numbers we present below are likely to be an underestimate of the net contribution immigrants make to the tax- and welfare system.

2.1.1 Second generation immigrants

How should one classify second generation immigrants, i.e. the UK-born children of immigrants, in an analysis of the fiscal contribution of immigrants? In most education systems, primary and secondary education is heavily subsidised through tax contributions of the working population. Thus, financing of education of the next generation is part of an intergenerational contract, where the working population finances the education of the next generation, which will in turn finance the next generation and – depending on the pension system – the current working populations’ retirement costs (see e.g. Boldrin and Montes (2005) and Rangel (2003)). The children of immigrants therefore will, if they remain in the receiving country, contribute to the education of the next generation, and the pensions of the current working population. In that sense, they will in the future pay off the investments made into their educational formation. Thus, immigrant children, though consuming public services while at school, will contribute to the next generation by paying taxes later in their lives. Even more so, as British born descendants of immigrants tend to perform better in public schools and acquire more education (see Dustmann, Machin and Schoenberg (2011) for evidence of the descendants of minority immigrants, and Dustmann and Theodoropoulos (2010) for overall educational attainments of British born descendants of minority immigrants), they possibly make a relatively higher net fiscal contribution than natives.

Empirically, serious data limitations prevent us from identifying adult second generation immigrants. The LFS does not have information on parents’ country of birth for individuals who live outside their parents’ household. Therefore second-generation immigrants can only be

identified when they are children (i.e. as long as they live in their parents' households), which is also the age range when they consume educational services. When grown up, working and paying taxes, and making a positive fiscal contribution, they are not identifiable in the survey data available to us.

In our analysis we will consider the children of immigrants under the age of 16 as immigrants regardless of their country of birth, whereas we classify as natives everyone who is at least 16 and is UK born, regardless of where their parents were born⁵. Note that this choice implies that we neglect the contribution the children of immigrants will make in turn when they enter the labour market. Further, we also neglect the costs of educating the immigrants themselves, which – other than the cost of educating the workforce that is native born – has not been borne by British taxpayers, but by taxpayers in the origin country. Thus, we are taking a very cautious approach, in the sense that we assign public expenditures to immigrants, while not assigning to them the educational expenditure contributions that they implicitly make.

2.1.2 Public goods

What is the cost of providing public goods to immigrants? This is a critical question, as public goods and services represent about one third of total government expenditures in all years, although their share has decreased from over 35% in 1995 to 28% in 2011. Thus, the choice of the apportioning coefficient for public goods plays an important role in determining the overall result of our analysis.

Some types of public goods (like, e.g. national defence), would arguably be provided to the same amount and at the same cost regardless of the level of immigration. In this case, the marginal cost of providing the good to an immigrant would be zero, and (if assigning to them the average costs of that public good) immigration simply allows sharing the cost of that good among a larger number of individuals, thus representing a form of implicit saving for natives. Conversely, the expenditure for other types of public goods and services (like e.g. fire-protection services)

⁵ Since the LFS has no direct information about parents' country of birth, we can infer it only for individuals who live in the same household as their parents. For this reason, we have limited our attention to second-generation immigrants under the age of 16, who presumably do not live alone. Further, we have dropped from our sample all individuals under 16 who do not live with their parents (e.g. those living with their grandparents or other adults).

will increase as a result of immigration, although probably less than proportionately (in other words, the marginal cost is likely to be smaller than the average cost). If we could measure the marginal cost of provision of each public good, we could assign this to every new immigrant. Unfortunately, though, we have no data about the marginal cost of public good provisions, and all we know is the average cost (the ratio of total expenditure for the good to the total population).

Although it is therefore likely that the marginal cost of public goods provision is lower than its average cost, in our analysis we will in most cases assign to immigrants the average cost of publicly provided goods and services, which will probably overestimate the fiscal cost component for immigrants for these items.

We distinguish between two types of public goods and services: “pure” and “congestible” public goods⁶. “Pure” public goods are public goods that are not rival in consumption, and where the marginal cost of providing these goods and services to immigrants is likely to be zero. For example, the expenditure for defence or for the running of executive and legislative organs is largely independent of the size of the population. “Congestible” public goods and services are goods that are – at least to some extent – rival in consumption: the marginal cost of providing these goods is unknown, likely smaller than the average cost, but positive. For example, the cost of fire-protection services, waste management and water supply may increase with the size of the resident population. In our analysis below, we will always assume that the marginal cost of providing “congestible” public goods and services to immigrants equals their average cost – which is likely to be an overestimate of the actual cost of provision of these goods to immigrants. On the other hand, we will consider two alternative scenarios for the apportionment of costs for “pure” public goods to immigrants. In the first scenario (“Average effect scenario”), we will assume that the marginal cost of providing public goods to immigrants equals their average cost (as for the “congestible” public good category). In the second scenario (“Marginal effect scenario”), instead, we assume that the marginal cost of providing “pure” public goods to immigrants is zero, and therefore apportion all government expenditures for “pure” public goods to natives only. The difference between the amount of public expenditure apportioned to natives in the first and in the second scenario allows assessing the implicit savings brought about by immigration for natives, by sharing the cost burden of pure public goods across a larger

⁶ See the Appendix for a detailed list of all goods and services in each category.

population – a potentially important aspect of the fiscal contribution of immigration, which is largely neglected.

A related question is what is the marginal contribution of immigrants to government revenues from interests and dividends and to government’s gross operating surplus and rents. In our analysis, we apply to these sources of government revenues the same apportioning criteria as for “pure” public goods. Hence, when we consider that immigrants bear the average cost of public goods, we also apportion to them the average revenue from interests and dividends and from gross operating surplus. Conversely, when we allocate the cost for “pure” public goods to natives only, we attribute all revenues from interest and dividends and from gross operating surplus to natives only.

2.2 Estimation and Measurement

2.2.1 Benefits and social housing

In the first part of our analysis, we assess the degree to which immigrants draw on benefits and tax credits or live in social housing in comparison to natives. To do so, we use responses to questions on the LFS that address two interrelated issues: The first is whether individuals claim any type of benefits or tax credits, including unemployment related benefits, National Insurance credits, income support, sickness or disability benefits, state pension, family related benefits, child benefit (since 2001), housing/council tax (GB) or rent/rate rebate (NI), and/or tax credits. The second is the type of landlord from whom tenants are renting. Based on this latter, we define “living in social housing” as all individuals who rent their accommodation from local authorities or housing associations⁷. We are thus able to construct two indicator variables identifying (i) benefits/tax credits claimants and (ii) those living in social housing. Next, we estimate the following regressions:

$$y_{it} = \alpha + \beta I_{it} + X'_{it} \gamma + T_t + u_{it} \quad (1)$$

⁷ Housing associations are non-profit organizations that typically receive public funding and whose functioning is regulated by the state.

where for each unit of analysis i observed at time t , y is the dummy variable for state benefits/tax credits recipients or for living in social housing; I is a dummy variable for immigrant status; X is a control variable vector that includes age, age squared, a gender dummy, and – in the analysis on social housing only – a set of dummy variables for region of residence; and T designates dummies for year-quarter interaction. While in regressions on welfare dependency, the units of analysis i are individuals, in the case of social housing we perform the analysis at the household level. Using the household (defined as a single person, or a group of people living at the same address who have the address as their only or main home) as the unit of analysis allows assessing the number of residential units that are occupied by immigrants and fully accounts for differences in the average size of households between natives and immigrants.

When we regress our indicator variable only on immigrant status and time dummies, the coefficient β indicates the percentage points difference in the probability of receiving benefits or living in social housing between immigrants and natives observed at the same moment in time. This observation answers a question that is important for assessing immigration's fiscal cost: "Is a randomly drawn immigrant more or less likely to receive benefits (live in social housing) than a randomly drawn native, and if so, by how much?". Also of interest are comparisons between immigrant and native populations that are identical in some observed characteristics. For instance, one such question would be what the difference is in the probability of receiving benefits (living in social housing) between immigrants and natives who have the same gender and age structure and/or the same regional distribution. This is a "counterfactual" question, in the sense that it refers to comparing hypothetical populations that are identical in a set of observable characteristics. We can answer such questions by including a vector of observable variables X in our regression. In this case, the coefficient β measures the difference in the benefits receipt rate (probability of living in social housing) between immigrants and natives who are identical with respect to the variables included in X . Our empirical analysis addresses both factual and counterfactual questions.

2.2.2 Fiscal cost and benefit

Although the analysis of self-reported questions on welfare receipt and social housing provides an initial indication of the degree to which immigrants draw on the welfare system compared to natives, it is not providing us with estimates on immigrants' net fiscal contribution. To make progress on this, we adopt an approach similar to that used by Dustmann, Frattini and Halls (2010) and construct quantitative measures of immigrants' cost and tax receipts. Instead of focussing only on one group of immigrants, however, we also adapt the methodology to study the net fiscal contribution of immigrants from two areas of origin (EEA and non-EEA), which we further break down in different arrival cohorts (arrived in the UK before and in or after 2000).

Because in every year t , the government surplus or deficit ($GSUR_t$) amounts to the difference between receipts (REV_t) and expenditures (EXP_t), total receipts can be decomposed into the revenue from each tax and duty levied by the government, plus interest and dividends and gross operating surplus and rents. We designate rev_{it} as the amount received by the government from the revenue source i in year t , and N_R as the number of revenue sources. Similarly, total expenditures in every year can be decomposed into expenditure for N_E different services, with exp_{jt} denoting the expenditure for service j in year t . The total government surplus can thus be written as

$$GSUR_t = REV_t - EXP_t = \sum_{i=1}^{N_R} rev_{it} - \sum_{j=1}^{N_E} exp_{jt} \quad (2)$$

We then further decompose each revenue and expenditure item rev_{it} and exp_{jt} into the amount paid or received by natives versus immigrants, where we distinguish between immigrants from EEA and non-EEA countries. We can then divide the UK population at any point in time into three groups indexed by $k=1,2,3$ (Natives, EEA and non-EEA immigrants⁸) and rewrite (2) as

$$GSUR_t = \sum_{k=1}^3 \left(\sum_{i=1}^{N_R} \alpha_{it}^k rev_{it} - \sum_{j=1}^{N_E} \beta_{jt}^k exp_{jt} \right) \quad (3)$$

where α_{it}^k denotes group k 's share of tax payments i in year t and β_{jt}^k denotes their share of government expenditures j received, so that $\sum_{k=1}^3 \alpha_{it}^k = 1$ for every i and $\sum_{k=1}^3 \beta_{jt}^k = 1$ for every j .

⁸ Throughout the paper, we will also compute the net fiscal contributions of immigrants who arrived since 2000. In that case, we adopt the same methodology described here, but we break further down the EEA and non-EEA groups into separate sub-groups based on the year of arrival in the UK.

Although rev_{it} and exp_{jt} are observable in the data (see section 3), we need to estimate the apportioning coefficients α_{it}^k and β_{jt}^k , which we can then use to estimate the total revenues and

expenditures, $REV_t^k = \sum_{i=1}^{N_R} \alpha_{it}^k rev_{it}$ and $EXP_t^k = \sum_{j=1}^{N_E} \beta_{jt}^k exp_{jt}$, for each group. Doing so allows us to

compute the net fiscal contribution of every group k in year t as

$$GSUR_t^k = REV_t^k - EXP_t^k \quad (4)$$

2.2.3 Measurement

We first group government receipts into the eight categories listed below, for each of which we compute a different apportioning coefficient α_{it}^k (see section 3 for our data sources and the Appendix for details of each category):

- 1) “Income Tax and National Insurance Contribution payments” represent almost 45% of total government revenues. We estimate each group’s share of total payments from the LFS data by applying year-specific NIC and income tax rates and allowances to individual wages.
- 2) “VAT and excise duties” account for 28% of total government revenues. We estimate each group’s share of payments for each of these consumption taxes by applying the effective tax-specific rates by decile of household disposable income to the gross individual income from the LFS. We compute effective tax rates for VAT and other indirect taxes as the ratio of the estimated amount paid by households in each income decile for each indirect tax to the average income of households in that decile. These data are available from the ONS publication “The Effect of Taxes and Benefits on Household Income”⁹, which is based on the Expenditure and Food Survey. The implicit assumption in this strategy is that immigrants and natives with similar incomes have the same consumption patterns. However, some studies have shown that immigrants, especially those who have recently arrived in the host country or intend to return to their country of origin may have a lower consumption rate than natives with similar income. This difference in behaviour may arise because they remit part of their income to their home countries, but also because they tend to face a higher labour market uncertainty and thus may have a higher level of precautionary savings (see e.g. Dustmann (1997), Dustmann, Fasani and

⁹ Available at <http://www.ons.gov.uk/ons/rel/household-income/the-effects-of-taxes-and-benefits-on-household-income/historical-data/sum--historical-tables.html>

Speciale (2013), Carroll, Rhee and Rhee (1999) for the U.S., Piracha and Zhu (2007) for Germany). We have no direct source of information on immigrants' consumption patterns in the UK, and we thus cannot directly test the extent of immigrants' under-consumption relative to natives. Therefore, we construct an alternative scenario, where we assume that the consumption of recent immigrants (those arrived since 2000) is only 80% that of natives with a similar income¹⁰. In practice, this assumption amounts to applying the effective tax rates to 80% of immigrants' income.

3) "Company and capital taxes" represent about 9% of total government revenues. We apportion these tax payments, net of the percentage likely to be paid by foreign shareholders which ranges between 16% and 40%¹¹, on a per capita basis among the adult population. We are thus making the implicit assumption that company ownership (i.e. share ownership) is similarly distributed between the native and immigrant population.

4) "Council tax" payments, levied on domestic residences by individual local authorities dependent on the market value of the property, make up slightly more than 4% of total government revenues. Because we have no detailed information on individual housing value or local tax levels, we abstract from such differences and simply estimate each group's share of council taxes as proportional to the number of households in the group.

5) "Business rates", a tax on non-domestic property typically paid by businesses and other organisations that occupy non-domestic premises, represent about 4% of total government revenues. We apportion these payments according to the proportion of businesses owned by each group, proxying business ownership by self-employment status reported on the LFS.

6) "Gross operating surplus and rents and interests and dividends" amount to 5% of total government revenues. As explained in section 2.1, we apportion government's gross operating surplus and rents and interests and dividends proportionately to the share of each group in the adult (16+) population. When assessing the marginal fiscal effects of immigration, however, we attribute these revenues entirely to natives, thus implicitly assuming that they are the result of government operations undertaken before immigrants' arrival.

¹⁰ The estimates in Piracha and Zhu (2007) imply that immigrant consumption is about 90% of native consumption. Hence, in the absence of estimates for the UK, we choose a fraction that should, if anything, underestimate immigrants' consumption and thus their tax payments.

¹¹ The share of foreign ownership in UK companies is available from the annual ONS "Share Ownership" report.

7) “Inheritance tax” payments account for just 0.6% of total revenues. We use house ownership (from the LFS) as a proxy for asset ownership and apportion inheritance tax proportionately to the share of natives and immigrants in the house-owner population.

8) All remaining tax payments (4.7% of total revenues), including landfill tax, climate change levy, aggregates levy, other taxes and royalties, and other receipts, are apportioned according to the share of each group in the adult (16+) population.

We group government expenditures in like manner, estimating a different apportioning coefficient β_{ji}^k for each of the eight categories (see Appendix for details):

I) “Pure public goods and services” represent 23% of total government expenditures and include all public goods and services that are typically non-rival in consumption (see section 2.1.2). In our first scenario (“Average effect scenario”) we apportion the cost of providing these goods proportionately to the share of each group in the adult (16+) population. In our second scenario (“Marginal effect scenario”), when we assume that the marginal cost of providing “pure” public goods to immigrants is zero, we attribute these expenditures entirely to natives.

II) Expenditures for “congestible public goods and services”, publicly provided goods and services that are to some extent rival in consumption, represent about 7.5% of total government expenditures. We apportion the cost of providing these goods according to each group’s share in the adult (16+) population.

III) “Medical and other health services” make up almost 17% of total government expenditures. Wadsworth (2012) shows that age is one main determinant of health status and of the demand for GP and hospital visits in the UK, and that there are no large differences in health service use between immigrants and natives within similar age groups. For this reason we estimate the proportion of health services expenditure attributable to each group based on the group’s age structure.

IV) “Education” represents 12% of total government expenditures. For compulsory education, we estimate each group’s apportioning coefficient based on the share of its children in the relevant age bracket for each school level (0–4 for pre-primary, 5–15 for primary and secondary). For post-secondary education, we compute the share of the school population for each group using direct information from the LFS on type of school attended by those still in the education system.

V) Expenditure for “social protection”, which includes expenditure for sickness and disability, old age, family and children, unemployment, housing and social exclusion, makes up more than 34% of government expenditures. Since about 85% of these expenditures are allocated in terms of cash benefits, we use LFS information on the receipt of different types of benefits and compute for each group the share among the total recipients of each type of benefit. Because we have no information on the amount of benefits received, we implicitly assume that every recipient receives the same amount.

VI) “Prisons and law courts” account for less than 2% of total government expenditures. We use information on the nationality of prison inmates from the Ministry of Justice’s Offender Management Caseload Statistics¹² and apportion prison costs proportionately to the size of each group in the prison population.

VII) “Housing development”, which comprises expenditures for social and local authority housing, accounts for about 1% of total expenditures. We estimate each group’s share of total costs based on its share of social housing tenants reported in the LFS.

VIII) “Police services” account for 3% of total government expenditures. Since most police services are equally used by immigrants and natives, we attribute their cost on a per capita basis. However, since “immigration-related police services” are separately reported as a sub-item of expenditure for police services, we attribute their cost only to immigrants.

3. Data

Our primary data source, the British Labour Force Survey (LFS), is a quarterly representative survey of about 60,000 households in the UK, or about 0.2% of the UK population. The survey records respondents’ labour market status and wages, as well as their personal and household circumstances, including country of birth and year of arrival in the UK if applicable, although not parental country of birth (see section 2.1.1). It also gathers self-reported information on any type of state benefit or tax credit received and on the type of accommodation, which we use to identify individuals living in social housing. The variable on receipt of state benefits is available since 1998 only, whereas we have information on social housing for all the years we consider in

¹² Available at <https://www.gov.uk/government/publications/offender-management-statistics-quarterly--2>.

our analysis. To increase the sample size, we pool the four quarterly waves in every fiscal year, which in the UK begins in April. Hence, for fiscal year t , we pool LFS quarters 2, 3 and 4 of year t and quarter 1 of year $t+1$.

We use the LFS as the main source of information on native and immigrant population characteristics and rely on it for both a description of UK immigration and an analysis of the probability of welfare and social housing receipt. We also employ it as the basis for many of the apportioning coefficients in the fiscal cost and benefits analysis.

For the fiscal analysis we use administrative data on government receipts and expenditures; particularly, information on current government revenues for the fiscal years 2010 and 2011 from the March 2012 and December 2012 Office for Budget Responsibility Economic and Fiscal Outlooks¹³, respectively. For earlier fiscal years, we rely on information in Table C4 of the now-discontinued Public Finances Databank – a compilation of data published by the ONS that covers the main aspects of government finances, including receipts, expenditure, borrowing and debt as provided by HM Treasury – which we were able to obtain for all years between 1995 and 2009.

We derive our public expenditure data from the "Total Expenditure on Services by Sub-function" table of the Public Expenditure Statistical Analyses (PESA), also published annually by HM Treasury. These tables report expenditures for different items classified according to the United Nations Classification of the Functions of Government (UN COFOG) definitions at level 2¹⁴. We use PESA 2012 (Table 5.2) for years 2007–2011, PESA 2009 (Table 5.2) for years 2003–2006, PESA 2004 (Table 3.6) for years 1998–2002, and PESA 1999–2000 (Table 4.5) for years 1995–1997¹⁵.

¹³ Tables 4.7 and 4.6, respectively, available on line at <http://budgetresponsibility.independent.gov.uk/pubs/December-2012-EFO-charts-and-tables2342.xls> and <http://budgetresponsibility.independent.gov.uk/pubs/March-2012-EFO-charts-and-tables.xls>

¹⁴ Prior to adoption of the UN COFOG classification with PESA 2007, government functions were categorised based on an HMT classification. We therefore used the mapping in the HMT technical manual to construct a consistent classification over time.

¹⁵ Recent PESA are available on line at <https://www.gov.uk/government/organisations/hm-treasury/series/public-expenditure-statistical-analyses-pesa>

4. Immigration to the UK

Since the late 1980s, when net migration to the UK was close to zero or even negative for some years, immigration has been steadily rising. This rise is evident in Table 1a, which reports the evolution of the UK population since 1995 based on figures from the LFS. As the first column shows, over the past 15 years the native population has barely increased, remaining relatively stable at around 52 million. The immigrant population, on the other hand, has grown substantially over that period, from about 4.8 million in 1995 to around 9 million in 2011, an increase from 8.4% to 14.7% of the general population in just 17 years¹⁶. Breaking these figures down into EEA versus non-EEA immigrants, in 1995, the former made up under 20% of the total UK immigrant population but more than tripled between 1995 and 2011, growing from 885 thousand to 2.8 million. Over that same period, the non-EEA population grew at a considerably lower rate, increasing from 3.9 million to 6.1 million, so that by 2011, 32% of the immigrant population was composed of EEA immigrants. However, as shown in last two columns of Panel A, between 2000 and 2011, the net addition to the UK immigrant population was about 1.5 million for EEA and 2.9 million for non-EEA immigrants, meaning that despite an increase in EEA immigration, non-EEA net immigration was twice as large as EEA net immigration during that decade.

As indicated in Table 1a, Panel B, migration has also contributed substantially to overall employment- which is not surprising, since (as explained in Panel A) immigration accounts for nearly the entire growth of the UK population. About 2.3 million of new jobs created since 1995 went to immigrants, but - despite their population size being unchanged over the period, see Panel A - about 1 million new jobs created over the period went to natives. More specifically, the number of employed individuals from the EEA increased fourfold, from 377 thousand to 1.5 million, while the number of employed non-EEA increased by almost 80%, from 1.5 to 2.6 million.¹⁷

¹⁶ Note that, as discussed in section 2.1.1, throughout the paper we define as “immigrants all foreign born individuals and their children under 16 years of age, regardless of their country of birth.

¹⁷ These figures illustrate the irrelevance of the “lump labour fallacy”, i.e. that the amount of work to workers is fixed. Rather, the numbers suggest that employment has increased even more than population growth through

The median length of immigrant stay in the UK decreased quite dramatically, from 24 to 12 years between 1995 and 2011 (see Table 1b). Further, the proportion of immigrants staying for less than 5 years increased from 16% in 1995 to 24% in 2011. Breaking these numbers down for immigrants from EEA versus non-EEA countries suggests that this change in average duration can be attributed primarily to the relative increase in EEA immigrants since the mid-2000s. That is, by 2011, EEA immigrants' median UK residence had reduced by over two thirds, from 28 to 9 years, while that for non-EEA immigrants had dropped by 44%, from 23 to 13 years. In this same year, about 30% of EEA and 21% of non-EEA immigrants had been in the UK for at most 5 years, up from 17% and 16%, respectively, in 1995.

According to Table 2a, which reports the demographic characteristics of immigrant populations to the UK, the UK's immigrant population has, perhaps not surprisingly, been consistently younger than the native population. Moreover, despite clear evidence for aging in the native born population (with the average age increasing by 2.5 years, from 38.2 to 40.8), the age of the non-EEA population has remained roughly constant at 32–34 years, while that of the EEA population decreased from 36.3 years in 1995 to 32.3 years in 2011. This demographic trend in the immigrant population is due partly to return migration and partly to the younger age of recently arrived immigrants, who are on average younger than their co-nationals who have been longer in the UK. For example, the average age of recent (i.e. those arrived since 2000) non-EEA immigrants has remained constant at around 26 years for all years while the average age of recent EEA immigrants, although it fluctuated between about 25 and 27 up until 2004, has since stabilised at just above 26 years of age.

Even more remarkable is the immigrant population's educational achievement, which has been consistently higher than that of the native population since 1995, with an increasing gap ever since. Whereas in 1995, about 12% of the UK born and EEA immigrant population (excluding those still in full-time education) held a university degree, such was the case for 15% of the non-EEA population. It should however be noted that substantial changes to the LFS classification of foreign qualifications effective since Q1 2011 have resulted in a large number of foreign

immigration: between 1995 and 2001, the total UK population (including children) increased by 7.7%, and the total working age (16-65) population increased by 10.2%, while the total number of jobs increased by 12.8%.

respondents, previously classified as having “other” qualifications, now being correctly coded as having university degrees. The proportion of these immigrants is thus likely to be substantially underestimated until the fiscal year 2010¹⁸. By 2011, the percentage of natives with a degree had nearly doubled, to 21%, while the percentage of EEA and non-EEA immigrants had increased even further, to 32% and 38%, respectively¹⁹. Similarly, about one in two native born individuals fall into the “low education” category (defined as those who left full-time education before 17), while only one in five EEA immigrants and one in four non-EEA immigrants do so. EEA immigrants arrived since 2000 tend to include a slightly lower share of university graduates (although our measurement is imperfect because of problems coding foreign qualifications) but also a substantially lower share (around 10% in all years) of “low education” individuals than earlier immigrant cohorts from the same origin. Likewise, recent (arrived since 2000) non-EEA immigrants, although they show similar rates of university degrees as earlier immigrants, include a considerably lower share of “low education” individuals.

These stark educational differences between immigrants and natives are not, however, reflected by wage differences, as we show in Table 2a: the median wages of natives and non-EEA immigrants are nearly the same, while the median wages for EEA immigrants are substantially below those of natives, by about 15% in 2011. One possible reason for these modest wage differences relative to the considerable educational differences is the age structure: many of these immigrants are young enough that their career profiles have not yet peaked. Another reason may be occupational downgrading of immigrants who have spent only a short time in the UK because of factors (e.g. language proficiency) that prevent them putting their qualifications to the most productive use. This latter explanation is supported by the larger wage gap suffered by recent EEA and non-EEA immigrants arrived since 2000 with respect to their co-nationals who have been longer in the UK.

Since the mid-2000s, employment rates have also been slightly higher for EEA immigrants than for natives, 75% versus 70% in 2011 (see Table 2b). The employment rate of non-EEAs, on the

¹⁸ For consistency in the qualification variable, we measure the share of college degree holders for fiscal year 2010 in Q1 2011 only.

¹⁹ Note that these differences are not only due to the different age structure of the native and immigrant population. For instance, in 2011, even within the age bracket 25-45 the percentage of natives with a degree is 30%, whereas the respective shares for EEA and non-EEA immigrants are 40% and 46%.

other hand, is substantially lower in all years, only 62% in 2011. Interestingly, although in all years, recent immigrants, both EEA and non-EEA, have lower wages than earlier immigrants, they have similar or higher employment rates, especially in recent years. Recent EEA immigrants, in particular, have very high employment rates, just below 80% since the late 2000s. Conversely, over the same period, the employment rate of recent non-EEA immigrants has hovered consistently around 60%.

In the rightmost panel of Table 2b, we report the ratio of children under 16 to the working age (16–65) population of each group, a ratio that in all years is substantially larger for non-EEA immigrants than for natives and EEAs. In 2011, for instance, the fraction of non-EEA children to adults is 0.38, 12 percentage points higher than for natives and 11 percentage points higher than for EEA immigrants. Nevertheless, it is also important to note that this ratio is lower for recent immigrants, especially in the first years after arrival when they are younger.

The figures reported above raise a number of important issues: First, not only is the demographic structure of the immigrant versus the native population quite different, but the demographic features of the immigrant population have changed quite dramatically over the last 1.5 decades towards a younger and better educated population. This shift also means, however, that immigrants are likely to be at earlier stages of their career profiles, which, as previously mentioned, may explain relatively modest wages despite strong educational backgrounds. The profile of immigration over the last decade also indicates that today's immigrants are relatively recent arrivals in the UK, which again may affect their earnings potential through initial downgrading (Dustmann, Frattini and Preston 2013). Their younger age may also imply a greater likelihood of having children under 16. Greater parental responsibilities may also partly explain the lower employment rates for non-EEA immigrants.

5. Fiscal Impact of Immigration

5.1 Benefits and social housing

We assess the degree of welfare dependency of immigrants relative to natives based on the responses in each LFS wave on whether individuals receive state benefits or live in social housing. We distinguish two immigrant populations: all immigrants (for which we pool all available years, i.e. 1998-2011 for welfare receipt and 1995-2011 for social housing²⁰) and recent immigrants, defined as those who have arrived since 2000. Panel A in Table 3 displays the results for all immigrants and panel B, those for only the more recently arrived cohorts (i.e. since 2000). For receipt of benefits, we report results for two specifications: estimates that condition on year and quarter effects only and estimates that additionally condition on age and gender. The first set of results (column 1) thus accounts for seasonal and yearly variations in benefit receipt and can be interpreted as the differences between natives and the respective immigrant group, averaged over all observation years. The second set (column 2) represents hypothetical differences when the immigrant and native age distributions are kept the same, meaning that the estimated coefficients can be interpreted as the differences in any outcomes if immigrants had the same age and gender structure as natives.

For social housing we perform the analysis at the household level, as we explain in section 2.2.1, and we report the same specifications, but we further condition on regional dummies (column 4) and regional dummies plus age controls (column 5). Conditioning on regional dummies accounts for the fact that 42% of the immigrant population live in London, which has a high density of socially housed individuals²¹. These estimations therefore represent the hypothetical differences between immigrants and natives if their gender composition, age distribution and geographic distributions were the same. Finally, in the last row of each panel, we report the average percentage of recipients for natives over the period considered.

²⁰ As we explain in section 3, we do not have information on welfare receipt in the LFS before 1998.

²¹ Over 24% of native households in Greater London live in social housing, compared to a national average of 20%. The proportion of native households in social housing is the same in Greater Manchester, and higher only in Tyne and Wear (32%), South Yorkshire and the metropolitan countries of West Midlands (26%) and Scotland (28%).

5.1.1 Overall Immigrant Population, all years

The last row of panel A in Table 3 shows that according to the LFS, over the years 1998-2011, 37% of natives were receiving some type of state benefit or tax credit. The table entries indicate that, even when we keep the age structures the same, immigrants overall have a lower probability than natives of receiving state benefits or tax credits. Clear differences emerge, however, between EEA immigrants, who are 8 percentage points less likely than natives to receive transfers or state benefits, and non-EEA immigrants, who are 1.2 percentage points less likely to be benefit recipients. When the same age structure is maintained for immigrants and natives, EEA immigrants show a -4.7 percentage points difference, but non-EEA immigrants have basically the same probability of drawing benefits or tax credits as natives (they are just 0.8 percentage points more likely to receive a transfer).

In columns 3–5, we report the estimates in which the outcome variable is whether or not the respondent's household lives in social housing: over the period 1995-2011 the LFS indicates that 20% of native households were living in social housing, as indicated in the last row of Panel A. Although we find that immigrants overall are slightly more likely to live in social housing (by almost 2 percentage points), stark differences again emerge between non-EEA immigrants, who are over 3 percentage points *more* likely to live in social housing, and EEA immigrants, who are 3 percentage points *less* likely to do so. Yet again, however, this difference may be attributable to immigrants being predominantly located in urban areas, especially London, where social housing is far more widespread than in the rest of the country. In fact, on average over the years 1995-2011, London is home to 33% of EEA and 44% of non-EEA immigrant households, as compared to just under 9% of natives. Indeed, when we condition on region of residence (column 4), the difference between immigrants and natives becomes negligible (0.2 percentage points). Conditioning additionally on average household age (thereby comparing immigrant and native households with the same age structure and the same allocation across UK regions), in column 5, does not significantly affect the results.

5.1.2 Arrivals since 2000, years 2001-2011

For the more recently arrived cohorts (i.e. those who arrived since 2000), the pattern of estimates is similar, but magnitudes differ, and we present results in Panel B of Table 3. Recent immigrants are far less likely than natives to draw state benefits or receive tax credits both overall (17.8 percentage points, column 1) and in comparison to natives with the same age structure (8.4 percentage points, column 2). These numbers are quite similar for EEA and non-EEA immigrants. Recent immigrants overall are also 0.6 percentage points less likely than natives to live in social housing, a probability gap that increases to 7.5 percentage points for recent EEA immigrants. Recent non-EEA immigrants, in contrast, are 2.6 percentage points *more* likely than natives to live in social housing. Again, the concentration in London leads to a slightly higher social housing uptake for all immigrant groups, as illustrated by the differences between columns 3 and 4. Column 5 clearly shows that, even when we condition on age in addition to region of residence, recent immigrants overall are over 3 percentage points less likely to live in social housing than natives.

5.2 Expenditures and revenues

Table 4a presents the results of our analysis for overall expenditures and revenues, which in the upper block are calculated in millions of current GBP for the native and the resident EEA and non-EEA immigrant population in each year since 1995. In the next two pairs of columns, we perform the same calculations but only for immigrants arriving since 2000. In both sets of numbers, we allocate both types of public goods to immigrants at their *average* cost. Thus, the estimates are likely to represent an overestimate of immigrants' fiscal costs.

Table 4b has the same structure, but now we assume that the marginal cost of providing "pure" public goods to natives is zero, and we have thus allocated the cost of their provision entirely to natives.

5.2.1 Overall Immigrant Population, years 1995-2011

Our results in Table 4a indicate that the net fiscal contribution of natives and immigrants varies substantially over time. Consider first natives, and all immigrants, in each year since 1995, displayed in columns 1-3. Over the 17 fiscal years considered, the amount of public expenditures received by natives exceeds the amount of government revenues they contributed in twelve instances. While this is the case for non-EEA immigrants for all 17 fiscal years, it happens for EEA immigrants only for seven years. These differences are possibly attributable to a higher fraction of children and a lower employment rate in non-EEA households.

Figure 1a then graphs the evolution over time of the revenues/expenditures ratio for the three groups. Up until 2000, the relative fiscal contribution of natives was larger than the contributions of either EEA or non-EEA immigrants. However, since 2001, EEA immigrants have not only consistently had a higher revenues/expenditures ratio than natives but have often made positive fiscal contributions even in years when the amount of public expenditure on natives has been larger than natives' fiscal payments. On the other hand, the fiscal contribution of non-EEA immigrants is slightly negative in all years, although the difference between their net cost and that of natives has been closing over time. It is also worth noting that the three lines tend to co-move, reflecting the cyclicity of net fiscal revenues. Nevertheless, even though the evolution of the net fiscal contribution of non-EEA immigrants closely mirrors that of natives, the fiscal contributions of EEA immigrants have strongly improved in relative terms over time.

5.2.2 Arrivals since 2000, years 2001-2011

When we focus on recent immigrants, i.e. those immigrants who arrived since 2000 (in the two rightmost columns of Table 4a), however, the picture changes drastically. In all fiscal years, recent EEA and non-EEA immigrants have made higher relative fiscal contributions than natives, and recent EEA immigrants particularly have made positive net fiscal contributions. This observation holds true even in recent crisis years when the government has been running a budget deficit and the net fiscal contribution of natives – and to a lesser extent, recent non-EEA immigrants – has turned negative.

Between 2007 and 2011, recent EEA immigrants made a net contribution of 15.2 billion GBP (expressed in 2011 equivalency) to UK public finances, which amounts to an annual average of 2,610 GBP per capita over the 5-year period. Over the same time frame, the annual net fiscal cost of UK natives amounted to about 1,900 GBP per capita and the net fiscal cost of recent non-EEA immigrants to about 332 GBP per capita.

We display the difference between the revenues/expenditures ratio of recent EEA and non-EEA immigrants and that of natives in Figure 1b. The difference is particularly large in the first years, but it remains substantial throughout the period, in particular between natives and EEA immigrants, indicating a persistently higher fiscal contribution for the new cohorts of immigrants. Thus, these figures document that recent immigrants, and particularly those from the EEA countries, contributed substantially more in terms of taxes than they took out in terms of benefits and transfers over the period since 2000, even in those years where the UK ran a deficit, and the net fiscal contributions for natives were negative. Immigration since 2000, in particular from the EEA countries, has thus helped to reduce the fiscal burden for native workers, and contributed to reducing the UK's fiscal deficit.

In columns 6 and 7 of Table 4a we report the estimated fiscal revenues generated by recent EEA and non-EEA immigrants under the assumption that their consumption is only 80% than natives'. This assumption implies that their payments for VAT and other indirect taxes are lower (see section 2.2.3). Even under this scenario, recent EEA immigrants would still make a substantial positive net fiscal contribution in every year.

5.2.3 The Contribution of Immigration to non-congestible public goods

Until now we have assumed that immigrants pay the average cost of all publicly provided goods and services. However, some public goods and services, such as national defence, are non-congestible (see section 2.1.2), meaning that the cost of their provision is largely independent of the size of the UK's resident population. Therefore, by attributing a proportional share of the cost of these non-congestibles to immigrants, we are likely to overestimate the effective fiscal costs

of immigration because the marginal cost of their provision is actually likely to be close to zero. Accordingly, in Table 4b, we assign the cost of all these “pure” public goods only to natives, meaning that the expenditure column represents the cost of pure public goods that natives would have to bear in the absence of any immigrant population.

An interesting statistic is then a difference between the first columns in Tables 4a and 4b: it measures the reduction due to immigration in the expenditures natives have to bear for fixed public goods. According to this statistic, the implicit savings from sharing the fiscal burden of these goods among a larger population are not only quite substantial but have been rising over time. For example, these “implicit savings” for natives in expenditure on “pure” public goods totalled about 4.7 billion GBP in 1995 (equivalent to 6.5 billion in 2011 GBP), but amounted to a 15.8 billion GBP saving in 2011. Moreover, when we consider the “marginal” fiscal impact of immigration, the net fiscal contribution of EEA immigrants is positive in all years 1995-2011, even in those years when the native net fiscal contribution is negative, while the net fiscal contribution of non-EEA immigrants is positive in all years between 1997 and 2007. This can be easily seen from Figure 2a, which reports – for this scenario - the evolution of the ratio of public expenditures to public revenues for each group over time.

6. Discussion and Conclusions

Although the fiscal contribution of immigrants has emerged as a key issue of concern in the public debate on immigration, very little evidence is yet available that allows assessment of how much immigrants take out of and contribute to the public purse. This paper attempts to fill this void by focussing on the UK, a country in which this debate has been particularly fierce over recent years.

We start out by discussing the difficulties with any such assessment. These relate to the way particular items are classified in any such calculation of the fiscal costs of immigration, and the methodology employed. We then describe our methodology to compute the fiscal cost and benefit of the native population, and different immigrant populations. We take a very cautious stance, meaning that we are likely to overestimate the fiscal net cost of immigrants.

Overall, our findings draw a positive picture of immigrant contributions, particularly for those immigrants who entered the UK fiscal system since 2000. Our results are summarised, and expressed in 2011 equivalent GBP, in Table 5. We find that between 1995 and 2011, immigrants from EEA countries made a net fiscal contribution of about 8.8 billion GBP (in 2011 equivalency), compared with an overall negative net fiscal contribution of 604.5 billion GBP by natives. Thus, between 1995 and 2011, EEA immigrants contributed to the fiscal system 4% more than they received in transfers and benefits, whereas natives' payments into the system were just 93% of what they received. Our estimates also show that immigrants from non-EEA countries have made a negative fiscal contribution overall, when considering all years between 1995 and 2011. This is partly explained by their demographic structure – non-EEA immigrants have had more children than natives, and we have allocated educational expenditure for children to immigrants (ignoring that immigrants arrived with their own educational expenditure paid for by the origin country).

The contribution of recent immigrants (i.e. those who arrived after 1999) to the UK fiscal system, however, has been consistently positive and remarkably strong. Between 2001 and 2011 recent EEA immigrants contributed to the fiscal system 34% more than they took out, with a net fiscal contribution of about 22.1 billion GBP. In contrast, over the same period, natives' fiscal payments amounted to 89% of the amount of transfers they received, or an overall negative fiscal contribution of 624.1 billion GBP. At the same time recent immigrants from non-EEA countries made a net fiscal contribution of 2.9 billion GBP, thus paying in the system about 2% more than they took out. The net fiscal balance of overall immigration to the UK between 2001 and 2011 amounts therefore to a positive net contribution of about 25 billion GBP, over a period over which the UK has run an overall budget deficit.

Our analysis thus suggests that – rather than being a drain on the UK's fiscal system – immigrants arriving since the early 2000s have made substantial net contributions to its public finances, a reality that contrasts starkly with the view often maintained in public debate. This conclusion is further supported by our evidence on the degree to which immigrants receive tax credits and benefits compared to natives. Recent immigrants are 45% (18 percentage points) less

likely to receive state benefits or tax credits. These differences are partly explainable by immigrants' more favourable age-gender composition. However, even when compared to natives with the same age, gender composition, and education, recent immigrants are still 21% less likely than natives to receive benefits. Yet again, there are differences between EEA and non-EEA immigrants: recent EEA immigrants are more than 50% less likely than natives to receive state benefits or tax credits compared to a 43% lower likelihood for recent non-EEA immigrants.

We thus conclude that the recent wave of immigrants, those who arrived to the UK since 2000, and who have driven the stark increase in the UK's foreign born population, contributed far more in taxes than they received in benefits. Further, by sharing the cost of fixed public expenditures (which account for 23% of total public expenditure), they reduced the financial burden of these fixed public obligations for natives. These findings place the UK in a far more favourable position than its European neighbours. For instance, a recent paper by Bratsberg et al. 2013 reveals that in Norway, immigrants are making lower contributions than natives. In contrast, our more detailed findings are broadly in line with a recent OECD study that emphasises immigrants' positive contributions to the UK fiscal system compared to the situation in other countries. One unique aspect of our work is that by covering many years, we avoid the caveat that the strong cyclicity of immigrations' fiscal effects may generate results that hold only for the short term. Our findings are therefore likely to present a far more robust long term picture.

One may argue that part of our positive picture of recent UK immigrants (i.e. those who arrived since 2000) may be related to their favourable age structure. While we cannot compute counterfactuals for the net fiscal contributions of recent immigrants if they had the same age structure than natives, our results for tax credits and benefits receipt (where we do compute such counterfactuals) remain favourable for immigrants relative to natives even assuming the same age structure for the two groups. Furthermore, while aging of the immigrant population that arrives since 2000 may lead in the longer run to an increase in benefit receipt, this may be counteracted by two factors. First, it is likely that many of these immigrants return migrate, thus spending their later and less productive years in their home countries. Second, a large fraction of these recent immigrants are at the beginning of their careers – and possibly underemployed for lack of complementary skills such as language – and thus far from reaching their full economic

potential (see Dustmann, Frattini and Preston 2013). Hence, although their net contributions may decrease in later years because of demographic changes, given their far more favourable educational distribution, the contributions of those who decide to stay in the UK will likely increase through individual career development.

We should also note that most immigrants arrive to the UK after completing their education abroad, and thus at a point in their lifetime where the discounted net value of their future net fiscal payments is positive. If the UK had to provide domestically to each immigrant the level of education they have acquired in their home country (and use productively in the UK, as natives do), the costs would be very substantial.

In addition, our investigation of recent immigration to the UK reveals that, even though one third of UK immigration is through movement within the EEA and cannot be regulated, the UK is still – and possibly even more so than in previous years (see e.g. Dustmann and Fabbri, 2005) – able to attract highly educated and skilled immigrants. This positive trend has even continued throughout the last recession. This surprising feature distinguishes the UK sharply from other European and non-European countries.²² This ability to attract highly skilled immigrants – even from within the EEA, where no restrictions can be imposed – is a strong and important feature of the UK economy.

Our analysis also highlights questions that are less explored and should be addressed in future research. One such issue is the remigration of immigrants.. For instance, if immigrants tend to return to their country of origin after reaching an individual career peak, it would bring additional relief to the UK's fiscal system. Another important question is whether it is immigrants who perform very strongly or those whose contributions fall below average that are the most likely to remain. This is an important issue to be addressed in future work, see Dustmann and Gorlach (2013) for a discussion of the empirical challenges, but certainly an exciting future research area.

²² For instance, in a recent paper, Dustmann and Frattini (2013) show that the UK is among the Western European countries with the highest share of tertiary educated immigrants after only Ireland and Norway. Not only is the UK in a position to attract better educated immigrants overall, it also attracts better educated immigrants from the same emigration countries as its European neighbours. For instance, in 2007, 26% of Polish immigrants in the UK had a tertiary education compared to only 11% in Germany (Dustmann, Frattini and Rosso, 2012).

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Table 1a: Native and immigrant population size and employment

<i>Fiscal year</i>	<i>Panel A: Total population</i>				
	<i>Natives</i>	<i>EEA</i>	<i>Non EEA</i>	<i>EEA, 2000 on</i>	<i>Non EEA, 2000 on</i>
1995	52,172,016	885,367	3,920,502	-	-
1996	52,053,113	823,820	4,049,663	-	-
1997	52,024,832	953,449	4,178,270	-	-
1998	52,044,969	1,044,056	4,258,364	-	-
1999	52,198,811	1,065,211	4,294,403	-	-
2000	52,167,122	1,054,930	4,509,258	-	-
2001	52,254,626	1,124,239	4,577,880	105,815	334,841
2002	52,221,725	1,161,818	4,762,303	157,264	611,803
2003	52,346,927	1,229,381	4,819,508	205,220	836,533
2004	52,384,909	1,282,428	5,010,460	301,420	1,116,979
2005	51,580,064	1,411,814	5,216,225	469,053	1,345,442
2006	52,191,015	1,677,650	5,543,197	658,519	1,697,557
2007	52,054,165	2,271,159	5,436,642	969,502	1,928,921
2008	52,115,726	2,373,601	5,702,679	1,070,076	2,260,517
2009	52,331,186	2,432,699	5,800,989	1,139,307	2,450,912
2010	52,333,130	2,763,560	5,987,809	1,462,313	2,656,915
2011	52,360,031	2,847,289	6,146,430	1,563,028	2,924,529

<i>Fiscal year</i>	<i>Panel B: In employment</i>				
	<i>Natives</i>	<i>EEA</i>	<i>Non EEA</i>	<i>EEA, 2000 on</i>	<i>Non EEA, 2000 on</i>
1995	23,930,613	377,016	1,451,450	-	-
1996	24,155,356	356,050	1,529,587	-	-
1997	24,461,211	419,926	1,605,000	-	-
1998	24,652,190	468,586	1,660,462	-	-
1999	24,990,998	488,195	1,666,979	-	-
2000	25,162,998	496,210	1,794,328	-	-
2001	25,302,857	529,538	1,819,187	58,947	142,097
2002	25,398,408	561,189	1,942,228	89,050	267,633
2003	25,598,868	571,608	2,006,992	115,526	385,887
2004	25,696,904	636,934	2,133,666	184,989	519,943
2005	25,764,907	762,028	2,215,631	316,648	623,315
2006	25,666,569	934,123	2,354,281	456,119	783,775
2007	25,674,649	1,248,355	2,320,422	660,926	884,941
2008	25,535,639	1,300,595	2,457,685	729,805	1,028,846
2009	25,105,774	1,286,007	2,413,828	725,301	1,064,516
2010	25,003,317	1,499,944	2,533,507	937,045	1,143,467
2011	24,966,418	1,518,116	2,576,056	977,164	1,242,846

The table reports in Panel A the number of UK natives and of EEA and non-EEA immigrants in every fiscal year. We define as immigrants foreign born individuals as well as native-born children of immigrants under the age of 15. In Panel B we report the number of individuals aged 16 and over who are employed or self-employed in each group.

Source: UKLFS, several years

Table 1b: Length of residence in the UK for the adult immigrant population

<i>Fiscal year</i>	<i>Median years since migration</i>			<i>Proportion 0-5 years</i>		
	<i>Imm</i>	<i>EEA</i>	<i>Non-EEA</i>	<i>Imm</i>	<i>EEA</i>	<i>Non-EEA</i>
1995	24	28	23	0.16	0.17	0.16
1996	24	28	24	0.16	0.17	0.15
1997	24	27	23	0.16	0.19	0.16
1998	23	25	23	0.17	0.22	0.16
1999	23	25	23	0.18	0.22	0.16
2000	23	25	22	0.20	0.24	0.19
2001	22	24	21	0.22	0.24	0.21
2002	20	21	19	0.23	0.25	0.23
2003	18	21	18	0.25	0.24	0.25
2004	17	17	17	0.27	0.28	0.26
2005	16	12	16	0.28	0.34	0.26
2006	15	10	15	0.29	0.38	0.25
2007	13	11	14	0.30	0.39	0.25
2008	12	11	13	0.29	0.38	0.25
2009	12	11	13	0.27	0.35	0.24
2010	12	10	13	0.25	0.34	0.21
2011	12	9	13	0.24	0.30	0.21

The table reports for all immigrants, EEA immigrants and non-EEA immigrants, the median years since migration and the proportion of population who have been in the UK for 5 years or less.

Source: UKLFS, several years

Table 2a: Descriptive statistics: age and education

Fiscal year	Average age					Proportion with university degree					Proportion with low education				
	Natives	EEA	Non EEA	Recent EEA	Recent non-EEA	Natives	EEA	Non EEA	Recent EEA	Recent non-EEA	Natives	EEA	Non EEA	Recent EEA	Recent non-EEA
1995	38.2	36.3	32.4			0.12	0.12	0.15			0.67	0.40	0.38		
1996	38.4	36.5	32.7			0.12	0.14	0.15			0.66	0.40	0.37		
1997	38.5	35.7	33.2			0.12	0.14	0.15			0.64	0.37	0.37		
1998	38.6	35.5	33.5			0.13	0.16	0.16			0.63	0.37	0.36		
1999	38.8	35.6	33.5			0.14	0.17	0.18			0.63	0.35	0.36		
2000	38.9	35.7	33.5			0.14	0.18	0.19			0.62	0.33	0.33		
2001	39.1	36.1	33.8	25.8	26.3	0.15	0.21	0.19	0.16	0.15	0.61	0.33	0.33	0.11	0.16
2002	39.3	36.3	33.5	26.3	26.2	0.16	0.20	0.19	0.11	0.12	0.60	0.30	0.31	0.13	0.14
2003	39.5	36.0	33.3	26.8	26.1	0.16	0.21	0.18	0.18	0.13	0.59	0.29	0.30	0.10	0.15
2004	39.6	35.0	33.2	27.0	26.1	0.17	0.21	0.21	0.13	0.17	0.58	0.26	0.29	0.12	0.17
2005	40.2	34.9	34.1	26.8	26.4	0.18	0.21	0.21	0.14	0.18	0.57	0.24	0.29	0.10	0.18
2006	40.0	34.5	33.0	26.5	25.8	0.19	0.20	0.23	0.15	0.20	0.55	0.24	0.28	0.12	0.16
2007	40.2	35.8	32.1	26.3	25.8	0.19	0.21	0.24	0.17	0.23	0.55	0.24	0.26	0.10	0.18
2008	40.3	35.4	31.9	26.3	25.5	0.19	0.20	0.25	0.17	0.24	0.56	0.25	0.26	0.11	0.17
2009	40.5	34.8	32.0	26.3	25.6	0.20	0.22	0.27	0.20	0.28	0.54	0.24	0.25	0.09	0.16
2010	40.7	34.4	32.3	26.6	25.8	0.21	0.32	0.37	0.32	0.41	0.53	0.22	0.24	0.12	0.17
2011	40.8	34.3	32.7	26.3	25.7	0.21	0.32	0.38	0.32	0.43	0.52	0.21	0.24	0.10	0.17

The table reports, for each fiscal year 1995-2011 the average age, the share of population not in full time education having a university degree, and the share of population not in full time education with low education, for the native born and immigrant population. We distinguish between EEA and non-EEA immigrants. In the last two columns of each panel we report information for recent immigrants, defined as those arrived since 2000. Note that the way of classifying foreign qualifications in the LFS has changed substantially since Q1 2011. As a result a large number of foreign respondents who were previously classified as having "other" qualifications are now correctly coded as having university degrees. For consistency we measure the share of college degree holders for fiscal year 2010 in Q1 2011 only. The proportion of immigrants having a university degree is therefore likely to be substantially underestimated until fiscal year 2010. We define as having "low education" individuals who left full time education before age 17.

Source: UKLFS, several years.

Table 2b: Descriptive statistics: labour market and dependent children

Fiscal year	Median wage					Employment rate (16-65)					Children (under 16) per working age (16-65) adult				
	Natives	EEA	Non EEA	Recent EEA	Recent non-EEA	Natives	EEA	Non EEA	Recent EEA	Recent non-EEA	Natives	EEA	Non EEA	Recent EEA	Recent non-EEA
1995	6.7	7.4	7.5			0.69	0.64	0.58			0.31	0.28	0.44		
1996	6.7	7.6	7.3			0.70	0.64	0.59			0.30	0.26	0.43		
1997	6.8	7.0	7.4			0.71	0.66	0.60			0.30	0.29	0.42		
1998	7.0	7.1	7.7			0.72	0.67	0.60			0.30	0.28	0.41		
1999	7.2	7.6	8.0			0.72	0.68	0.60			0.30	0.28	0.41		
2000	7.5	8.7	8.4	5.6	8.1	0.73	0.69	0.61	0.67	0.52	0.30	0.27	0.40	0.15	0.20
2001	7.8	8.7	8.7	8.3	8.6	0.73	0.69	0.60	0.64	0.51	0.29	0.27	0.38	0.15	0.20
2002	8.1	8.6	8.8	7.3	8.2	0.73	0.71	0.61	0.65	0.55	0.29	0.25	0.37	0.14	0.24
2003	8.2	9.0	8.8	8.6	7.8	0.73	0.69	0.62	0.67	0.57	0.28	0.28	0.36	0.17	0.23
2004	8.4	8.9	9.2	7.4	7.9	0.73	0.72	0.63	0.72	0.59	0.28	0.27	0.36	0.16	0.25
2005	8.6	8.6	9.2	6.5	8.5	0.73	0.75	0.62	0.76	0.59	0.25	0.23	0.34	0.13	0.26
2006	8.7	7.7	9.0	6.4	8.2	0.73	0.76	0.63	0.79	0.62	0.27	0.22	0.38	0.13	0.32
2007	8.8	7.8	9.3	6.5	8.6	0.73	0.76	0.63	0.79	0.61	0.27	0.22	0.38	0.16	0.33
2008	8.8	7.7	9.0	6.8	8.2	0.72	0.76	0.63	0.80	0.61	0.26	0.23	0.38	0.17	0.33
2009	8.9	7.7	9.3	6.7	8.4	0.70	0.74	0.62	0.77	0.59	0.26	0.25	0.39	0.21	0.35
2010	8.6	8.0	9.0	7.0	8.4	0.70	0.76	0.63	0.79	0.59	0.26	0.26	0.39	0.23	0.37
2011	8.5	7.1	8.7	6.3	7.9	0.70	0.75	0.62	0.78	0.59	0.26	0.27	0.38	0.24	0.38

The table reports, for each fiscal year 1995-2011 the median hourly real wage (discounted using the 2005 based CPI), the employment rate of the working age population (16-65), and the ratio of the number of children under the age of 16 per working age adult, for immigrants and natives. We distinguish between EEA and non-EEA immigrants. In the last two columns of each panel we report information for recent immigrants, defined as those arrived since 2000.

Source: UKLFS, several years.

Table 3: Immigrants-natives differential in probability of claiming state benefits/tax credits or living in social housing

Panel A: All arrival years	State benefits/tax credits		Social Housing		
	1	2	3	4	5
<i>All immigrants</i>	-0.029*** (0.001)	-0.006*** (0.001)	0.019*** (0.001)	0.002*** (0.001)	0.004*** (0.001)
<i>EEA</i>	-0.080*** (0.001)	-0.047*** (0.001)	-0.029*** (0.001)	-0.037*** (0.001)	-0.040*** (0.001)
<i>Non-EEA</i>	-0.012*** (0.001)	0.008*** (0.001)	0.035*** (0.001)	0.015*** (0.001)	0.019*** (0.001)
Proportion of native recipients	0.370		0.199		
N	4534953	4534953	3618262	3617735	3617735
Panel B: Arrived in years 2000 onwards					
<i>All immigrants</i>	-0.178*** (0.001)	-0.084*** (0.001)	-0.006*** (0.002)	-0.020*** (0.002)	-0.031*** (0.002)
<i>EEA</i>	-0.201*** (0.002)	-0.100*** (0.002)	-0.075*** (0.002)	-0.084*** (0.002)	-0.092*** (0.002)
<i>Non-EEA</i>	-0.167*** (0.002)	-0.077*** (0.002)	0.026*** (0.002)	0.010*** (0.002)	-0.004* (0.002)
Proportion of native recipients	0.391		0.188		
Year and quarter effects	Yes	Yes	Yes	Yes	Yes
Gender	No	Yes	No	No	No
Age	No	Yes	No	No	Yes
Region of residence	No	No	No	Yes	Yes
N	3495478	3495478	2162207	2162207	2162207

The table reports the gap in the probability of claiming state benefits/tax credits (columns 1 and 2) and in the probability of living in social housing (columns 3-5) between immigrants and natives. The units of observation are individuals for state benefits/tax credits and households for social housing. Panel A considers all immigrants, regardless of their year of arrival in the UK in fiscal years 1998 -2011 (for state benefits) and 1995-2011 (for social housing), while Panel B focuses on immigrants arrived in the UK since 2000. Probability gaps are computed as coefficients on an immigrant dummy in separate linear probability models. Robust standard errors in parenthesis.

Source: UKLFS several years.

* Denotes significance at 10%, ** significance at 5% and *** significance at 1%.

Table 4a: Overall expenditures and revenues (in millions GBP) - Public goods at their average cost

Fiscal Year	Baseline results										Alternative scenario: immigrants' lower consumption	
	(1) Natives		(2) EEA		(3) Non EEA		(4) Recent EEA		(5) Recent Non EEA		(6) Recent EEA	(7) Recent Non EEA
	Exp	Rev	Exp	Rev	Exp	Rev	Exp	Rev	Exp	Rev	Rev	Rev
1995	268,771	252,156	4,944	4,342	20,147	16,161						
1996	275,328	259,032	4,509	4,145	20,529	16,856						
1997	278,905	281,513	5,088	5,080	21,819	20,123						
1998	288,267	297,935	5,687	5,848	22,770	21,467						
1999	299,373	317,377	6,094	6,345	24,237	23,125						
2000	316,060	335,770	6,359	6,827	27,355	26,255						
2001	335,759	340,763	7,038	8,061	29,695	27,332	521	930	1,627	2,374	882	2,255
2002	358,923	347,808	7,825	8,130	32,771	28,675	838	1,200	3,237	3,954	1,136	3,750
2003	394,678	370,891	8,944	9,040	35,859	31,488	1,176	1,813	4,938	5,974	1,721	5,624
2004	421,556	395,025	9,796	9,993	39,408	34,972	1,801	2,365	7,147	7,743	2,234	7,294
2005	446,021	418,330	10,905	12,535	44,154	39,038	2,880	4,214	9,251	11,063	3,983	10,472
2006	462,716	441,329	13,260	16,144	47,070	42,532	4,150	6,599	12,026	14,102	6,230	13,374
2007	488,136	461,255	19,314	22,018	48,332	44,694	6,540	9,897	14,443	16,990	9,353	16,148
2008	527,084	446,427	21,993	23,026	54,002	44,334	7,875	11,454	18,195	18,130	10,854	17,226
2009	560,249	440,076	23,852	22,646	58,383	44,817	9,242	11,227	21,073	19,114	10,634	18,191
2010	574,226	447,903	26,971	27,375	60,671	45,865	11,942	15,320	23,944	19,938	14,469	18,876
2011	576,847	461,510	27,895	26,162	62,071	50,552	12,879	14,622	25,917	23,870	13,742	22,562

The table reports the estimated amount of government expenditures and revenues attributable to the native born and immigrant population when we impute to immigrants the average cost of public goods provision. We distinguish between EEA and non-EEA immigrants. In columns (4) and (5) we report information for recent immigrants, defined as those arrived since 2000. In columns (6) and (7) revenues from recent EEA and non-EEA immigrants are computed under the assumption that immigrants' consumption is 80% that of natives.

Source: Our calculations based on UKLFS and government budget.

Table 4b: Overall expenditures and revenues (in millions GBP) - Public goods at their marginal cost

Fiscal Year	Baseline results										Alternative scenario: immigrants' lower consumption	
	(1) Natives		(2) EEA		(3) Non EEA		(4) Recent EEA		(5) Recent Non EEA		(6) Recent EEA	(7) Recent Non EEA
	Exp	Rev	Exp	Rev	Exp	Rev	Exp	Rev	Exp	Rev	Rev	Rev
1995	273,430	253,577	3,890	4,021	16,542	15,061						
1996	280,215	260,445	3,479	3,847	16,673	15,741						
1997	284,021	282,980	3,954	4,755	17,837	18,981						
1998	294,049	299,493	4,354	5,489	18,321	20,268						
1999	305,217	318,911	4,726	5,986	19,762	21,950						
2000	322,427	337,563	4,943	6,429	22,403	24,861						
2001	342,476	342,555	5,486	7,647	24,529	25,953	340	882	1,099	2,233	834	2,114
2002	366,258	349,711	6,160	7,698	27,102	27,204	565	1,129	2,282	3,707	1,065	3,502
2003	402,807	372,896	7,094	8,584	29,579	29,939	806	1,722	3,540	5,629	1,629	5,279
2004	430,361	397,226	7,783	9,489	32,616	33,274	1,226	2,222	5,273	7,274	2,090	6,825
2005	456,154	421,048	8,432	11,872	36,495	36,983	1,911	3,954	6,929	10,440	3,723	9,849
2006	473,802	444,237	10,180	15,337	39,064	40,432	2,745	6,231	9,226	13,368	5,862	12,639
2007	500,258	464,632	15,011	20,819	40,514	42,515	4,522	9,335	11,300	16,115	8,791	15,272
2008	541,259	449,896	17,001	21,804	44,819	42,087	5,439	10,858	14,205	17,154	10,258	16,249
2009	574,209	443,848	19,031	21,344	49,243	42,348	6,848	10,580	16,938	17,997	9,987	17,074
2010	589,615	450,839	21,349	26,303	50,905	44,002	8,863	14,733	19,482	19,087	13,882	18,025
2011	592,646	464,404	22,187	25,116	51,980	48,704	9,689	14,038	21,177	23,002	13,157	21,694

The table reports the estimated amount of government expenditures and revenues attributable to the native born and immigrant population when the entire cost of public goods provision is attributed to natives. We distinguish between EEA and non-EEA immigrants. In columns (4) and (5) we report information for recent immigrants, defined as those arrived since 2000. In columns (6) and (7) revenues from recent EEA and non-EEA immigrants are computed under the assumption that immigrants' consumption is 80% that of natives.

Source: Our calculations based on UKLFS and government budget.

Table 5: Summary results

Panel A: 1995-2011				
Natives	EEA	Non EEA	Recent EEA	Recent Non EEA
<i>Overall net fiscal contributions (million, 2011 GBP equivalent)</i>				
-604,529	8,775	-104,176		
<i>Ratio of real revenues to real expenditures</i>				
0.926	1.036	0.864		
<i>Share of each group in total population</i>				
0.890	0.026	0.084		
Panel B: 2001-2011				
Natives	EEA	Non EEA	Recent EEA	Recent Non EEA
<i>Overall net fiscal contributions (million, 2011 GBP equivalent)</i>				
-624,120	8,978	-86,820	22,106	2,942
<i>Ratio of real revenues to real expenditures</i>				
0.894	1.045	0.851	1.339	1.019
<i>Share of each group in total population</i>				
0.879	0.031	0.090	0.012	0.028

Each panel reports, for natives, EEA and non-EEA immigrants, and recent EEA and non-EEA immigrants, their overall net fiscal contribution, cumulated over several years, expressed in 2011 equivalent GBP (first line), the ratio of revenues contributed to expenditures received (second line), the share of each group in the total UK population (third line). Panel A refers to years 1995-2011, Panel B refers to years 2001-2011.

Figure 1a: Ratio of overall revenues to expenditures by group

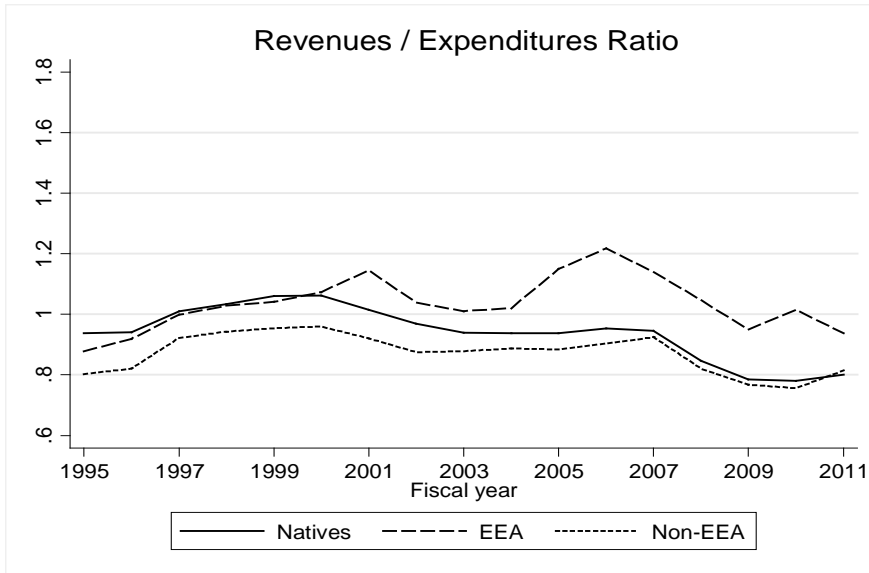
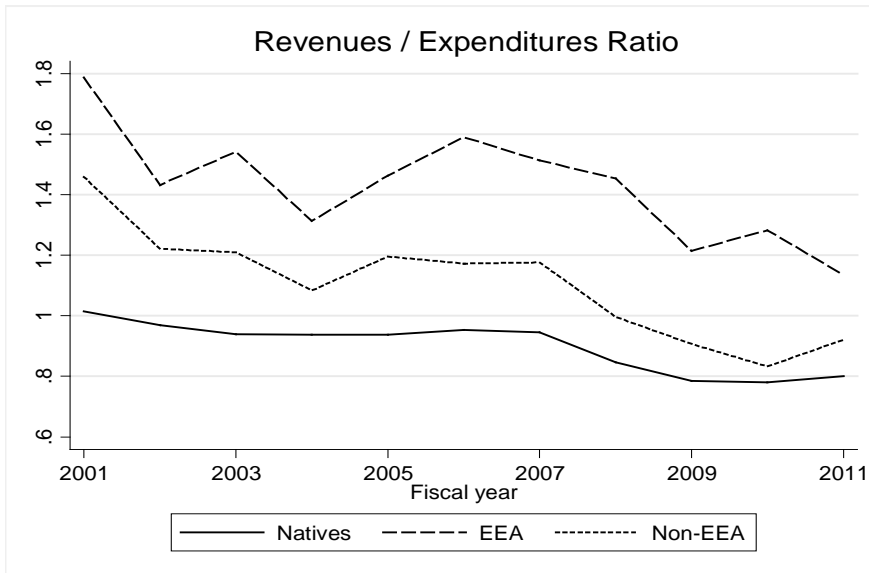


Figure 1b: Ratio of overall revenues to expenditures by group (recent immigrants)



The figure reports for each fiscal year the ratio of public revenues to expenditures for EEA and non-EEA immigrants and natives when we impute to immigrants the average cost of public goods provision. Figure A reports figures for all immigrants, regardless of their year of arrival in the UK, whereas figure B reports figures for recent immigrants (arrived since 2000) only.

Source: Our calculations based on UKLFS and government budget.

Figure 2a: Ratio of overall revenues to expenditures, marginal immigrants effects, by group

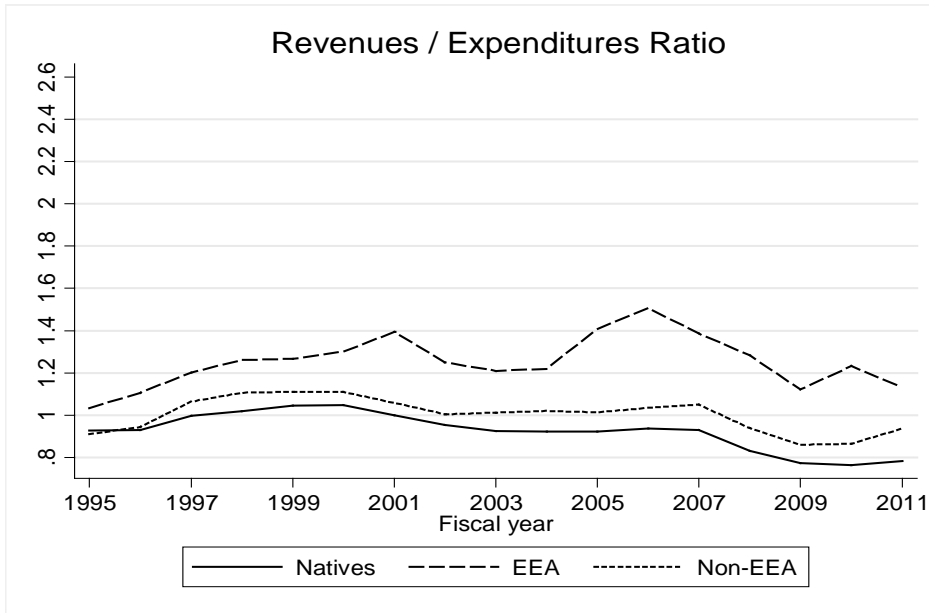
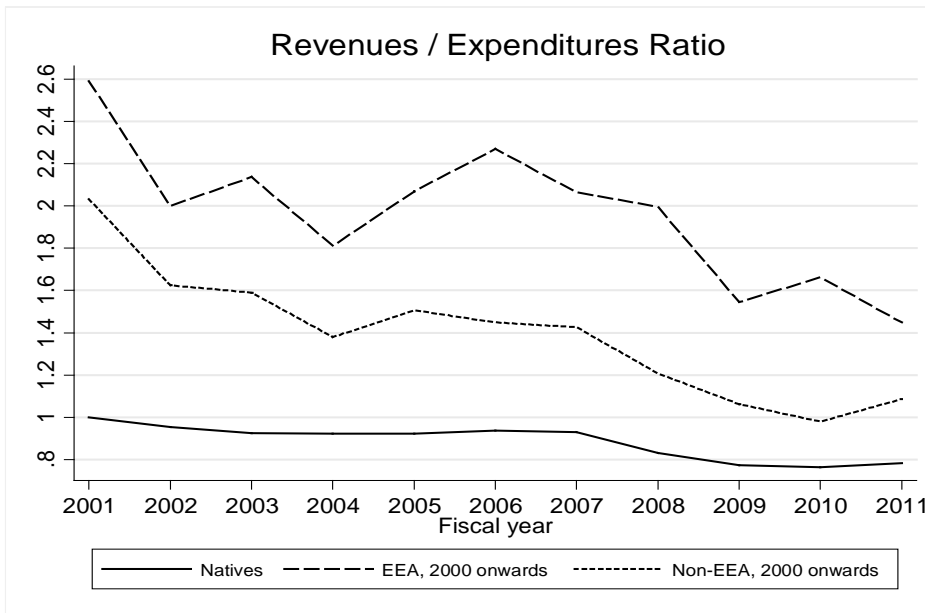


Figure 2b: Ratio of overall revenues to expenditures, marginal immigrants effects, by group (recent immigrants)



The figure reports for each fiscal year the ratio of public revenues to expenditures for EEA and non-EEA immigrants and natives when the entire cost of public goods provision is attributed to natives. Figure A reports figures for all immigrants, regardless of their year of arrival in the UK, whereas figure B reports figures for recent immigrants (arrived since 2000) only.

Source: Our calculations based on UKLFS and government budget.

Appendix

Table A1: Expenditures allocation criteria

	% of total	Apportioning criterion
"Pure" public goods	23.3	Share of 16+ population (<i>average cost</i>)
"Congestible" public goods	7.5	Share of 16+ population (<i>average cost</i>)
Health costs (except medical research)	16.9	Share of population in age group, and share of total health costs of age group
Compulsory education: pre-primary	0.7	Share of [0,4] children population
Compulsory education: primary and secondary	8.4	Share of [5,15] years old population
Further education	1.0	Share of population in further education
Higher education	1.9	Share of population in higher education
SP: Sickness and disability	4.8	Share of sickness and disability benefit claimants (<i>actual recipients</i>)
SP: Pensions	13.2	Share of pension claimants (<i>actual recipients</i>)
SP: Family and children	7.4	Share of income-support or family-related benefits claimants (<i>actual recipients</i>)
SP: Unemployment	1.0	Share of unemployment benefits recipients (<i>actual recipients</i>)
SP: Housing benefits	3.5	Share of housing benefits recipients (<i>actual recipients</i>)
SP: Personal social services	4.5	Average of share of sickness and disability benefits recipients, pension claimants, income support or family-related benefits recipients (<i>actual recipients</i>)
Law courts and prisons	1.9	Share of prison population
Housing development	1.1	Share of social housing tenants population
Immigration and citizenship police services	0.3	Share of immigrant population
Other police services	2.8	Share of population
EU transactions	-0.2	Share of population

Column 1 reports the categories in which we have grouped public expenditure items from Table 5.2 of PESA 2010 (years 2004-2010), Table 5.2 of PESA 2009 (year 2003) Table 3.6 of PESA 2004 (years 1998-2002), and Table 4.5 of PESA 1999-2000 (years 1995-1997). Column 2 reports the share (in percent) of total public expenditure accounted for by each category, pooling over all years 1995-2011. Columns 3 summarises the criteria followed in the construction of apportioning coefficients for each group. Column 4 summarises the alternative criteria which we use in the robustness checks. Where not specified, the data source is the LFS.

Table A2: Receipts allocation criteria

	% of total	Apportioning criterion
<i>Income tax and National Insurance</i>	44.7	Share of total payments: actual tax and NI rates applied to LFS income
<i>VAT and other indirect taxes</i>	28	Share of total payments: effective rates by household income decile from ONS "Effects of taxes and benefits on household income", accounting for immigrants' lower consumption, applied to LFS income.
<i>Company and capital taxes</i>	9.3	Share of adult population, net of foreign owned share from ONS "Share ownership"
<i>Council tax</i>	4.2	Share of total households
<i>Business rates</i>	4.3	Share of self employed
<i>Gross operating surplus and rents</i>	5	Share of adult population/All to natives (<i>marginal contribution</i>)
<i>Inheritance tax</i>	0.6	Share of homeowners population
<i>Income tax credits</i>	-0.8	Share of dependent children population
<i>Other</i>	4.7	Share of adult population

Column 1 reports the categories in which we have grouped the items in Table C4 of the HM Treasury's Public Sector Finances Databank. Column 2 reports the share of total government receipts accounted for by each revenue source, pooling over all years 1995-2011. Column 3 summarises the criteria followed in the construction of apportioning coefficients for each group.

Table A3: List of government expenditures by sub-function (UN COFOG) and grouping

<i>Expenditure item</i>	<i>Expenditure group</i>
1.1 Executive and legislative organs, financial and fiscal affairs, external affairs	
1.2 Foreign economic aid	
1.3 General services	
1.4 Basic research	
1.5 R&D general public services	
1.6 General public services n.e.c.	
1.7 Public sector debt interest	
2.1 Military defence	
2.2 Civil defence	
2.3 Foreign military aid	
2.4 R&D defence	
2.5 Defence n.e.c	<i>"Pure" public goods</i>
4.1 General economic, commercial and labour affairs	
4.2 Agriculture, forestry, fishing and hunting	
4.3 Fuel and energy	
4.4 Mining, manufacturing and construction	
4.5 Transport	
4.6 Communication	
4.7 Other industries	
4.8 R&D economic affairs	
4.9 Economic affairs n.e.c	
Health research	
3.2 Fire-protection services	
3.5 R&D public order and safety	
3.6 Public order and safety n.e.c.	
5.1 Waste management	
5.2 Waste water management	
5.3 Pollution abatement	
5.4 Protection of biodiversity and landscape	
5.5 R&D environment protection	
5.6 Environment protection n.e.c	
6.2 Community development	
6.3 Water supply	
6.4 Street lighting	
6.5 R&D housing and community amenities	
6.6 Housing and community amenities n.e.c	<i>"Congestible" public goods</i>
8.1 Recreational and sporting services	
8.2 Cultural services	
8.3 Broadcasting and publishing services	
8.4 Religious and other community services	
8.5 R&D recreation, culture and religion	
8.6 Recreation, culture and religion n.e.c	
9.5 Education not definable by level	
9.6 Subsidiary services to education	
9.7 R&D education	
9.8 Education n.e.c	
10.8 R&D social protection	
10.9 Social protection n.e.c.	

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3.3 Law courts	<i>Law courts and prisons</i>
3.4 Prisons	
6.1 Housing development	<i>Housing development</i>
Medical services	
Central and other health services	<i>Health costs (except medical research)</i>
9.1 Pre-primary and primary education: under fives	<i>Compulsory education: pre-primary</i>
9.1 Pre-primary and primary education: primary education	<i>Compulsory education: primary and secondary</i>
9.2 Secondary education	
9.3 Post-secondary non-tertiary education	<i>Further education</i>
9.4 Tertiary education	<i>Higher education</i>
3.1 Police services: Immigration and citizenship	<i>Immigration and citizenship police services</i>
3.1 Police services: other police services	<i>Other police services</i>
10.1 Sickness and disability: incapacity, disability and injury benefits	<i>SP: Sickness and disability</i>
10.2 Old age: pensions	<i>SP: pensions</i>
10.3 Survivors	
10.4 Family and children: family benefits, income support and tax credits	<i>SP: Family and children</i>
10.7 Social exclusion n.e.c: family benefits, income support and tax credits	
10.5 Unemployment: other unemployment	<i>SP: Unemployment</i>
10.6 Housing	<i>SP: Housing benefits</i>
10.1 Sickness and disability: personal social services	
10.2 Old age: personal social services	
10.4 Family and children: personal social services	<i>SP: Personal social services</i>
10.5 Unemployment: personal social services	
10.7 Social exclusion n.e.c: personal social services	
Total EU transactions	<i>EU transactions</i>

The table reports the list of government expenditures by function from the UN COFOG classification, adopted in PESA issues after 2007, and the categories in which we have grouped them in our analysis.

Table A4: List of government receipts and grouping

<i>Revenue source</i>	<i>Grouping</i>
Income tax revenue	<i>Income tax and National Insurance</i>
NICs payments	
Income tax credits	<i>Income tax credits</i>
VAT	<i>VAT and other indirect taxes</i>
Fuel duties	
Stamp duties	
Tobacco duties	
Spirits duties	
Wine duties	
Beer and cider duties	
Betting and gambling duties	
Air passenger duty	
Customs duties and levies	
Insurance premium tax	
Vehicle Excise Duties	
Corporation tax	
Corporation tax credits	
Capital Gains Tax	
Petroleum revenue	
PC corporation tax payments	
Inheritance tax	<i>Inheritance tax</i>
Council Tax	<i>Council Tax</i>
Business rates	<i>Business rates</i>
Gross operating surplus and rents	<i>Gross operating surplus and rents</i>
Interests and dividends	
Landfill tax	<i>Other</i>
Climate change levy	
Aggregates levy	
Other taxes and royalties	
Adjustments	
Other receipts	

The table reports the list of receipts from Table C4 of the Public Sector Finances Databank and the category in which they have been grouped.