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The US Labour Force Participation Debacle: Learning from the Contrast with Britain

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Non-Technical Summary

The United States have experienced a decline in labour force participation, particularly visible after the Financial Crisis. While the unemployment rate has returned to historically low levels, the employment rate is still relatively low, due the high number of inactive people. In view of the rapid population ageing connected to the ageing of the Baby Boom generation, this is not sustainable. We offer new insights on the nature and causes of the US participation problem by contrasting the US experience with the UK experience. These two countries have many features in common, including independent currencies and deregulated labour markets. Given the divergence in participation rates since 2000 and through the Crisis and recovery periods, comparative analysis of these two cases can provide a helpful perspective on country-specific versus common structural and cyclical drivers. This paper exploits this comparative potential, analysing the two countries' experiences over recent decades through a common analytical lens and assessing hypotheses about key drivers of stagnant participation in the US in that light.

We draw from the Labour Force Survey for the UK and the Current Population Survey for the US to construct homogenous and consistent series of repeated cross-sections for the two countries. We then apply age-period-cohort analysis and decomposition techniques to investigate the determinants of the relatively dismal US performance.

Contrary to a common US narrative, our comparative perspective suggests that the relative decline in US labour force participation is not confined to the (white) male population: the divergence in female participation rate is even more pronounced. We also do not find evidence that the poor US performance is linked to some structural changes brought about by the financial crisis; instead, it is a more pervasive, longer-run phenomenon. Our Oaxaca decomposition shows that the relative decline of US participation rates with respect to the UK is roughly equally attributable to characteristics, which have become less favourable over time, and the impact of those characteristics, which have become more adverse to participation.

We show that the US is particularly ill-equipped to deal with the looming ageing of the Baby Boom generation. This calls for an urgent and dramatic change in policies, unless adjustment mechanisms of unknown nature are triggered. In particular, our finding that the main factor in improving the characteristics of the working age population in the UK compared with the US is the spectacular reduction in the proportion with low education, suggests that policies aimed at incentivising education in the US are likely to play an important factor in addressing the low labour market participation problem in this country.

The US Labour Force Participation Debacle: Learning from the contrast with Britain*

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Abstract

This paper uses the marked divergence in labour force participation trends between the US and the UK to probe underlying drivers and implications for recent US poor performance. Contrary to a common US narrative, our comparative perspective suggests that the relative decline in US labour force participation is not confined to the (white) male population: the divergence in female participation rate is even more pronounced. We also do not find evidence that the poor US performance is linked to some structural changes brought about by the financial crisis; instead, it is a more pervasive, longer-run phenomenon. Our multivariate analysis seeks to disentangle age, cohort, and period effects, and shows that the US is particularly ill-equipped to deal with the looming ageing of the Baby Boom generation. An Oaxaca decomposition shows that the relative decline of US participation rates with respect to the UK is roughly equally attributable to characteristics, which have become less favourable over time, and the impact of those characteristics, which have become more adverse to participation.

Keywords: Labour force participation, employment, human capital, gender

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The US Labour Force Participation Debacle: Learning from the contrast with Britain

1. Introduction

After a period of rapid increase in the 1980s, labour force participation in the US plateaued in the 1990s and then declined from around 2000 to 2007, before falling much more sharply in the Great Recession. Macroeconomic recovery saw unemployment fall rapidly from 2011, but the participation rate has only increased modestly, remaining well below its pre-crisis level and even further below its late-1990s peak. A range of explanations has been advanced in an expanding research literature focused purely on the US. However, the US experience since 2000 contrasts sharply with what has happened in the United Kingdom. There, participation was fairly stable in the decade up to the onset of the global financial crisis, fell by much less during the crisis, and since 2012 has been rising significantly. These two countries have many features in common, including independent currencies and deregulated labour markets. Given the divergence in participation rates since 2000 and through the Crisis and recovery periods, comparative analysis of these two cases can provide a helpful perspective on country-specific versus common structural and cyclical drivers. This paper exploits this comparative potential, analysing the two countries' experiences over recent decades through a common analytical lens and assessing hypotheses about key drivers of stagnant participation in the US in that light.

Our findings bring out that male participation rates are trending downwards in both countries, but the trend is stronger in the US; however, female participation is also a major part of the story, with rates for later cohorts trending upward in the UK, while downward in the US. The ageing of the Baby Boom generation has a greater impact in the US than the UK, because participation rates decline with age more steeply in the US and the Baby Boom generation was a relatively high-participation generation there. Alongside compositional change, aspects of behaviour of the US population have become comparatively less favourable to participation. There was little difference in participation between the two countries in the decade from the mid-1990s because composition and behavioural differences roughly offset one another. The marked gap observed more recently, by contrast, reflects both composition differences and behaviour becoming less favourable to participation in the US compared with the UK.

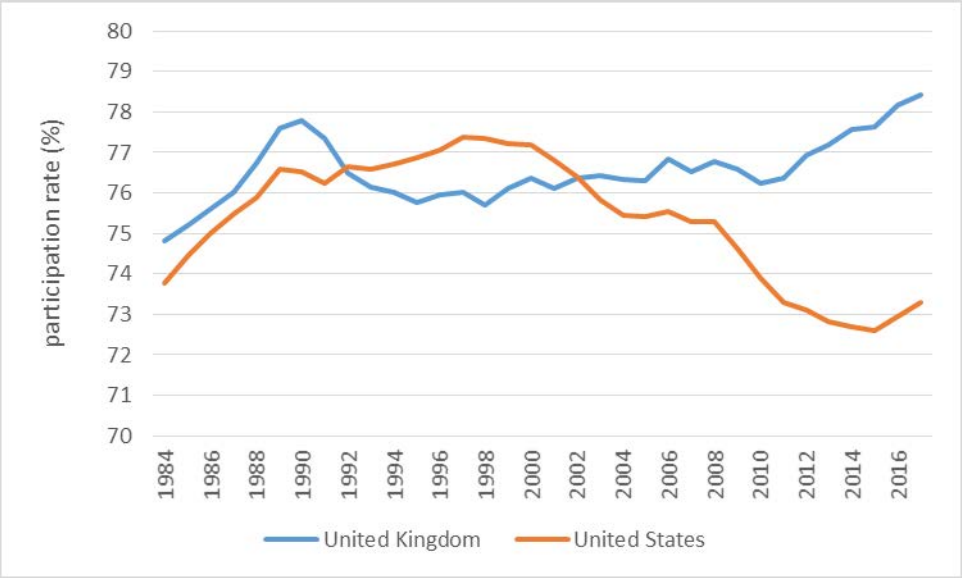
The paper is structured as follows. Section 2 fills out the background in terms of trends in participation, employment and unemployment rates in the two countries over recent decades. Section 3 reviews the explanations for these trends advanced in recent research on each country. Sections 4 and 5 describe, respectively, our empirical strategy and the data we employ. Section 6 presents the central results in terms of estimated econometric models. Section 7 discusses the specification these adopt for the crucial age, period and cohort effects, and tests some alternative specifications. Section 8 presents a decomposition of the estimates in terms of the relative importance of the characteristics of the population versus their behaviour given the observed characteristics. The final section summarises the main conclusions.

2. Recent Trends in Labour Force Participation and Employment

The way the overall labour force participation rate – or the activity rate, as it is sometimes known – has evolved in the US and the UK since 1984 is shown in Figure 1. (We take 1984 as initial year at this point for data comparability reasons.) The measure employed shows the percentage of the working-age population, defined as ages 15 to 64, who are active in labour market terms – that is, who are either in paid work or unemployed. We see that up to the early 1990s, both countries saw substantial increases in the participation rate, with the UK rate about 1 percentage point higher and peaking at almost 78% in 1990. The UK level then dipped in the early 1990s and remained at about 76% to 2000, whereas in the US the participation rate rose to reach 77.5% in the 'Clinton boom' of the second half of the 1990s, and was still at that peak entering 2000.

However, the US rate then declined to about 75% in the years up to the 2008-09 global financial crisis, before falling much more sharply during and after the Great Recession to hit a low of 72% in 2015. Recovery since that low point has been modest, with the participation rate in late 2017 only 73%. In the UK, on the other hand, the participation rate remained at about 76-77% up to the onset of the crisis, did not fall below 76% even in the depths of the Great Recession, and bounced back quite quickly so that by late 2017 it was approaching 79%. The gap in participation between the two countries at that point was 5 percentage points, quite unprecedented in recent experience.

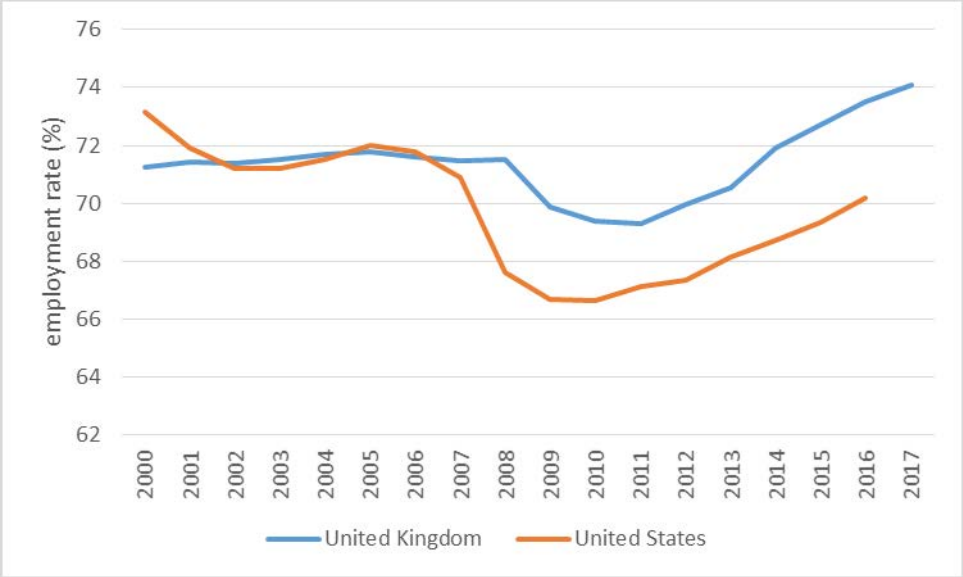
Figure 1: Labour force participation rates USA and UK, population aged 15-64, 1984 to 2017.



Source: OECD data.

The business cycle dynamics of the two countries in terms of unemployment are rather similar since 2000, fluctuating more than in the US up to and through the Crisis but then converging. The major differences in participation rates between the two countries since 2000 are to be seen not in their unemployment experiences but with respect to employment versus inactivity. Figure 2 shows that the UK employment rate was stable at about 71% from 2000 up to the Crisis, and then fell by more than 2 percentage points before recovering from 2012 to now reach 74%. In the US, by contrast, the employment rate fell quite sharply in the early 2000s, then fell by almost 5 percentage points during the early years of the Crisis, twice as much as in the UK. While employment picked up from 2012 onwards, by 2017 it was still only about 70%, compared to 72% in 2007. Having been nearly three percentage points higher than the UK in 2000, this left the US employment rate 4 percentage points below it in 2017. So from 2000 to the present, the percentage of the working-age population at work in the US contracted, and the percentage inactive expanded, by about 4 percentage points. Over the same period, the percentage at work in the UK rose by 2 percentage points. This is the key difference underlying the contrasting evolution of their participation rates.

Figure 2: Employment rates, population aged 15-64, 2000 to 2017.



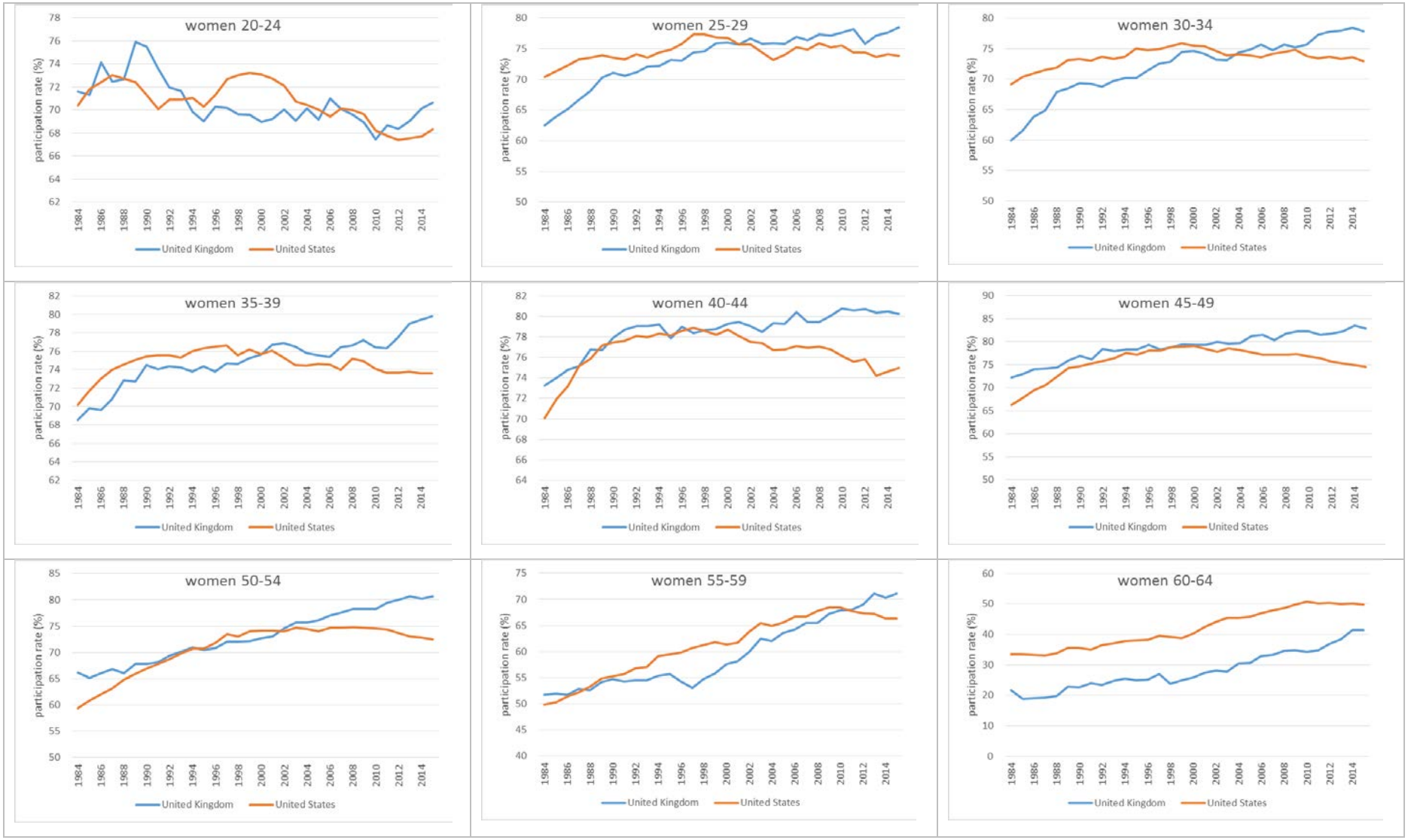
Source: OECD data.

The falling participation rate in the US is often discussed there as mainly relating to men (e.g. Eberstadt, 2017), or even as concentrated among middle-aged men. However, the comparative patterns for the participation rate since 1983 disaggregated by gender and age group in Figures 3 for men and Figure 4 for women are illuminating in that regard. They show participation rates in the US from 2000 falling substantially for men in each age group up to 54, with those over 60 being the only ones to see an increase. For women up to age 50 there is also some decline over that period, though much less pronounced than for men and varying across age groups. What is striking, though, is that for men the decline since 2000 represents a continuation of a longer-term trend evident, albeit accelerated during Crisis, whereas for women it is a reversal of the upward trajectory seen up to that point. For the UK, by contrast, the male participation rate also declined up to 2000 for most age groups, but by 2017 was generally as high or higher than in 2000 (except for youngest age group), while the rate for women aged 25 or over has continued to rise. As a result, higher participation rates are now to be seen in the UK than the US for both men and women in each age group up to the age of 60.

Figure 3: Labour force participation rate by age group, men.

Source: OECD data.

Figure 4: Labour force participation rate by age group, women. Source: Our elaboration on OECD data.



Source: OECD data.

3. Previous Research

The decline in the US labour force participation rate since the turn of the millennium has fuelled a vigorous debate about the extent to which this primarily reflects cyclical forces or longer-lasting structural factors, and about the nature of those factors. The early paper by Aaronson *et al*. (2006) concluded that cyclical fluctuations in participation were taking place around a declining trend. In the wake of the financial crisis, Aaronson, Davis, and Hu (2012) and Van Zandweghe (2012) concluded that more than half of the decline in aggregate labour force participation from 2000 to 2011 was due to cyclical factors. Hotchkiss and Rios-Avila (2013) found that nearly all of the decline from 2007 to 2012 was cyclical. Bengali, Daly, and Valletta (2013) also identified a substantial cyclical component in the decline from 2007, as did a study by the Council of Economic Advisers (2014). Aaronson *et al* (2014) looked at a variety of different approaches and concluded that much of the decline from 2007 was structural in nature.

The most commonly cited structural factor is the ageing of the population and the 'Baby-Boom' cohort. Abraham and Kearney's (2018) detailed decomposition exercise distinguishing finely-grained age groups by gender found that changes in age composition and falling participation within age-groups among young and prime age adults have been equally important. The declining participation rate for younger age groups has been attributed in part to increased college attendance, but that is not the whole story. Controversially, it has been proposed that an increase in the value of leisure time owing to improved video gaming technology may have increased the relative attractiveness of non-work for young men (Aguiar et al. 2017). The notion that changing social norms have made it more socially acceptable for young men to be out of work and relying on support from their parents has also been mooted (Eberstadt, 2016).

For prime-age and older workers, growth in the availability and/or generosity of social insurance programs including disability insurance, the Supplemental Nutrition Assistance Program and publicly provided or subsidized health insurance have been advanced as contributing to declining participation. The dramatic growth in the prison population and discriminatory employment practices against those with criminal records may also mean more labour force drop-out after release (Western 2018). The trend towards lower participation has coincided with the increase in premature mortality for the non-Hispanic white population highlighted by Case and Deaton (2015, 2017) as "deaths of despair". The

increase in opioid use in particular has received a great deal of attention; Krueger (2017) for example found that labour force participation fell more in areas where relatively more opioid pain medication has been prescribed, but causality clearly runs in both directions.[1]

While much of the attention has focused on men, some of these drivers also apply to women, and other factors which may have contributed to the levelling-off in female labour force participation have also received attention. Blau and Kahn (2013) is among the studies highlighting the absence of family-friendly policies such as paid parental leave in the US. Caring for elderly parents may also be a factor, with the share of prime-age workers with eldercare responsibilities increasing as the Baby Boom cohort ages and unpaid family caregiving the most common form of eldercare. The importance of gender role attitudes has also been debated, with respect for example to the disputed claim that highly educated women have been increasingly 'opting out' (Goldin and Katz, 2008; Herr and Wolfram, 2012), or that a 'rebound in traditional gender role attitudes' is implicated (Fortin, 2015).

With a great deal of attention paid in recent US research to the displacement of workers by a combination of globalization and technological change, including robotisation, some have argued that disappointing levels of participation reflects a growing mismatch between available workers and vacant jobs. The extent to which this is seen in the data, and if so whether it represents a short-term feature of the recession rather than a longer-term and more structural phenomenon, is contested. A related debate is about the extent to which declining rates of geographic mobility have led to lower rates of employment. Molloy, Smith, and Wozniak (2011), for example, document that internal migration rates have trended steadily downward over the past 25 years and are now lower than at any previous time in the post-war period.

For the UK, research has focused on the relatively limited loss of jobs and increase in unemployment during the Great Recession compared with previous downturns, and on the remarkable recovery in the employment rate since 2012. This is generally linked to what happened to pay, with the UK seeing the biggest fall in real wages of any G7 country (Taylor, Jowett and Hardie, 2014), fairly uniform across sectors. so the focus of research has been as

[1] Among the few such results available in the research literature, quasi-experimental evidence for Denmark shows that a 10 percentage point higher opioid prescription rate leads to a 1.5 percentage point decrease in labour force participation for an average individual (Laird and Nielsen, 2016).

much on why wages have performed so poorly. The UK's high degree of labour market 'flexibility' is often advanced as a key factor, but as Coulter (2016) points out, this does not help to explain why the Great Recession was so different to previous recessions since many of the key reforms aimed at increasing flexibility were enacted in the late 1980s, and in the 1990s recession employment rather than wages bore the brunt of the shock. Research suggests that more people are willing to work at a given real wage and/or are less responsive to falls in the real wage (Disney, Jin and Miller 2013), but it is not clear why this should be the case. An aspect that has received attention is capital 'shallowing' as opposed to deepening: the fall in the price of labour relative to the cost of capital may have encouraged firms to substitute labour for equipment. Pessoa and Van Reenen (2014) argue that this accounts for up to half the fall in labour productivity since the start of the Great Recession, with a correspondingly large impact on employment.

A sharp increase in labour market polarisation was also seen in the UK during the recession, with low-skilled jobs expanding their share and medium-skilled jobs continuing to decline (Plunkett and Pessoa 2013), and sectoral shifts may also have been important in the evolution of average real wages with some higher paying sectors experiencing falls in employment and a marked shift from public to private sector employment. Inward migration may also have been associated with greater willingness to work in insecure sectors and for lower pay, though empirical studies have not found a statistically significant impact from EU migration on native employment outcomes (Devlin et al., 2014). Changes in social transfers from 2010, reducing their generosity and increasing conditionality in terms of job search, may have reduced the reservation wage for some, while on the other hand enhanced family policy may also have played a role in underpinning female participation.

4. Empirical strategy

We now set out the approach to be followed here in seeking to understand the evolution of labour force participation over time in the US and the UK, and how this relates to previous US studies. A useful point of departure is Aaronson et al.'s (2006) study employing a cohort-based model.[2] In this modelling strategy, participation rates are analysed separately by age group and gender. Controls include only aggregate variables, where aggregation is specific to the different gender and age groups. The controls include the share of individuals with

[2] The same methodology is used, among others, by the European Commission in its 2015 Ageing Report – see EC (2014, 2015).

high/low education, the share of individuals living in different types of households (e.g. with/without a partner, with/without children), the share of individuals with disabilities, measures of earning potentials such as the (age-specific) gender wage gap, measures of (average) household wealth, measures for business cycle effects, and proxies for the relevant welfare programs, such as the availability of childcare for women in childbearing years, and the fraction of individuals eligible for early retirement in older cohorts. Because each gender-age subgroup provides one unit of observation, the identification of the effects of each determinant can be obtained only by exploiting its variation over time. Time invariant cohort effects are also included. Aggregation over the different gender-age categories is obtained by weighting the participation rates in each subgroup by the population size of that subgroup.

However, the group-level analysis suffers from what is known as the "ecological fallacy" (Robinson, 1950). The ecological fallacy arises when aggregate data are used to make inferences about individual level parameters. Many investigators have shown that the aggregate and the individual-level coefficients seldom agree in either magnitude or direction. For instance, it is possible that the individual probability to participate is higher for the majority of individuals in group A, but group B displays a higher aggregate participation rate.[3] Also, a characteristic might negatively impact on the participation rate at the individual level, but display a positive association at the aggregate level.[4] Avoiding the ecological fallacy is important if one wants to learn about the channels through which the determinants of participation work. This is particularly important when it comes to evaluating or devising policies aimed at fostering participation.[5]

[3] Suppose there are 1,000 individuals in each group. 800 individuals in group A have a probability to participate of 50%, while the remaining 200 individuals have a probability to participate of 0. In group B, 800 individuals have a probability of 40%, and 200 individuals have a probability of 100%. Individuals in group A are more likely to participate than individuals in group B; however, the participation rate is higher in group B (52% versus 40%).

[4] As an example, individual wealth might have a negative impact on participation, but aggregate wealth could affect participation even after controlling for individual wealth. This could happen for instance if people are trying to "catch up with the Joneses", reacting to relative wealth. If the distribution of wealth is skewed enough, a positive association between wealth and the participation rate would be detected, at the aggregate level.

[5] In the example of footnote 4 where both individual and relative wealth matter for participation, a policy aimed at reducing property taxes for low-value houses on the basis of a positive association between wealth and participation detected at the aggregate level, would achieve the opposite effect of lowering participation rates, both because it increases individual wealth and because it reduces wealth differentials.

As well as avoiding the ecological fallacy, using micro-data often allows one to control for more characteristics.[6] This is the strategy used, for instance, by Aaronson et al. (2012), who estimate the probability of being in the labour force at the individual level, separately by gender and age groups in order to allow the cohort effects and other controls to flexibly vary across age, gender, and education. They control for age, year of birth, race, education, the business cycle, plus include additional conditioning variables for specific demographic groups, like the real state minimum wage and the ratio of the average youth hourly wage to average adult hourly wage for the younger age groups, indicators for being married with children and married with a young child for the middle age groups, and gender-specific life expectancies for the older age groups.

We follow this approach here and model participation at the individual level, by considering three groups of variables: (i) individual and household characteristics X, (ii) regional labour market characteristics L, and (iii) regional policies P. Participation is therefore modelled as

$$p_{i,t} = f(X_{i,t}, L_{r,t}, P_{r,t}). \quad (1)$$

To obtain a more flexible specification, eq. (1) is estimated separately by gender and age group.

5. Data and descriptive statistics

One major challenge for this comparative exercise is obtaining consistent and homogeneous data, both over time and across the two countries. This means that the same variables have the same meaning, irrespective of time and space.[7] We use the Labour Force Survey for the UK, and the CPS for the US. For each year we select the second quarter LFS for the UK and the March CPS for the US, because these particular surveys contain additional information. Our data are repeated cross-sections.

Most of the data constraints are in the UK data, where the Office for National Statistics does not attempt to homogenize variables in the face of significant changes in the questionnaire over the years. We took considerable care at selecting only those variables which can be

[6] One could use micro-data and then aggregate them and run a cohort-based analysis – this is, for instance, what Aaronson et al. (2006) do. However, the advantages of using an aggregate model then become even less evident.
[7] This does not prevent us from including country-specific covariates in some of the models, when appropriate.

traced back, possibly with minor changes in the filtering conditions or categorical values, with a sufficient level of reliability. There is a trade-off between the number of variables that can be included and the length of the time series. We focus on the period between 1996 and 2017, as information on educational levels, health status, home ownership and household composition prior to 1996 becomes difficult to compare with more recent waves. As conservative as this choice can appear, it still precludes the use of retrospective information, in particular the labour market status of individuals in previous periods, which is only available from 2011 onwards. However, while participation in the past is possibly the single most important predictor of current participation, its inclusion would in any case have been problematic. This is because, without controlling for individual effects (which is possible only using panel data), the lagged endogenous variable will soak up the effects of unobserved heterogeneity, hence introducing an upward bias in true state persistence. Finally, in the LFS it is not possible to reconstruct the labour market status of partners.

These data limitations with respect to the UK then constrain our choices of covariates for the US, but we do end up with datasets for the two countries that are highly comparable. The differences are:

- *Health*: While we define "bad health" in the UK data as having a health problem that limits the kind of paid work that the respondent can do, in the US data we define it as being in the lower two categories of self-reported health status, on a scale from 1 to 5. The resulting fraction of individuals with "bad" health is larger in the UK than in the US, as shown in the descriptive statistics (see Table 1).
- *Race*: A dummy for Hispanic is added for the US.
- *Household type*: The US data allow distinguishing married couples living together from married individuals living with a partner, outside marriage. We follow the lesser data demanding UK definition and distinguish only between married individuals living alone and married individuals living with their partner, irrespective of whether the partner is their legitimate spouse or not.
- *Children*: The UK data provide dummies for the presence of children of different ages (under 2, 2-4, 5-9, 10-15) in the household. They do not provide information on the number of children in each age group. The US data records the overall number of children, and then the age of the youngest and the oldest child. From this we reconstructed dummies for the youngest children being in each relevant age group

(under 2, 2-4, 5-9, 10-15). Consequently, it is possible that all flags related to children are switched on in the UK data, while in the US data they are mutually exclusive.

- *Home ownership*: In the UK data it is possible to distinguish between whether the house is owned outright or with an ongoing mortgage. Information on mortgages is available only from 2010 onwards in the US data, and is therefore not included.

Data for social policies come from the OECD Social Policy database. They include the amount of *social expenditures for family policies*, and the amount of *total social expenditures,* both as a percentage of GDP.

Data for family policies are taken from the OECD Family database. The variables selected are *Maternity total protected weeks,* defined as the maximum weeks of job-protected maternity, parental and home care leave available to mothers, regardless of income support, *maternity total paid weeks*, the total weeks of paid maternity, parental and home care payments available to mothers, *paternity total specific weeks,* the total weeks of leave reserved for exclusive use by the father, and *paternity specific paid weeks,* the total weeks of paid leave reserved for exclusive use by the father. Data are restricted to 2016 for the US.

In the analysis of the US, we use additional state-level policy information provided by the University of Kentucky Center for Policy Research (UKCPR).[8] In particular, we consider the following variables: *AFCD/TANF/SNAP,* the combined monthly maximum AFDC/TANF and Food Stamps benefits for a 4-person family; *EITC2max*, the EITC maximum credit for 2 dependents; *EITC state*, the state EITC credit as percentage of the federal credit; and *SSI federal*, the monthly maximum federal SSI benefits for individuals living independently.[9]

The *minimum wage* is at the national level for the UK. For the US, we use the state minimum wage, as provided by the UKCPR.

Monetary variables, including the minimum wage, are normalised by the GDP per capita (in thousands of dollars/pounds). As monetary variables (benefits and the minimum wage) have state variation in the US, we use state-level GDP per capita for the US. As the only monetary

[8] See www.ukcpr.org/data.

[9] We include AFDC/TANF/Food Stamp monthly maximum for a 4-person family only as this is highly correlated with the monthly maxima for other types of family. Similarly for the EITC maximum credit.

variable for the UK is the minimum wage, which has only national variation, we use national GDP per capita for the UK. This normalisation eliminates the need to convert currencies and to adjust for inflation. Moreover, GDP and GDP per capita are potentially endogenous to the participation rate, with reverse causality running from participation to income and income per capita. If this is the case, the minimum wage and the social benefits, which are obviously influenced by the level of income (both real and nominal), are also endogenous. Our normalisation should help net this out and leave only a measure of the relative generosity of the policy. To be more concrete, let the policies P be a function of GDP per capita, y:

$$P_{r,t} = g(y_{r,t}) \quad (2)$$

where GDP per capita is potentially a function of participation:

$$y_{r,t} = h(p_{r,t}) \quad (3)$$

Normalising the policy indicators by the level of GDP per capita breaks the endogeneity problem if the function g is approximately linear:

$$\frac{P_{r,t}}{y_{r,t}} = \frac{\alpha y_{r,t}}{y_{r,t}} = \alpha \quad (4)$$

However, some policies –in particular the minimum wage– may be affected by the participation rate not only indirectly, via the level of income, but also directly, as in:

$$P_{r,t} = g(y_{r,t}, p_{r,t}) \quad (2')$$

This could happen if politicians see the minimum wage as a way to influence participation. Our normalisation is not safe against this possibility: this suggests some caution in interpreting the coefficient for the (normalised) minimum wage.

Minimum legal working age is 16 in the UK and 14 in the US, with limits on the number of hours worked by minors under the age of 16. Hence, we focus on the 16+ population. As labour market status is not recorded in the UK data for individuals above state pension age unless they are working, and state pension age has changed over the years, we restrict our analysis to females under 60 and males under 65. Overall, we end up with 1,550,258 observations for the UK and 2,528,122 observations for the US.

Average values for the variables included in the analysis, in the initial and final year, are reported in Table 1.

Table 1: Descriptive statistics: average values

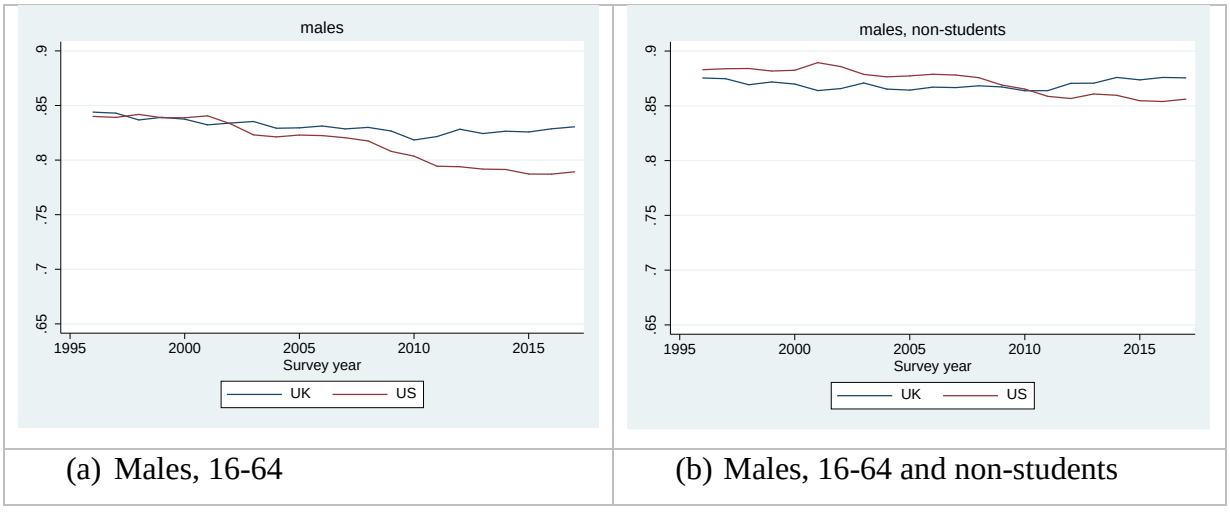
	US			UK	
	1996	2017		1996	2017
Active	0.775	0.743		0.778	0.798
Student	0.106	0.150		0.070	0.088
NEET (15-24) (a)	0.232	0.220		0.241	0.175
Age	37.0	38.5		38.1	40.1
Year of birth	1959.0	1978.5		1957.9	1976.9
Race black	0.099	0.123		0.015	0.030
Race other	0.049	0.108		0.040	0.103
Hispanic	0.152	0.204			
Foreign born	0.150	0.192		0.078	0.177
Foreign national	0.094	0.102		0.047	0.142
Education low	0.202	0.156		0.359	0.164
Education medium	0.581	0.545		0.442	0.447
Education high	0.218	0.299		0.199	0.388
Household single alone	0.272	0.312		0.260	0.283
Household single cohabiting	0.020	0.043		0.054	0.121
Household married alone	0.009	0.013		0.016	0.003
Household married cohabiting	0.565	0.510		0.557	0.487
Household separated alone	0.025	0.019		0.024	0.023
Household separated cohabiting	0.002	0.003		0.004	0.003
Household divorced alone	0.082	0.070		0.052	0.048
Household divorced cohabiting	0.012	0.018		0.019	0.023
Household widowed alone	0.012	0.011		0.013	0.009
Household widowed cohabiting	0.001	0.002		0.001	0.001
Number of children	0.953	0.950			
Household child under 2 (b)	0.080	0.065		0.078	0.074
Household child 2-4 (c)	0.090	0.084		0.114	0.116
Household child 5-9 (d)	0.105	0.104		0.173	0.182
Household child 10-15 (e)	0.105	0.111		0.210	0.206
Health bad	0.092	0.097		0.152	0.139
Home owned	0.664	0.645		0.729	0.646
Home owned outright				0.154	0.199
Home owned mortgage				0.576	0.447
Rural	0.220	0.172			
Unemployment rate (regional or state level)	0.061	0.048		0.084	0.045
GDP per capita (national currency)	29615	58081	(2016)	15526	30850
Minimum wage (% of GDP per capita) (f)	0.154	0.147	(2016)	0.000	0.233
Social expenditure family (% of GDP) (g)	0.5	0.7	(2016)	2.2	3.8
Social expenditure total (% of GDP) (h)	14.8	19.3	(2016)	18.1	21.5
Maternity total protected (weeks) (i)	12	12	(2016)	40	70
Maternity total paid (weeks) (j)	0	0	(2016)	18	39
Paternity total specific (weeks) (k)	12	12	(2016)	0	20
Paternity total specific paid (weeks) (l)	0	0	(2016)	0	2
AFDC/TANF/SNAP(m)	29.3	21.2	(2016)		
SSI federal (n)	16.4	13.4	(2016)		
EITC2max (o)	124.0	102.0	(2016)		
EITC state (p)	0.027	0.160	(2016)		

[a] Not in employment, education or training.
[b] UK: presence of children below 2. US: youngest child below 2.
[c] UK: presence of children aged between 2 and 4. US: youngest child aged between 2 and 4.
[d] UK: presence of children aged between 5 and 9. US: youngest child aged between 5 and 9.
[e] UK: presence of children aged between 10 and 15. US: youngest child aged between 10 and 15.
[f] UK: national minimum wage. US: state minimum wage. Normalised by GDP per capita (000).
[g] Social expenditures on family policies (% of GDP).
[h] Social expenditures, total (% of GDP).
[i] Maximum weeks of job-protected maternity, parental and home care leave available to mothers, regardless of income support.
[j] Total weeks of paid maternity, parental and home care payments available to mothers.
[k] Total weeks of leave reserved for exclusive use by the father.
[l] Total weeks of paid leave reserved for exclusive use by the father.
[m] Combined monthly maximum AFDC/TANF and Food Stamps benefits for a 4-person family. Normalised by GDP per capita and multiplied by 1,000.
[n] EITC maximum credit for 2 dependents. Normalised by GDP per capita (000).
[o] Monthly maximum federal SSI benefits for individuals living independently. Normalised by GDP per capita (000).
[p] State EITC rate as percentage of Federal credit.

Sources: UK LFS Q2; March CPS; OECD Family and Social Policy databases; University of Kentucky Center for Poverty Research, UKCPR National Welfare Data 1980-2016.

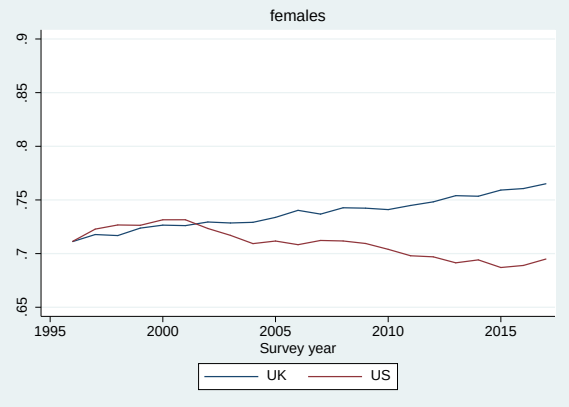
In the econometric analysis we focus on the non-student population only. Figure 5 compares the participation rates for the overall population and the non-student population, by gender and country. After filtering out the students, the trends remain substantially unchanged: in the US, the aggregate male participation rate is slightly decreasing, while the female participation rate is roughly constant; in the UK, the male participation rate is roughly constant, while the female participation rate is steadily increasing.

Figure 5: Labour force participation rates: overall population vs. non-students.

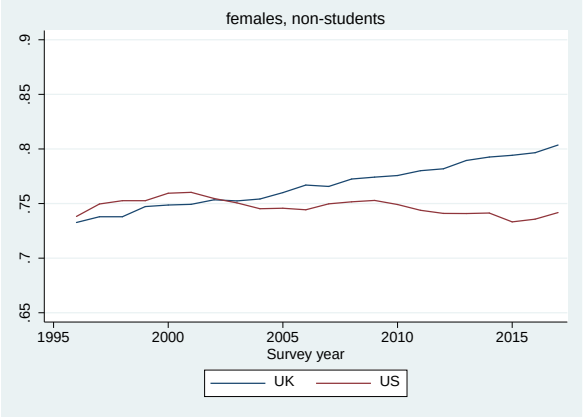


(a) Males, 16-64

(b) Males, 16-64 and non-students



(c) Females, 16-59



(d) Females, 16-59 and non-students

6. Multivariate analysis

With these data, we estimate logistic regression models including the following control variables:

- *Demography*: age (squared polynomial), cohort (squared polynomial)[10], race (white, black or other), ethnicity (US only: Hispanic or other), country of birth (foreign or domestic), citizenship (foreign or domestic).
- *Education*: low, middle or high.
- *Household type*: marital status (single, married, separated, divorced or widowed), interacted with cohabitation (presence of a partner).
- *Children*: age of children (US only: number of children).
- *Health*: self-reported bad health status.
- *Home ownership*: rent or ownership (UK only: presence of a mortgage).
- *Geography*: 20 regions for the UK, 56 FIPS codes for the US, plus an urban/rural indicator for the US.
- *Business cycle*: regional unemployment rate, post-crisis (2009 onwards) dummy.
- *Policies*: minimum wage, characteristics of family policies (number of weeks of maximum and parental leave and number of weeks of paid parental leave, for both men and women), amount of social expenditures in % of GDP, additional indicators for the generosity of the AFDC/TANF/Food Stamp/EITC/SSI programs for the US.
- *Time interactions*: year interacted with health status and education. This allows the effects of health and education to vary over time, with a linear trend.

[10] Cohort is measured in years from 1900, to reduce the collinearity between cohort and cohort squared.

Since there is no longitudinal variation in the family policies measures at the federal level in the US, these are excluded for the US. To measure the business cycle we prefer the unemployment rate over other measures like the gap between GDP and potential GDP (as employed by Aaronson et al., 2012), as the unemployment rate has regional variation.

Age, period and cohort effects are disentangled at this point by means of parametric assumptions. Specifically, age and cohort are assumed to enter with a quadratic specification, while period effects are proxied by the business cycle. The advantages and disadvantages of this versus alternative approaches are discussed in Section 7.

The model is estimated separately by gender and country for non-students only, and the results are reported in Table 2. The baseline is a white individual with middle education living in London (UK) or urban California (US), and renting.

Table 2: Logit estimates of the probability of being in the labour force. Students excluded.

	(1)		(2)		(3)		(4)	
	US		UK		US		UK	
Variables	M 16-64		M 16-64		F 16-59		F 16-59	
Age	0.123	***	0.178	***	0.076	***	0.156	***
Age squared	-0.002	***	-0.003	***	-0.001	***	-0.002	***
Year of birth	0.029	***	0.047	***	0.034	***	0.056	***
Year of birth squared	0.000	***	0.000	***	0.000	***	0.000	***
Race black	-0.479	***	-0.315	***	0.174	***	0.231	***
Race other	-0.367	***	-0.447	***	-0.109	***	-0.712	***
Foreign born	0.311	***	0.222	***	0.003		-0.063	***
Foreign national	0.112	***	-0.082	***	-0.519	***	-0.043	***
Hispanic	0.111	***			0.105	***		
Education high	-31.25	***	-4.44		-24.42	***	10.35	***
Education low	3.050		5.772	*	-13.140	***	25.070	***
Health bad	-8.532	**	-47.640	***	29.210	***	0.993	
Year x health	0.003	*	0.023	***	-0.015	***	-0.001	
Year x education high	0.016	***	0.002		0.012	***	-0.005	***
Year x education low	-0.002		-0.003	*	0.006	***	-0.013	***
Household single cohab	0.735	***	0.617	***	0.191	***	0.212	***
Household married alone	0.639	***	0.804	***	-0.050	*	-0.167	***
Household married cohab	0.899	***	0.730	***	-0.384	***	-0.141	***
Household separated alone	0.443	***	0.361	***	0.200	***	0.037	*
Household separated cohab	0.548	***	1.030	***	0.063		0.399	***
Household divorced alone	0.486	***	0.307	***	0.315	***	0.206	***
Household divorced cohab	0.793	***	0.689	***	0.197	***	0.300	***
Household widowed alone	0.133	***	0.238	***	-0.431	***	-0.084	***
Household widowed cohab	0.351	***	0.544	***	-0.248	***	0.059	
Household child under 2	0.041		-0.114	***	-0.967	***	-1.479	***
Household child 2-4	0.013		-0.205	***	-0.645	***	-1.283	***
Household child 5-9	0.067	***	-0.225	***	-0.285	***	-0.759	***
Household child 10-15	0.169	***	-0.145	***	0.071	***	-0.429	***
Number of children	0.139	***			-0.094	***		
Home owned	0.068	***			0.182	***		
Unemployment rate	-1.215	***	-0.023		0.615	**	-0.038	
Post-crisis	0.116	***	0.089	**	0.083	***	0.043	
Minimum wage	-0.546		-0.243	*	0.910	***	-0.010	
Social expenditure family	-0.104	**	-0.031		0.091	**	0.005	
Social expenditure total	-0.008		-0.010		-0.021	**	-0.008	
AFDC/TANF/SNAP	-0.014	***			-0.018	***		
SSI federal	0.003				0.022			
EITC2max	0.000				0.000			
EITC state	-0.022				0.019			
Rural	-0.137	***			0.007			
Home owned outright			0.240	***			0.320	***
Home owned mortgage			1.232	***			1.056	***
Maternity total protected			-0.007	***			-0.008	***
Maternity total paid			0.006	***			0.000	
Paternity total specific			0.007	*			0.007	***
Constant	1.127	***	-0.792		0.461	**	-3.431	***

Observations	1063351	718417	1053301	704235
chi2	97216	120525	79867	120176
P	0.000	0.000	0.000	0.000
r2_p	0.239	0.364	0.118	0.246

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The baseline is a medium education white individual, single and not cohabiting, living in urban California (US) or central London (UK), and renting. Cohort is measured subtracting 1,900 from year of birth. State (US) and NUTS1 (UK) regional dummies included.

Figures 6a-d show the actual versus estimated participation rates, for the population of non-students: apart from the age group 16-19, where the population of non-students is very small, the goodness of fit is in general high.

Figure 6a: Observed vs. fitted participation rates, US males. Coefficients as in Table 2.

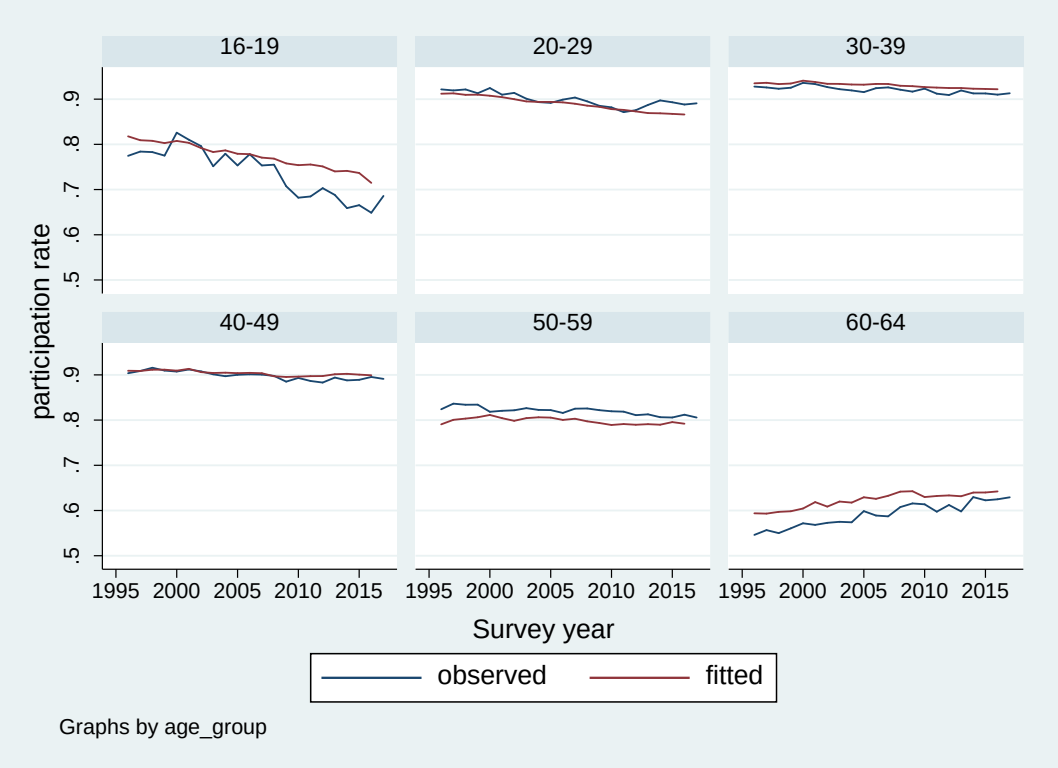


Figure 6b: Observed vs. fitted participation rates, UK males. Coefficients as in Table 2.

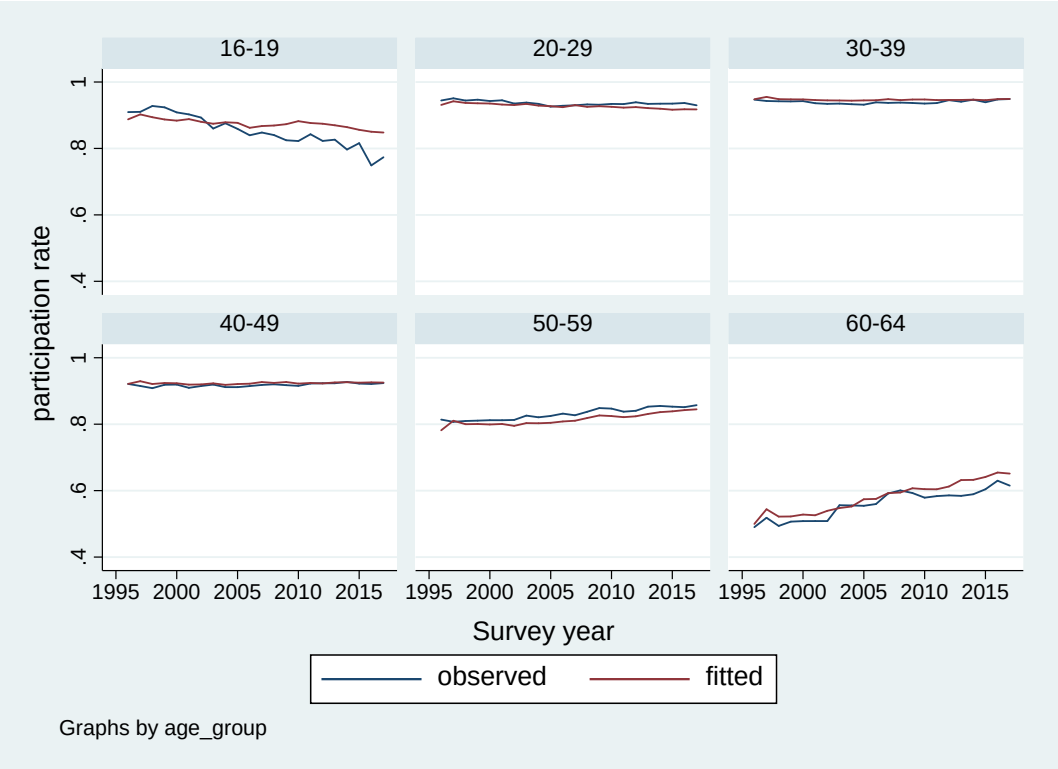


Figure 6c: Observed vs. fitted participation rates, US females. Coefficients as in Table 2.

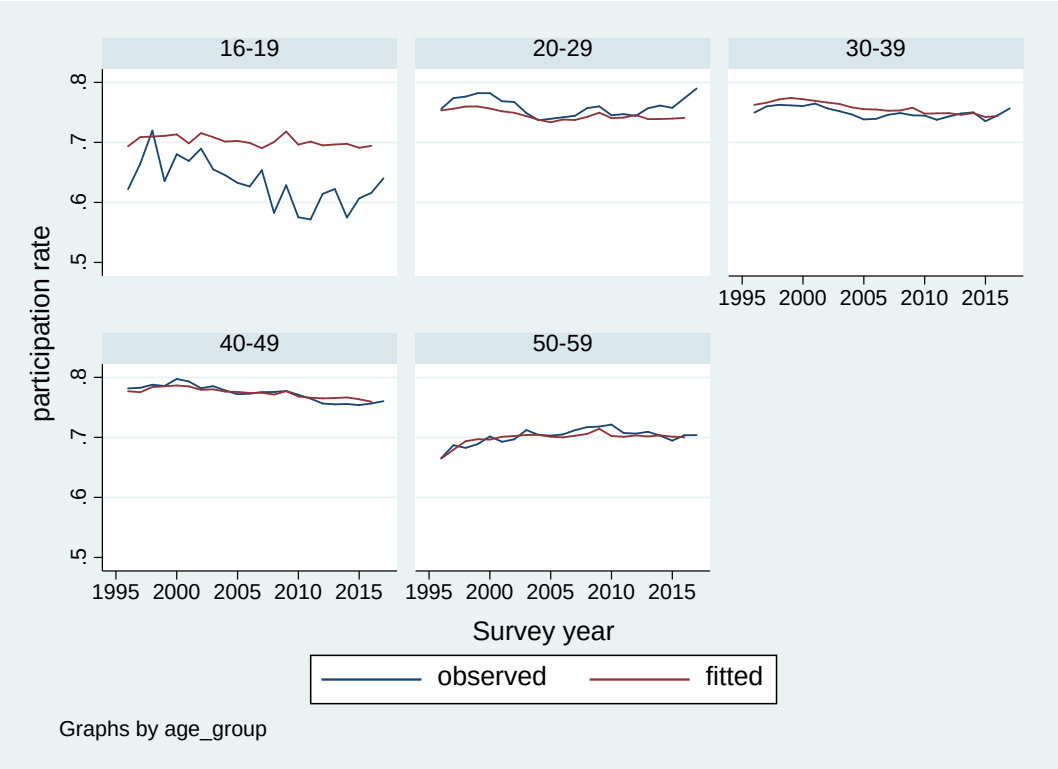
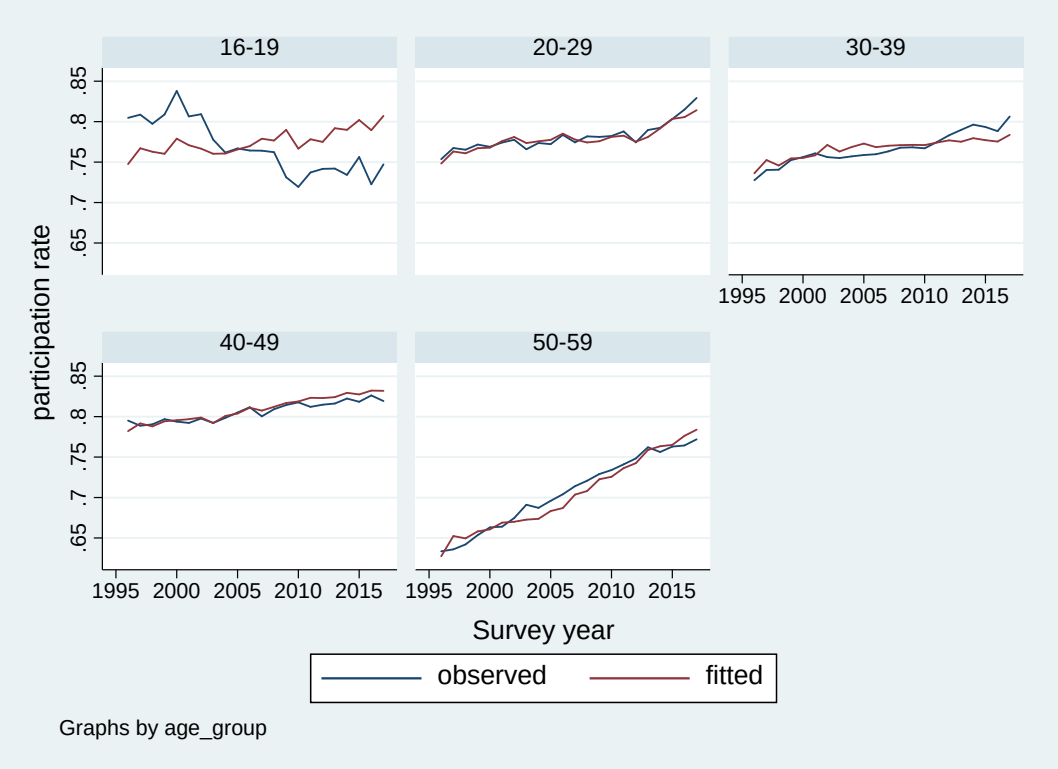


Figure 6d: Observed vs. fitted participation rates, UK females. Coefficients as in Table 2.



Most of the estimated effects in Table 2 go in the expected direction. In both countries, being black reduces *ceteris paribus* participation for males, and increases it for females. By contrast, male immigrants (born outside the country) are more likely to be in work in both countries, *ceteris paribus*, whereas for women that effect is insignificant in the US and negative in the UK. Hispanics participate more in the US, whether male or female. Living with a partner outside marriage increases participation for both genders, compared to living alone, while marriage increases participation for males and decreases it for females. Being separated or divorced increases participation for both genders. Widowhood increases participation for males, and decreases it for females. Home ownership is associated with increased participation, and in the UK (whether outright owners versus those with mortgages can be distinguished) this is most pronounced in presence of a mortgage; it should be noted though that causality could well go the other way round, from participation to home ownership.[11]

[11] This could also be a concern for other variables, if less clear-cut. For instance, not participating in the labour market could affect self-perceived health status, while participation could sometimes be a positive for the likelihood of marriage.

Amongst the most striking country differences, having older children in the household increases participation for males in the US but decreases it in the UK; female participation is generally reduced by children in both countries. Business cycle conditions seem to matter only in the US, decreasing participation for males and increasing it for females. The positive post-Crisis dummy variable we find in the US case goes against the narrative of a negative structural break taking place around that time in the US; any such effect is more muted in the UK though still positive for men. The minimum wage, normalised by GDP per capita, has a positive effect for females in the US; in all other cases it is either not significant or only weakly so. Expenditure on family policies at the national level have a negative impact on participation for males and a positive impact for females, but only in the US, while higher AFDC/TANF benefits and Food Stamps are associated with lower participation for both males and females there. Greater maternity leave is associated with slightly lower female participation in the UK, while the opposite is the case for paternity leave. (Such a relationship cannot be probed for the US as there is no variation in the duration of leave periods across the sample).

Table 3 brings out that, after taking into account the interaction with time, high education has a positive effect on participation, although for men in the UK the effect is very limited, and low education has a negative effect throughout. Bad (self-reported) health has a negative effect on participation. The positive effects of high education are increasing over time in the US, both for males and females, while they are much more constant in the UK. The negative effects of low education do not vary much over time in either country. The negative effects of bad health remain more or less constant over time for US males and UK females, whereas they get smaller (less negative) for UK males, and larger (more negative) for US females. So in the US case, where the relationship between health and participation for men has been such a focus in recent debate, there is no evidence that those in bad health have become less likely to participate over time – it is only for women that any such pattern is seen.

Table 3: Effects of education and health over time.

		Males				Females			
		US		UK		US		UK	
Case	Reference category	1996	2017	1996	2017	1996	2017	1996	2017
Education High	Education Medium	0.29	0.62	0.04	0.08	0.33	0.59	0.57	0.47
Education Low	Education Medium	-0.58	-0.62	-0.40	-0.46	-0.80	-0.67	-0.48	-0.75
Health Bad	Health Good	-2.16	-2.10	-2.73	-2.26	-1.33	-1.65	-1.90	-1.93

Note: the table reports the contribution to the logit score from Table 2.

6.1 Age and cohort effects

A natural way to visualise age and cohort effects, given our econometric specification, is to look at the contribution of age and cohort respectively to the logit score:

$$logit(\pi_i) = log\frac{\pi_i}{1-\pi_i} = x_i\beta. \quad (5)$$

where π_i is the probability of the event (in our case, participation). Note that the logit transformation function, while linear in the covariates and the coefficients, is S-shaped with respect to the probability of the event. The non-linearity of the logit function means that the same increase in the logit score has a different impact on the estimated probability depending on the starting value of the score. More specifically, changes in the logit score have a stronger impact for individuals with a probability to participate in the range of 40-60%, well below the average participation rates in both countries, for both men and women.

To take this into account, we compute the estimated participation probabilities for different ages and cohorts respectively, at the average values of all other covariates. These age and cohort profiles should not be interpreted as average participation rates: they are highly hypothetical counterfactuals. For instance, they assume that individuals have at the same time high, medium and low education, in proportion to the share of individuals with high, medium and low education observed in the data. All mutually exclusive categorical variables, which in the data are expressed with a 0-1 dummy variable, have intermediate values in this exercise: not only education, but also marital status, health status, etc. Moreover, all characteristics are kept constant across ages and cohorts. This means for example that we assume the same ("mixed") marital status irrespective of age, or cohort. However, this is the only way to provide a meaningful quantification of the age and cohort effects, in our specification, and provides a benchmark of interest.

Figure 7 plots the predicted participation rates at average values of all other covariates. Because participation at older ages is generally lower, the age effect becomes increasingly more detrimental for the US, relative to the UK, at older ages.

Figure 7: Estimated age effects: Participation probability at average values of other variables.

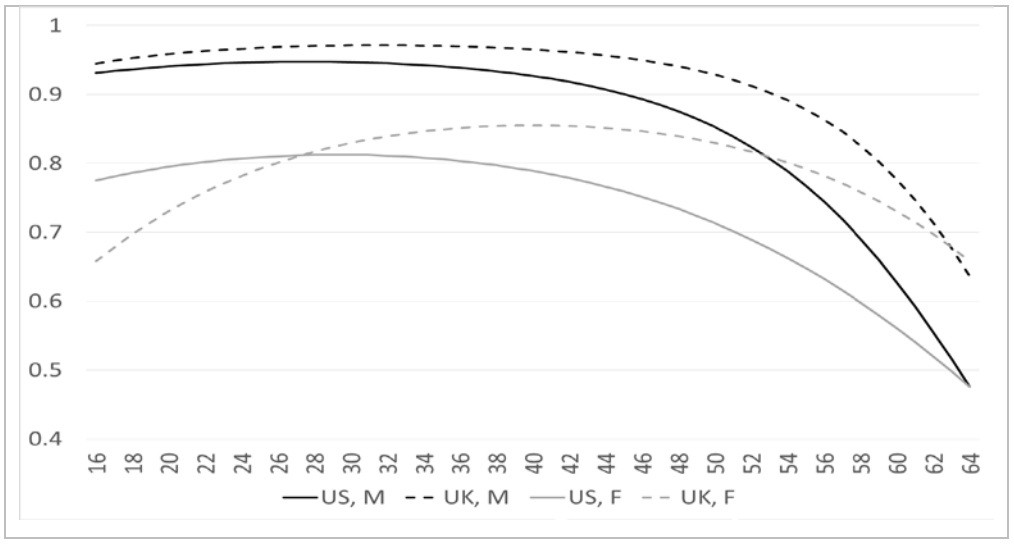
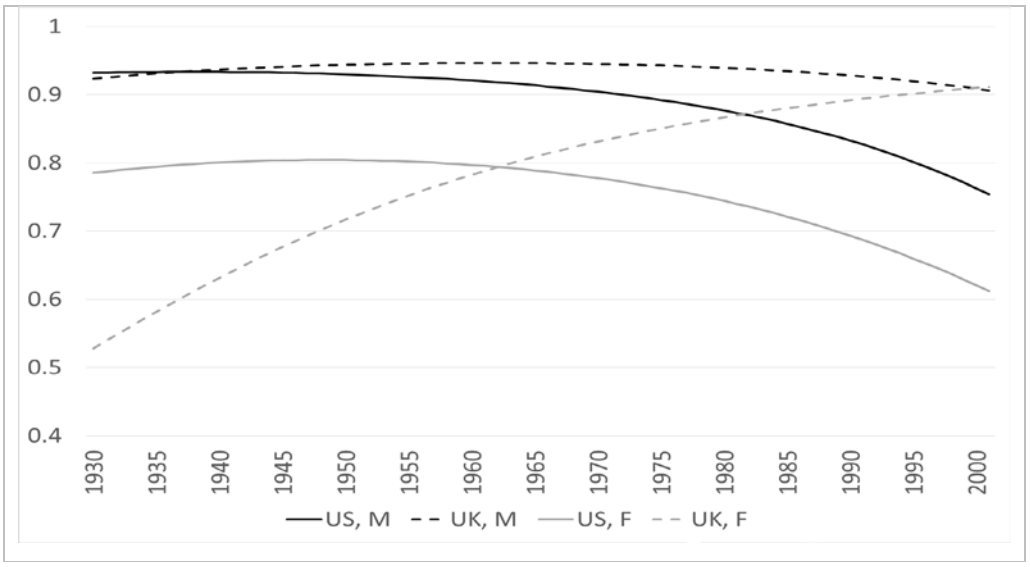


Figure 8 depicts the cohort effects, analogously to Figure 7, plotting the predicted participation rates by cohort at average values of all other covariates.

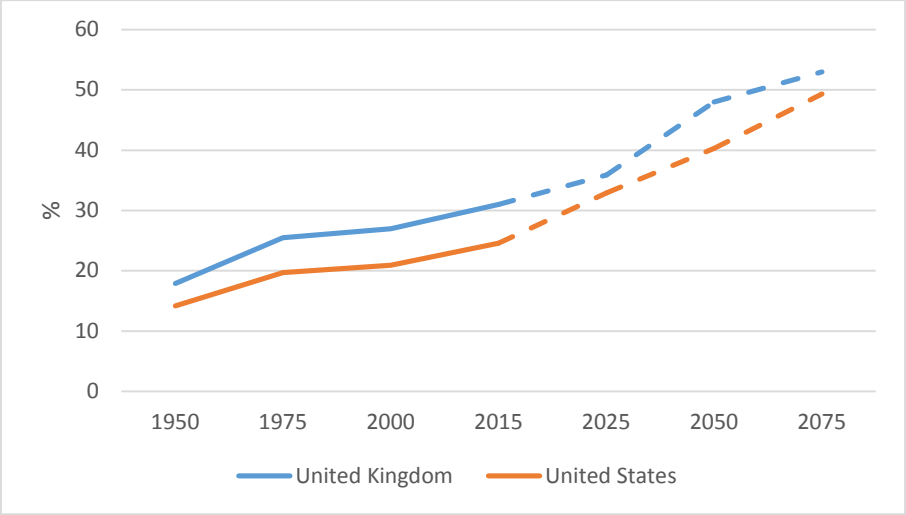
Figure 8: Estimated cohort effects: Participation probability at average values of other variables.



Cohort effects are quite flat for men in the UK, while in the US they point downwards. Even more prominently, cohort effects for women are trending upward in the UK, while downwards in the US. Although the decline in participation rates in younger cohorts is perceived mainly as a male problem in the US debate, when looked at through our comparative lenses it turns out to be even stronger for women.

The differences in the estimated age and cohort effects in the two countries have important implications with respect to population ageing. Both countries are experiencing rapid population ageing, as the Baby Boom generation progresses in its life cycle, but the population structure is and will remain more biased towards older ages in the UK, as Figure 9 illustrates.

Figure 9: Demographic old-age dependency ratios. Historical and projected values, 1950-2075.



Source: OECD (2017).

This should put more pressure, *ceteris paribus*, on participation rates in the UK. However, the decline in the participation with age is lower in the UK, as shown in Figure 7. Moreover, given the cohort effects depicted in Figure 8, a negative selection effect operates in the US, as the older cohorts which are exiting the labour market have a relatively high participation rate vis-a-vis younger cohorts. In the UK, on the other hand, male participation rates in older cohorts are only slightly higher, *ceteris paribus*, than in younger cohorts, and female participation rates are significantly lower. Hence, the selection effect is negligible for males,

while it is positive for females. In conclusion, while ageing is more pronounced in the UK than in the US, our estimates show that the UK is better equipped to deal with it.

To summarise, the results of our multivariate analysis confirm the divergence in participation patterns between the US and the UK observed in the raw data. This divergence, contrary to the popular narrative that sees a specific participation problem for US males, is particularly marked for the female population. In the next section we elaborate on model specification choices we have made, and in particular on our treatment of the period effects, the specific effects of time on top of age and cohort, which play a key role in interpretation of the observed trends over time.

7. Distinguishing age, period and cohort effects: assessing the strategy adopted

It was noted earlier that one of the principal challenges in interpreting what underlies the observed patterns of labour force participation is distinguishing the effects of age, period and cohort. Labour force participation varies with age, generally rising to middle age and then declining; it may differ from one age group or cohort to another, so that for example at a given age more of those born in 1955 than 1935 are in the labour force; and participation may be higher in one time-period than another, for various reasons including the state of the economy and structural factors. This is an analytical problem that arises in a very wide range of contexts, with which social science has struggled. As it is well known, age, period and cohort effects are not separately identifiable, given that

$period = cohort + age$	(6)

In our analysis we have followed a parametric strategy according to which age and cohort enter the specification with a second order polynomial, while period effects are entirely captured by macroeconomic variables (the regional unemployment rate and a shifter for before/after the financial crisis). In this way, we can identify both the linear and the quadratic effect of age and cohort, up to a constant. Moreover, this lean specification allows us to identify the effects of policies on top of the business cycle, though these also include additional unknown period effects which are not captured by our macroeconomic variables.

To assess this specification choice, we can compare it with a fully saturated model, where dummies are introduced for each region-period interaction. This allows the period effects to differ across regions in a flexible way, but it comes at two costs: (i) the first order (linear)

effects of cohort and age are no longer identifiable, and (ii) the effects of policies are also no longer identifiable. Moreover, the degrees of freedom of the model increase enormously (with 50 states in the US and 22 periods, we introduce 1,100 extra variables). Ultimately, the choice is between measuring imprecisely the effects of policies in our baseline model, by being unable to disentangle the residual period effects, and measuring imprecisely the period effects in the saturated model, by being unable to disentangle the effects of policies. An intermediate option is to assume that period effects are homogenous across regions, and introduce (non-interacted) time dummies in the model. This allows one to identify the effects of policy *differentials* when policies have regional variation (i.e. in the US only) with respect to some benchmark - either the national average, or some specific region. However, the linear age and cohort effects are still not identifiable, and only the curvature of the age and cohort profiles, which is an object of lesser interest, can be analysed.

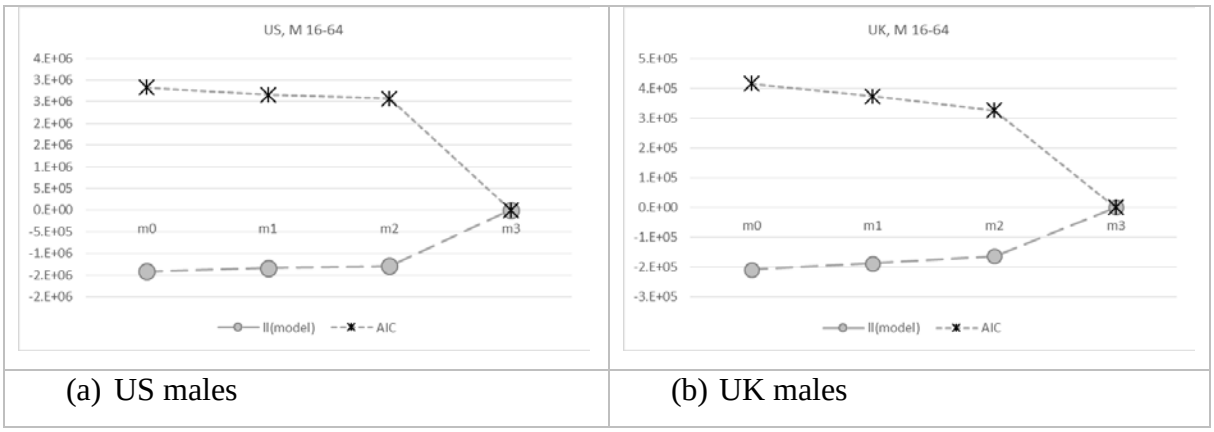
As (i) we are mostly interested in the first order effects of age and cohort; (ii) we have a large number of controls at the individual and regional level that could in principle explain part of the period effects; and (iii) we want to be able to say something about the effects of policies, we tend to prefer our lean specification. However, to assess how much explanatory power we lose by adopting it, we also run the other models, plus a benchmark model where we do not control for any period effect –that is we exclude all the covariates with only national or regional time variation (the macroeconomic and policy variables). Table 5 summarises the alternative models tested. It highlights the benefits of our lean specification m1: as already noted, this is the only model amongst those considered where the linear age and cohort effects and the policy effects are separately identifiable.

Table 5: Alternative specifications.

Model name	Treatment of period effect	Linear age and cohort effects identifiable	Policy effects identifiable
m0	No period effects	Yes	No
m1	Period effects captured by macroeconomic variables	Yes	Yes
m2	Time dummies	No	only policy differentials in the US
m3	Time*region dummies	No	No

The four models are nested. To further ensure that the estimation sample is the same, we restrict it to 1996-2016 for the US, as policy variables for 2017 are not available for this country.[12] Standard likelihood ratio (LR) tests on the four models above always reject the simpler models vis-a-vis more flexible ones.[13] The ranking does not change when we look at penalised measures of likelihood (AIC and BIC), to take into account the large difference in degrees of freedom. However, as Figure 10 shows, most of the increase in explanatory power comes from moving from m2 to m3, the saturated model, i.e. by allowing for regional differences in period effects. Differences between m1, our baseline model, and m2, the hybrid model, are more modest. While Table 5 highlights the benefits, Figure 10 depicts the costs associated with our lean specification. On the benefits side, we are able to identify age, cohort and policy effects. On the minus side, we lose only little explanatory power with respect to the hybrid model. Taken together, this reinforce our confidence in the trade-off we have made and the strategy we have employed up to this point in estimating and presenting a model that captures key influences on participation.

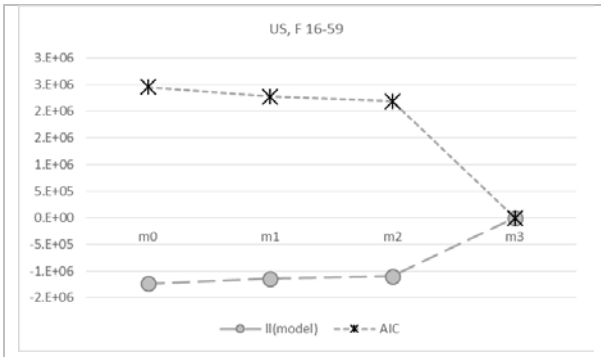
Figure 10: Goodness of fit, alternative models.



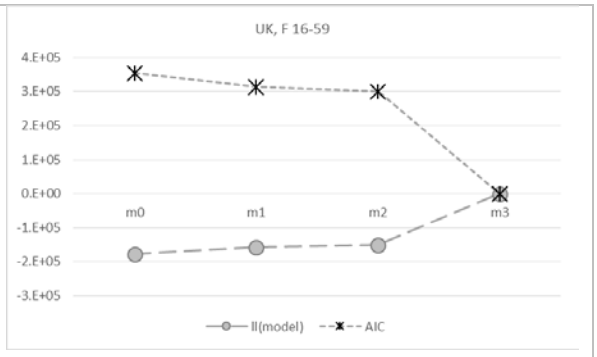
(a) US males (b) UK males

[12] Results for models m0, m2 and m3 are available upon request. The results for a model using the m2 specification on common variables only are presented in Table A.4 (see Section 8).

[13] The LR test relies on asymptotic theory, which could be unsatisfactory in m3 given the high degrees of freedom. To be consistent with the asymptotic nature of the test we use the standard asymptotic estimator, based on the observed information matrix, for the variance-covariance matrix, rather than the robust or sandwich estimator we use in our baseline analysis.



(c) US females



(d) UK females

Note: Each panel reports the log likelihood (ll) of the models and the Akaike Information Criterion (AIC), normalised by the values achieved by the best fit (m3). Higher is better for ll, while lower is better for AIC. Models as in Table 5.

8. US vs. UK: Oaxaca decomposition

We are particularly interested in understanding the relative importance of differences in the composition of the population (endowments) versus differences in behaviour (as reflected in the estimated coefficients in our models) in explaining the different trajectories of participation in the US and the UK. For example, are these driven by changes in the age or education profile of the working-age population, or by changes in the likelihood that someone of a given age and education will be participating? We explore this by means of an Oaxaca decomposition exercise for logit models, the standard approach employed in such contexts. We follow Jann (2008) and decompose the difference in the linear prediction in participation rates - that is, in log odds - as:

$$
\begin{aligned}
R &\equiv E(Y_{UK}) - E(Y_{US}) \\
&= [E(X_{UK}) - E(X_{US})]'\beta_{US} \\
&+ E(X_{US})'(\beta_{UK} - \beta_{US}) \\
&+ [E(X_{UK}) - E(X_{US})]'(\beta_{UK} - \beta_{US}) \\
&= E + C + I
\end{aligned}
\qquad (7)
$$

The first term, $[E(X_{UK}) - E(X_{US})]'\beta_{US}$, accounts for the difference in endowments; the second term, $+E(X_{US})'(\beta_{UK} - \beta_{US})$, accounts for the difference in coefficients, while the third term accounts for an interaction effect. The decomposition is viewed from the point of view of the US.

In order to perform this exercise, we need to adopt a common specification for the two countries, and use common definitions as much as possible. We therefore drop from our model all regional dummies, the rural indicator and the number of children for the US, and create dummies for home ownership and age of youngest child for the UK. We also exclude our health indicator at this point, as we cannot say whether the difference in the proportion of people with bad health in the two countries (see Table 1) is due to a true difference in characteristics, or reflects the difference in the way the indicator is framed. Finally, we are forced to drop all state-level policy variables for the US, and family policy variables at the national level, which have variation only for the UK. This leaves us with a very crude representation of the policy environment –with only minimum wage and social and family expenditure information, both at the national level. This is unsatisfactory especially in the US where state-level policies have a great deal of variation, and changes the terms of the trade-off in model specification as discussed in Section 7. Hence, we opt for estimation of a model in the spirit of m2, with time dummies and macroeconomic (unemployment rate) differentials.[14] Finally, we restrict our sample to 1996-2016, as social expenditure variables for 2017 are not available (at the moment of writing) for the US. To see whether the importance of covariates and coefficients has changed over time, we estimate the model separately for the two sub-periods 1996-2007 and 2008-2017. (The estimation results for this common specification are reported in Appendix 1.)

Table 6a presents the results for men, showing for each sub-period the contribution of endowments, coefficients and interaction between them to the estimated difference in participation rates between the UK and the US. Between 1996 and 2007, there was almost no average participation gap between the two countries, with the participation rate being a mere 0.14 percentage points higher. We see that composition effects work to lower the participation gap from a US perspective – in other words, "endowments" of the working-age population are more positive for participation there, so that predicted participation on that basis would be higher. This is almost exactly offset by negative behavioural effects ("coefficients"), however, which serve to widen the participation gap from a US perspective. These two offsetting effects underpin the almost identical levels of participation observed.

[14] The model differs from m2 as it includes only common variables.

For the 2008-2017 period, by contrast, the average participation gap had become substantial, with participation more than 3 percentage points higher in the UK. This reflects the fact that the positive effect of endowments for the US (in reducing this gap) fell markedly over time to effectively disappear, while the negative effect of coefficients (in widening the gap) also increased substantially over time (from 1.8 to 3.9 percentage points). Assuming interaction effects are equally attributable to both endowments and coefficients, endowments account for 46% of the overall deterioration in male participation rates, while coefficients account for the remaining 54%.

When looking at the importance of each covariate in the bottom part of the table, we must bear in mind that the effects of age, cohort and period, given the inclusion of time dummies, are identified only up to a constant (which can be arbitrarily added to either age, cohort, or any combination of the two, or attributed to the dummy for the reference year, see Table 2). We therefore group together the three effects, which also include the effects of policies, under the heading 'APC'. The main explanation for why composition effects were favourable to the US in the first sub-period, but became negligible in the second sub-period, relates to the education profile of the working-age population. The US started with a lower share of individuals with low education but the UK reduce this share faster, so that the two shares converged over time (as documented in Table 7 below). As far as the effects of behavioural are concerned, the fact that these turned increasingly against the US reflects a turnaround with respect to the likelihood of participation for married men, which reduced the gap in the earlier period but widened it in the later one, together with a reduction in the containment effect of age, period (including policies) and cohort, and a variety of small changes in the contribution of other coefficients. Changes in the effect of high education on participation, on the other hand, served to reduce that gap. The lower impact of home ownership on the propensity to participate in the US had a large effect on the participation gap throughout, but did not change substantially between the two periods.

Table 6a: Oaxaca decomposition of the estimated US participation gap, males.

Males, 16-64	1996-2007		2008-2017	
UK mean	87.2%		87.8%	
US mean	87.1%		84.7%	
difference UK-US (pp)	0.14		3.12	
of which:				
endowments (pp)	-1.75		-0.04	
coefficients (pp)	1.83		3.86	
interaction (pp)	0.06		-0.70	
	endowments	coefficients	endowments	Coefficients
Overall (pp)	-1.75	1.83	-0.04	3.86
Contribution of each covariate (pp):				
APC	-0.77	-1.04	-0.01	-0.25
Race black	0.78	0.46	-0.05	0.44
Race other	0.03	-0.06	0.00	-0.08
Foreign born	-0.34	0.08	0.02	0.19
Foreign national	-0.08	-0.23	-0.01	-0.26
Education high	-0.12	-0.63	-0.04	-1.34
Education low	-1.50	0.27	0.07	0.16
Household single cohab	0.61	0.01	-0.06	0.07
Household married alone	-0.14	0.05	0.01	0.06
Household married cohab	-0.29	-1.08	0.03	0.69
Household separated alone	-0.00	-0.02	-0.00	0.09
Household separated cohab	0.02	0.01	-0.00	0.03
Household divorced alone	-0.27	-0.13	0.01	0.11
Household divorced cohab	0.11	0.00	-0.00	0.08
Household widowed alone	0.00	0.00	0.00	0.02
Household widowed cohab	0.00	0.00	-0.00	0.00
Household child under 2	-0.00	-0.27	-0.01	-0.25
Household child 2-4	-0.01	-0.36	-0.00	-0.28
Household child 5-9	-0.00	-0.35	-0.00	-0.38
Household child 10-15	0.07	-0.28	-0.00	-0.29
Home owned	0.16	5.41	-0.00	5.07
Unemployment rate difference	-0.02	-0.00	0.00	-0.00

Note: Cells with a positive (negative) contribution to the US participation gap of more (less) than 1 pp are highlighted in red (green).

The corresponding results for females are shown in Table 6b. In the 1996-2007 period the average participation gap was again small, at only 0.17 percentage points. By 2008-2017, the average gap had become even larger than for males, at 4.5 percentage points. The effect of endowments on the gap declined substantially between the two time-periods, reducing the gap from a US perspective by 4 percentage points in the earlier period but only 1 percentage

point by 2008-2017. In the earlier period US women had an even greater advantage over their UK counterparts than men in terms of employment-related characteristics; by the latter period this had fallen by three-quarters though not disappeared. As for men, the causes of the overall deterioration in female participation rates are roughly equally split between endowments (again, 46%) and coefficients (54%). Similar to men, the main contributory factor is the spectacular reduction in the fraction of working-age individuals with low education in the UK, shown in Table 7. However, the increase in the fraction of high-educated individuals in the UK, which is stronger for females than for males as that table illustrates, also played a role. The effect of coefficients in widening the participation gap for women also increased markedly over time, doubling from 3.3 to 6.61 percentage points; this is mainly due to a change in the overall effect of age, period (including policies) and cohort, which reduced the participation gap in the first period, and increased it in the second period.

In order to disentangle age, period and cohort effects, we run additional regressions following our baseline parametric specification (model m0, as in Table 2), separately for the two sub-periods. As already noted, because this specification is not restricted to common variables and common definitions only, it is not suitable for our decomposition exercise. However, it allows us to identify the change in the relative importance of age, cohort and policy effects over time in the two countries. The results confirm an increasing divergence of the age and cohort profiles in the two countries, with age and cohort becoming increasingly more adverse to participation in the US, relative to the UK. This is however a common trend across genders. What is specific to women is the marked increase over time in the incentivising effect of the minimum wage on female participation in the UK, which is not matched by a similar increase in the US.[15] The greater impact of young children on the propensity to participate in the UK contributed to the participation gap throughout, but did not change substantially between the two periods. The same is true for home ownership, as for men.

[15] Results are not shown in the interest of brevity, but are available upon request.

Table 6b: Oaxaca decomposition of the estimated US participation gap, females.

Females, 16-60	1996-2007		2008-2017	
UK mean	75.1%		78.6%	
US mean	74.9%		74.0%	
difference UK-US (pp)	0.17		4.54	
of which:				
endowments (pp)	-4.05		-1.17	
coefficients (pp)	3.26		6.61	
interaction (pp)	0.95		-0.91	
	endowments	coefficients	endowments	Coefficients
Overall (pp)	-4.05	3.26	-1.17	6.61
Contribution of each covariate (pp):				
APC	-0.14	-2.55	0.54	1.14
Race black	-0.15	0.35	-0.11	0.34
Race other	0.01	-0.36	-0.02	-0.69
Foreign born	-0.01	-0.02	-0.05	0.08
Foreign national	0.13	0.36	-0.50	0.64
Education high	-0.23	0.31	1.09	-0.32
Education low	-4.32	0.27	-2.47	-0.03
Household single cohab	0.30	0.06	0.56	0.10
Household married alone	0.02	0.02	0.01	0.00
Household married cohab	0.29	2.54	0.67	2.39
Household separated alone	0.01	-0.01	0.01	0.03
Household separated cohab	0.00	0.01	-0.00	0.02
Household divorced alone	-0.25	-0.11	-0.15	0.12
Household divorced cohab	0.05	0.05	0.02	0.08
Household widowed alone	0.03	0.07	0.13	0.13
Household widowed cohab	-0.00	0.01	0.01	0.02
Household child under 2	-0.02	-0.95	-0.51	-0.87
Household child 2-4	0.01	-1.04	-0.28	-1.08
Household child 5-9	0.02	-0.76	-0.03	-0.69
Household child 10-15	-0.00	-0.51	-0.00	-0.48
Home owned	0.23	5.51	-0.06	5.68
Unemployment rate difference	-0.04	0.00	-0.01	-0.00

Note: Cells with a positive (negative) contribution to the US participation gap of more (less) than 1 pp are highlighted in red (green).

Table 7: Trends in educational attainment by gender.

	Male				Female			
	US		UK		US		UK	
	1996	2017	1996	2017	1996	2017	1996	2017
Education Low	0.210	0.167	0.320	0.182	0.194	0.145	0.399	0.146
Education High	0.229	0.279	0.210	0.366	0.206	0.319	0.189	0.411

Summarising the key messages from this decomposition analysis, we find that the US participation gap is mainly explained by (i) a lower participation propensity associated to home ownership, (ii) the extraordinary performance of the UK in terms of educational attainments, and for females only (iii) a lower participation propensity associated to marriage, mitigated by (iv) a lower penalisation for child bearing. In Appendix 2 we report the results of the same decomposition exercise by age groups, which confirm the general pattern towards less favourable composition effects and more detrimental behavioural effects in the US over the years.

9. Conclusions

This paper has highlighted the marked divergence in labour force participation trends between the US and the UK over recent decades, and sought to learn from in-depth comparison of these two cases about the underlying drivers and how recent US experience is best understood. Our multivariate analysis aimed at disentangling insofar as possible the complex mix of age, cohort, and period effects which underpin the observed trends in participation. This showed that female participation increases much more steeply at younger ages in the UK than in the US, while for both genders participation starts decreasing later in life. Male participation rates for later cohorts, after controlling for other characteristics, are basically flat in the UK, but are trending downwards in in the US. The difference is even more prominent for women, where the cohort effects are positive for the UK, and negative for the US. The ageing of the Baby Boom generation is thus having a greater impact in the US than the UK for two reasons: the decline in participation rates with age is more marked in the US, and the Baby Boom generation is a relatively high-participation generation in the US compared with younger generations, a good deal more so than in the UK, so its gradual exit from the working age population is more detrimental to overall labour force participation

there. While ageing is more pronounced in the UK than in the US, the negative impact on participation is more pronounced in the US.

Dividing our sample into two sub-periods, 1996-2007 and 2008-2017, we decomposed the average difference in participation between the two countries into the difference attributable to 'endowments/characteristics' of the working-age population versus 'behaviour' as reflected in the estimated coefficients on these characteristics in our econometric models. For men, there was a negligible average participation gap between the two countries in the first period, whereas by the second period a substantial gap had emerged. In the first period, the "endowments" of the working-age population were more positive for participation in the US, but this was almost exactly offset by negative behavioural effects. By 2008-2017, the positive effect of endowments for the US in reducing the participation gap had effectively disappeared, while the negative effect of coefficients had also increased substantially. In the earlier period US women had an even greater advantage over their UK counterparts than men in terms of employment-related characteristics; by the latter period this had fallen by three-quarters, and the effect of coefficients/behaviours in widening the participation gap were also greater. For both men and women, the overall deterioration in US participation rates vis-à-vis the UK is quite evenly split between changes in endowments and in coefficients. The main factor in improving the endowments of the working age population in the UK compared with the US is the spectacular reduction in the proportion with low education, while the increase in the proportion who are highly educated also played a role.

The UK has caught up with the USA in terms of educational attainment, but behaviour across the range of endowments has also become relatively more favourable to participation there than in the US. The poor recent performance of the US in terms of participation pre-dates the financial crisis and is not confined to a specific demographic, and policies aimed at specific sub-groups are not likely to be an adequate response.

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Appendix 1

Estimated Participation Model with Common Specification

Table A1a: Logit estimates of the probability of being in the labour force, common specification, males. Students excluded.

	(1) US M 16-64		(2) UK M 16-64		(3) US M 16-64		(4) UK M 16-64	
VARIABLES	1996-2007		1996-2007		2008-2017		2008-2017	
Age	0.094	***	0.066	***	0.123	***	0.154	***
Age squared	-0.002	***	-0.002	***	-0.002	***	-0.003	***
Year of birth	0.038	***	0.087	***	0.007		0.022	**
Year of birth squared	0.000	***	-0.001	***	0.000		0.000	***
Race black	-0.583	***	-0.072		-0.480	***	-0.058	
Race other	-0.492	***	-0.619	***	-0.376	***	-0.489	***
Foreign born	0.347	***	0.408	***	0.442	***	0.556	***
Foreign national	0.189	***	-0.099	***	0.352	***	0.067	**
Education high	-13.91		6.15		-34.72	***	22.41	*
Education low	-25.92	***	13.19	**	-2.11		35.67	***
Year x education high	0.007	*	-0.003		0.018	***	-0.011	*
Year x education low	0.013	***	-0.007	**	0.001		-0.018	***
Household single cohab	0.764	***	0.817	***	0.758	***	0.934	***
Household married alone	0.766	***	1.150	***	0.772	***	1.253	***
Household married cohab	1.115	***	0.884	***	0.941	***	1.085	***
Household separated alone	0.529	***	0.387	***	0.263	***	0.758	***
Household separated cohab	0.670	***	1.358	***	0.454	***	1.513	***
Household divorced alone	0.512	***	0.310	***	0.387	***	0.547	***
Household divorced cohab	0.953	***	0.965	***	0.694	***	1.152	***
Household widowed alone	0.267	***	0.289	***	0.072		0.359	***
Household widowed cohab	0.455	***	0.775	***	0.323	**	0.925	***
Household child2	0.252	***	-0.235	***	0.351	***	-0.120	***
Household child4	0.290	***	-0.298	***	0.288	***	-0.178	***
Household child9	0.270	***	-0.206	***	0.388	***	-0.126	***
Household child15	0.349	***	-0.024		0.416	***	0.038	
Home owned	0.195	***	1.176	***	0.158	***	1.026	***
Unemployment rate diff	-6.934	***	-7.906	***	-3.925	***	-4.687	***
1996	0.034		-0.105	***				
1997	0.070	**	-0.131	***				
1998	0.063	**	-0.186	***				
1999	0.027		-0.166	***				
2000	0.044		-0.165	***				
2001	0.022		-0.198	***				
2002	0.012		-0.192	***				
2003	-0.045	*	-0.122	***				
2004	-0.078	***	-0.148	***				
2005	-0.060	**	-0.139	***				
2006	-0.018		-0.063	**				
2007								
2008					0.025		-0.251	***
2009					-0.032		-0.231	***

2010			-0.017		-0.241	***
2011			-0.081	***	-0.184	***
2012			-0.078	***	-0.139	***
2013			-0.017		-0.106	***
2014			-0.007		-0.057	*
2015			-0.015		-0.050	
2016			0.006		-0.017	
Observations	580,515	444,333	530,802		274,084	
chi2	144667	159295	118940		95339	
P	0.00	0.00	0.00		0.00	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The baseline is a medium education white individual, single and not cohabiting, who is renting. Cohort is measured subtracting 1,900 from year of birth.

Table A.1b: Logit estimates of the probability of being in the labour force, common specification, females. Students excluded.

VARIABLES	(1) US F 16-59 1996-2007		(2) UK F 16-59 1996-2007		(3) US F 16-59 2008-2017		(4) UK F 16-59 2008-2017	
Active								
Age	0.042	***	0.063	***	0.110	***	0.135	***
Age squared	-0.001	***	-0.002	***	-0.002	***	-0.002	***
Year of birth	0.050	***	0.059	***	-0.024	***	-0.005	
Year of birth squared	0.000	***	-0.001	***	0.000	***	0.000	
Race black	0.060	***	0.325	***	0.033	**	0.223	***
Race other	-0.154	***	-0.738	***	-0.177	***	-0.771	***
Foreign born	0.009		-0.003		0.077	***	0.109	***
Foreign national	-0.432	***	-0.025		-0.435	***	0.067	***
Education high	8.42		-2.257		-53.80	***	-0.227	
Education low	-37.16	***	44.29	***	-20.75	**	0.278	
Year x education high	-0.004		0.001		0.027	***	0.000	
Year x education low	0.018	***	-0.023	***	0.010	**	-0.001	
Household single cohab	0.226	***	0.433	***	0.223	***	0.400	***
Household married alone	-0.084	**	0.049		-0.037		-0.031	
Household married cohab	-0.317	***	0.113	***	-0.336	***	0.000	
Household separated alone	0.093	***	0.061	***	0.063	**	0.157	***
Household separated cohab	0.037		0.616	***	-0.015		0.574	***
Household divorced alone	0.288	***	0.186	***	0.152	***	0.251	***
Household divorced cohab	0.238	***	0.529	***	0.132	***	0.421	***
Household widowed alone	-0.449	***	-0.108	***	-0.613	***	-0.084	*
Household widowed cohab	-0.386	***	0.134		-0.234	***	0.249	*
Household child under 2	-1.158	***	-2.259	***	-0.935	***	-1.800	***
Household child 2-4	-0.818	***	-1.871	***	-0.638	***	-1.549	***
Household child 5-9	-0.396	***	-1.010	***	-0.337	***	-0.803	***
Household child 10-15	-0.018		-0.425	***	-0.002		-0.319	***
Home owned	0.267	***	1.082	***	0.255	***	0.947	***
Unemployment rate diff	-4.673	***	-3.742	***	-1.904	***	-2.786	***
1996	-0.011		-0.281	***				
1997	0.042	*	-0.263	***				
1998	0.050	**	-0.242	***				
1999	0.040	*	-0.199	***				
2000	0.074	***	-0.176	***				
2001	0.045	**	-0.161	***				
2002	0.017		-0.146	***				
2003	0.009		-0.147	***				
2004	-0.033	*	-0.123	***				
2005	-0.049	***	-0.080	***				
2006	-0.036	**	-0.015					
2007								
2008					0.172	***	-0.138	***
2009					0.171	***	-0.123	***
2010					0.133	***	-0.123	***
2011					0.071	***	-0.118	***
2012					0.044	**	-0.101	***

2013			0.051	**	-0.040	
2014			0.021		-0.046	*
2015			-0.030		-0.036	
2016			-0.013		-0.032	
Observations	583535	436474	515633		267761	
chi2	109824	116367	87444		76039	
P	0.00	0.00	0.00		0.00	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The baseline is a medium education white individual, single and not cohabiting, who is renting. Cohort is measured subtracting 1,900 from year of birth.

Appendix 2

Oaxaca decomposition by age groups

Tables A2.1a and A2.1b report the overall estimated US participation gap, and its composition in terms of the effect of endowments, coefficients and interaction, for males and females respectively. The estimated US participation gap has increased in *every* age group; it is well above 10 pp for the younger age group, and it has turned positive even for those age groups where participation rates in the US where initially higher than in the UK (males 50-59, females 30-39 and females 50-59). The only exception is for males 60-64, where the US still outperform the UK, albeit by a diminished margin.

Table A2.1a: Oaxaca decomposition of the estimated US participation gap by age group and sub-periods, males.

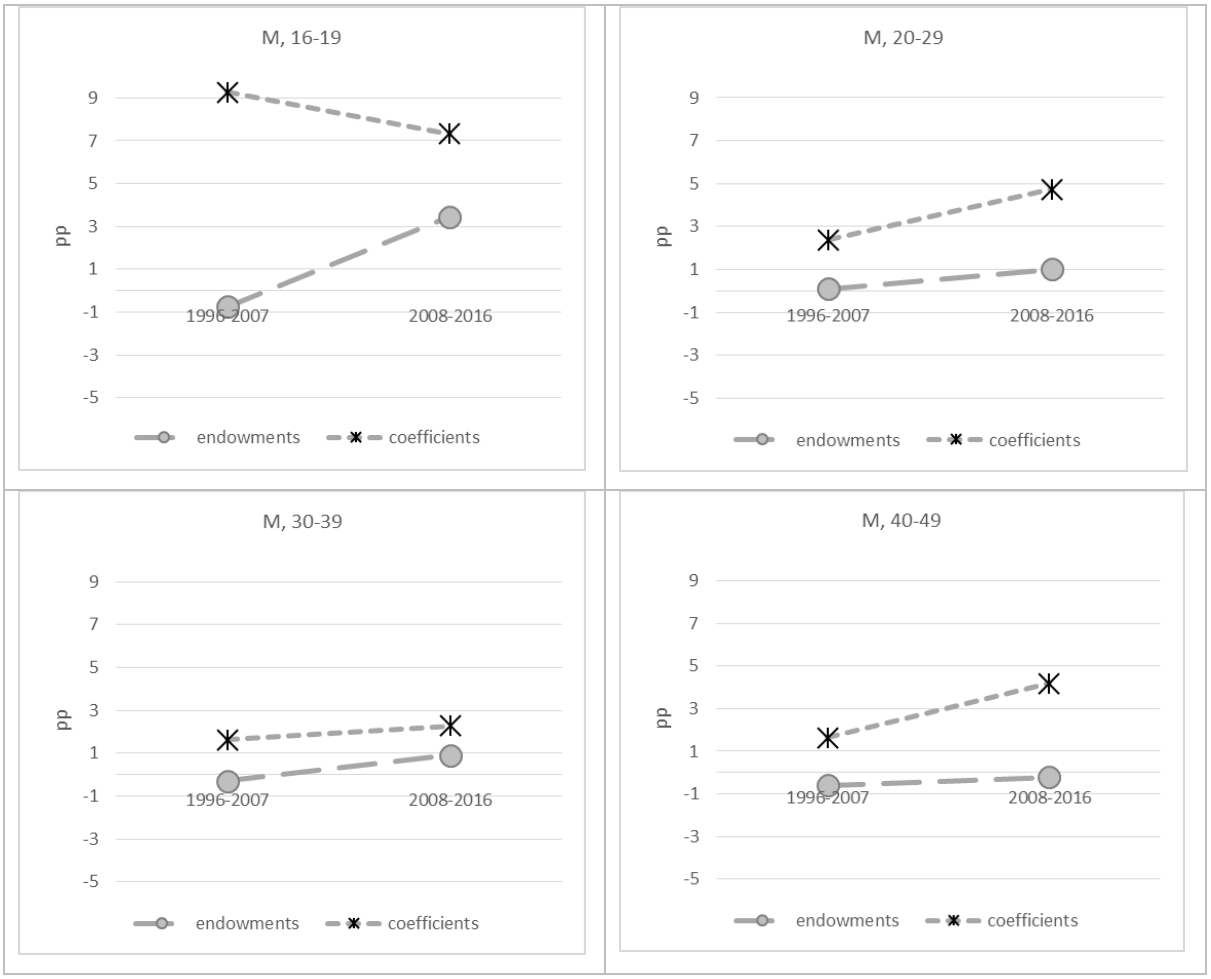
Gender	Male		Male		Male	
age group	16-19		20-29		30-39	
Period	1996-2007	2008-2016	1996-2007	2008-2016	1996-2007	2008-2016
overall (pp)	*10.6*	*12.9*	*3.0*	*4.7*	*1.3*	*2.7*
endowments	-0.7	3.5	0.1	1.0	-0.3	0.9
Coefficients	9.3	7.3	2.4	4.7	1.6	2.3
Interaction	2.1	2.1	0.5	-1.1	0.0	-0.5
Gender	Male		Male		Male	
age group	40-49		50-59		60-64	
Period	1996-2007	2008-2016	1996-2007	2008-2016	1996-2007	2008-2016
overall (pp)	*1.0*	*3.2*	*-0.7*	*3.5*	*-4.1*	*-2.1*
endowments	-0.6	-0.2	-2.7	-0.9	-3.1	-3.9
Coefficients	1.6	4.2	1.5	4.9	-1.6	0.0
Interaction	0.0	-0.8	0.6	-0.5	0.6	1.9

Table A2.1b: Oaxaca decomposition of the estimated US participation gap by age group and sub-periods, females.

Gender	Female		Female		Female	
age group	16-19		20-29		30-39	
Period	1996-2007	2008-2016	1996-2007	2008-2016	1996-2007	2008-2016
overall (pp)	*13.3*	*13.9*	*1.1*	*3.4*	*-0.1*	*3.8*
endowments	2.9	4.8	1.1	0.7	-3.0	-1.2
Coefficients	6.6	7.4	0.0	3.8	3.2	6.4
Interaction	3.9	1.7	-0.1	-1.0	-0.3	-1.4
Gender	Female		Female			
age group	40-49		50-59			
Period	1996-2007	2008-2016	1996-2007	2008-2016		
overall (pp)	*1.4*	*5.5*	*-2.5*	*4.2*		
endowments	-5.3	-1.7	-9.4	-3.2		
Coefficients	5.1	7.8	2.5	7.1		
Interaction	1.7	-0.6	4.4	0.3		

Figures A2.1a (males) and A2.1b (females) offer a visual representation of the contribution of endowments and coefficients to the overall US participation gap. For both males and females, the contribution of endowments was generally negative in the period 1996-2007, but it has approached 0 or even turned positive in the period 2008-2016. The composition of the male population, which used to play in favour of the US in comparison with the UK, is now much more neutral. On the other hand, the contribution of coefficients is always positive, and generally increased over time. Behaviour increasingly plays against the US, in comparison with the UK.

Figure A2.1a: Oaxaca decomposition of the estimated US participation gap by age group and sub-periods, males.



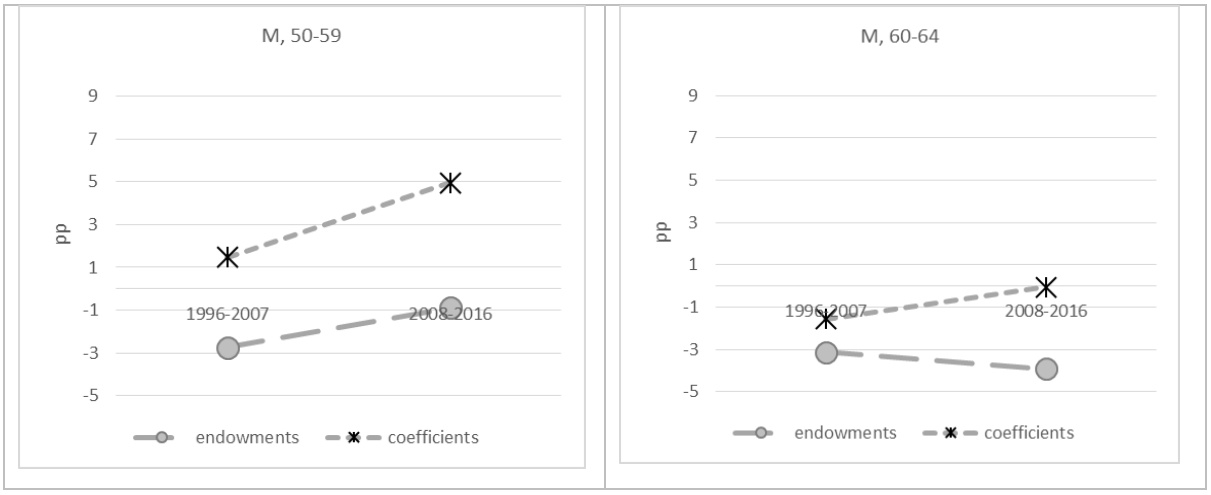
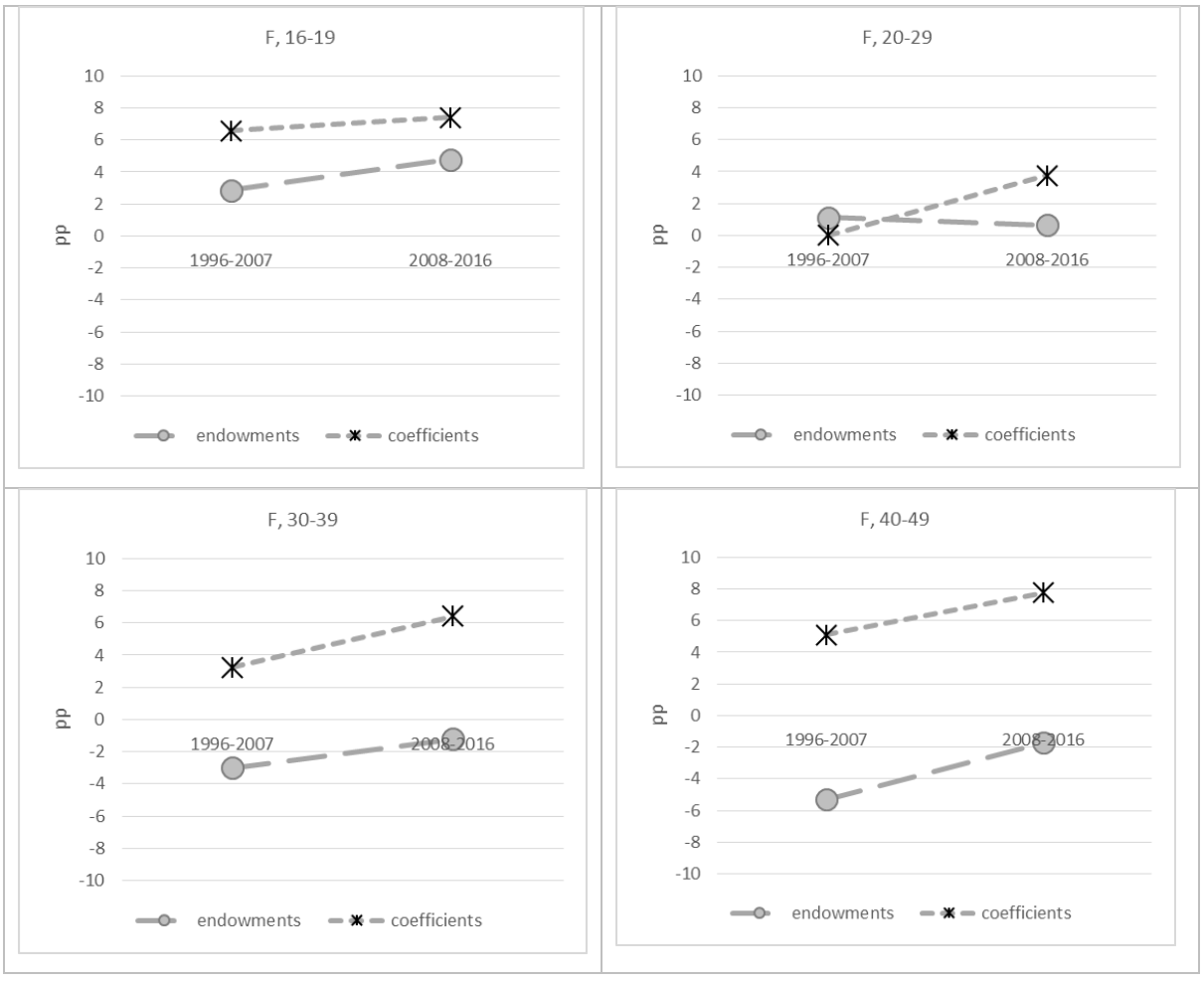
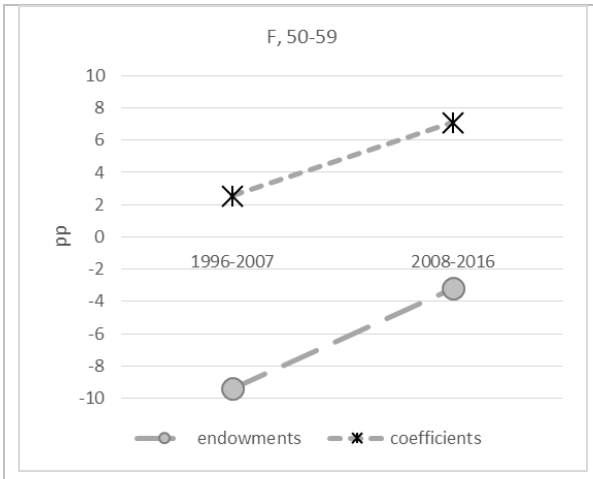


Figure A2.1b: Oaxaca decomposition of the estimated US participation gap by age group and sub-periods, females.




F, 50-59
10
8
6
4
2
0
-2
-4
-6
-8
-10
pp
1996-2007
2008-2016
endowments
coefficients