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UNION MEMBERSHIP PEAKS IN MIDLIFE

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**ABSTRACT**

Using data from 68 countries on over 8 million respondents over forty years we show union membership peaks in midlife – usually around workers’ late 40s or early 50s. In doing so we extend Blanchflower’s (2007) earlier study, incorporating a further 39 countries and another decade or so of data. We also found it in every US state and the District of Columbia as well as across industries. The fact that this relationship exists in virtually every country across the world challenges a key precept in industrial relations, namely that institutions matter: they appear to matter little, at least in the case of the hump-shaped relationship between unionization and age. The union membership rates at the age peak in the United States and the United Kingdom have lowered over time, while the age at which the peak has occurred has increased in both countries. In part this is due to increasing union membership rates among those over the age of sixty-five. Declines in membership by birth cohort have lowered union density rates as the older cohorts with historically higher membership rates leave labor markets.

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## 1. Introduction

Although there has been a long-standing interest in the correlates of trade unionism among social scientists, the relationship between individuals' age and their propensity for union membership has attracted little attention. It was covered in a single sentence in Claus Schnabel's chapter on the correlates of union membership for the International Handbook on Trade Unions published in 2003. He stated:

*Research results on the relationship between age or, more appropriately, years of work experience and membership are somewhat mixed, with many estimated coefficients not being statistically significant, but in general this relationship tends to be positive or concave (increasing at a decreasing rate and possibly falling at the end). (Schnabel, 2003).*

This changed in 2007 when Blanchflower (2007) showed union membership followed an inverted U-shaped – or hump shaped - pattern in age, peaking in midlife. Using micro-data files for 34 countries Blanchflower (2007) found that, prior to 2005, union density rates peaked in midlife maximizing in the mid to late 40s.<sup>1 2</sup> This U-shaped, or hump shaped, pattern was also found subsequently for Norway by Nergaard and Stokke (2007) and Posthuma (2009) in the World Values Survey, 1999-2002. Blanchflower found it made little difference whether controls were included, such as education, gender, race, occupation, location and so on; the probability of being a union member peaked in midlife.

Blanchflower (2007) offered ten, not necessarily mutually exclusive, reasons for the finding that union membership peaked in mid-life:

1. Cohort effects. Several experiments were conducted for the US and the UK to determine whether these results were driven by cohort effects. The evidence appeared to be to the contrary.
2. The inverted U-shape pattern in union membership reflects a broader life-cycle pattern
3. Union members quit their jobs from their late 40s and move to nonunion jobs in other organizations.
4. Union members lose their jobs and become unemployed
5. Union members quit their jobs and are promoted to managerial jobs in their own organization, or elsewhere, which are non-union.
6. Union workers are disproportionately employed in older workplaces, many of which are in traditional industries that have been subject to increased competition. When downsizing or plant closures occur, union members lose their jobs and are unable to replace them with comparable union jobs.

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<sup>1</sup> The data used was the European Social Survey 1998-1994 and 2001; the Eurobarometers of 1988-1994 and 2001; the International Social Survey Programme 2000-2002; the UK Labour Force Surveys of 1993-2004; the General Household Survey of 1983; the MORG files of the CPS for 1984-2002 and the Canadian Labor Force Surveys of 1997-December 2005.

<sup>2</sup> The 34 countries were Australia\*, Austria, Bangladesh\*, Belgium, Bulgaria, Canada, Chile, Czech Republic, Denmark, Estonia\*, Finland, France, Germany, Greece\*, Hungary, Ireland, Israel, Japan, Italy, Luxembourg, Mexico\*, the Netherlands, New Zealand, Norway, Poland, Portugal, Russia, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States. The five marked as a \* above were not founded here so the inverted U-shape has been found for a total of 73 countries.

7. Older union workers increasingly free ride as they age. They enjoy union benefits but stop paying their union dues.
8. Older and younger workers have less ‘need’ for unions than prime-age workers.
9. The most productive union members quit because the seniority/wage compression rule reduces their potential earnings.
10. More highly unionized industries may have a higher proportion of older workers because the benefits brought by unions reduce turnover

His paper partially explores the first of these reasons – cohort effects - for the United States for the period 1983-2002 using 3.4 million workers from the Merged Outgoing Rotation Groups (MORG) files of the Current Population Survey (CPS). Cohort dummies for decade of birth were added as additional controls in a union membership equation, and collectively they were significant, showing that there are cohort effects in union membership. Decade of birth reduced the size of coefficients on the age variables that were included as five-year bands, plus they lowered the peak age. For example, in Blanchflower (2007) Table 8, column 3, with state dummies, the age maximum goes from 55-59 to the 35-39 category. Cohort effects were also found for the United Kingdom using the Labour Force Surveys (LFS) of 1992-2004. Once the cohort dummies are included the age paths are much flatter than without them.

The relationship occasioned little comment at the time from either the academic community or from employment relations practitioners. Although the paper has been Google cited 157 times subsequently, few of those papers focus on the relationship between age and trade union membership. Nevertheless, Jelle Visser – a leading authority on union density around the world - even argued recently as follows.

*Union density rates tend to increase with age in almost all countries. The issue here is that the differences between young and old have increased. The higher density rates of older workers are the result of higher density rates of past generations – in other words, of decisions made some thirty to forty years ago. Workers tend to join the union when they are young, most often when they have landed their first stable job and begun establishing a family (Visser, 2019).*

We show in this paper that Visser is partially right – cohort effects do matter for union density. But we also show something that Visser does not comment upon, namely that union density peaks in midlife *within* cohort, and that this is true for all birth cohorts.

The age profile of union members is potentially important for trade unions keen to maintain their bargaining power and remain financially viable (Willman et al., 2020) – especially in a time of declining membership – and to the operation of the labour market – since unions tend to affect worker flows (notably quits), wages and wage growth, working conditions and, at plant and firm level, employment growth, productivity and profitability (Bennett and Kaufman, 2007). Even more broadly, the findings pose a challenge to a fundamental tenet of employment relations and labour economics generally, namely that institutions matter. If they do, then why was this hump-shaped relationship between age and union membership apparent everywhere?

Five issues remain outstanding following Blanchflower (2007): these are the motivation for this paper. First, the key finding was challenged, at least for one country (Germany) by Schnabel and Wagner (2012). They argued that the relationship disappeared with the addition of controls. We show this is not the case and that the disappearance of the raw correlation in their data occurs due to over-parameterisation. The problem arises when they incorporate cohort effects alongside age effects in estimates based on small samples. We show that the hump-shaped relationship between age and union membership is apparent for Germany, and that this is robust to the introduction of cohort dummies in Germany, as, indeed, is the case elsewhere. We go on to explain why the persistence of a hump-shaped age effect in the presence of cohort dummies is substantively important in understanding unionisation.

Second, Blanchflower's paper relies on data through to 2004, raising the question as to whether the association with age persisted after the Great Recession of 2008/9. It is conceivable that this huge economic shock resulted in differential job loss by age across the union and non-union sectors which may have affected the relationship. We tackle this issue by extending the analysis a decade or so after the Great Recession and find similar results.

Third, some countries not previously covered in Blanchflower (2007) may not exhibit a hump-shaped association between age and union membership. We find U-shapes for 68 countries here and there were five in the Blanchflower (2007) paper in addition to those - Australia Bangladesh Estonia, Greece and Mexico- so to 61 countries over all - and find similar inverted U-shape patterns for all of them.

Fourth, the literature on the decline in union membership, apparent in many parts of the world, has tended to focus on younger workers' attachment to unionisation. Analysts suggest that the failure of younger workers to join unions has played an important part in declining union density, in part because falling membership has a snowball effect by reducing the likelihood of new entrants to the labour market experiencing the value of union membership, resulting in a rise in "never-membership" which has been observed in the UK (Bryson and Gomez, 2005) and the United States (Booth et al., 2010). Thus, although inter-generational transmission of unionisation is still apparent (Bryson and Davies, 2019) young workers are less likely to join unions because their parents were less likely to be members than their parents. There has been speculation that there has been a shift away from collectivist values that underpin the provision of public goods through union solidarity towards individualist values which reduce young workers' perceived value of joining a union<sup>3</sup> although the evidence - at least for English-speaking economies - appears to run counter to this argument (Bryson et al., 2005; Waddington and Kerr, 2008).

In any event, both these lines of argument (the snowball effect and changes in demand for unionisation) are essentially about cohort effects - the propensity of later-born generations to join unions compared to earlier generations - rather than age effects. We show that the hump-shaped age effect is apparent when one controls for cohort effects, so this is not what lies behind the hump-shape. However, we go further by examining these age effects across time. We show that in the two countries for which we have the longest time-series - the United States and the United Kingdom - union membership rates decline in later cohorts, thus contributing to declining union

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<sup>3</sup> For a discussion of the shift to a more consumer-oriented culture and its implications for the 'taste' for trade unionism see Bryson et al. (2010a).

density over time, but the hump-shape in age persists in each cohort. The union membership rate at the age peak in the United States and the United Kingdom has lowered over time, while the age at which the peak has occurred has increased in both countries. In part this is due to increasing union membership rates among those over the age of sixty-five. The peak gradually creeps upwards – in the United States from age 46 to age 49 between 1983 and 2018, and in the United Kingdom from age 46 in 1992 to age 53 in 2019.

Finally, although Blanchflower (2007) enumerates possible reasons as to why union membership peaks in midlife he only briefly speculates about possible answers to the question. He suggests that the likely reason for the midlife peak in union membership was the fact that older union workers are paid above the values of their marginal products; employers thus have incentives to replace them. The mechanisms by which this is done, he thought, would likely vary across countries. In this paper we tackle some of those reasons. But some avenues for further exploration remain open. We return to this issue in the final section of the paper.

In the next section we present our empirical results showing that union membership peaks in midlife across the world. We begin with the United States, followed by the United Kingdom, before turning to Europe – where we spend some time focusing on Germany given Schnabel and Wagner’s (2012) earlier paper – before going on to the rest of the world. Finally, in this section we turn to the changing age distribution of union membership in the two countries where we have a long timeframe, namely the United States and the United Kingdom. In our concluding section we discuss the implications of our findings and address some of the reasons as to why we find union membership peaking in middle-age.

## 2. Empirical Results

In this section we present estimates of a peak in midlife of union membership probabilities in **sixty-eight** individual countries using data on just over 8 million respondents, maximizing around age fifty.<sup>4</sup> We examine several of the same data files examined by Blanchflower (2007) and extend them all to the present, including the MORG files for the United States (1983-2018) and the Labour Force Survey (LFS) files for the United Kingdom (1992-2019) and the European Social Surveys (2002-2018). We also examine the World Values Surveys (1981-2019); all four of these surveys allow us to examine the role of cohort effects in a subset of countries. In addition, we examine cross-section data from the 2015 International Social Survey Programme (ISSP) and Gallup World Poll data for Asia and the South Pacific (2010-2013). It turns out that the inclusion of cohort dummies has little impact on the age peak and neither does the addition of additional personal controls such as education and labor force status measures such as measures of self-employment or underemployment (part-time wants full-time). In every case we restrict our samples to *workers only*.

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<sup>4</sup> We find an inverted U-shape *with* cohort dummies for fifty countries - Andorra; Austria; Azerbaijan; Belarus; Belgium; Bolivia; Bulgaria; Canada; Chile; China; Cyprus; Czech Republic; Denmark; Ecuador; Finland; France; Germany; Hungary; Iceland; India; Ireland; Israel; Italy; Japan; Kyrgyzstan; Lebanon; Luxembourg; Malaysia; Montenegro; Netherlands; Nigeria; Norway; Poland; Portugal; Romania; Russia; Singapore; Slovakia; Slovenia; South Africa; Spain; Sweden; Switzerland; Taiwan; Tanzania; Turkey; Ukraine; United Kingdom; USA and Vietnam. We find it for eighteen others *without* cohort controls: Armenia; Bosnia; Brazil; Cambodia; Croatia; Georgia; Hong Kong; Macau SA; Mali; Nepal; New Zealand; Palestine; Rwanda; South Korea; Suriname; Tunisia; Uruguay; and Yugoslavia.

## 2.1 United States

The Bureau of Labor statistics reports annually on the characteristics of union members. In 2019 10.3% of workers were members of unions.<sup>5</sup> Membership rates varied by age as follows:

	2000	2008	2010	2015	2019
All	13.4	12.4	11.9	11.1	10.3
16 to 24	5.1	5.0	4.3	4.4	4.4
25 to 34	11.7	10.7	10.1	9.7	8.8
35 to 44	14.6	13.4	12.8	12.3	11.8
45 to 54	18.8	16.0	15.0	13.6	12.6
55 to 64	17.6	16.6	15.7	14.3	12.7
65+	8.1	9.0	10.0	9.5	9.7

Membership rates have declined since 2000 for all groups except for those ages sixty-five and over. There is an obvious turn in age in these raw data with rates rising after midlife, in the age-range 45-54 in 2000 and in the range 55-64 since then, and then a decline in rates for the oldest group of workers. Of note is the fact that, in contrast to all other age groups, the membership rate for the 65+ is higher in 2019, by nearly two percentage points, than it was in 2000.

In **Table 1** we examine this hump-shaped unionization rate in age for the United States in a little more detail with three micro-datasets. The first three columns use the Merged Outgoing Rotation Group files of the Current Population Survey from 1983-2018 provided by the NBER.<sup>6</sup> In column 1, with 6.2 million observations, with controls for gender, race, state, year and month of interview (and a private sector dummy in column 1), age is negative and age squared is positive, both with t-statistics of around 200, implying an inverted U-shape. We differentiate with respect to age and solve and calculate an age maximum of 48. Column 2 adds decade of birth cohort dummies which are statistically significant but have little impact on the age variables. Blanchflower (2007: Table 5) used the same MORG files and found a maximum of 48 for 1984-1991 and 49 for 1992-2002.<sup>7</sup> Columns 3 and 4 for the public and private sectors are similar, with cohort dummies, with maxima of 48 and 45 respectively.

Column 5 uses the Gallup United States Daily Tracker Poll (GUSDTP)<sup>8</sup> for 2008-2017 with 1.4 million observations with the same controls including cohort – and shows the same with a maximum of 47 also. The final column 6 uses the much smaller General Social Survey<sup>9</sup> that has a longer time run back to 1973 with the same controls and essentially identical results.

The quadratic age term imposes a functional form on the association with age so in **Chart 1** we simply rerun column 2 for the MORGs and column 5 for GUDSTP replacing the two age terms with a full set of year-specific age dummies. We do this rather than plot the raw means so we can take out the time and area effects. We take the coefficients from this regression, add the constant,

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<sup>5</sup> Union members, 2019, BLS. <https://www.bls.gov/news.release/pdf/union2.pdf> and <https://www.bls.gov/webapps/legacy/cpslutab1.htm>

<sup>6</sup> <https://data.nber.org/morg/annual/>

<sup>7</sup> Blanchflower (2007) included controls for industry as well as for education. They have little impact here so for simplicity and to be comparable across data files we just use parsimonious specifications.

<sup>8</sup> <https://www.gallup.com/174155/gallup-daily-tracking-methodology.aspx>

<sup>9</sup> <https://gss.norc.umd.edu/get-the-data>

and plot the numbers. The two scatter plots have clear and similar hump shapes with maxima around age fifty, confirming the quadratic specifications, albeit with a flat tail after around age 70.

In **Table 2** we explore whether this pattern holds *within* states of the United States. We classify states according to whether they have passed Right-to-Work (RTW) laws which prohibit union security agreements between employers and labor unions. Under these laws, employees in unionized workplaces are banned from negotiating contracts which require all members who benefit from the union contract to contribute to the costs of union representation. The institutional settings in these two sets of states are very different with RTW states being more hostile to union organizing than non-RTW states. Over the period in question seven states implemented RTW laws – Idaho; Indiana; Kentucky; Michigan; Oklahoma; West Virginia and Wisconsin. In every case there is a peak in union membership in midlife and a peak is present for these seven states before and after the switch. The peak in RTW states was 47 and 48 in non-RTW states. The minimum was 42 in Georgia, an RTW state and the maximum was in Vermont, at 54, a non RTW state. Institutions seem to have little impact on the age peaks in union membership.

We also find the same hump-shaped age profile for union membership within industrial sectors in the United States, and it exhibits similar variance to that across states, with the membership peaking at 42 years in Public Administration compared with 57 years in Professional services.

## 2.2 The United Kingdom

In the United Kingdom the Office of National Statistics provides data on union membership.<sup>10</sup> As in the United States, union density rates have been gradually declining for some decades (although it has actually risen in the last three years (ONS, 2019)). As can be seen below membership rates among employees have fallen for every age range over time, except among those aged 60-64, where they have been stable, and those aged 65+, where they have risen. Membership rates peak in midlife but just as in the United States the peak has moved upwards from age 45-49 in 2000; to 50-54 in 2008, 2010 and 2015 to 55 to 59 in the latest release. We return to this issue in Section 2.6.

	2000	2008	2010	2015	2019
All Employees	29.8	27.5	26.6	24.7	23.5
16 to 19	5.4	4.4	3.9	2.4	3.3
20 to 24	14.3	12.1	12.1	11.6	10.4
25 to 29	23.1	20.2	19.5	17.7	18.5
30 to 34	28.2	24.9	22.6	21.9	21.0
35 to 39	33.5	27.5	27.0	25.2	23.3
40 to 44	37.2	33.3	31.2	26.1	25.3
45 to 49	40.3	35.4	34.1	30.3	28.5
50 to 54	38.5	38.4	37.6	36.0	31.1
55 to 59	36.7	38.2	37.1	34.0	32.5
60 to 64	30.7	29.0	28.2	30.0	30.0
65 to 69	14.4	19.1	13.6	20.1	19.5

<sup>10</sup> Data are available three of the twelve monthly surveys each year: in September, October and November for 1992-2005 and in October to December 2005-2019. In four years, 2011, 2012, 2016 and 2017 there are a few cases for January. <https://data.gov.uk/dataset/2139dde9-cb3a-43c3-9c93-dc98b91d448e/trade-union-membership>



Over 70	*	9.3 (2007)	7.2	12.2	15.3
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As in the United States, in contrast to the younger age groups, the membership rate of those age 65-69 is higher in 2019 than it was in 2000. We only have data for those 70 and over since 2007 but rates have risen sharply over the past decade.

Blanchflower (2007) also examined data on union membership using the UK Labour Force Surveys of 1993-2004 and found union probabilities maximized at age 48. **Table 3** makes use of the same LFS data but now from 1992-2019 and the specifications are equivalent to those above for the United States. The inverted-U shape is apparent in all five estimates presented. In column 1 for the whole economy and in the absence of cohort controls union membership reaches a peak in midlife at age 49. The inclusion of cohort dummies in column 2 makes barely any difference, with membership now peaking at age 50. There are inverted U-shapes also in the private and public sectors (columns 3 and 4 respectively). The hump or hill-shape is also apparent in each of the nine English regions as well as Wales, Scotland and Northern Ireland, with the highest in London at age 56, with the others close to age fifty. **Chart 2** plots the raw data for the UK showing an inverted U-shape rather than the single year of age plots from a regression to make it clear that there is a big drop in membership rates at age 65.

### 2.3 Europe

**Table 4** now moves to examine European Social Survey (ESS) data<sup>11</sup> for 2002-2018 for the EU28 plus ten other European countries extending the 2002 and 2004 data used by Blanchflower (2007) so sample sizes are now large enough with a long run of years that it is possible to include decade of birth cohort dummies. There is an inverted U-shape in age in column 1 without sweep, country or cohort dummies and an age maximum of 58. Including country and survey sweep dummies lowers the age maximum to 55 in column 2 and adding cohort variables in column 3 lowers it further to age 54. The maxima are a little higher than for the United Kingdom and United States in the previous tables. Column 4 reports the results for Germany and finds an inverted U-shape with a maximum at age 54, with cohort dummies, a finding we return to in Section 2.4 below. The table also reports maxima for twenty-eight of the thirty-eight countries in the sample with the full set of controls included in columns 3 and 4. We found membership was an inverted U-shape in age for all the major European countries.<sup>12</sup> **Chart 3** shows an inverted U-shape for Europe, plotting the single year of age coefficients using the column 3 specification. The chart shows a hump-shape in age in union membership probabilities comparable to those found in the previous two charts for the United States and the United Kingdom.

We thus now have a running total of U-shapes in 29 countries with cohort controls – Austria; Belgium; Bulgaria; Cyprus; Czech Republic; Denmark; Finland; France; Germany; Hungary; Iceland; Ireland; Israel; Italy; Luxembourg; Netherlands; Norway; Poland; Portugal; Romania; Russia; Slovakia; Slovenia; Spain; Sweden; Switzerland; UK; Ukraine and the USA.

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<sup>11</sup> The countries are Albania; Austria; Belgium; Bulgaria; Croatia; Cyprus; Czechia; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Iceland; Ireland; Israel; Italy; Kosovo; Latvia; Lithuania; Luxembourg; Montenegro; Netherlands; Norway; Poland; Portugal; Romania; Russian Federation; Serbia; Slovakia; Slovenia; Spain; Sweden; Switzerland; Turkey; Ukraine; United Kingdom; see <https://www.europeansocialsurvey.org/data/>

<sup>12</sup> We didn't find the inverted U-shape for Albania; Croatia; Estonia; Greece; Kosovo; Latvia; Lithuania; Montenegro; Serbia; or Turkey.

## 2.4 Germany

Schnabel and Wagner (2012) argued that in the case of West Germany there was no inverted U-shape in age. In contrast, Blanchflower (2007) found inverted U-shapes for West Germany using the International Social Survey Programme (ISSP) and Eurobarometer files with age maxima of 43 in both cases. Schnabel and Wagner (2012) used ALLBUS data for three time periods; 1980-1988; 1990-1998 and 2000-2006. They did not report a pooled estimate for all years, despite small sample sizes which caused major problems as we note below.<sup>13</sup> First, in all of the six cases in the raw data, which they called their Model 1, there was an inverted U-shape – that is the age coefficient was positive and the age squared negative and both were significant. If we look at the specification using their Model 1 and solve the probabilities membership for men maximizes at ages 51, 49 and 51 and for women 39, 45 and 46 for the 1980s, 1990s and 2000s respectively.

The significance of these two age terms disappeared in their Model 2 with the inclusion of cohort dummies. Unfortunately, there are not enough degrees of freedom to do so given the high correlation between the age and cohort variables with such small sample sizes. Their Model 3 adds year dummies and their Model 4 adds personal controls, but they are not informative due to the inappropriate inclusion of the cohort variables. As an illustration, below we present their results for 2000-2006 for men, with a sample size of 1950 only, using Model 1 with just the age variables and then Model 2 adding eight cohort dummies for 1916-1925, 1926-1935, 1936-1945, 1946-1955, 1956-1965, 1966-1975, and 1976-1985 identifying year of birth, that are illustrative, just for men. The coefficients and p-values are reported. Both age variables are highly significant in Model 1. The addition of the cohort dummies destroys the significance of the two age terms which go from highly significant to highly insignificant.

	Model 1	Model 2
Age	.0639	.00042
p-value	.003	.993
Age squared	-.00067	-.00012
p-value	.016	.819
Age maximum	51	
N	1950	1950

It should be noted that including age and age squared to model any potential U-shapes in age in union membership equations is simply a convenient shorthand. Schnabel and Wagner (2012) apply procedures suggested for testing U-shapes especially when they are impacted by outliers. The authors of that test Lind and Mehlum (2010) argued as follows

*“Most works, nevertheless, seem to be on fairly safe ground when they claim to have found a U shape. The reason is that the de facto common practice seems to be to check two necessary conditions, namely that the second derivative has the right sign and that the extremum point is within the data range. However, only the results from the former are usually reported. This criterion will be misleading, however, if the estimated extremum point is too close to the end point of the data range.”*

<sup>13</sup> Men 1980-1998=2943 (1767); 1990-1998=2907 (1950); 2000-2006=1708 (1309) with female numbers in parentheses.

Using a flexible functional form overcomes any difficulties in relation to turns in the data especially in the upper tail. Restricting the cut off age solves most of the problems but, in general, these seem to be small sample problems.

**Chart 4** takes the data from the European Social Survey for Germany and plots the single year of age coefficients, added to the constant. This allows us to determine if there are any outliers and whether the quadratic form is appropriate. An issue of course could be that there are turns in the data especially after retirement age. This usually can be solved easily by restricting the sample to prime age workers from say, 16 to 70. We also fit the quadratic from Table 4 column 4 and alongside that also fit a quadratic to the year of age plots (which takes the form  $-.1408\text{Constant} + .0097\text{Age} - .0009\text{Age}^2$ ) which maximizes at age fifty-four.

In the final column of **Table 4** the function also reached a maximum at age 54. Using both methods there is a clear inverted U-shape maximizing at the same age. Contrary to the claims of Schnabel and Wagner (2009) there are U-shapes in Germany even when cohort effects are controlled for in our data. This is hardly surprising: the inverted-U shape in age has been found previously for West Germany in panel random effects models using the German Socio-economic Panel Survey for 1985-1998 by Beck and Fitzenberger (2004: Table 4).

## 2.5 The World

So far, our analyses have been confined to the United States and European countries. But we have data for other parts of the world too. **Table 5** uses data from a pooled sample of seven sweeps of the World Values Survey (WVS) with 200,000 observations to estimate union membership equations across 101 countries.<sup>14</sup> In column 1 with only the age and gender variables there is another inverted U-shape for union membership by age with a maximum at age forty-five. Adding wave and country dummies, as well as contractual status, in column 2 increased the age maximum to age 47 and adding the cohort dummies in column 3 raises the maximum to age 49. **Chart 5** plots the single year of age coefficients using the specification in column 3 with cohort dummies and the hump shape is apparent again. We fitted a quadratic to the single year of age plots (which takes form  $-.1065\text{Constant} + .009\text{Age} - .00009\text{Age}^2$ ) which maximizes at age 50.

**Table 5** also reports results for thirty-two countries including some advanced countries – Canada, Japan, Sweden and the USA but also several developing countries including China (where membership has been rising), India, Azerbaijan, Kyrgyzstan, Malaysia, Nigeria, Taiwan, Tanzania and Vietnam. We report results for countries for whom both the age and age squared coefficients respectively were positive and negative with both having t-statistics of  $>1.65$  with models including cohort dummies. The overall midpoint is age 45 which is also the mean of the country level estimates. This adds another 21 countries to the list taking the total to 50 - Andorra; Azerbaijan; Belarus; Bolivia; Canada; Chile; China; Ecuador; India; Japan; Kyrgyzstan; Lebanon; Malaysia; Montenegro; Nigeria; Singapore; South Africa; Taiwan; Tanzania; Turkey and Vietnam.

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<sup>14</sup> The WVS sweeps are 1981-1984 (6,081); 1989-1993 (10,294); 1994-1998 (39,543); 1999-2004 (20,285); 2005-2009 (40,794); 2010-2014 (45,208) and 2017-2019 (40,771) and all (202,976) with # observations in parentheses.

Many of these countries had few observations and often only a single wave of data so we reran the estimation excluding the cohort variables and found U-shapes for a further eighteen countries – Armenia; Bosnia; Brazil; Bulgaria; Croatia; Finland; Hong Kong; Italy; Macau SA; Mali; New Zealand; Norway; Palestine; Rwanda; South Korea; Tunisia; Uruguay; Yugoslavia. Of these thirteen were new - Armenia; Bosnia; Brazil; Croatia; Hong Kong; Macau SA; Mali; Palestine; Rwanda; South Korea; Tunisia; Uruguay; and Yugoslavia. This takes the total to 63 countries.

We now move to a cross-section data file, the 2015 International Social Survey Programme (ISSP) on 37 countries with just under 27,000 observations. Table 6 reports once again there are inverted U-shapes in age for union membership which maximize around age 50 once country dummies are added. We re-estimated by country using the specification in column 2 and found significant U-shapes – with t-statistics on the age and age squared variable both  $>1.65$ . The fact that we don't have enough time series variation to include cohort effects is unlikely to be a major problem given we have shown how small an effect their inclusion has in Tables 1-5 above. The sample sizes are small, mostly with under 1000 observations, but we still found U-shapes in fifteen countries, including in two new countries – Suriname and Georgia with cohort dummies. Now we have 65 countries.

## **2.6. South Asia and South Pacific**

In [Table 7](#) we report union membership equations using the Gallup World Poll for 2010, 2012 and 2013 on 21 developing countries– Afghanistan; Bangladesh; Bhutan; Cambodia; China; Hong Kong; India; Indonesia; Laos; Malaysia; Mongolia; Myanmar; Nepal; Pakistan; Philippines; Singapore; South Korea; Sri Lanka; Taiwan; Thailand; Vietnam; plus the three main developed countries from the region – Australia, Japan and New Zealand. There are U-shapes in age once more with a maximum at age 55 in column 3.

We find significant U-shapes in nine countries including in three new ones – Cambodia, Nepal, and New Zealand taking us to 68 countries in total.

## **2.7. Changes in Union Membership by Age Peak Over Time – the United States and the United Kingdom**

We have established that the age-profile of union membership is hump-shaped across the world, but has this hump-shape changed over time? It turns out that, whilst membership rates have fallen across the age distribution, the hump-shape remains but the peak in age has increased over time. To investigate this question, we examine data for the two countries for which we have the largest data sets stretching back a long time, namely the United States and the United Kingdom. The data from the MORG files from 1983-2018 in the United States and the Labour Force Survey from 1992-2018 are well suited for this purpose. We simply take the weighted means in our data files, and to ensure large sample sizes we pool several years of data together.

In [Chart 6](#) we do this exercise for five-year groupings – from the start of the series in 1983 through 2018 – for the United States. We see a flattening of the top of the distribution over time – akin to a mountain seeing its peak flattened. For the period 1983-1985 the peak of the series is age 55 when the union membership rate was 27.8%. By 2016-2018 the peak of the series was at age 57 where the membership rate was 14.3%. A similar picture is seen in [Chart 7](#) which does the equivalent for the United Kingdom. Once again, the peak flattened.

In both countries the flattening of the peak is in fact akin to a soufflé effect, in that the entire function moves down approximately together. The delicious soufflé rises and when it has fully formed and cools it deflates roughly evenly. In **Chart 6** at age 55 the yellow line for 1983-1985 has a membership rate of 27.8% versus 13.3% in 2016-2018. This compares with 18.7% at 30 in the first period and 9.4% in the most recent period. Both ages have seen the probabilities approximately halving. In **Chart 7** for the UK the membership rate at age 46 is 36.1% in the earliest period versus 24.4% in the later period. At age 30, membership rates are 31.5% and 18.0% respectively.

We now turn to plot the age peaks over time for the United States and the United Kingdom, and both show the peak rises over time. In **Chart 8** for the United States we use the MORG data, 1983-2018. We include controls for state, year, and month of interview, gender, race and private sector. **Chart 8** also includes the equivalent plot for the United Kingdom using the LFS, 1992-2019. Controls here are region, gender, race and labour market status. Again, as throughout this paper, the chart is confined to those who are working.

The peak rises even more sharply in the UK than it did in the United States rising over time from 46 in 1992 to 53 in 2019. It turns out that this movement of the peak to the right is driven by the facts noted above, in both countries, because union density rates of those age 65 and above have been rising over time. In part this reflects the rising labor force participation rates of these groups.

The flattening of the peak in age and its movement to the right has been accompanied by declines in union density in both countries that have broadly similar paths. Bryson, Gomez and Willman (2010b) examined union density rates in the United Kingdom and the United States and showed there were broadly common paths, although with the United States always having a lower rate, from around 1910 to 1960. Density rates in both picked up in World War One fell through the mid-1930s and then rose through 1960.<sup>15</sup> The big difference is that the United States reached a peak in 1960 and then the paths diverged. **Chart 9** plots union density rates from Jelle Visser’s ICTWSS database on international union data around the world at the University of Amsterdam (<https://www.ictwss.org>).<sup>16</sup> It shows that in contrast to the United States the United Kingdom reached its peak in 1980, along with other European countries that saw big rises in unionism in the years after the Paris riots of 1968.<sup>17</sup>

Below we show the union membership rate, weighted by the sample weights, in our data since 2000 by birth cohort for the two countries. Union density falls as the older cohorts leave the labor force.

US

UK

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<sup>15</sup> We update using data for the US from [www.unionstats.com](http://www.unionstats.com) and for the UK from <https://www.gov.uk/government/statistics/trade-union-statistics-2019>. Of interest in the UK is that the union membership numbers closely track the rates (Table 1). In thousands 1920=8,348; 1930=4,842; 1940=6,613; 1950=9,289; 1960=9,835; 1970=11,179; 1979 (peak)=13,212; 1980=12,636; 1990=9,810; 2000=7,779; 2010=7,261; 2017=6,768

<sup>16</sup> For further discussion of union density across countries see Visser, (2002, 2006, 2019) and Ebbinghaus and Visser (1999).

<sup>17</sup> Examples are, with rates in 1968 alongside rates for 1980 in parentheses from ICTWSS – Belgium 42 (54); Denmark 59 (78); Finland 41 (69); Italy 31 (50); Sweden 66 (78) and UK 41 (52).

1940-49	10.3	15.9
1950-59	14.5	27.7
1960-69	13.7	28.3
1970-79	12.3	23.5
1980-89	9.4	18.3
1990+	4.4	10.0
Total	11.1	22.0

### 3. Discussion and Conclusions

We have reported inverted U-shapes in age in union membership equations in sixty-eight countries from around the world including the vast majority of EU countries plus the United States, the United Kingdom, Canada Japan, China, India and New Zealand.<sup>18</sup> We make use of eight major survey series and, in six of these, we use several sweeps of the same data. Previous studies clearly established the decline in union membership due to birth cohort effects, with more recent generations less likely to join trade unions, resulting in a rise in never-membership. But this paper confirms a life-cycle effect *within* as well as across cohort, with individuals increasingly likely to be unionized until midlife, after which their unionization rate declines.

We found the association in all fifty states in the United States plus the District of Columbia, in both Right-to-Work law states and those with no such laws. We even found membership peaked in midlife in seven states that switched RTW status, both before and after the switch. If the age at which workers are, or are not union members, follows a similar life-cycle pattern everywhere, as these findings suggest, then it seems that labor market institutions matter little.

However, we also find that the height of the midlife peak has been falling in both the United States and the United Kingdom, the only two countries for which we have a long time series with a sizeable number of worker observations. The fact that union membership rates have been declining most rapidly among the group who are most likely to be union members – the middle-aged – is a major reason for the decline in union density across the world, one which has not been commented upon to date.

The obvious question is why is there this stable pattern of union density by age peaking in midlife across countries? If we return to Blanchflower’s (2007) ten potential reasons, we have already dismissed the proposition that these reflect cohort effects: although cohort effects exist, membership also follows a life-cycle pattern, peaking in midlife, regardless of cohort.

The second possibility is that age-membership patterns reflect broader life-cycle patterns. There is growing evidence that other variables reach a peak in midlife. In the United States Case et al. (2020) have noted that deaths of despair – from suicide, drug and alcohol poisonings – disproportionately occur in midlife. Misery peaks in midlife (Blanchflower and Oswald, 2020) as

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<sup>18</sup> Andorra; Armenia; Austria; Azerbaijan; Belarus; Belgium; Bolivia; Bosnia; Brazil; Bulgaria; Cambodia; Canada; Chile; China; Croatia; Cyprus; Czech Republic; Denmark; Ecuador; Finland; France; Georgia; Germany; Hong Kong; Hungary; Iceland; India; Ireland; Israel; Italy; Japan; Kyrgyzstan; Lebanon; Luxembourg; Macau SA; Malaysia; Mali; Montenegro; Nepal; Netherlands; New Zealand; Nigeria; Norway; Palestine; Poland; Portugal; Romania; Russia; Rwanda; Singapore; Slovakia; Slovenia; South Africa; South Korea; Spain; Suriname; Sweden; Switzerland; Taiwan; Tanzania; Tunisia; Turkey; Ukraine; United Kingdom; Uruguay; USA; Vietnam and Yugoslavia.

does the taking of anti-depressants (Blanchflower and Oswald, 2016). Happiness reaches a nadir in midlife and unhappiness reaches a zenith (Graham and Pozuelo, 2019). Even great apes have a midlife slump in happiness (Weiss, 2018). Blanchflower (2020a) found in a study of 145 countries that happiness reached a midlife nadir at age 48, and Blanchflower (2020b) using twenty measures of unhappiness found it reached a mid-life zenith at the same age.<sup>19</sup>

Crucially from a worker perspective, job satisfaction is also U-shaped in age, reaching its low point in workers' late 20s or early 30s – so a little earlier than the high point in union membership (Blanchflower and Bryson, 2020). It may be that workers stick with trade unions in their late 20s and 30s when their job satisfaction is at its lowest, in the hope that their union will improve their lot. As their wellbeing begins to rise in their late 40s and early 50s, perhaps this is the moment at which the net benefits of union membership look less attractive? After all, by this point they should have accrued the union-procured benefits associated with bargaining for higher wages and pension rights, while the amenity of the insurance component of the union good is a declining function of time left to retirement (put simply, the value of insurance from arbitrary employer behavior is considerably higher in one's 20s and 30s than it is much later in life when one is approaching retirement).

Further evidence of lifecycle returns to union membership were provided by Blanchflower and Bryson (2003, 2004) who estimated the union membership wage premium in the United States and the United Kingdom in age cells: they show the premium is higher among younger workers than it is among older workers.

If, as we suggest above, older workers have less 'need' for unions than their prime-age or younger counterparts, it may be economically rational for them to simply quit membership and save their union dues. If this were so it would manifest itself in a higher exit rate from union membership among 'ever-members', that is, those who are currently or who have ever been union members. To investigate whether this is the case we run linear estimation models with country fixed effects for the (0,1) outcome of being an ex-member among ever-members whose main activity is paid work. We do so by pooling the 80,593 observations from 31 countries in the European Social Survey over the period 2002-2016. The pooled regression, which only contains age and age squared, alongside country fixed effects, accounts for 22% of the variance in ex-membership. Conditioning on country fixed effects, the rate of ex-membership is flat across most of the lifecycle but rises later in life from around the age of 50.<sup>20</sup>

It is conceivable that in many countries leaving union membership in this way is particularly beneficial financially since members may continue to benefit from union bargaining coverage – which arises through workplace, firm, sectoral or national bargaining – because bargained terms and conditions are extended to non-members and – unless they live in a regime such as the non-RTW states of the United States – they will not be charged a fee reflecting the union's cost of

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<sup>19</sup> There have however, been dissenters from the view that there is a midlife crisis in well-being (Blanchflower and Graham, 2020).

<sup>20</sup> The age coefficient is positive but statistically non-significant with a t-stat of 0.98 but the age squared term is positive and statistically significant with a t-stat of 3.68. Of course, we do not have the timing of their departure from union membership because we have no panel data and no retrospective information. So this issue could be usefully investigated further with panel data. Results available from the authors.

procuring those public goods. However, it is not obvious why there are additional incentives for workers beyond midlife to become ‘free-riders’. Although, to our knowledge, nobody has examined this issue, work that has been done on the probability of being a free-rider suggests, if anything, that the probability falls later in life (see Bryson, 2008 for the United Kingdom and New Zealand).

A further possible explanation for the decline seen in union membership rates after midlife is the well-known correlation between the age of workers and the age of the workplaces that employ them. Studies find older (younger) workers tend to sort into, or are hired by, older (younger) workplaces. Machin (2002) argues that it is the age of the workplace that is the crucial age-based factor behind union decline. Its omission from the social surveys we examine may lead to omitted variables bias, with age potentially proxying age of workplace. However, as Machin (2002) makes clear, the workplace effect is really a cohort effect, with workplace in the early post-war period having a higher likelihood of being unionized. This effect, previously documented by Millward et al. (2000), has subsequently received great attention in the worker voice literature with newer workplaces switching away from union-based voice towards non-union direct forms of voice such as team briefings (Bryson et al., 2019). However, since most of the estimates presented in this paper contain cohort effects, these are liable to account for Machin’s (2002) point.

A stronger test of the role played by worker sorting into older and younger workplaces or industries is to estimate the association between worker age and union membership *within* the workplace. In order to examine this phenomenon, we turn to an analysis of an establishment level survey, the British Workplace Employment Relations Survey (WERS).<sup>21</sup> We pooled the linked employer-employee data from the 2004 and 2011 surveys and run simple linear regression estimates on the probability of being a union member and workplace fixed effects on 44,432 employees in 3,056 workplaces. The adjusted R-squared with the workplace fixed effects is 0.40. In both the OLS and workplace fixed effects models, membership rises with age, peaking when employees are in their 50s before declining from age 60 onwards. This is the case when one runs raw correlations (with a year dummy only), and if one adds controls for sex, education and region. The fact that union membership peaks in midlife before declining *within* workplaces, at least in Britain, indicates that the pattern is not accounted for by selection into different types of workplace.<sup>22</sup>

Other reasons Blanchflower (2007) suggests for the peak in membership in midlife relate to union workers leaving their union jobs. This may occur if they have a higher probability of moving to unemployment or labour market inactivity than non-union workers, as might be the case, for example, if employers single them out for dismissal because they are more expensive than ‘like’ non-members, or because they are more likely to be in workplaces that close. Alternatively, some union workers may gain promotion to managerial jobs and other positions that are, traditionally, less likely to be unionized.

Another possibility is that it is a subset of union members who quit after midlife because seniority wages and wage compression rules reduce their potential earnings later in life, such that these most

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<sup>21</sup> For full details on this survey go to <https://www.wers2011.info/home> and van Wanrooy et al. (2013).

<sup>22</sup> Results available on request from the authors.



productive workers quit membership at that point. These propositions, which are best investigated with panel data tracking individuals through time, have not been tested in the literature.<sup>23</sup>

The hill shape in age in union membership is a remarkably consistent pattern in the data, maximizing around age fifty everywhere. Our estimates show that it is present in 68 countries with very different bargaining institutions, and high union density rates such as Norway, Sweden, and Finland where bargaining is centralized. It is also present in France where there is low membership as well as in the United States and the United Kingdom. We found it in all fifty states in the United States plus the District of Columbia, whether these states were Right-To-Work states or not, including in South Carolina where private sector union density was 1.3% in 2019. It is also found in a large number of developing countries, including China and India, Nigeria, Rwanda, Russia, Azerbaijan, Kyrgyzstan, Nepal and Malaysia.

In a set of experiments that we conducted in the United States and the United Kingdom, we found in both the peak of the hill-shape has come down over time as union density declined. The age at which union membership peaked has *increased* over time, not least because the one group whose rates are increasing are older workers over the age of sixty-five. If labor market institutions mattered, we would have expected to see big differences in union density by age across countries. We don't. Globalization seems to imply that labour markets no matter what their institutional structures are more similar than previously thought.

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<sup>23</sup> There is a literature on union effects on workplace survival and employment growth. Evidence on union closure effects is contested but the weight of evidence suggests unions do not increase the probability of workplace closure (Bryson, 2004a; Machin, 1995). Unions are also associated with lower rates of employment growth (Bryson, 2004b; Blanchflower, Milward and Oswald, 1991, Blanchflower and Millward, 1988).

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Table 1. OLS Union membership equations in the United States

	All	All	Private	Public	GUSDT	GSS
Age	.0121 (225.72)	.0124 (164.87)	.01071 (142.19)	.03162 (109.12)	.01098 (37.45)	.0055 (8.47)
Age <sup>2</sup> *100	-.0125 (197.41)	-.0129 (174.59)	-.01105 (145.49)	-.03500 (121.47)	-.01159 (39.23)	-.0054 (7.29)
Male	.0551 (212.14)	.0561 (216.28)	.06199 (245.75)	.01966 (22.81)	.00296 (5.51)	.0356 (12.22)
Private	-.2596 (745.80)	-.2577 (740.21)	-			
Cohort dummies	No	Yes	Yes	Yes	Yes	Yes
Adjusted R <sup>2</sup>	.1366	.1373	.0536	.1577	.0371	-.1372
N	6,179,923	6,179,923	5,085,546	1,067,907	1,434,653	1,341,685
Age maximum	48	47	48	45	47	51

Notes: Columns 1-4 MORG, 1983-2018; column 5 GUSDT, 2008-2017; column 6. GSS 1972-2018.

All equations include 5 race dummies, 50 state dummies, 11 interview month and 35-year dummies. For GSS 8 region dummies included

Table 2. Age zeniths in union membership in US states by Right-To-Work laws, 1983-2018.

<b>Switchers</b>	<b>RTW</b>			<b>Non-RTW</b>	
	Age maximum	N		Age maximum	N
Idaho	50	90,260	Idaho	60	4,098
Indiana	43	91,480	Indiana	47	76,899
Kentucky*	49	3,890	Kentucky	48	72,978
Michigan	54	78,061	Michigan	48	172,362
Oklahoma	44	68,648	Oklahoma	48	39,183
West Virginia	44	75,417	West Virginia	50	62,574
Wisconsin	56	83,045	Wisconsin	44	99,145
<b>Non-switchers</b>					
<b>RTW</b>			<b>Non-RTW</b>		
RTW	47	2,348,713	Non RTW	48	3,831,210
Alabama	47	18,9423	Alaska	47	81,946
Arizona	50	25,808	California	50	474,114
Arkansas	46	10,087	Colorado	51	102,930
Florida	47	98,351	Connecticut	48	94,269
Georgia	42	84,365	DC	56	75,584
Iowa	46	86,980	Delaware	46	76,840
Kansas	47	117,079	Hawaii	48	76,624
Louisiana	44	175,781	Illinois	47	230,917
Mississippi	47	106,770	Maine	49	81,197
Nebraska	49	251,278	Maryland	47	106,209
Nevada	48	3,890	Massachusetts	46	168,937
North Carolina	44	81,851	Minnesota	49	113,673
North Dakota	45	78,031	Missouri	47	90,433
South Carolina	41	73,058	Montana	47	73,367
South Dakota	46	69,674	New Hampshire	42	94,047
Tennessee	48	37,341	New Jersey	47	190,411
Texas	46	301,813	New Mexico	45	66,877
Utah	46	72,607	New York	50	328,774
Virginia	49	74,131	Ohio	49	221,955
Wyoming	50	84,606	Oregon	49	76,847
			Pennsylvania	47	231,350
			Rhode Island	53	79,577
			Vermont	54	76,033
			Washington	53	91,410

Notes: the dates for the seven states that switched from non RTW to RTW were as follows Idaho=1985; Indiana=2012; Kentucky=2017; Michigan=2012; Oklahoma=2001; West Virginia=2016 and Wisconsin=2015.

\*As there were only two years of data for Kentucky the estimate there excludes cohort dummies.

Table 2a. Union membership in the 2000-2018 MORG by industry

	Age maximum	N
2000-2018	49	3,242,682
Private	50	2,693,029
Public	46	549,650
Agric	51	57,538
Construction	48	190,286
Manufacturing	54	374,816
Wholesale trade	51	89,067
Retail trade	51	375,515
Transportation	51	171,121
Information	51	77,107
FIRE	55	216,690
Professional services	57	305,705
Educational services	50	765,696
Arts, entertainment	55	292,557
Other services	46	141,516
Public administration	42	182,086

From Census Basic Monthly CPS website

[https://www2.census.gov/programs-surveys/cps/datasets/2020/basic/2020\\_Basic\\_CPS\\_Public\\_Use\\_Record\\_Layout\\_plus\\_IO\\_Code\\_list.txt](https://www2.census.gov/programs-surveys/cps/datasets/2020/basic/2020_Basic_CPS_Public_Use_Record_Layout_plus_IO_Code_list.txt)

0010 - 0560 Agriculture, Forestry, Fishing and Hunting, and Mining

0770 - 1060 Construction

1070 - 4060 Manufacturing

4070 - 4660 Wholesale Trade

4670 - 6060 Retail Trade

6070 - 6460, 0570 - 0760 Transportation and Warehousing, and Utilities

6470 - 6860 Information

6870 - 7260 Finance and Insurance, and Real Estate and Rental and Leasing

7270 - 7790 Professional, Scientific, and Management, and Administrative and Waste Management Services

7860 - 8490 Educational Services, and Health Care and Social Assistance

8560 - 8690 Arts, Entertainment, and Recreation, and Accommodation and Food Services

8770 - 9290 Other Services (except Public Administration)

9370 - 9590 Public Administration



Table 3. OLS Union membership equations in the UK

	All	All	Private	Public	All
Age	.0291 (181.27)	.0264 (111.72)	.0142 (60.65)	.0372 (62.90)	.0236 (92.45)
Age <sup>2</sup> *100	-.0296 (155.12)	-.0263 (109.74)	-.0134 (56.86)	-.0400 (65.75)	-.0226 (87.53)
Male	-.0011 (1.58)	-.0009 (1.24)	.0574 (62.48)	.0339 (20.84)	-.0009 (1.19)
Self-employed	-.2331 (216.48)	-.2329 (216.38)	-.1259 (130.28)	-.2609 (42.58)	-.2365 (216.68)
Training program	-.1149 (18.46)	-.1192 (19.15)	-.0630 (9.65)	-.3464 (23.77)	-.1202 (18.78)
ALS					.0133 (93.82)
Cohort dummies	No	Yes	Yes	Yes	Yes
Adjusted R <sup>2</sup>	.0788	.0795	.0506	.0572	.0316
N	1,385,113	1,385,113	932,536	384,885	1,338,720
Age maximum	49	50	53	47	52

Notes: LFS 1992-2019. Private sector variable available from 1993. All equations include 20 region dummies, 5 race dummies and 27-year dummies.

Union membership in the 1992-2019 LFS by Region and Country

	Age maximum	N
UK	50	1,385,113
North East	50	57,573
Merseyside	49	150,539
Yorkshire & Humberside	50	121,079
East Midlands	49	103,497
West Midlands	49	121,499
Eastern	51	137,624
London	56	139,637
South East	50	203,377
South West	51	123,086
Wales	50	63,130
Scotland	50	120,979
Northern Ireland	48	44,093

Table 4. European Social Survey OLS union membership equations 2002-2018

	All	All	All	Germany
Age	.0180 (35.96)	.0190 (42.75)	.0197 (27.38)	.0091 (3.12)
Age <sup>2</sup> *100	-.0156 (27.13)	-.0172 (33.69)	-.0186 (24.55)	-.0084 (2.75)
Male	.0071 (3.66)	-.0044 (2.57)	-.0044 (2.54)	.0702 (10.56)
Native	.0425 (13.01)	.0499 (16.86)	.0494 (16.71)	.0423 (3.70)
Years education	.0118 (44.75)	.0071 (29.05)	.0072 (29.35)	-.0007 (0.06)
Self-employed	-.2087 (73.35)	-.1982 (78.05)	-.1971 (77.54)	-.1552 (15.53)
Family business	-.2293 (27.88)	-.2138 (29.31)	-.2131 (29.22)	-.1339 (3.50)
Sweep dummies	No	Yes	Yes	Yes
Country dummies	No	Yes	Yes	No
Cohort dummies	No	No	Yes	Yes
Constant	-.3551	-.3817	-.2476	-.1142
Adjusted R <sup>2</sup>	.0523	.261	.0354	.0347
N	204,214	204,214	204,214	12,488
Age maximum	58	55	54	54

Countries are Albania; Austria; Belgium; Bulgaria; Czech Republic; Cyprus; Croatia; Denmark; Germany; Estonia; Finland; France; Greece; Hungary; Iceland; Ireland; Israel; Italy; Kosovo; Latvia; Lithuania; Luxembourg; Montenegro; Netherlands; Norway; Poland; Portugal; Romania; Russia; Serbia; Slovakia; Slovenia; Spain; Sweden; Switzerland; Turkey; Ukraine and UK.

Individual country results below with controls as above – gender years education, native, wave and cohort dummies where both age and age squared t statistics >1.5.

#### Age Maxima for Union membership by Country in the 2002-2018 European Social Survey

	Max	N		Max	N
All	53	204,214	Luxembourg	59	1,363
Austria	47	6,874	Netherlands	56	8,195
Belgium	52	7,792	Norway	59	8,866
Bulgaria	57	4,290	Poland	61	7,215
Czech Republic	53	8,803	Portugal	66	6,765
Cyprus	57	2,580	Romania	44	1,596
Denmark	46	5,886	Russia	41	6,522
Finland	51	8,982	Slovakia	55	4,461
France	65	6,555	Slovenia	47	5,236
Germany	59	12,488	Spain	68	7,258
Hungary	53	6,233	Sweden	52	9,036
Iceland	40	1,302	Switzerland	41	8,582
Ireland	57	8,899	UK	54	9,733
Israel	58	6,889	Ukraine	57	3,813
Italy	47	3,990			

Table 5. World Values Survey OLS union membership equations Sweeps 1-7 workers

Age	.0087 (24.13)	.0061 (17.71)	.0073 (15.39)
Age <sup>2</sup> *100	-.0097 (22.86)	-.0065 (16.02)	-.0074 (15.36)
Male	-.0046 (2.92)	.0052 (3.35)	.0050 (3.23)
Part-time		-.0271 (12.21)	-.0274 (12.36)
Self-employed		-.0584 (10.12)	-.0584 (28.62)
Wave/country dummies	No	Yes	Yes
Cohort dummies	No	No	Yes
Constant	-.0283	.0273	-.0358
Adjusted R <sup>2</sup>	.0031	.1227	.1231
N	200,380	200,380	200,380
Age maximum	45	47	49

Age maxima for union membership from country level results using column 3 specification with cohort dummies

	Max	N		Max	N
All	45	200,380	Nigeria	39	2,929
Andorra	40	1,713	Romania	57	2,521
Azerbaijan	37	1,817	Russia	37	6,263
Belarus	50	2,141	Singapore	44	2,006
Bolivia	32	1,037	Slovakia	45	631
Canada	54	3,291	Slovenia	42	1,538
Chile	44	3,734	South Africa	41	5,489
China	55	7,697	Spain	45	2,702
Cyprus	57	1,735	Sweden	40	3,367
Czech Republic	31	606	Switzerland	48	2,322
Ecuador	39	1,329	Taiwan	47	2,891
India	44	4,494	Tanzania	36	608
Japan	50	5,911	Turkey	45	3,781
Kyrgyzstan	43	2,305	Ukraine	59	2,869
Lebanon	52	1,436	USA	50	7,770
Malaysia	40	2,664	Vietnam	60	1,950
Montenegro	46	621			

Table 6. ISSP 2015 OLS union membership equations – workers age <70

Age		-.0198 (27.10)	.0150 (12.00)	.0141 (11.39)
Age <sup>2</sup> *100		.0025 (27.54)	-.0147 (10.12)	-.0125 (8.68)
Male		-.0132 (6.10)	.0128 (2.84)	-.0013 (0.29)
Self no employees				-.1581 (20.64)
Self with employees				-.1664 (15.09)
Family's business				-.1712 (10.31)
N/a If status				-.0617 (3.99)
Education dummies	No		No	Yes
Country dummies	No		Yes	Yes
Constant		.5941	-.1035	-.2068
Adjusted R <sup>2</sup>		.0283	.2645	.2870
N		27,071	27,071	27071
Age maximum		39	51	56
Mean		.244		

Notes: sample consists of those currently working

Age maxima for union membership from country level results using column 2 specification

	Age Max	N		Age Max	N
All	56	27,071	Japan	36	897
Belgium	47	1,200	Lithuania	45	568
Chile	47	636	New Zealand	54	417
China	54	970	Slovenia	59	482
Czechia	51	760	Spain	49	870
Finland	57	654	Suriname	52	650
Georgia	57	431	Sweden	51	672
Israel	55	588	Taiwan	57	1,267

Countries (37) are - Australia; Austria; Belgium; Chile; China; Taiwan; Croatia; Chechia; Denmark; Estonia; Finland; France; Georgia; Germany; Hungary; Iceland; India; Israel; Japan; Latvia; Lithuania; Mexico; New Zealand; Norway; Philippines; Poland; Russia; Slovakia; Slovenia; South Africa; Spain; Suriname; Sweden; Switzerland; UK; USA and Venezuela

Table 7. Asia and South Pacific - Gallup World Poll, 2010, 2012, 2013- workers

Age	.0072 (12.15)	.0069 (11.66)	.0068 (11.56)
Age <sup>2</sup> *100	-.0081 (11.92)	-.0065 (9.71)	-.0062 (9.25)
Male	.0114 (3.72)	.0050 (1.64)	.0029 (0.91)
Self-employed		-.0889 (26.90)	-.0881 (25.92)
PT wants FT		-.0787 (15.97)	-.0761 (15.40)
Education dummies	No	Yes	Yes
Country/year dummies	No	No	No
Constant	-.0347	-.0359	-.0897
Adjusted R <sup>2</sup>	.0031	.0405	.0612
N	46,071	46,071	46,071
Age maximum	44	53	55

Notes: excluded category employees  
Country level results using column 3 specification

	Age Max	N		Age Max	N
All	55	46,071	Japan	41	2,149
Australia	52	8,803	Nepal	43	1,602
Cambodia	39	1,919	New Zealand	54	1,503
China	55	9,675	Singapore	50	1,200
India	51	8,984	Taiwan	73	1,073

Countries are - Afghanistan; Australia; Bangladesh; Bhutan; Cambodia; China; Hong Kong; India; Indonesia; Japan; Laos; Malaysia; Mongolia; Myanmar; Nepal; New Zealand; Pakistan; Philippines; Singapore; South Korea; Sri Lanka; Taiwan; Thailand and Vietnam

Chart 1. US union membership probabilities by age

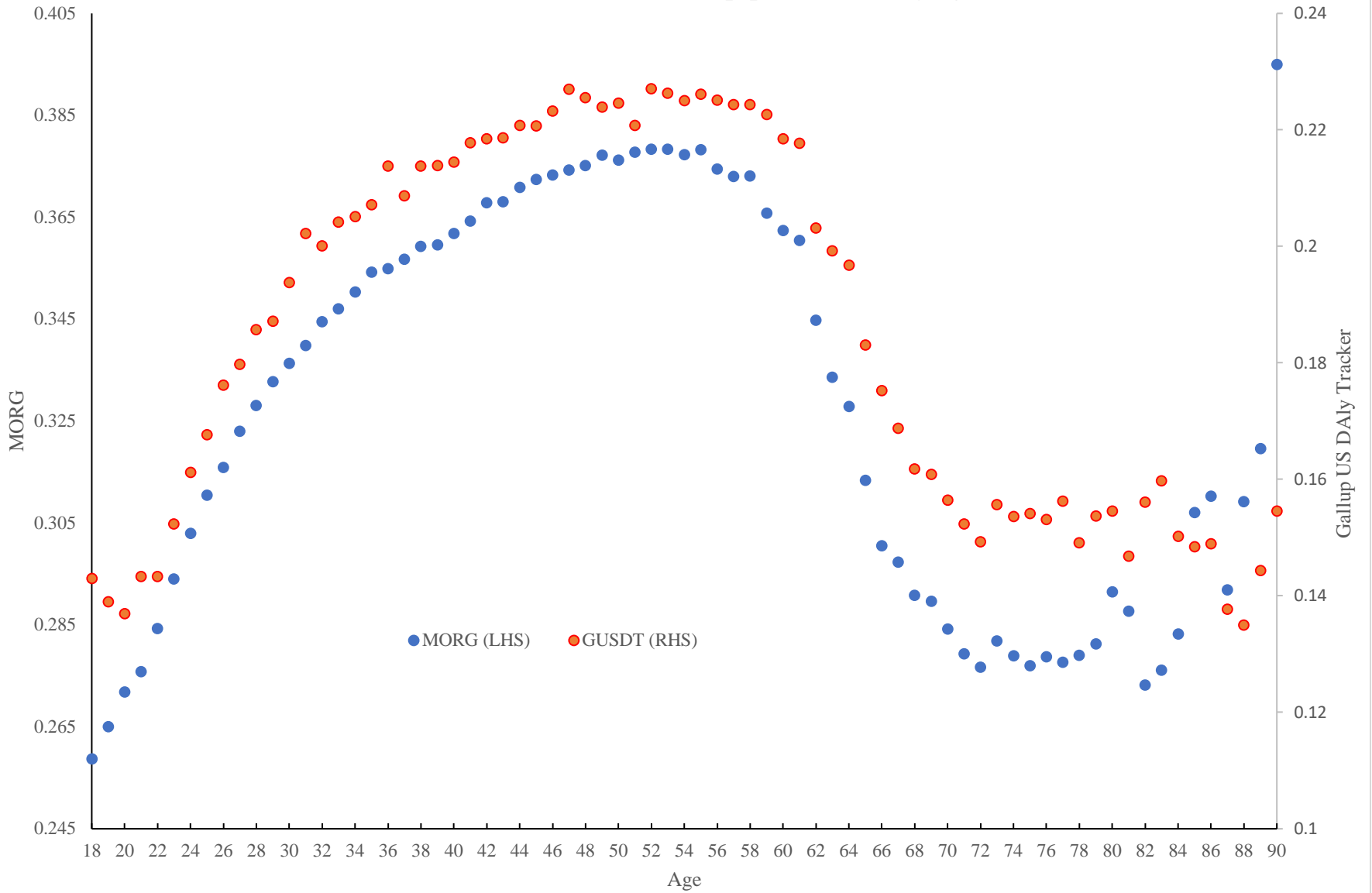


Chart 2. Raw weighted union membership data for the UK, 1992-2019

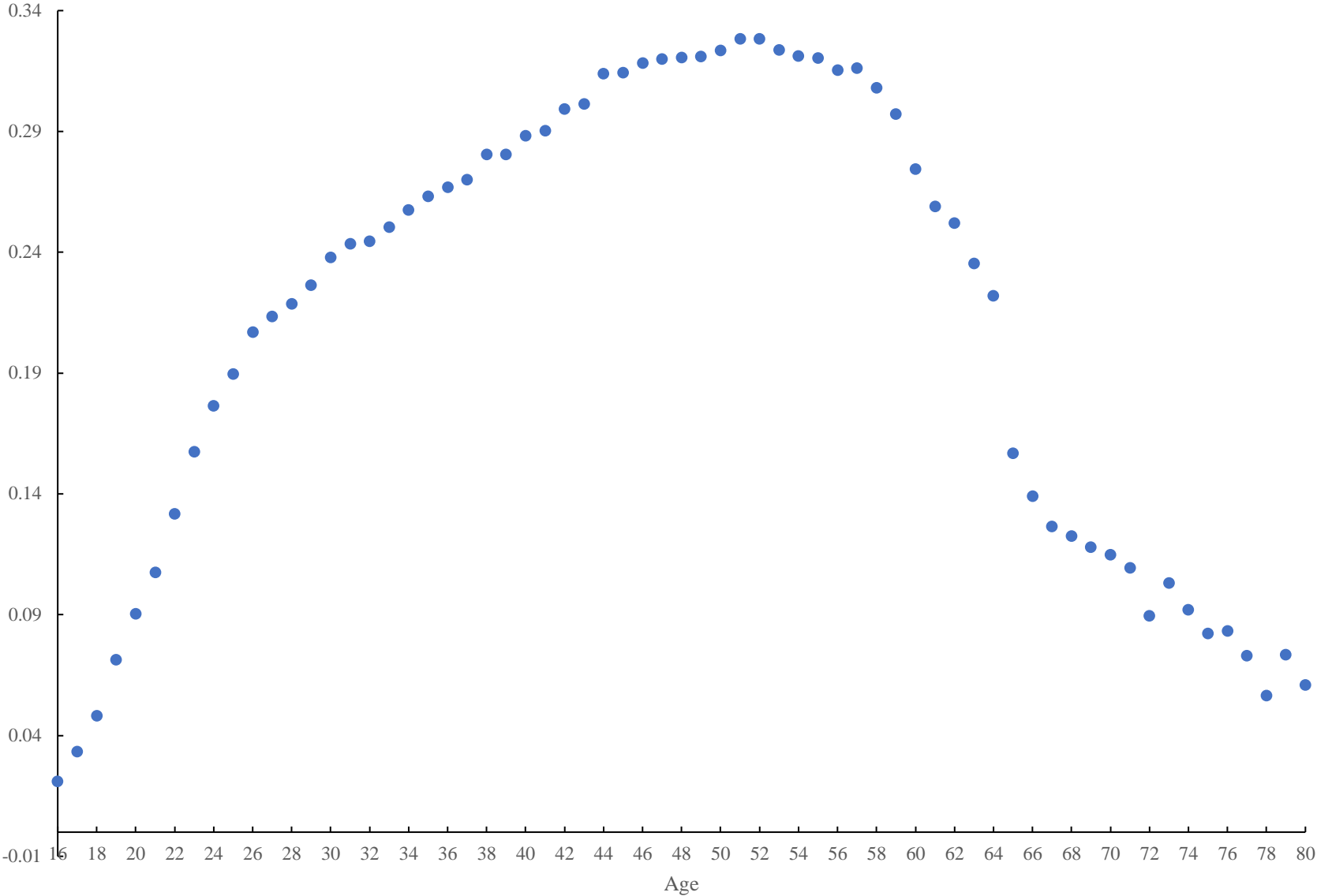


Chart 3. Union membership proportions ESS 2002-2018

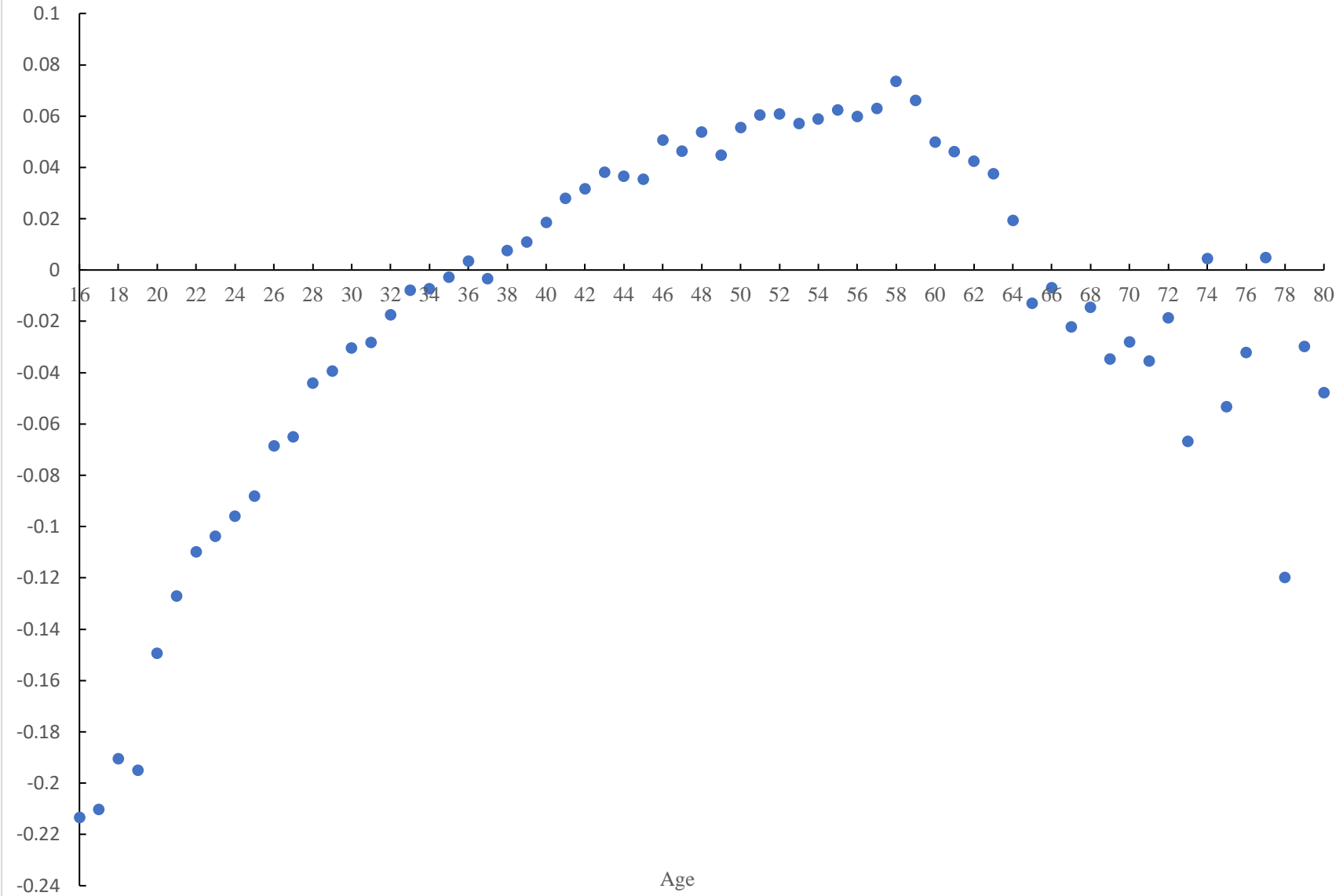




Chart 4. German union membership, ESS, 2002-2018

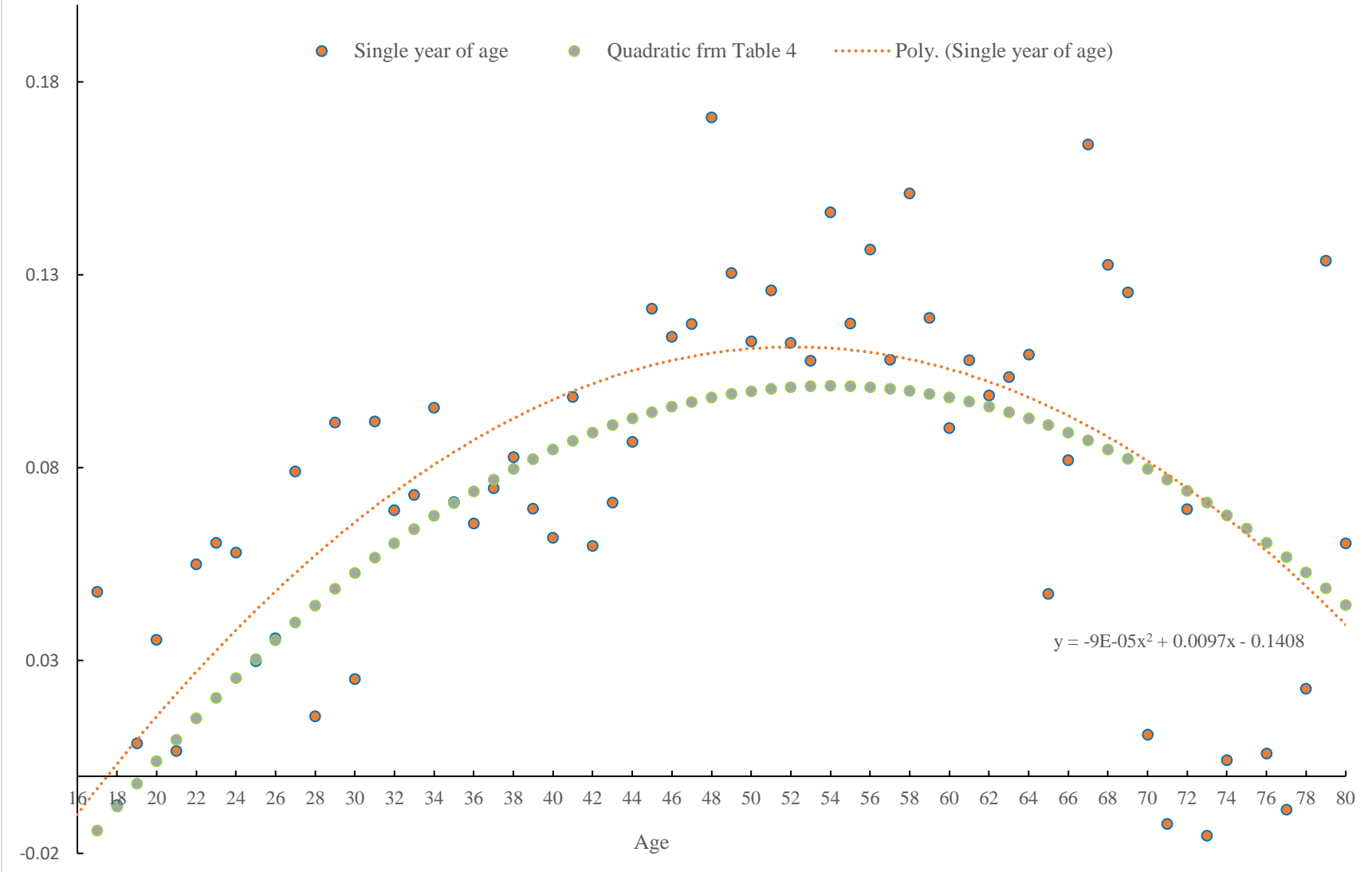


Chart 5. Union probability, World Values Survey, 1981-2020

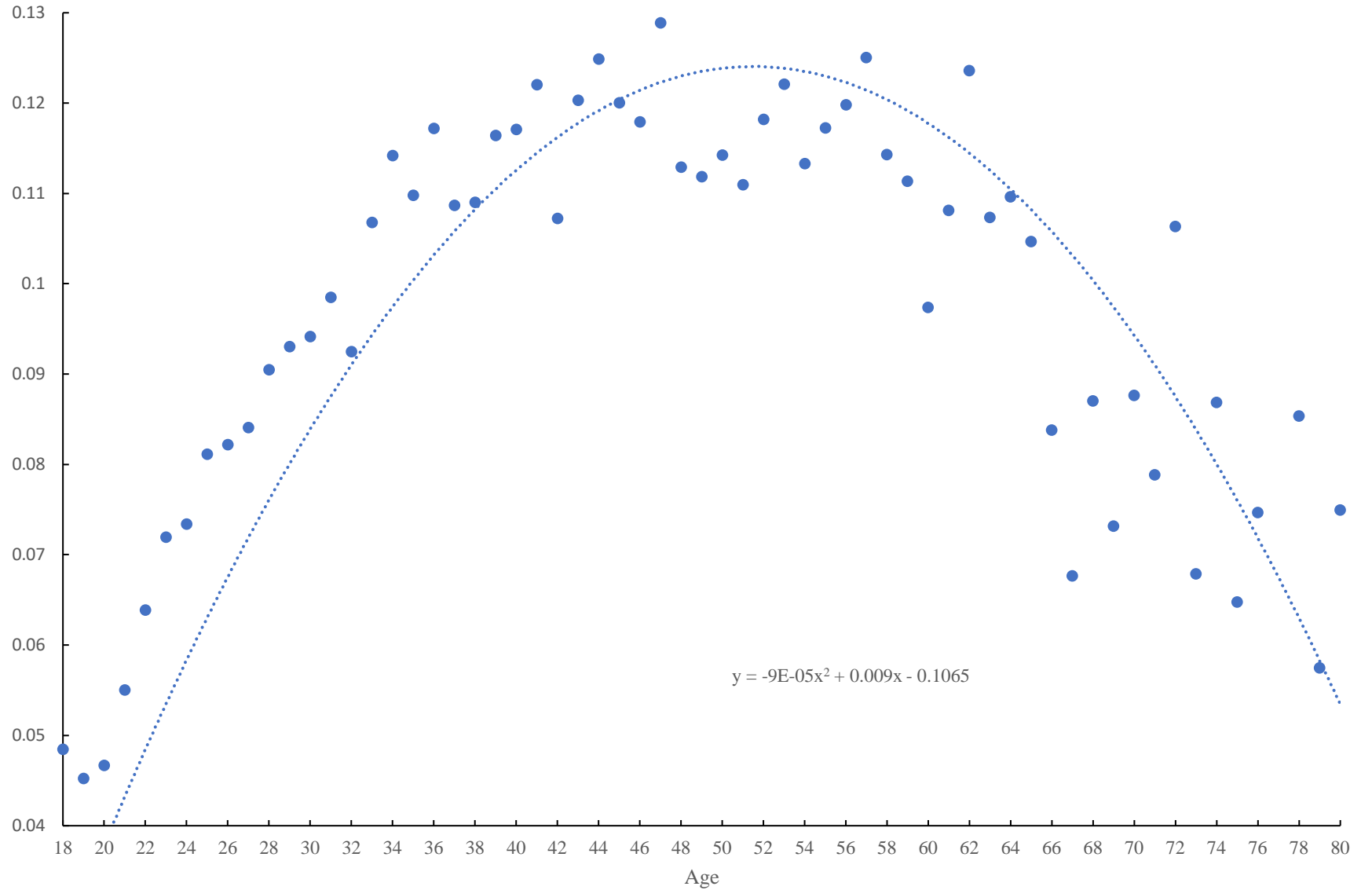


Chart 6. Change in the age distribution of union membership rates, US, 1983-2018

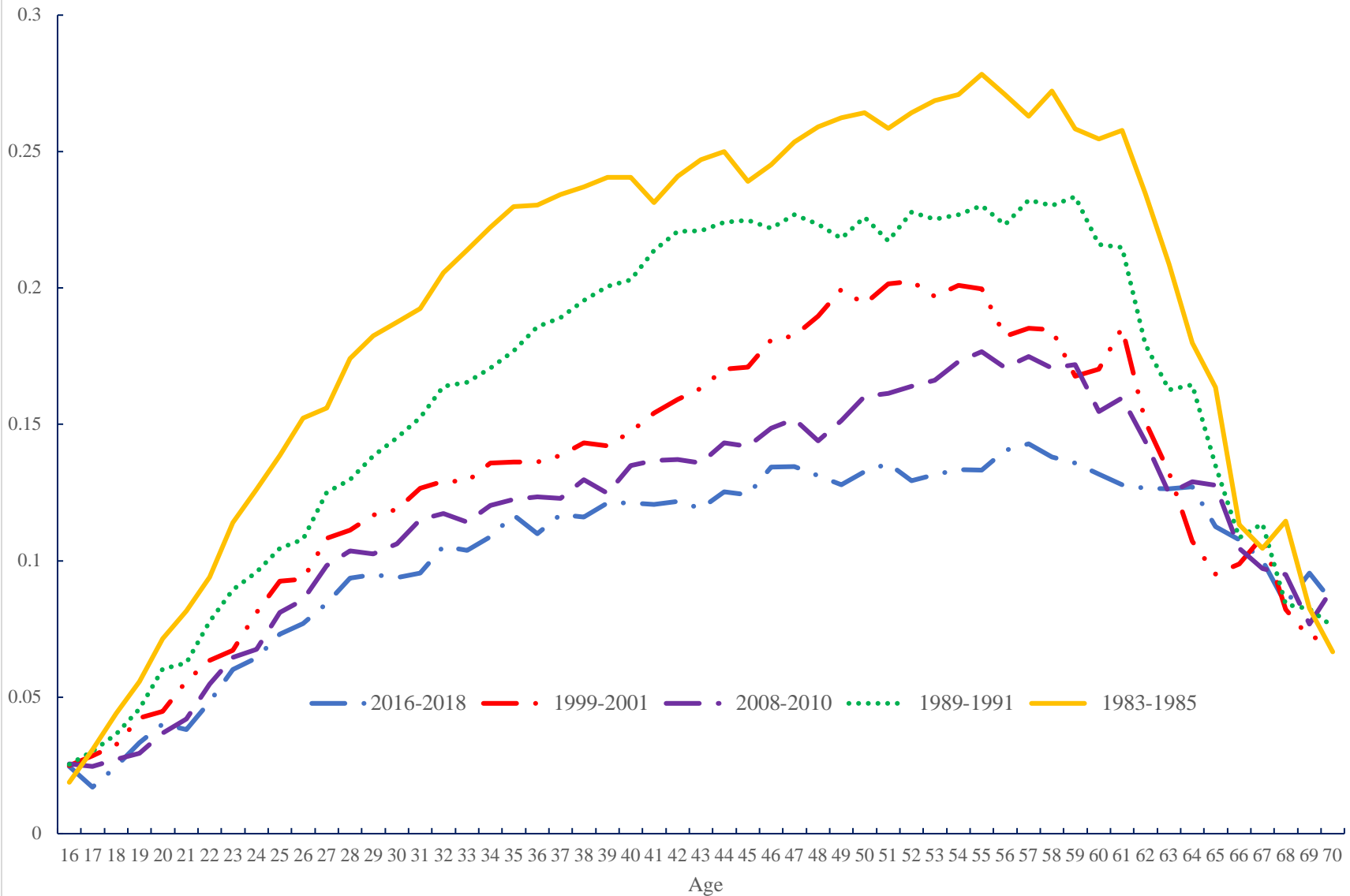


Chart 7. Change in the age distribution of union membership rates, UK, 1992-2018



Chart 8. Change in age peak in union membership, UK and USA

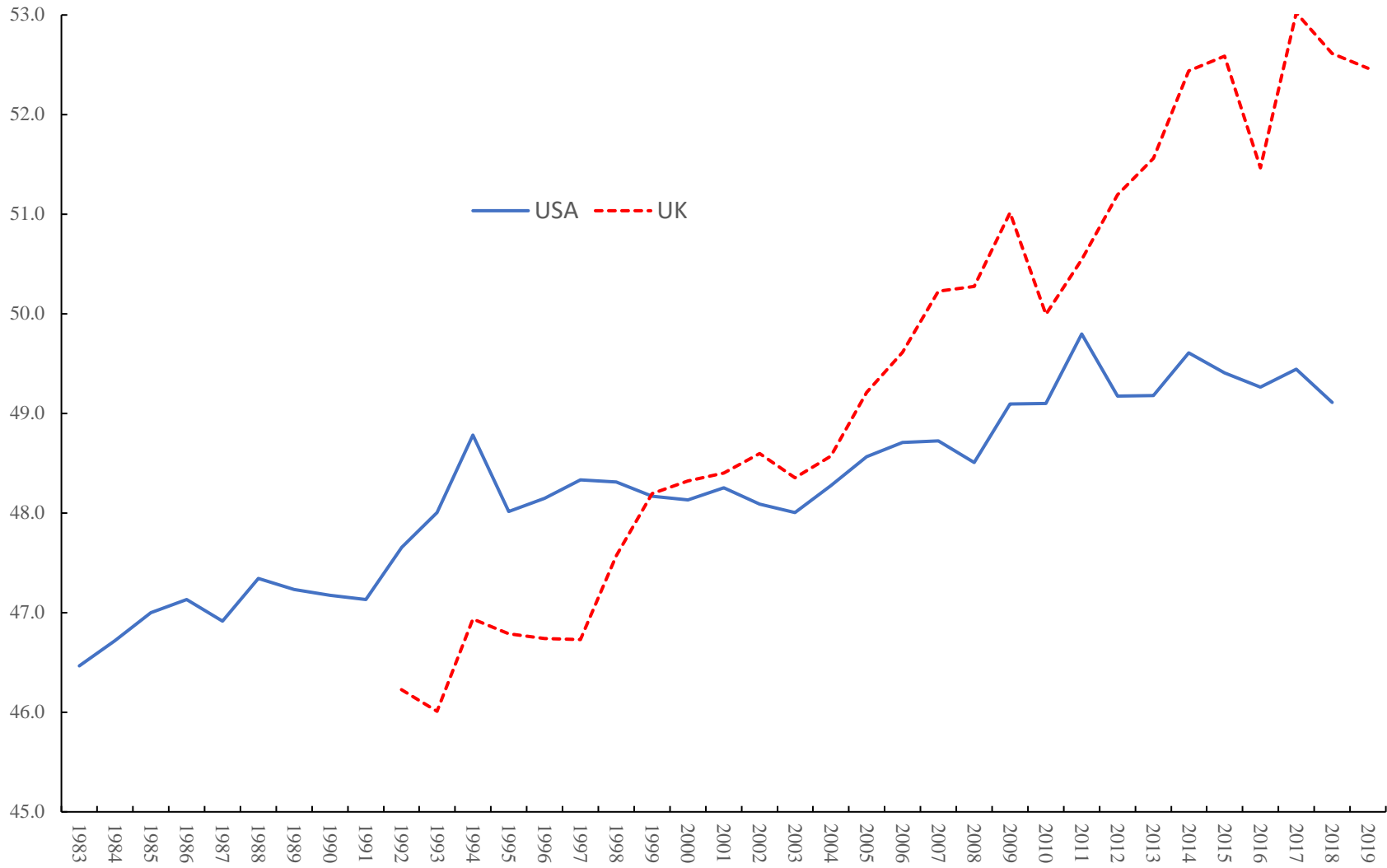


Chart 9. Union Density , 1960-2019 Source: ICTWSS Database

