The Sahm Rule and Predicting the Great Recession Across OECD Countries

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Abstract

We examine the start date of the Great Recession across OECD countries based on two successive quarters of negative GDP growth recession. For most OECD countries this establishes the start of recession in Q22008 or Q32008. We find that the Sahm Rule identifies the start of recession in the US to the beginning of 2008 but in other OECD countries it identifies the start in almost every case, *after* that identified by GDP. But the GDP and labor market data are subject to major revisions, so the turn is not apparent in most countries for some time. We establish our own rule for predicting recession using the fear of unemployment series to predict recession. It involves looking for a ten-point rise in the series compared to its previous twelve month low. These surveys are timely and have the major advantage they are not subject to revision. Across the OECD we confirm this finding with other types of qualitative data and especially so in the UK. Qualitative surveys, we show, in the US in 2006 and 2007 predicted the subsequent recession and they did the same in Europe at the end of 2007 and in the early part of 2008.

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> *"(O)ne would need to be endowed with perfect foresight to have been able to predict how the financial crisis would unfold, spilling over from one institution to another, and from one market to another. …The moral from this is one should not expect to be able to predict the timing and scale of these sorts of events with any precision".* Charlie Bean, Deputy Governor for Monetary Policy at the Bank of England, speech to the Royal Statistical Society User Forum, London, 27th October 2010.

There was no need for perfect foresight to predict the Great Recession of 2008; following the data was enough. Turning points, admittedly, are hard to spot, both downturns and upturns although the former matter more. Being overly optimistic at a turn down is likely worse than being too pessimistic about an uptick, especially if institutions and investors limit their exposures in the face of a predicted downturn that does not come. Inevitably estimation involves extrapolation of existing trends, hence at down turns estimates tend to be too high and at upticks, they tend to be too low. Real time data are also problematic: quarterly GDP estimates are constantly revised by statistical authorities as new data arrive, so early releases tend to have a high proportion of estimate and little data. As time goes on more data arrive and the estimated proportion declines. As we shall see below there are also issues with revisions to labor market data.

The simplest way to identify the start of a recession outside the United States is to see when there are two successive negative quarterly growth estimates for GDP. The problem in spotting the timing of the Great Recession was that initial estimates of GDP change at the turning point were heavily revised. We only know definitively when the start of the Great Recession began a decade or so later. As data come in over time the estimates at the turning points tend to be revised a lot, but it takes a while.[1] Consequently policymakers have little sound information in real time to make judgements about the past, the present and the future. The MPC in its August 2008 Inflation Report wrongly forecast no recession but also in its *backcast* assumed the past and the present would be revised upwards, which they were not. Chart 1 presents the MPC's forecast and backcast, from August 2008, five months after recession in the UK started and many months after it started in the USA. The forecast band widens to the right as the further out the forecast the greater the errors. It shows that the central forecast is no recession in the future, as the green swathe does not go below zero.

The green band to the left narrows due to revisions over time becoming more accurate and the black line is the latest data from the ONS. The fact that the green band is above the ONS line implies the MPC expects data from the past, and the present, to be revised up. It wasn't and as we show below there was a recession that lasted five quarters from Q22008-Q22009. The forecast was conditioned on market interest rates which at the time suggested they would remain above 5% for the duration of the forecast, which turned out to be too high, given that rates were cut to 0.5 by March 2009. Getting GDP revisions wrong really matters.

[1] For example, in the UK in May 1992 the first estimate of quarterly GDP growth for Q21992 was published as -0.7% and is now 0%. This estimate has subsequently been revised twelve times as follows Jun-92=-0.5%; Sept-92=-0.4%; Sept-93=-0.6%; Jun-95=-0.7%; Sept-98=-0.1%; Sept-01=+0.1%; Sept-03=+0.3%; Jun-06=+0.2%; Sept-08=+0.1%; Jun-12=+0.3%; Jun-13=+0.6%; Sept-14=0%.
https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/revisionstrianglesforukgdpabmi

A major issue is what data is available to call the start of recession, and when? It turns out that qualitative data are available first, usually in the month it refers to, which as we will see is a major advantage because of its timeliness.[2] Then labor market data is released, but the data takes time to collect and is also subject to revision.[3] For example, the estimate of non-farm payrolls is revised for two subsequent months. In some countries labor market data are available much earlier than others.[4] The UK is the slowest to produce national statistics although it does publish monthly estimates that it doesn't use as a national statistic because of their variability.[5] Early estimates of quarterly GDP growth are usually available shortly after the quarter ends, but these data are open to revision.

Now a decade after the revisions we find that the qualitative data give an accurate early indicator of recession. In the US the labor market data turned down before the downturn in the revised GDP data. In contrast in almost all the other OECD countries declining GDP *preceded* labor market declines. This is what also happened during the COVID-19 pandemic when the US unemployment rate jumped from 3.5% in February to 19.8% in April, whereas other countries saw much lower and smaller rises in unemployment.[6]

This paper is a companion to Blanchflower and Bryson (2021a) where we used panel data for 29 European countries over 439 months between 1985 and 2021 in an unbalanced country*month panel of just over 10000 observations, to predict changes in the unemployment rate 12 months in advance. This was based on individuals' fears of unemployment, their perceptions of the economic situation and their own household financial situation. We found fear of unemployment predicts subsequent changes in unemployment 12 months later in the presence of country fixed effects and lagged unemployment. Individuals' perceptions of the economic situation in the country and their own household finances also predict unemployment 12 months later. Business sentiment we also

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[2] . For example, The European Commission released data for August 2021 for their Business and Consumer Surveys on 30th August 2021.
https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys/latest-business-and-consumer-surveys_en

[3] For example, at the end of each calendar year, the Bureau of Labor Statistics (BLS) re-estimates the seasonal factors for the Current Population Survey series by including another full year of data in the estimation process. For the major aggregate labor force series, however, the first-time revisions rarely alter the essential trends observed in the initial estimates. https://www.bls.gov/news.release/archives/empsit_05082020.htm

[4] For example, at the time of writing in early September 2021, the latest Employment Situation Report from the BLS reports the unemployment rate and employment for August 2021. In contrast in the UK data is available for April-June 2021, which is reported as May. In contrast in EU countries seasonally adjusted data are available for July 2021.
https://www.bls.gov/news.release/pdf/empsit.pdf
https://ec.europa.eu/eurostat/documents/2995521/11563247/3-01092021-AP-EN.pdf/e045fa11-8a9e-6e60-6967-19088d96af8a?t=1630482630262
https://www.ons.gov.uk/employmentandlabormarket/peopleinwork/employmentandemployeetypes/datasets/summaryoflabormarketstatistics

[5] Spreadsheet X01 shows an unemployment rate of 4.9% for April-21; 4.8% for May-21and 4.4% for Jun-21 and an overall unemployment rate for April-June of 4.7%, which, confusingly, is reported as being for May-21.
https://www.ons.gov.uk/employmentandlabormarket/peopleinwork/employmentandemployeetypes/datasets/laborforcesurveysinglemonthestimatesx01

[6] The official US unemployment rate for April 2020 was 14.8% but 5% has to be added to it because of misclassification errors in the Current Population Surveys reported in the April 2020 Employment Situation Report (https://www.bls.gov/news.release/archives/empsit_05082020.htm) which is continuing. In the September 2021 report the unemployment rate was biased downwards by 0.3pp due to this misclassification error.

found to be predictive of unemployment 12 months later. It also is a companion to Blanchflower and Bryson (2021b) where we use data from both The Conference Board and the University of Michigan to predict recessions. The data suggests the possibility that the US is headed into recession in 2022.

In this paper we focus in more detail on the Great Recession of 2007-2009. We examine the value of qualitative data and establish our own rule for predicting recessions. We compare it to the Sahm Rule that has been proposed as a way of identifying recessions in the United States by looking at movements in the unemployment rate. It has not previously been applied elsewhere. The labor market started loosening in the US before GDP started to fall. The complication in the USA is that there were not two successive quarters of negative growth until Q32008: Q12008 was negative, but Q42007 and Q22008 were positive.

We examined quarterly GDP growth rates in 2007 and 2008 in 39 OECD countries (Table 1). This is after more than a decade of revisions. Using the two successive quarters of negative growth to signal recession, seven countries did not conform to the rule - Australia, Bulgaria, Iceland, Korea, Malta, Norway, Poland and Slovakia. Norway, it should be noted, had three of five negative quarters from Q12008 while Iceland had negative growth in Q32007 (-2.2%); Q12008 (-2.9%); Q32008 (-5.6) and Q12009 (-10.1%) but positive growth in Q42007 (+4.6%); Q22008 (+3.6%) and Q42008 (+6%).

However, thirty-one countries did fully conform to the rule, and in all but one of these cases recession started in 2008. One saw growth starting in Q42007 (Estonia); and five in Q12008 (Finland, Ireland, Luxembourg, New Zealand and Sweden). Nine countries saw two quarters of negative growth starting in Q22008 (Denmark, France, Germany, Greece, Italy, Japan, Latvia Portugal and the UK) with ten in Q32008 (Austria, Belgium, Chile, Hungary, Lithuania, Netherlands, Russia, Slovenia, Spain and the USA). Finally, six countries saw their economic activity head downwards in Q42008 (Canada, Czechia, Israel, Mexico, Romania and Switzerland)

We have unemployment rates for all of these OECD countries and in the majority the Sahm Rule, which compares a three-month moving average of the present with the lowest value of the moving average over the preceding year, suggests recession started *after* the date indicated by two-quarter declining GDP. In sixteen countries the Sahm Rule suggests recession started in 2009 whereas in no case was that true using the two successive quarters rule. But that is an ex-post judgment. The Sahm Rule is likely to indicate a downturn, even before the GDP data does, given the long revision cycles at turning points as we show below in the case of the US and especially the UK.

We then examined qualitative data for 29 European countries, which seems to give a much better and more-timely indicator of turning points in 2008 than either the unemployment rate or GDP. We also focus on the UK where there were a number of qualitative series in the Spring of 2008 consistently suggested recession had started at that point. The official GDP estimates didn't show that until June 2009.

The remainder of this paper is structured as follows. The next section describes traditional means of identifying business cycle turning points in the United States and elsewhere. Section Two shows the value of the Sahm Rule in predicting the Great Recession across the United States and at state-

level. Section Three extends this analysis to previous US downturns. In Section Four we turn to the UK and show that the Sahm Rule does not perform so well. Instead, we show that qualitative metrics of economic activity available at the time were 'flashing red' and were good at predicting the onset of recession. Section Five presents similar evidence for the rest of the OECD. Section Six offers another rule for predicting recession based on percentage point shifts in the fear of unemployment. Section Seven concludes.

1. Dating US Business Cycles

We first need to look at, traditionally, how peaks of business cycles are identified. In the US there is an official committee to retrospectively date recessions: the NBER Business Cycle Dating Committee (BCDC), who do so well after the event. Over the last six recessions they took at least six months to make the call. This has the advantage that relevant data has become available as it is published with lags and some revisions have occurred.[7] As Stock and Watson (2010) note '*the problem of dating turning points differs from the forecasting problem because turning points are estimated retrospectively*." And later "*We consider the problem of dating a reference cycle turning point, once it has been established that a turning point has occurred."* This is of little use to policymakers who want to call turning points as they happen, not many months after they have passed.

There is a large literature using financial variables such as the inversion of the yield curve to predict recessions, see for example Henry and Phillips (2020), Bauer. and Mertens (2018) and. Cooper, Fuhrer, and Olivei (2020). Aastveit, Anundsen and Herstad (2018) examined the role of residential investment. Kelley (2019) showed the importance of using Leading Indicator. He constructed a Composite Leading Indicator Index which included data on employment, manufacturing activity, housing, consumer expectations, and the return on the stock market. He shows that a composite index of seventeen of these measures outperforms the yield curve. We take a somewhat similar route focusing primarily on qualitative measures from businesses and especially from consumers as additional measures to the yield curve. We also find a role for labor market variables. In two companion papers Blanchflower and Bryson (2021a, 2021b), we examine US data from The Conference Board and the University of Michigan used by Kelley (2018) to predict recessions.

On December 1st, 2008, the BCDC determined that a peak in economic activity occurred in the US economy exactly a year earlier in December 2007.[8] The peak marked the end of the expansion that began in November 2001 and, the NBER argued, the beginning of a recession. The expansion lasted 73 months; the previous expansion of the 1990s lasted 120 months. They noted that "*the currently available estimates of quarterly aggregate real domestic production do not speak clearly about the date of a peak in activity*".[9] They noted that non-farm payrolls reached a peak in December 2007 and declined every month after that. The BCDC also noted that their preferred measure of real personal income less transfers peaked in December 2007 while industrial

[7] For example the BLS publishes non-farm payrolls but revises them in the next two data releases.

[8] https://www.nber.org/news/business-cycle-dating-committee-announcement-december-1-2008

[9] The NBER BCDC noted. "*The product-side estimates fell slightly in 2007Q4, rose slightly in 2008Q1, rose again in 2008Q2, and fell slightly in 2008Q3. The income-side estimates reached their peak in 2007Q3, fell slightly in 2007Q4 and 2008Q1, rose slightly in 2008Q2 to a level below its peak in 2007Q3, and fell again in 2008Q3. Thus, the currently available estimates of quarterly aggregate real domestic production do not speak clearly about the date of a peak in activity*." After revisions the most recent estimates suggest that Q407 was positive; Q108 negative and Q208 positive.

production peaked in January 2008. The unemployment rate for December 2007, was 5.0% up from 4.7% in November.

No other country has the equivalent, to our knowledge of the BCDC. Instead, more informal ways are used to identify turning points. The most widely used rule is that two successive quarters of GDP constitute a recession. That presents a couple of problems as the NBER noted. The first is that GDP growth, as noted above, is revised for a long time and sometimes by a lot especially at turning points. But second, the rule often doesn't give a clear-cut answer of when a recession started. In some cases, there are not two successive quarters but may be alternating negative quarters (e.g. Norway) or one very large negative quarter (Slovakia).

The United States presented a particular problem in 2007/8. GDP growth in Q42007 was positive (0.6%), Q12008 was negative (-0.4%) while Q22008 was positive (0.6%). It was then followed by three negative quarters. So according to the two successive quarters rule the US recession started in July 2008, at the start of the third quarter. In the US estimates are reported as annualized percentage growth rates so that is what we report here. Below we report the first to third and current final estimates of quarterly changes in GDP. As we can see below the first estimate for Q12008 was positive, but it eventually switched to negative. 2008Q3 and 2008Q4 became more negative over time and as the economy started to improve in Q1 and Q2 2009 the early estimates were revised up. Over time Q22008 has become more positive over time. The four quarters 2008Q3-2009Q2 were negative, suggesting the recession using GDP growth started in Q32008.

Date	First	Second	Third	Most Recent
Q42007	0.636	0.626	0.578	2.460
Q12008	0.597	0.901	0.959	-1.619
Q22008	1.889	3.278	2.825	2.310
Q32008	-0.252	-0.514	-0.511	-2.091
Q42008	-3.804	-6.248	-6.342	-8.452
Q12009	-6.144	-5.719	-5.493	-4.581
Q22009	-1.017	-1.014	-0.738	-0.675

As noted in Blanchflower and Bryson (2021) the problem in the UK was that the first estimate of GDP growth in Q22008 produced by the Office of National Statistics in July 2008 was of growth of +0.2%. It took until June 2009 for that estimate to turn negative: it is currently -0.6%. In October 2008 Q32008 was reported at -0.5% (now -2.0%) and in January 2009 Q42008 was reported at -1.5% (now -2.3%). So, from January through June 2009, it was wrongly thought the recession started in Q3 2008 whereas, in GDP terms it started in Q2.[10] At downturns initial releases tend to overestimate growth.

[10] There were analogous issues on the upside, with the initial data releases tend to be underestimates. In July 2009 Q209 was reported at -0.8% (now -0.2%) in October 2009 Q3 was reported as -0.4% (now +0.4%) and in January 2010 Q409 was estimated at +0.1% (now +0.4%).
https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/revisionstrianglesforukgdpabmi

Table 2 shows changes in employment in the US from both the household and establishment surveys.[11] Employment in the household survey declined first in April 2007 (-734k), was positive in May, June, September, November 2007 and January 2008 and then went negative from February 2008 and was negative in 22 of the next 24 months. Using a rule of two successive negative months of employment growth data gives the start of the US recession as July 2007 using household data. We find similarly below using state data.

In contrast non-farm payrolls first went negative in February 2008 and stayed negative for 22 of the next 23 months. The decline in employment over the period 2007-2009 was slightly larger on the household survey -7.96 million and on the establishment surveys 7.46 million which is to be expected given its broader scope. If we use non-farm payrolls that suggests that February 2008 was the start of the recession in the United States.

2. The Great Recession, the Sahm Rule and the United States

2.1. The Sahm Rule

For the United States, Claudia Sahm (2019) has invented the Sahm Rule, which identifies turning points in the unemployment rate, to identify the start of recession. It identifies signals related to the start of a recession when the three-month moving average of the national unemployment rate (U3) rises by 0.50 percentage points or more relative to the three-month moving average low during the previous 12 months.

Detailed data are available at FRED for the United States on the Sahm Rule. Data are available for both real time and for currently available data and they are very similar. The one instance where there is a little difference is in 2008 when the real time data suggested April 2008 as the starting point of the Great Recession while the revised data suggests February 2008. The series using the current data, available since March 1949 and is plotted with the unemployment rate in Chart 2.[12]

Data are also available on a broader measure of labor market slack that includes a measure of underemployment, the so-called U6 measure. That reached 0.50 in December 2007, the same month the BCDC called the recession.[13] It is plotted in Chart 3. Feng and Sun (2020) suggest that the unemployment rate is subject to misclassification error due to difficulties in classifying some groups of people, like marginally attached worker and involuntary part-time workers who are included in the U6 variable. They also find that their corrected recession indicator identifies recession start dates a few months earlier than the original Sahm recession dates. Their indicator is rather complicated to calculate.

We also examined the unemployment rate by state and the Sahm Rule suggested that the first state to turn to recession was Florida as it did in the 1930s (Knowlton, 2021).[14] There were ten states

[11] The household survey has a more expansive scope than the establishment survey because it includes self-employed workers whose businesses are unincorporated, unpaid family workers, agricultural workers, and private household workers, who are excluded by the establishment survey. See https://www.bls.gov/news.release/pdf/empsit.pdf

[12] https://fred.stlouisfed.org/release?rid=456

[13] Bell and Blanchflower (2021) show that the underemployment rate (U7) is a better measure of labor market slack than the unemployment rate. They define U7 as PT for Economic Reasons divided by Employment.

[14] Spreadsheet available on request.

that began the recession, as measured by the Sahm Rule, in 2007. Alaska and North Dakota were the last to enter recession in December 2008.

April 2007	Florida
June 2007	Illinois
August 2007	Nevada
September 2007	California and Hawaii
October 2007	Missouri, Montana and Tennessee
November 2007	Colorado
December 2007	Alabama and Georgia
January 2008	Arizona and New York
February 2008	Connecticut; Virginia and the USA
March 2008	Delaware and New Jersey
April 2008	Idaho and Utah
May 2008	Indiana; Iowa; Michigan; Minnesota
June 2008	DC; Kentucky; New Mexico; North Carolina; Ohio and Washington
July 2008	Louisiana; Maryland; Massachusetts; Mississippi; Oregon; Pennsylvania; Rhode Island and Vermont
August 2008	Maine and Texas
October 2008	Arkansas; Kansas, New Hampshire, Oklahoma, South Dakota, Wisconsin and Wyoming
November 2008	Nebraska and West Virginia
December 2008	Alaska and North Dakota.

All fifty states plus DC saw their estimated Sahm Rule values hit 0.5 between April 2007 and December 2008.

2.2. Employment declines by U.S state

We then examined employment growth by month by state as reported by the BLS and most states. We identified when there were two successive months of negative employment growth. Here we focus on employment levels. The data source is the Current Population Survey which includes the most marginal workers includes self-employed workers whose businesses are unincorporated, unpaid family workers, agricultural workers, and private household workers, who are excluded by the establishment survey.

In the majority of states this occurred in 2007. Looking back at the US numbers for 2007 from Table 2, there were five months with negative growth (April, -734; July -158; August, -223; October -298 and December -332) including two successive ones (July and August). This is reflected by state also and it complicates determining starting points. The twelve-monthly observations for these thirty-three states with more than one successive negative monthly observation in 2007 are reported in Appendix Table 2.

Below we report the starting month, which is the first of two negative months of employment growth for twenty-one states that had one continuous spell of unemployment ranging from twelve

months (Texas) to fifty-two months duration (Michigan). The details of the start and end dates of the spell and duration in continuous months is reported below.[15]

The earliest start, and the longest spell, was for Michigan in September 2005 lasting 52 months through December 2009. Vermont started in November 2006 with five others in 2007 and with the rest in 2008. Spells mostly lasted through the end of 2009 but in two cases they didn't end until 2010 (Colorado and Nevada) while two other starts didn't complete their spell until 2011 (Arizona and Utah).

	Start	End	Duration		Start	End	Duration
Michigan	Sep-05	Dec-09	52	Utah	Feb-08	Nov-11	34
Vermont	Nov-06	Dec-09	32	Colorado	Mar-08	Feb-10	24
West Virginia	Jan-07	Dec-09	20	Arizona	May-08	Jun-11	38
Rhode Island	Feb-07	Nov-09	34	Nebraska	May-08	Jan-10	21
Florida	Mar-07	Nov-09	33	Georgia	Jul-08	Aug-10	26
South Carolina	Mar-07	Nov-09	33	N. Hampshire	Jul-08	Nov-09	17
Tennessee	Mar-07	Aug-09	30	Washington	Aug-08	Dec-09	17
Idaho	Jul-07	Nov-09	28	Virginia	Aug-08	Dec-09	17
California	Jan-08	Dec-09	24	Texas	Oct-08	Sep-09	12
Connecticut	Feb-08	Dec-09	23	Wyoming	Oct-08	Dec-09	15
Nevada	Feb-08	Oct-10	33				

The remaining thirty states and DC had two broken spells, meaning two consecutive falls in employment level month on month followed by a subsequent spell of two consecutive falls but interrupted by months of growth. With the exception of Indiana, which started in December 2006, first spells *all* started between January and May 2007.

In Alabama, Kentucky and Missouri the second spell started in December 2007 but in all the other states it started in 2008. The finish date was also in 2008 except for Kansas and Missouri (January 2010), Oklahoma (October 2010) and Alabama (July 2011). Texas and Wyoming started last, in October 2008. The data are reported below.

	First spell			Second Spell		
	Start	End	Duration	Start	End	Duration
Indiana	Dec-06	Jul-07	8	Apr-08	Dec-09	21
Alabama	Jan-07	Aug-07	2	Nov-07	Jul-11	45
Hawaii	Jan-07	Sep-07	6	Apr-08	Oct-09	19
Illinois	Jan-07	Mar-07	10	Feb-08	Dec-09	23
Maine	Jan-07	Aug-07	7	Apr-08	Nov-09	20
Maryland	Jan-07	May-07	10	Apr-08	Dec-09	21
Iowa	Jan-07	May-07	15	Sep-09	Dec-09	16
Minnesota	Jan-07	Oct-07	3	Feb-08	Oct-09	21
Mississippi	Jan-07	Apr-07	9	Feb-08	Dec-09	23

[15] Georgia had zero growth in May 2010 and Vermont had six positives interspersed in the 32 months.

New Jersey	Jan-07	Jun-07	8	Mar-08	Nov-09	21
New York	Jan-07	Jun-07	13	Aug-08	Dec-09	17
Alaska	Feb-07	May-07	14	Aug-08	Oct-09	16
Arkansas	Feb-07	Jul-07	10	Jun-08	Dec-09	12
Delaware	Feb-07	May-07	9	Mar-08	Dec-09	22
Kansas	Feb-07	May-07	12	Jun-08	Jan-10	16
Kentucky	Feb-07	Sep-09	2	Dec-07	Nov-09	24
Missouri	Feb-07	Aug-08	3	Dec-07	Jan-10	26
Oklahoma	Feb-07	Jun-07	15	Oct-10	Nov-09	15
Wisconsin	Feb-07	Jun-07	9	Apr-08	Dec-09	21
Louisiana	Mar-07	Jun-07	14	Sep-08	Nov-09	15
North Carolina	Mar-07	May-07	9	Mar-08	Nov-09	20
North Dakota	Mar-07	Jun-07	13	Aug-08	Apr-09	9
Ohio	Mar-07	Sep-07	4	Feb-08	Dec-09	23
Pennsylvania	Mar-07	Apr-07	15	Aug-08	Dec-09	17
South Dakota	Mar-07	May-07	10	Apr-08	Dec-09	21
DC	Apr-07	Jun-07	13	Aug-08	Jun-09	11
New Mexico	Apr-07	May-07	15	Sep-08	Dec-09	16
Massachusetts	May-07	Aug-07	6	Mar-08	Nov-09	19
Montana	May-07	Jul-07	7	Mar-08	Dec-09	22
Oregon	May-07	Jul-07	12	Aug-08	Oct-09	15
USA	Jul-07	Aug-07	2	Feb-08	Oct-09	21

As an example of the prevalence of negative growth months, in May 2007, thirty-three states experienced negative growth in that month. This includes seven states with one ongoing spell and twenty-six in their first spell of two had negative growth in May. The exceptions are Arizona*, California*, Colorado*, Connecticut*, Georgia*, Idaho*, Illinois, Mississippi, Nebraska*, Nevada, NH*, Pennsylvania, Texas*, Utah, Virginia*, Washington*, WV and Wyoming*, where * notifies a long single spell to start in 2008.

As was clear from Table 2 the US had two successive negative months in July and August 2007 and then again in February 2008, with five months alternating positive to negative months and back. From February 2008 the US saw a spell of 22 negative months from Feb-08 through October 2009. From Nov-09 through Dec-10 there were another 7/14 months with negative growth.

By July 2007, **all but fourteen states** in 2007 had also experienced at least two successive months of negative employment growth. That is also the date we get if we used two consecutive months of employment falls for the US as a whole.[16]

2.3. Policymakers missed the Great Recession

[16] We should note that over the period January 1996 through July 2008 for the US there were only two prior occasions when there were two successive months of negative growth – April (-484) and May (-207) and November (-454) and December (-154) 2001, with the numbers in parentheses the employment decline in thousands. Since January 2011 there have only been two such spells –July (-99) and August (-1) 2012; March (-95) and April 2019 (-68) and March and the COVID declines in April 2020 (-3196 and -22,166).

Despite many measures available with only a lag of a few weeks, suggesting the US labor market had been in recession for many months even by the summer of 2008 policymakers still seemed unaware. The transcript of the minutes of the FOMC meeting of August 5th, 2008, suggested that their next move of monetary policy was likely to be a tightening.[17]

"Most members did not see the current stance of policy as particularly accommodative, given that many households and businesses were facing elevated borrowing costs and reduced credit availability due to the effects of financial market strains as well as macroeconomic risks. Although members generally anticipated that ***the next policy move would likely be a tightening****, the timing and extent of any change in policy stance would depend on evolving economic and financial developments and the implications for the outlook for economic growth and inflation.*

Lehman Brothers went bankrupt in September 2008. At the October 2008 meeting the FOMC was forecasting in its Economic Projections that the central tendency of the unemployment rate would be 7.1% to 7.6% in 2009 and 6.5% to 7.3% in 2010.[18] This was up from their economic projections in June 2008 of 5.3% to 5.8% in 2009 and 5.0% to 5.6% in 2010. Monthly unemployment in the US averaged 9.3% in 2009 and 9.6% in 2010, peaking at 10.0% in October 2009. This was a big miss.

3. Previous US Downturns

The following six peaks have been identified by the CBDC.[19] 1) January 1980 (5 months) 2) July 1981 (6 months) 3) July 1990 (9 months) 4) March 2001 (8 months) 5) December 2007 (12 months) 6) February 2020 (4 months). The numbers in parentheses are how many months since the onset of recession it took the CBDC to call the recession.

However, if we were to simply use the two quarters of negative GDP growth rates that would show 11 recessions starting since Q21947. Appendix Table 3 reports GDP quarterly growth rates for the USA. In the 297 quarters from Q11948-Q22021 there have been forty-two quarters of negative growth and eleven recessions measured by two successive negative quarters of GDP growth. Historically there are thirteen occasions between 1949 and August 2021 that the Sahm rule reaches 0.5 and hence, according to Sahm (2019) identifies the start of recession .

It turns out that the Sahm Rule approximates very closely the starting dates for recession that would be identified if we simply looked at the starting data for two successive months of negative growth in either non-farm payrolls (NFP) or CPS employment. Table 3 illustrates. It reports monthly changes in NFP and CPS employment for the month identified as the start of the recession by the Sahm Rule (year t) plus five years earlier (t-1 through t-5) and three years later (t+1 through t+3). The data identified as the start point (shown in green in the table) by the change in NFP is very close to the Sahm Rule date and is as follows

$year_{t-5}$ October 1957 and October 1960

[17] There was even a vote at this meeting to raise rates by Richard Fisher, Dallas Fed President "*to help restrain inflation and inflation expectations, which were at risk of drifting higher*".

[18] https://www.federalreserve.gov/monetarypolicy/fomcminutes20081029ep.htm and https://www.federalreserve.gov/monetarypolicy/fomcminutes20080625ep.htm

[19] https://www.nber.org/research/business-cycle-dating/business-cycle-dating-committee-announcements

$year_{t-4}$	November 2002
$year_{t-3}$	November 1953, November 1981 and June 2001
$year_{t-2}$	October 1990
$year_{t-1}$	April 2020
$year_{t}$	February 2008
$year_{t+1}$	March 1970 and July 1974
$year_{t+2}$	February 1980

November 1959 using NFP does not have two quarters of negative growth but does have negative growth in t-1 and t-3.

CPS employment, start dates are as follows

$year_{t-4}$	November 1953 and October 1990
$year_{t-2}$	June 2001
$year_{t-1}$	November 2002 and April 2020
$year_{t}$	October 1957, November 1981and February 2008
$year_{t+1}$	February 1980
$year_{t+2}$	October 1960 and March 1970

Two successive monthly negatives for CPS employment were not seen for November 1959 or July 1974.

Overall, in eight of the occasions the start based on NFP gives an earlier read than the Sahm Rule. On three occasions it was later and in the Great Recession they were the same. For the CPS five gave earlier starts, three were the same and one was a month later and two were two months later. If we just take the six NBER identified recessions since 1980 this is what we see.

NBER	GDP	Sahm	NFP	CPS
1) January 1980	Q21980	February 1980	February 1980	March 1980
2) July 1981	Q41981	November 1981	September 1981	November 1981
3) July 1990	Q41990	October 1990	August 1990	July 1990
4) March 2001	No	June 2001	April 2001	May 2001
5) December 2007	Q32008	February 2008	February 2008	January 2008
6) February 2020.	Q12020	April 2020	March 2008	March 2020

If anything, the two-month employment decline rules using the NFP, and CPS give a slightly earlier read of NBER recession start dates than does the Sahm Rule. All three, though, are broadly consistent and give an earlier read than the BCDC.

The qualitative data in the US in the Great Recession gave an even earlier indication of what was coming in the United States. This is consistent with claims made in Blanchflower (2008) in April 2008, which examined how slowing started in the US housing market, first in prices which started falling at the end of 2006 and then spread to quantities such as permits to build, and housing starts, which slowed sharply in 2007. Consumer confidence data started falling around August 2007. Retail sales growth slowed from the spring of 2007 while real consumption and real disposable income slowed from around August 2007. As background Chart 4 plots the Michigan Consumer

Confidence Index and the US unemployment rate which track each other pretty closely. As Blanchflower (2008) noted this started to decline from a peak of 96.9 in January 2007 to 75.5 in December 2007. By April 2008 it was clear the US was in recession. This led to the following conclusion.[20]

"*For some time now I have been gloomy about prospects in the United States, which now seems clearly to be in recession….. By approximately December 2007 the housing market problems have now spilled over into real activity. The US seems to have moved into recession around the start of 2008*."

The same process then followed in the UK a few months later, based on the equivalent data. Recession in the UK started in the housing market at the end of 2007 and, as in the US, spread far and wide. This led to the conclusion.

More bad news is on the way. I think it is very plausible that falling house prices will lead to a sharp drop in consumer spending growth. Developments in the UK are starting to look eerily similar to those in the US six months or so ago. There has been no decoupling of the two economies: contagion is in the air. The US sneezed and the UK is rapidly catching its cold," (Blanchflower, 2008).

As we show below that is exactly what happened across the OECD.

4. The United Kingdom in the Great Recession

4.1.The Sahm Rule

The Sahm Rule does not do such a good job in the UK. As noted in Table 1 above using the two negative quarters of GDP growth rule the recession started in the UK in April 2008. Table 4 presents the latest revised data for the UK by month for employment and its monthly change in the first two columns and the unemployment rate and the Sahm Rule estimates in columns 3 and 4 respectively. Employment growth goes negative in May 2008 and continues to be negative for eleven of the next thirteen months. The unemployment rate jumped from 5.2% to 5.4% in May 2008 – reported as April-June 2008 by the ONS.

The Sahm Rule for the UK went to 0.5 in August 2008 (Chart 5). It does seem that the unemployment rate is more of a lagging indicator in the UK than it is in the United States. But we should note that is ten months before GDP growth in Q22008 was revised negative and Q32008 was not reported as negative until October 2008. Negative employment growth in two successive quarters does suggest the recession started three months earlier in May 2008.

4.2. The fear of unemployment

Blanchflower and Bryson (2021) have already noted that there is considerably more qualitative data for Europe in general than for the USA, including the EU Business and Consumer Surveys and the Purchasing Manager Indexes (PMI), plus for the UK there were the Bank of England Agent's monthly scores. The question is whether these help with turning points in 2008. Columns 6-8 of Table 4 for the UK report the fear of unemployment series from the EU Commission; the

[20] The US qualitative data and a longer discussion to support this claim are reported in Blanchflower (2008).

Bank of England Agents' Recruitment Difficulties score, and the Employment PMI from Markit.[21] These are timely indicators available often in the relevant month itself and are not revised.

In particular we make use of qualitative survey data from the Joint EU Harmonized Programme of Business and Consumer Surveys conducted by the European Commission (EC). Our major focus here is on the fear of unemployment (Blanchflower, 1991; Blanchflower and Shadforth, 2009) expressed not just by workers but based on a sample of working and non-working adults.

The question asked is:

Q1. How do you expect the number of people unemployed in this country to change over the next 12 months? The number will...
+ + increase sharply (PP)
+ increase slightly (P)
= remain the same (E)
− fall slightly (M)
−− fall sharply (MM)
DK (N)

Hence PP+P+E+M+MM+N=100.

On the basis of the distribution of the various options for each question, aggregate balances are calculated for each question based on the proportions in each category. Balances are the difference between positive and negative answering options, measured as percentage points of total answers. The score is calculated as B = (PP + ½P) − (½M + MM) which means the scores can vary between -100 and +100.

Chart 6 for the UK plots the fear of unemployment rate and the unemployment rate itself over a longer time run. The UK fear series jumped sharply in April 2008, and the other two scores rose abruptly in May 2008. All suggested a sharp downturn in the second quarter of 2008, which is the month where the recession started based on two successive negative growth quarters.

The fear of unemployment started picking up from March 2005 (=14.7) and rose steadily through November 2006 (34) and then fell back through July 2007 (25.5). The unemployment rate started rising from 4.5% in August 2005 to 5.5% in January 2007 before falling back to 5.2% in February 2008. The movements of the fear of unemployment preceded the changes in the unemployment rate. From September 2007 the fear series started picking up reaching a peak in January 2009. The unemployment rate started rising in March 2008, reaching a peak in September 2009. In August 2008 the fear series reached 49.8; the previous time it reached that level was when the unemployment rate was over 10%.

Many other qualitative indicators in the UK were flashing red by the second quarter of 2008 and were approaching or even passing historic lows. Chart 7 plots the Bank of England Agents' Scores on recruitment difficulties. Prior to 2008 the lowest level the series had reached was -0.7 in August 2006. The series started declining from the start of 2008. The series had gone negative in May

[21] https://www.markiteconomics.com/Public/Release/PressReleases

2008 and at -1.1 was below its historic low when the MPC in August 2008 declared there was no recession. Chart 8 plots Markit's Employment PMI and shows that the previous low of the series was 45.6 in December 2001; that number was reached in July 2008 and the series continued down.

Both series suggests the UK was slowing sharply, and presumably in recession, having reached historic lows certainly by July 2008. This was apparent in July 2008.

4.3. Other qualitative surveys

Table 5 reports results by sector from the same source as the fear of unemployment series for the period January 2007 to May 2009. Here we report confidence series by four business sectors and for the consumer. Together they are aggregated to calculate the Economic Sentiment Index.[22] Each is an aggregation of several components. Details are provided in the notes to the table. We also report pre-2007 averages. It is notable that all five series started declining in 2007.

In the case of manufacturing the index started deteriorating in March 2008 and went below its long run average (-7.7) in May 2008. Similarly, Construction started declining in November 2007 also went below its long run average (-13.2) in May 2008. The other three sectors all went below their long run averages at the end of 2007. Services went below the long run average in November 2007 while retail and the consumer indices went below those averages in December. By August 2008 when the MPC said there would be no recession the Service score of -22.1 was below its historic low of -17.6, as were both the Consumer (-25.6 versus -25.3) and Retail scores (-26.5 versus -22.4).

4.4. The Bank of England missed the Great Recession

When setting interest rates, for example, the problem is not only trying to understand where the economy is going but also, as noted above, where the economy has been and where it is at that time. Time lags in data releases on the labor market are also problematic especially in the UK, where data releases are delayed more than in any other country.[23]

In its August 2008 Inflation Report (IR) the MPC forecast no recession: "*the Committee's central projection is for GDP to be broadly flat over the next year or so*" (p.37). Indeed, the word 'recession" is nowhere to be found in the report. It seems the MPC spotted, but ignored, the rapid decline in both the Nationwide and EU surveys of household's expectations of employment as shown in Chart 9 (IR Chart 3.8). The MPC also reported that the percentage growth of LFS employment had slowed from 0.5% in Q407; to 0.4% in Q108; 0.3% in Apr08 and 0.2% in May08. Plus, hours of work growth had halved between Q108 and April and May08. (IR table 3.8) while vacancies had collapsed (IR chart 3.7). The evidence of slowing was blindingly obvious as was pointed out in Blanchflower (2008).

The latest data on the labor market available from the ONS, now available from the National Archive, reported on 16th April 2008 showed an unemployment rate for December 2007-February

[22] https://ec.europa.eu/info/files/user-guide-joint-harmonised-eu-programme-business-and-consumer-surveys_en
[23] In contrast, the BLS reported data for the US unemployment rate of 5.0% for April 2008 on Friday May 2nd 2008 https://www.bls.gov/news.release/archives/empsit_05022008.htm

2008 of 5.2%.[24] The main headline in the report is that it was down 0.1% compared with the three months September-November 2007. Blanchflower (2008) however, did note on the basis of this release, that there were broad signs of the UK labor market starting to slow.[25] The signs included the following:

1) Hourly earnings growth is sluggish - both the AEI and LFS measures are slowing.
2) Total hours and average hours started to fall in early 2008.
3) Claimant count numbers for February 2008 are revised up from a small decline to an increase.
4) There is a growth in the number of part-timers who say they have had to take a full-time job because they couldn't find a part-time job - up 37,000 in March alone.
5) Even though the number of unemployed has fallen, the duration of unemployment appears to be rising, which means that the outflow rate from unemployment has fallen. The numbers unemployed over 6 months in March 2008 was up 22,000 while the numbers unemployed for less than 6 months was down 47,000.
6) As in the United States, recent declines in employment in the UK, Blanchflower noted, were concentrated in manufacturing, construction and financial activities. The numbers presented below are in thousands, seasonally adjusted and relate to the number of workforce jobs. The quarterly data relate to the period September-December 2007 while the annual data refer to December 2006-December 2007.

	Change on quarter	Change on year
All jobs	+13 (0.0%)	+208 (0.7%)
Manufacturing	-29 (-0.9%)	-53 (-1.6%)
Construction	-19 (-0.9%)	-7 (-0.3%)
Finance & Business Services	-5 (-0.1%)	+149 (2.3%)

It was clear that the UK labor market in April 2008 was slowing fairly quickly but it took several months to show up in the data. In the 13th, August 2008 Labor Market Release from the ONS, which provided evidence for April-June 2008, much had changed, and the unemployment rate had now jumped to 5.4%. By the 15th, October 2008 release, the unemployment rate for June-August had reached 5.7%. The subsequent rises were reported in Table 4 below which showed that employment started declining in May 2008.

The August release seasonally adjusted employment for those age 16+ for Apr-Jun 2008 was reported from the Labor Force Survey as 29,558,000, up from 29,541,000 in March-May 2008. However, the ONS subsequently adjusted the population weights and now the two numbers have been revised, as shown in Table 4, to show a fall of employment of 27,000 between April and May 2008. See for example Palmer and Chandler (2008) and Chandler (2009) and especially ONS (2014) that revised the May-July 2008 estimate to be consistent with the 2011 Census.

[24] https://webarchive.nationalarchives.gov.uk/ukgwa/20111122125222/http://www.ons.gov.uk/ons/rel/lms/labor-market-statistics/april-2008/index.html
https://webarchive.nationalarchives.gov.uk/ukgwa/20111122125154/http://www.ons.gov.uk/ons/rel/lms/labor-market-statistics/august-2008/index.html

[25] This paper has been downloadable from the Bank of England's website since 29th April 2008.

Blanchflower (2008) also looked at qualitative indicators that were available at the end of April 2008 as an alternative and these are reported in Appendix Table 5. Many were at historic lows. They have not been revised. The table reports on five qualitative indicators showing what was known *at the time* at the end of April 2008. In part a) there are four consumer confidence indicators, along with their long-run averages, one from Nationwide and three from GFK with an overall balance, indictors of views of the future economic situation and views on major purchases. All four started dropping sharply at the end of 2007.

By March 2008, which was the most recent data available in April 2008, all four were well below their long run historical averages. For example, the Nationwide Consumer Confidence Index stood at 77 compared to a series average of 96, and down from 110 in January 2005. Part b) of Appendix Table 5 reports on changes in a qualitative labor market series from REC on the demand for staff. This series started tumbling rapidly from around July 2007 and was at 49.0 in February 2008, compared with 64.1 in July 2007. All were good predictors of what was to come.

By the Spring of 2008 it was apparent from a large variety of UK qualitative data series, from the Nationwide Consumer Confidence series, The REC Series on demand for staff, the Bank of England Agents, the PMIs and the EU Commission Business and Consumer Surveys, *all* of which were saying the same things. The UK had followed the US into recession. It turns out, using the data in Table 1, that by the start of Q32008 another 22 OCED countries had also entered recession, but neither the MPC, the FOMC or the ECB to name but a few seemed to notice. It was possible to spot the recession coming across the OECD, including in the US and the UK.

5. The rest of the OECD

In most OECD countries the unemployment rate took somewhat longer to respond than it did in the United States where the Great Recession started. The monthly unemployment rates for these countries are reported in Appendix Table 1 from December 2007 through April 2009. Annual rates are reported in Appendix Table 6 and annual changes in employment are reported in Appendix Table 7. In Germany and the Netherlands, the unemployment rate fell steadily through October 2008, before rising. In France it started rising from June 2008, while in Italy the rise started in April 2008. In Spain and Greece, the rate started rising from November 2007. In the UK, the first big jump, from 5.2% to 5.4% was between April and May 2008.[26]

We then obtained monthly unemployment rates across 40 OECD countries and estimated the Sahm Rule. The full excel data file is available on request from the authors. The first column of Table 6 reports what we found, ranked by date, derived using the data in Appendix Table 1. We report Q32008 for New Zealand as they only publish quarterly data.[27] Sixteen of the estimates are for

[26] Appendix Table 7 shows annual employment changes from 2006 across OECD countries. Of particular note is that only a few countries besides the USA saw declines in 2008 compared with 2007; the major examples are Japan (-280k) and Spain (-110k). With only a few exceptions employment declined in 2009 versus 2008; the main exceptions are Mexico (+492k); and Brazil (+425k). The picture was more mixed in 2010 versus 2009, with the US still experiencing decline (-813k) but there was job growth in Australia (+217k); Canada (+222k); Chile (+350k); Germany (+255k); Korea (+345k) and Turkey (+1315k). Japan saw a major fall in employment in 2011 (-2820k) and so to a lesser extent did Greece (-335k) and Portugal (-158k). The UK only saw job loss in 2009 (-430k).

[27] Unemployment rates for New Zealand are Q407=3.4%; Q108=3.8%; Q208=3.8%; Q308=4.1%; Q408=4.4%; Q109=5.0% and Q209=5.8%

2009, including five of the countries that did not have two successive negative GDP quarters - Australia, Bulgaria, South Korea, Malta, Poland and Slovakia. For the remaining eleven this is well after recession is indicated by the GDP data. The Sahm Rule for Canada identifies the start of recession as December 2008, consistent with the GDP data which suggests Q42008.

Even for those countries with Sahm Rule estimates in 2008 most are later than would be indicated by the GDP data. For example, the GDP data suggest that the recession started in France (Dec-08), Germany (Apr-09), Italy (Feb-08), Japan (Feb-09) and the UK (Aug-08) in the second quarter of 2008 with the Sahm date in parentheses. The GDP data looks a better indicator of recession, but the problem is that these are estimates more than a decade later that have been subject to revision. These numbers were generally not available in 2007 and 2008.

6. Predicting turning points

The big question is, was this all foreseeable before it happened? Should the MPC and other central banks like the ECB have spotted it? Were the data there? It turns out they were. Hence, we now turn to Table 7 where we report the consumer fear of unemployment data by month from January 2007 through June 2008 for twenty-nine European countries including Turkey. We identify the month in 2007 when the fear series reached its minimum and identify that in red. We then identify when the fear series had risen by ten fear points versus the low point in 2007. We think of this as a potential alternative 'rule' to the Sahm Rule.

Another possibility to the plus 10 Rule is to identify when scores rise above the long run pre 2008 average. With the exception of Hungary, Portugal and the UK all of these starting points are below their long run averages. Using this rule we report in column 2 of Table 6, the month identified in the table using the **plus 10** rule. Almost all of these are well before the Sahm rule dates in column 1 and none are in 2009, whereas sixteen countries according to the Sahm Rule are.

The plus 10 rule works well in Europe. In 24/28 countries the start date of the recession identified by the plus 10 rule comes before the first of two quarters of negative GDP growth reported in column 3 of Table 6. The exceptions are fairly close. We miss four: 1) Italy where we identify July08 as the turn whereas GDP suggests Apr-08 2) Luxembourg where we identify Sept-08, and GDP suggests Jan-08, 3) Hungary and Slovenia where we identify Oct08 whereas GDP dropped first in Jul-08. The start as measured by the first of two negative GDP quarters comes *before* the Sahm rule date in 17/28 countries. Four are the same - Belgium, Bulgaria, Lithuania, and Slovakia. The Sahm Rule precedes that determined by GDP in five countries - Hungary, Ireland, Italy, Latvia, Spain

Results are very similar if we simply look to see evidence of big monthly increases without imposing a rule. Another possibility is to look for large upward monthly changes. Examples in western Europe from Table 7 are: Austria Oct-08(+13); Belgium Jul-08 (+9 and Denmark Apr-08

If we look at Table 5 which has the four business and one consumer indicators for the UK from January 2007 to May 2009, we can also use the **plus 10 rule**. In that case we see all give recession start dates from the end of 2007 through May 2008.

High in 2007	Month +10

Industry	September 2007	May 2008
Services	May 2007	November 2007
Consumer	August 2007	December 2007
Retail	April 2007	December 2007
Construction	October 2007	May 2008.

The Sahm Rule dates mostly come after those identified using the fear data either using the 10plus rule or looking for big monthly changes. These dates are also after those identified using GDP in seventeen countries including most of the major Western countries - Austria, Croatia, Czechia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Luxembourg, Netherlands, Portugal, Romania, Slovenia, Turkey and the UK.

Returning to the US there is one suitable employment confidence survey series available to calculate the plus 10, rule. The Conference Board's Plentiful Jobs Index as reported in Blanchflower (2008, Appendix Table 1) can be used.[28] The highest value in 2007 was in March at 30.7. It took until March 2008 for the series to drop at least 10 points to 18.5. The 10+ rule appears to also work in the United States. We knew this in March 2008.

7. Conclusions

This paper examines various data series for the United States, the UK and the rest of the OECD and considers how movements in these data helped identify the onset of the Great Recession. For the majority of OECD countries, it is feasible to identify the start of the Great Recession using the rule of two successive negative quarters of GDP growth. We found this in 32 of the 39 countries we examined. Of these only three saw the recession start in 2007, while the rest started in 2008. However, we only know this more than a dozen years after the onset of recession due to data revisions. At the time GDP estimates tended to overestimate GDP growth. Thus, a major problem with using these data is that it may well take a while to find the true turning point. This was the case in the UK when it took until June 2009 to establish that the recession started in April 2008.

The United States is in a unique position as it has the NBER Business Cycle Dating Committee who do not mechanically call recessions based on the two negative quarter GDP rule. In December 2008 the NBER called the start of recession as December 2007 despite the fact that there is a good deal of evidence from state level employment data suggesting the start was around July 2008. The reason for this was mostly based on developments in the labor market, including declining employment and rising unemployment. Unlike in the US, most other countries saw labor market declines coming after two negative quarters (e.g. France, Germany, Japan and the UK). This is what appears to have happened too in the pandemic when US unemployment rose sharply during 2020 but did so much less in other OECD countries.

We then evaluated the Sahm Rule which has been suggested as a way of signaling recession based on looking at the unemployment rate. It indicates recession started in February 2008. We applied this to 39 other countries and found that more often than not the start date was later than that

[28] Its values are Jan-06=27.0; Feb-06=27.4; Mar-06=28.3; Apr-06=29.4; May-06=29.1; Jun-06=28.0; Jul-06=28.6; Aug-06=24.5; Sep-06=26.2; Oct-06=25.6; Nov-06=25.7; Dec-06=27.6; Jan-07=29.6; Feb-07=27.8; Mar-07=30.3; Apr-07=29; May-07=29.1; Jun-07=27.6; Jul-07=30; Aug-07=27.5; Sep-07=25.6; Oct-07=24.1; Nov-07=23.3; Dec-07=23.6; Jan-08=23.8; Feb-08=21.5; and Mar-08=18.8.

derived from using GDP. But that is an ex-post rationalization, given that we know that at turning points GDP data itself is revised down and the Sahm Rule can indicate what is coming.

Evidence of employment declines across US states using household data suggests that recession started in 2007. By August 2007 thirty-eight states and the US as a whole had seen at least two successive quarters of negative growth in 2007. Non-farm payrolls declines suggest February 2008.

The major point of this paper is to argue that the qualitative data are the best indicators of recession across the OECD. In the US the labor market data turned down before quarterly GDP did. The reverse is true in other OECD countries. But in all of these countries qualitative data had turned down earlier, and especially so in the United States. Policymakers should focus on the qualitative data as an indicator of turning points. We find a good measure of when the recession started is when the fear of unemployment series begins to rise sharply. We adopt a "10 point rule": recession is signaled when the fear of unemployment series rose 10 points above its 2007 low. We use this rule as the data series had started to rise early in some countries such as the UK and the mean of the pre 2007 series differs a lot by country. It is especially low for example, in Denmark, Finland and Sweden, which are well known to be the happiest countries in the world, as shown in the 2021 World Happiness Report (see Helliwell et al, 2021).

We found this rule helped predict GDP calculated recession across the 28 countries we examined. In eleven countries the spike was in 2007 and unlike the Sahm Rule none was in 2009. In five countries it was in the same quarter as suggested using GDP (Belgium; Cyprus; Finland, Romania and the UK). In seventeen it was in an earlier quarter (Austria, Bulgaria, Croatia, Czechia, Denmark, Estonia, France, Germany, Greece, Ireland. Latvia, Lithuania, Netherlands, Portugal, Slovakia, Spain and Turkey). In three it was in the following quarter (Hungary, Italy and Slovenia) while in Luxembourg it was two quarters later. In two countries that GDP did not identify a recession we found the recession started in Poland in July 2008 and in Malta in April 2007, compared with February 2009 for both using the Sahm Rule.

The qualitative data were flashing red for recession across the OECD by April of 2008. Later GDP data confirmed that fact. It was also apparent that what was happening in the US had spread around the world as it did in the 1929 Great Crash. The data showed clearly by the spring of 2008 that the US had been in recession for several months (Blanchflower, 2008). This should have suggested the rest of the advanced world as going to follow a financial crisis in the US given the global banking system. Almost everywhere, and certainly in all the major Western countries, all of the qualitative data series we looked at were tumbling by the Spring of 2008. That was true by country and also true in manufacturing, services, retail and construction and consumer confidence was also plunging.

There is some evidence from Chart 6 that these fear data have some forecasting value in subsequent periods. The fear of unemployment series in the UK started picking up from 2014 even as the unemployment rate continued to fall through September 2019. It then started to pick up before the pandemic hit. Single month unemployment rates went from 3.5% in October 2019 to 4.0% in January 2021. It should also be noted that not only had the unemployment rate started to rise pre-

pandemic, but quarterly GDP growth had also started to slow with the latest estimate for 2019Q4 of 0%.

It turned out though that a big difference was that it took a while for the unemployment rate in particular to pick up outside the United States, just as happened in the Spring of 2020 as the COVID lockdown was implemented. Sadly, even by the time Lehman Brothers failed on September 14th, 2008, central bankers, policymakers and most economists hadn't understood what was happening on the ground. It was there right in front of their very eyes in the qualitative data, but they failed to look. This paper suggests this would not have happened in Europe if they had implemented the Plus 10 Rule. The moral from this is there was sufficient data available in early 2008 such that policymakers should have been able to predict the timing and scale of these sorts of events with quite a lot of precision. There was no need for perfect foresight; looking at the data would have been enough.

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World Happiness Report, 2021

Table 1. Quarterly GDP growth, Q42007-Q12009.

Location	Q4-2007	Q1-2008	Q2-2008	Q3-2008	Q4-2008	Q1-2009
Australia	0.5	1.1	0.2	0.7	-0.4	1.0
Austria	0.8	0.5	1.0	-0.6	-2.3	-1.8
Belgium	0.4	0.4	0.1	-0.6	-2.2	-1.0
Bulgaria	2.1	1.7	1.1	1.0	0.3	-3.9
Canada	0.1	0.1	0.4	0.8	-1.2	-2.3
Chile	1.7	2.6	0.1	-0.8	-1.0	-0.8
Czech Republic	1.2	0.5	0.7	0.2	-1.8	-3.4
Denmark	1.0	0	-0.9	-0.6	-2.4	-1.4
Estonia	-0.6	-2.2	1.0	0.1	-11.7	-2.6
Finland	1.3	-0.1	-0.8	0.3	-2.1	-6.5
France	0.2	0.4	-0.4	-0.3	-1.4	-1.7
Germany	0.7	0.6	-0.2	-0.6	-1.6	-4.7
Greece	-0.5	0.6	-0.6	-0.1	-1.4	-4.7
Hungary	0.4	1.0	0.6	-0.2	-3.3	-4.3
Iceland	4.6	-2.9	3.6	-5.6	6.0	-10.7
Ireland	3.9	-2.9	-2.6	-0.3	-4.3	0.2
Israel	1.5	0.8	0.2	0.2	-0.8	-0.1
Italy	-0.3	1.1	-0.9	-1.2	-2.5	-2.8
Japan	0.4	0.4	-0.6	-1.2	-2.5	-4.8
Korea	2.2	0.4	0.5	0.8	-3.3	0.1
Latvia	-1.2	1.9	-3.5	-4.1	-2.4	-3.7
Lithuania	1.7	-0.5	0.7	-1.2	-0.8	-12.9
Luxembourg	0.2	-0.4	-0.6	-0.9	-3.2	-1.4
Malta	-0.9	3.0	0.8	0.2	0.9	-3.4
Mexico	0.4	-0.2	0.7	0.3	-1.6	-5.1
Netherlands	1.4	0.3	0.5	-0.1	-0.7	-3.6
New Zealand	0.2	-0.3	-0.3	-0.4	-0.7	-1.0
Norway	1.1	-1.3	0	-0.2	0.3	-0.8
Poland	1.3	1.9	0.2	-0.3	0.4	1.6
Portugal	1.1	0	-0.5	-0.1	-1.3	-2.5
Romania	3.3	4.7	1.7	0.2	-1.7	-4.1
Russia	3.2	2.7	0.6	-1.5	-3.3	-3.5
Slovak Republic	6.4	-2.8	1.2	1.4	1.2	-9.5
Slovenia	0.2	1.6	1.7	-0.6	-3.7	-4.4
Spain	0.6	0.2	0.1	-0.2	-1.6	-2.6
Sweden	1.1	-0.7	-0.1	-0.5	-3.6	-1.4
Switzerland	1.1	0.9	0.9	0.4	-2.8	-1.6
United Kingdom	0.5	0.5	-0.6	-1.6	-2.1	-1.7
United States	0.6	-0.4	0.6	-0.5	-2.2	-1.2

Source: OECD and Eurostat.
Red shows negative GDP growth in countries that did not have two negative quarters. Green shows the two successive negative quarters.

Table 2. Monthly changes in US employment in thousands

a) Household Survey

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	58	29	263	-734	317	160	-158	-223	562	-298	649	-322	303
2008	105	-222	-70	46	-224	-171	-205	-329	-127	-274	-702	-731	-2904
2009	-1217	-512	-933	-51	-408	-239	-108	-409	-674	-386	227	-646	-5356
2010	425	143	170	546	-56	-100	38	259	-42	-277	-75	257	1288

b) Non-farm employment establishment survey

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	228	81	235	49	151	76	-31	-23	80	79	110	108	1143
2008	11	-79	-49	-240	-177	-171	-196	-278	-460	-481	-727	-706	-3553
2009	-784	-743	-800	-695	-342	-467	-340	-183	-241	-199	12	-269	-5051
2010	2	-92	181	231	540	-139	-84	-5	-65	268	125	72	1034

Notes: For details of the surveys see the Employment Situation, published monthly by the BLS.

Table 3. Sahm Rule hits .5 versus monthly changes in employment (‘000s)

a) Non-farm payrolls (NFP)

Month	Nov-53	Oct-57	Nov-59	Oct-60	Mar-70	Jul-74	Feb-80	Nov-81	Oct-90	Jun-01	Nov-02	Feb-08	Apr-20
t-5	29	**-88**	131	**-338**	207	154	27	194	42	-11	50	80	234
t-4	17	**-83**	123	**-127**	-35	42	154	111	153	91	**-94**	79	161
t-3	**-47**	56	-468	-42	155	86	92	**-36**	17	**-42**	**-3**	110	315
t-2	**-121**	5	92	-34	-65	167	99	**-88**	**-32**	**-284**	-86	108	289
t-1	-128	-194	-70	-45	129	55	128	-97	**-208**	-53	127	11	**-1683**
t	-332	-171	276	-85	146	32	83	-209	-98	-111	-13	**-79**	**-20679**
t+1	-205	-205	540	-181	**-103**	**-17**	111	-276	-151	-122	-143	**-49**	2833
t+2	-234	-174	100	-219	**-224**	**-9**	**-145**	-330	-153	-149	108	-240	4846
t+3	-87	-308	239	-59	-95	20	**-429**	-2	-48	-257	-136	-177	1726

b) Household employment from the CPS

Month	Nov-53	Oct-57	Nov-59	Oct-60	Mar-70	Jul-74	Feb-80	Nov-81	Oct-90	Jun-01.	Nov-02	Feb-08	Apr-20
t-5	437	-62	150	98	195	154	564	-750	299	164	-124	562	184
t-4	**-59**	211	162	111	96	199	64	395	**-168**	-166	-2	-298	195
t-3	**-246**	344	-167	-259	199	65	170	-4	**-173**	171	292	649	-76
t-2	-245	-581	-74	-14	40	-150	359	-625	-8	**-484**	597	-322	73
t-1	-13	162	141	372	-82	222	-54	314	-278	**-207**	**-294**	105	**-3196**
t	-155	**-75**	-381	-635	165	50	116	**-171**	12	-219	**-487**	**-222**	**-22166**
t+1	-761	**-377**	811	477	67	208	**-282**	**-562**	-230	198	-95	**-70**	3854
t+2	47	253	6	**-331**	**-366**	-112	**-480**	47	-65	-830	991	46	4876
t+3	639	-702	273	**-2**	**-151**	14	-288	70	-301	605	65	-224	1677

Table 4. Monthly UK, Employment levels and changes '000s and the unemployment rate

	Employment	change('000s)	Unempt rate	Sahm Rule	Fear	BOE Agents	Empt PMI	GDP growth
Jan-07	29,175	-26	5.5	0.33	32.8	0.3	53.8	Q107=0.9%
Feb-07	29,194	19	5.5	0.33	29.6	0.5	54.0	
Mar-07	29,232	38	5.5	0.30	30.3	0.9	53.0	
Apr-07	29,314	82	5.4	0.17	28.6	1.2	51.8	Q207=0.6%
May-07	29,322	8	5.4	0.03	26.2	1.4	53.1	
Jun-07	29,352	30	5.3	-0.10	27.2	1.6	53.4	
Jul-07	29,376	24	5.3	-0.03	25.9	1.7	52.8	Q307=0.8%
Aug-07	29,420	44	5.3	0.00	27.1	1.9	53.1	
Sep-07	29,470	51	5.2	0.00	25.5	1.6	52.0	
Oct-07	29,527	56	5.2	-0.07	27.0	1.2	52.7	Q407=0.5%
Nov-07	29,576	49	5.2	-0.10	28.9	1.1	52.0	
Dec-07	29,614	38	5.2	-0.07	27.7	1.0	52.1	
Jan-08	29,676	62	5.2	0.00	27.7	0.9	51.3	Q108=0.5%
Feb-08	29,684	8	5.2	0.03	29.6	0.6	51.3	
Mar-08	29,706	22	5.3	0.10	29.4	0.3	51.9	
Apr-08	29,749	43	5.2	0.10	34.6	0.1	50.7	Q208=-0.6%
May-08	29,722	-27	5.4	0.17	31.0	-0.2	46.8	
Jun-08	29,696	-26	5.5	0.23	37.7	-0.7	46.9	
Jul-08	29,612	-84	5.7	0.43	47.9	-1.1	45.6	Q308=-1.6%
Aug-08	29,580	-32	5.9	0.60	49.8	-1.3	46.5	
Sep-08	29,535	-45	6.0	0.77	51.5	-1.8	45.3	
Oct-08	29,556	21	6.2	0.90	60.0	-2.2	44.3	Q408=-2.1%
Nov-08	29,528	-28	6.4	1.07	65.9	-2.7	41.1	
Dec-08	29,539	11	6.5	1.27	71.2	-3.1	38.9	
Jan-09	29,429	-110	6.7	1.47	75.3	-3.2	38.5	Q109=-1.7%
Feb-09	29,366	-63	7.1	1.70	68.1	-3.4	38.3	
Mar-09	29,272	-94	7.3	1.90	65.2	-3.5	38.0	
Apr-09	29,155	-117	7.6	2.20	59.2	-3.6	39.9	Q209=-0.2%
May-09	29,087	-68	7.8	2.37	56.6	-3.6	42.6	
Jun-09	29,018	-70	7.9	2.47	55.5	-3.7	42.5	
Pre 2008 average					1.7	50.6		

Notes: BOE Agents score is recruitment difficulties https://www.bankofengland.co.uk/agents-summary/2018/2018-q3

Table 5. Business and Consumer Sentiment Scores for the UK from EU Commission

	Industry	Services	Consumer	Retail	Construction
Jan-07	0.5	16.7	-9.0	12.7	0.1
Feb-07	3.2	14.0	-7.5	15.5	-0.4
Mar-07	5.8	16.2	-7.4	20.1	-0.3
Apr-07	1.9	11.4	-6.9	21.8	0.9
May-07	4.5	18.1	-3.8	17.5	-1.7
Jun-07	9.0	14.7	-4.8	6.8	-2.7
Jul-07	-1.0	8.3	-5.6	6.6	2.0
Aug-07	-1.3	12.4	-4.4	15.6	1.9
Sep-07	4.2	16.2	-4.9	8.5	2.7
Oct-07	3.5	13.0	-4.4	11.1	5.5
Nov-07	2.2	6.0	-7.2	10.0	-1.3
Dec-07	0.0	9.2	-7.7	-4.7	-0.3
Jan-08	5.8	-2.7	-8.3	-4.7	-0.3
Feb-08	-4.2	-16.9	-10.5	1.6	-0.6
Mar-08	2.0	0.8	-11.6	5.1	-0.2
Apr-08	-7.4	-4.7	-17.2	-9.7	-8.6
May-08	-12.3	-12.6	-19.7	-6.8	-25.2
Jun-08	-6.9	-12.9	-23.8	-11.6	-32.2
Jul-08	-11.4	-15.5	-28.8	-22.4	-37.2
Aug-08	-15.7	-22.1	-25.6	-26.5	-39.4
Sep-08	-21.2	-18.8	-24.2	-29.3	-43.1
Oct-08	-30.2	-28.8	-25.5	-35.0	-48.0
Nov-08	-28.3	-35.2	-24.7	-39.1	-52.9
Dec-08	-32.6	-41.0	-25.3	-45.1	-58.2
Jan-09	-35.6	-48.9	-30.1	-47.1	-63.5
Feb-09	-44.9	-48.9	-27.7	-44.2	-66.9
Mar-09	-49.0	-57.4	-23.9	-39.8	-55.5
Apr-09	-43.3	-50.4	-20.5	-28.1	-55.0
May-09	-39.6	-42.0	-20.5	-20.2	-56.0
Pre 06 avge	-7.7	12.4	-7.0	4.7	-13.1

Red shows the highest value in 2007 and the green shows when the series dropped ten points.

a) Industry

COF Confidence Indicator (Q2 - Q4 + Q5) / 3

Q2. Assessment of order-book levels

Q4. Assessment of stocks of finished products

Q5. Production expectations for the months ahead

b) Services

COF Confidence Indicator (Q1 + Q2 + Q3) / 3

Q1. Business situation development over the past 3 months

Q2. Evolution of the demand over the past 3 months

Q3. Expectation of the demand over the next 3 months

c) Retail

COF Confidence Indicator (Q1 - Q2 + Q4) / 3

Q1. Business activity (sales) development over the past 3 months

Q2. Volume of stock currently hold

Q4. Business activity expectations over the next 3 months

d) Construction
COF Confidence Indicator (Q3 + Q4) / 2
Q3. Evolution of your current overall order books
Q4. Employment expectations over the next 3 months

e) Consumer
COF Confidence Indicator (Q1 + Q2 + Q4 + Q9) / 4
Q1. Financial situation over last 12 months
Q2. Financial situation over next 12 months
Q4. General economic situation over next 12 months
Q9. Major purchases over next 12 months
https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys/download-business-and-consumer-survey-data/time-series_en

Green shows the month the score was 10 below its 2007 peak, marked in red.

Table 6. Recession dates by Sahm Rule, Fear of Unemployment and two negative quarters GDP growth

	Sahm Rule	+10 Rule	GDP
Chile	September 2007		Q32008
Hungary	December 2007	October 2008	Q32008
Ireland	December 2007	February 2007	Q12008
Spain	December 2007	September 2007	Q32008
Italy	February 2008	July 2008	Q22008
Latvia	February 2008	January 2008	Q22008
USA	February 2008	March 2008	Q32008
Luxembourg	April 2008	September 2008	Q12008
Iceland	July 2008		NR
Israel	July 2008		Q42008
Lithuania	July 2008	November 2007	Q32008
New Zealand	Q32008		Q12008
Belgium	August 2008	July 2008	Q32008
Denmark	August 2008	December 2007	Q22008
Estonia	August 2008	July 2007	Q12008
Turkey	August 2008	November 2007	Q22008
UK	August 2008	June 2008	Q22008
Finland	November 2008	February 2008	Q12008
Mexico	November 2008		Q42008
Norway	November 2008		NR
Austria	December 2008	June 2008	Q32008
France	December 2008	October 2007	Q22008
Canada	December 2008		Q42008
Australia	January 2009		NR
Greece	January 2009	November 2007	Q22008
Czechia	January 2009	August 2008	Q42008
Portugal	January 2009	January 2008	Q22008
Japan	February 2009		Q22008
Malta	February 2009	April 2007	NR
Poland	February 2009	July 2008	NR
Slovakia	February 2009	April 2007	Q12009
Bulgaria	March 2009	October 2007	Q12009
Cyprus	March 2009	November 2008	Q42008
Russia	March 2009		Q32008
Slovenia	March 2009	October 2008	Q32008
Croatia	April 2009	June 2008	Q32008
Germany	April 2009	August 2007	Q22008
Korea	May 2009		NR
Netherlands	June 2009	February 2008	Q32008
Romania	April 2009	November 2008	Q42008

NR = no recession

Table 7. Fear of unemployment by month, January 2007-June 2009 Western Europe.

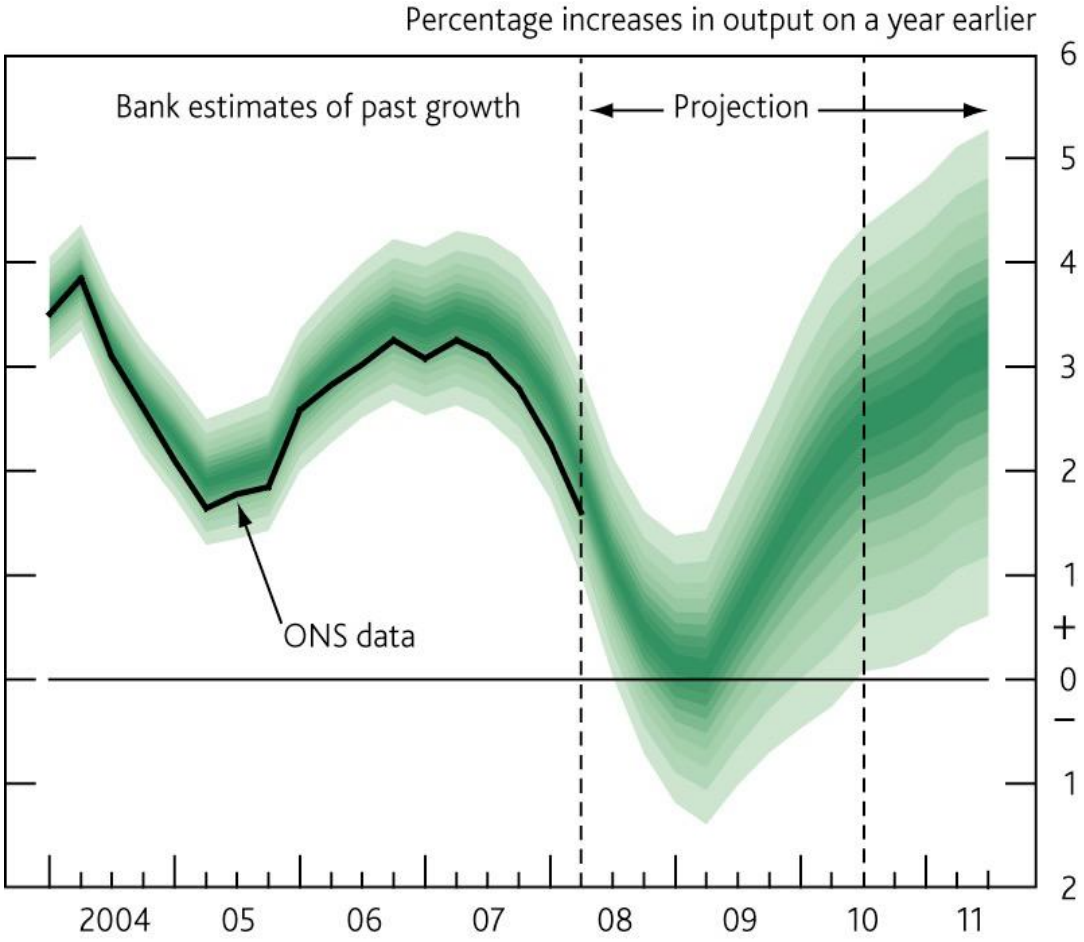
	Austria	Belgium	Cyprus	Denmark	Finland	France	Germany	Greece
Jan-07	-5.5	17.7	46.7	-14.1	-1.8	9.5	4.1	38.0
Feb-07	-5.1	16.3	47.3	-10.8	7.2	10.0	3.2	37.9
Mar-07	-3.4	15.6	45.9	-8.7	6.3	16.2	2.2	37.2
Apr-07	-4.3	6.7	44.3	-10.6	-5.2	10.3	-6.5	37.3
May-07	-6.1	10.6	38.0	-6.5	-2.1	-3.8	-10.7	33.1
Jun-07	-6.4	9.2	40.7	-9.9	-7.4	-5.4	-9.3	34.3
Jul-07	-5.3	12.0	36.5	-11.2	-8.2	-5.4	-9.2	38.7
Aug-07	-4.9	4.9	38.5	-6.8	-9.1	-0.9	3.1	36.2
Sep-07	-1.5	6.4	35.3	-7.9	-8.7	3.5	6.2	27.9
Oct-07	0.1	5.3	39.2	-9.6	-7.7	11.3	0.8	26.0
Nov-07	1.1	11.1	37.2	-7.6	5.6	11.8	3.8	38.3
Dec-07	2.4	6.1	40.8	2.0	1.7	6.3	5.8	38.3
Jan-08	1.3	3.8	36.7	2.5	5.1	7.2	5.7	43.9
Feb-08	1.8	2.6	35.7	5.8	14.4	10.7	11.1	41.4
Mar-08	1.5	-0.6	35.0	4.5	4.1	15.0	11.4	45.1
Apr-08	-0.9	5.3	36.2	12.6	2.3	9.5	0.2	44.2
May-08	4.6	9.3	28.9	11.3	2.9	11.5	1.6	45.1
Jun-08	8.4	6.9	33.2	15.8	2.2	9.6	2.7	35.3
Jul-08	11.1	16.2	33.2	23.4	11.5	18.4	8.7	51.9
Aug-08	18.5	18.3	33.0	16.7	10.0	25.8	22.7	50.0
Sep-08	17.8	20.2	30.2	20.6	15.7	28.6	20.4	46.8
Oct-08	31.0	44.3	38.1	37.1	33.2	56.1	24.1	58.6
Nov-08	49.8	62.7	47.4	41.3	51.7	62.0	38.9	63.3
Dec-08	57.2	70.2	54.6	45.6	59.5	68.0	55.9	72.5
Jan-09	58.8	67.3	53.1	46.3	55.4	66.5	62.2	58.6
Feb-09	59.9	76.0	61.4	51.4	58.1	67.7	71.6	74.3
Mar-09	63.8	71.8	65.0	45.5	53.9	74.0	79.8	72.6
Apr-09	65.4	70.2	58.3	31.8	50.7	68.6	78.9	70.4
May-09	60.4	67.4	52.7	31.0	41.1	64.6	77.7	67.9
Jun-09	53.0	65.3	42.5	34.4	38.6	61.0	74.8	64.6
Pre08 avge	23.7	26.2	39.0	8.0	3.9	29.4	32.1	38.7

	Ireland	Italy	Luxembourg	Malta	Netherlands	Portugal	Spain	Sweden	UK
Jan-07	9.9	17.0	25.3	3.8	-18.7	39.1	11.1	-16.8	32.8
Feb-07	25.0	17.8	30.7	0.5	-22.2	39.0	8.5	-22.2	29.6
Mar-07	34.8	17.0	30.5	1.7	-20.6	45.9	10.2	-17.1	30.3
Apr-07	46.4	16.5	26.9	13.5	-15.3	41.6	6.2	-22.0	28.6
May-07	19.5	16.7	17.7	12.5	-10.6	37.7	7.8	-22.7	26.2
Jun-07	25.9	22.0	20.2	11.3	-19.8	44.3	7.0	-19.9	27.2
Jul-07	37.1	16.4	12.5	7.1	-23.7	42.3	7.2	-20.7	25.9
Aug-07	38.1	19.7	15.4	14.3	-18.5	42.3	7.4	-19.2	27.1
Sep-07	35.4	17.4	17.6	20.3	-11.1	46.0	20.1	-19.3	25.5
Oct-07	39.5	22.0	20.4	15.0	-11.7	46.1	16.8	-17.8	27.0
Nov-07	42.8	22.8	17.0	19.0	-10.1	44.3	18.8	-12.3	28.9
Dec-07	46.4	21.7	20.1	-3.8	-12.4	47.9	20.2	-7.4	27.7
Jan-08	47.0	18.8	19.3	-3.8	-11.1	50.1	25.4	-2.8	27.7
Feb-08	52.5	23.2	22.0	-3.3	-4.5	47.9	28.3	6.8	29.6
Mar-08	50.1	24.4	20.1	-12.7	-5.1	44.4	24.2	6.6	29.4
Apr-08	58.6	22.6	17.8	-10.6	-2.3	45.6	30.9	11.6	34.6
May-08	35.5	14.7	18.3	0.3	-4.1	48.8	39.0	16.7	31.0
Jun-08	46.2	15.0	15.6	1.5	-0.8	49.7	44.0	23.3	37.7
Jul-08	51.5	26.1	22.3	4.8	-0.2	53.9	51.7	26.9	47.9
Aug-08	53.6	24.5	22.2	6.8	5.9	44.3	45.5	33.6	49.8
Sep-08	46.1	25.8	24.7	3.3	10.9	38.2	56.2	35.5	51.5
Oct-08	67.1	33.4	43.8	15.8	27.0	53.3	63.3	59.1	60.0
Nov-08	70.6	42.7	54.0	30.2	47.3	64.0	66.5	64.9	65.9
Dec-08	73.4	50.2	66.3	24.3	63.7	65.9	71.2	67.1	71.2
Jan-09	72.8	45.5	65.9	22.1	66.4	76.8	67.4	61.7	75.3
Feb-09	79.4	51.6	70.4	41.3	76.3	85.6	67.8	58.2	68.1
Mar-09	80.9	57.6	70.1	33.5	80.0	76.9	59.4	61.6	65.2
Apr-09	70.9	45.8	75.2	33.2	70.6	72.6	50.9	67.2	59.2
May-09	72.3	39.0	65.9	31.4	57.2	71.8	35.0	48.4	56.6
Jun-09	58.0	38.4	64.3	27.0	64.0	65.5	31.3	40.6	55.5
Pre08 avge	20.3	28.4	31.7	16.7	10.4	30.5	17.4	7.3	20.1

Eastern Europe

	Bulgaria	Croatia	Czechia	Estonia	Latvia	Lithuania	Hungary	Poland	Romania	Slovenia	Slovakia	Turkey
Jan-07	11.9	11.0	6.1	-19.1	-5.1	-31.7	55.8	-9.5	10.5	11.2	-19.5	NA
Feb-07	6.4	11.5	6.2	-15.1	0.4	-28.7	58.0	-4.8	17.5	8.9	-13.0	NA
Mar-07	7.2	9.7	2.2	-14.6	-0.5	-28.4	52.8	-7.8	15.8	13.4	-9.5	NA
Apr-07	5.5	5.6	3.6	-12.3	-4.2	-29.6	51.1	-15.3	18.5	12.9	-16.5	NA
May-07	3.3	10.1	2.6	-7.1	-1.7	-31.0	53.0	-17.9	17.4	12.3	-13.9	20.9
Jun-07	4.6	9.3	1.0	-10.9	-6.8	-33.1	53.4	-17.1	17.7	11.0	-17.9	21.3
Jul-07	9.8	8.3	2.5	-8.8	-8.8	-30.8	50.6	-20.2	13.2	5.5	-15.5	19.1
Aug-07	10.9	9.6	0.4	-4.1	-5.5	-27.5	50.8	-16.8	17.1	7.2	-13.4	11.7
Sep-07	11.0	14.4	-2.2	-1.2	-8.5	-22.6	52.7	-16.2	13.6	10.1	-6.3	12.4
Oct-07	13.6	12.1	-1.5	-2.9	-2.5	-23.7	52.3	-15.0	16.0	11.9	-6.0	19.3
Nov-07	11.4	6.9	4.5	3.8	-3.0	-18.7	54.0	-11.9	19.7	13.4	-5.1	23.4
Dec-07	13.0	12.8	5.2	10.6	-3.4	-16.9	49.4	-14.9	15.2	10.0	-12.5	20.8
Jan-08	7.1	9.1	2.1	9.9	4.2	-23.0	47.3	-12.2	17.5	8.3	-14.0	20.6
Feb-08	11.3	10.0	-1.9	17.8	7.9	-21.2	45.6	-16.8	20.0	11.0	-8.9	32.0
Mar-08	7.4	14.9	-1.8	19.5	11.0	-17.5	48.5	-13.5	14.1	14.6	-5.9	36.0
Apr-08	10.1	6.4	1.5	22.9	22.0	-14.4	48.3	-16.9	13.1	4.6	-10.0	37.9
May-08	3.7	12.1	0.9	34.0	22.0	-3.3	46.5	-16.5	11.3	12.4	-7.6	39.6
Jun-08	10.0	17.6	0.8	27.9	25.5	4.4	46.1	-11.0	13.7	7.0	-14.8	39.2
Jul-08	9.3	13.5	4.6	31.6	28.2	12.3	44.4	-9.6	13.0	12.8	-10.3	35.6
Aug-08	6.1	15.6	13.7	34.9	34.9	23.5	42.3	-7.8	12.1	15.3	-8.6	30.2
Sep-08	2.8	15.1	11.3	37.7	40.1	24.1	43.9	-6.0	15.0	10.9	-6.3	36.0
Oct-08	13.5	20.0	36.6	49.6	51.2	39.7	64.2	2.3	14.2	16.9	-0.1	42.7
Nov-08	39.4	28.0	45.3	56.0	61.9	53.2	73.1	12.9	48.0	52.7	48.8	52.2
Dec-08	55.7	43.4	57.7	61.4	74.8	71.1	81.4	24.2	59.5	60.9	51.8	50.5
Jan-09	51.8	49.1	65.0	58.2	78.6	77.7	82.3	33.9	66.5	72.7	53.7	45.5
Feb-09	55.7	56.6	64.9	67.4	80.1	82.1	84.0	57.3	70.0	65.2	76.3	41.1
Mar-09	58.2	59.6	49.1	65.8	74.8	81.8	80.1	59.2	73.5	67	76.5	37.2
Apr-09	62.9	54.3	48.8	59.1	58.4	77.1	81.1	44.5	70.9	71.4	63.0	28.4
May-09	56.4	47.8	43.0	50.3	48.8	75.4	74.9	40.4	70.6	56.3	54.7	28.5
Jun-09	54.7	55.5	38.7	44.8	57.6	67.4	69.9	29.1	63.6	46.1	50.7	24.0
pre ‘08 avge	16.9	17.4	27.8	27.2	22.1	-2.5	30.3	23.2	33.6	24.4	17.3	18.6

Chart 1 GDP projection based on market interest rate expectations



The fan chart depicts the probability of various outcomes for GDP growth. To the left of the first vertical dashed line, the distribution reflects the likelihood of revisions to the data over the past; to the right, it reflects uncertainty over the evolution of GDP growth in the future. If economic circumstances identical to today's were to prevail on 100 occasions, the MPC's best collective judgement is that the mature estimate of GDP would lie within the darkest central band on only 10 of those occasions. The fan chart is constructed so that outturns are also expected to lie within each pair of the lighter green areas on 10 occasions. Consequently, GDP growth is expected to lie somewhere within the entire fan on 90 out of 100 occasions. The bands widen as the time horizon is extended, indicating the increasing uncertainty about outcomes. See the box on page 39 of the November 2007 *Inflation Report* for a fuller description of the fan chart and what it represents. The second dashed line is drawn at the two-year point of the projection.

Chart 2. US Unemployment rate and Sahm rule, 1971-2021

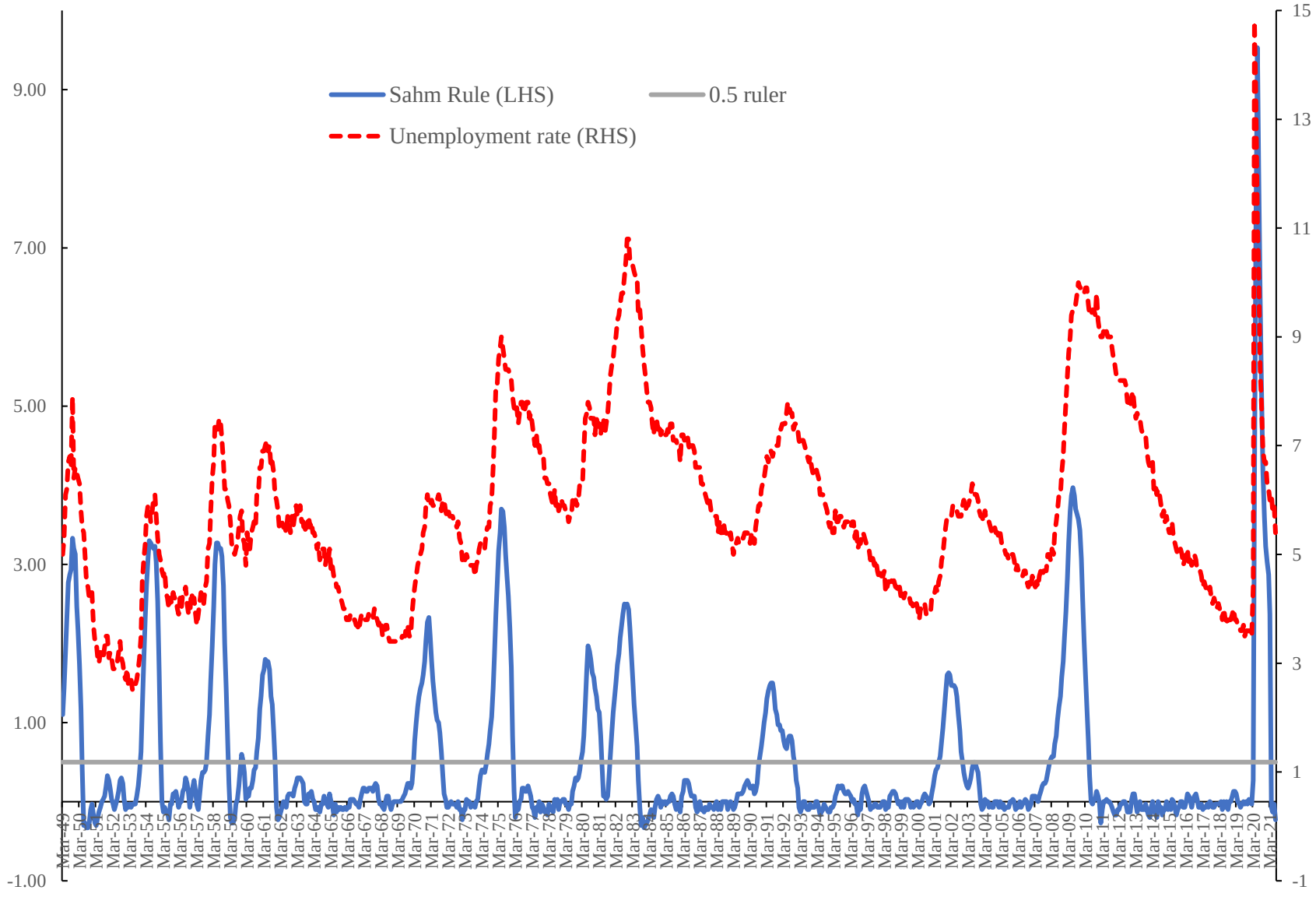
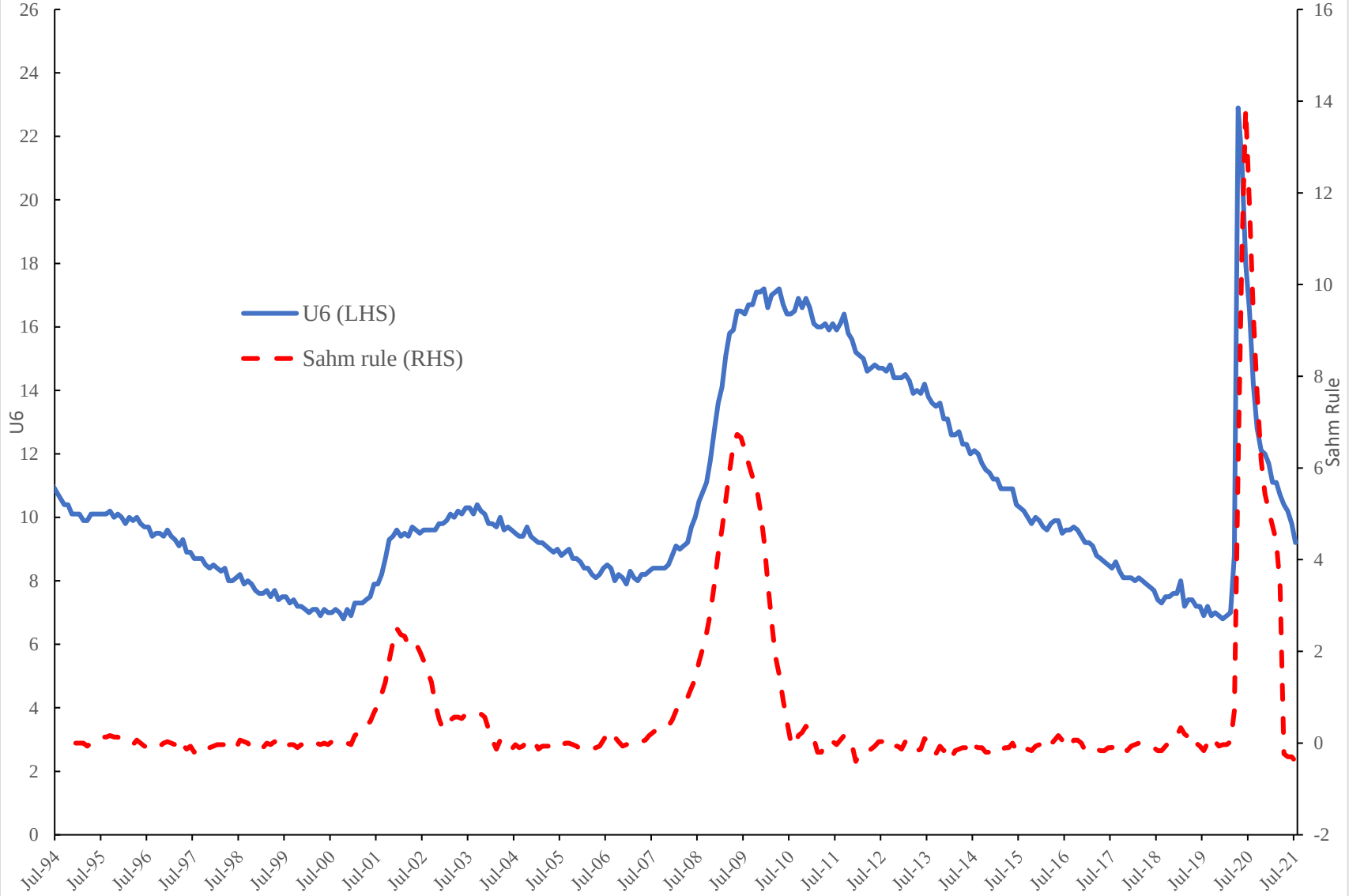


Chart 3. U6 Measure of US Labor Market Utilization and the Sahm Rule



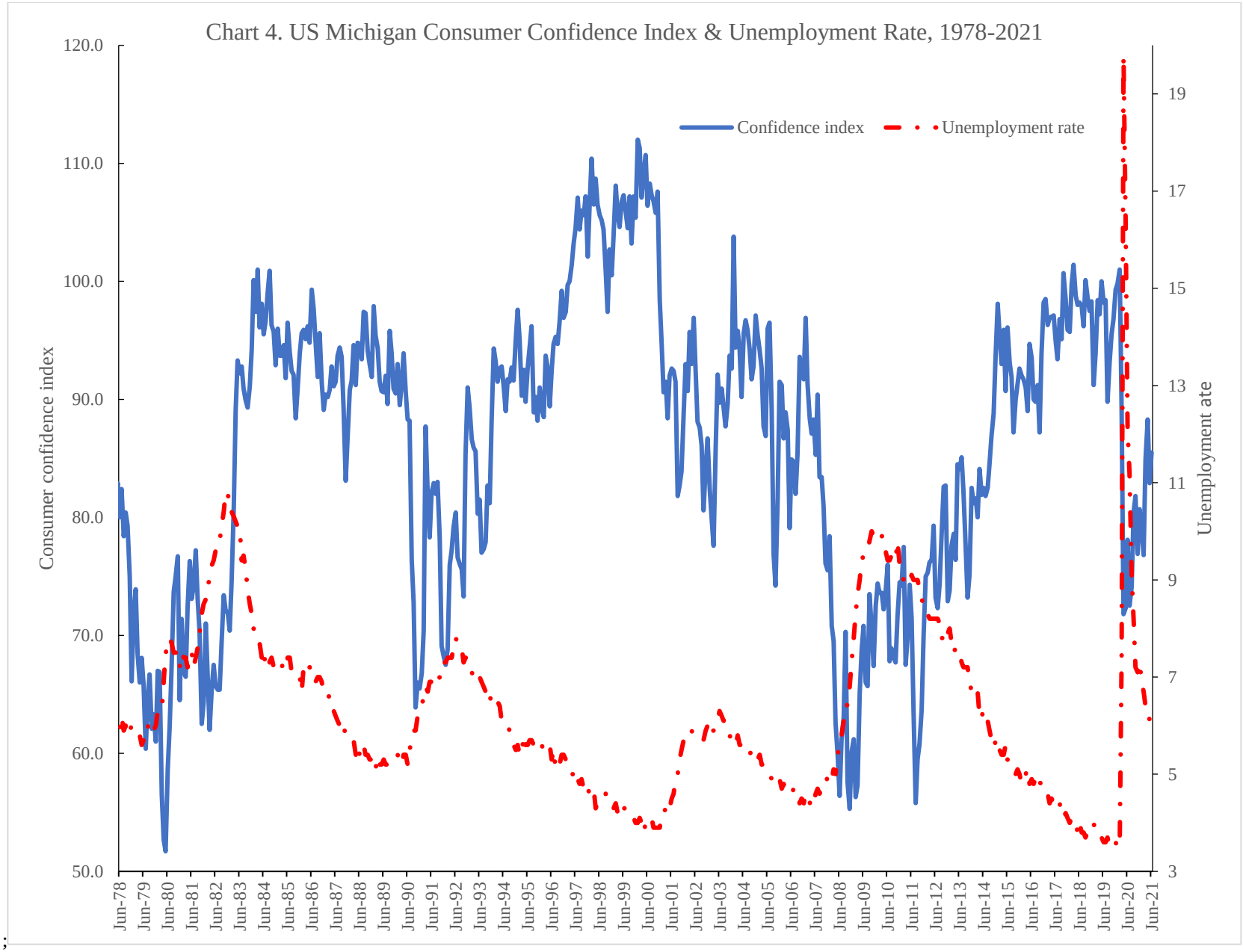


Chart 4. US Michigan Consumer Confidence Index & Unemployment Rate, 1978-2021
Confidence index
Unemployment rate
Consumer confidence index
Unemployment ate
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
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Jun-78
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Jun-20
Jun-21

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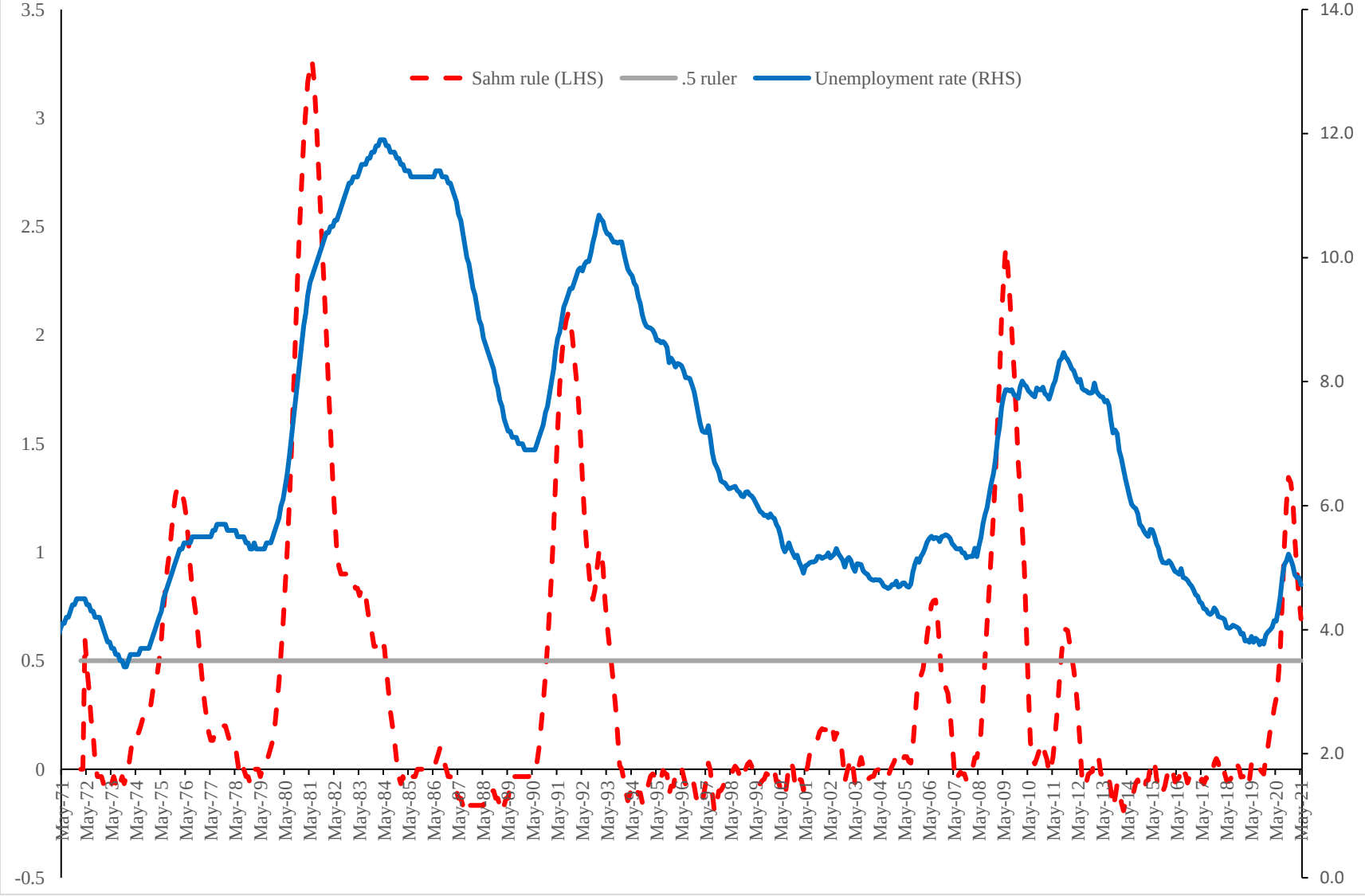
Chart 5. UK Unemployment rate and Sahm rule



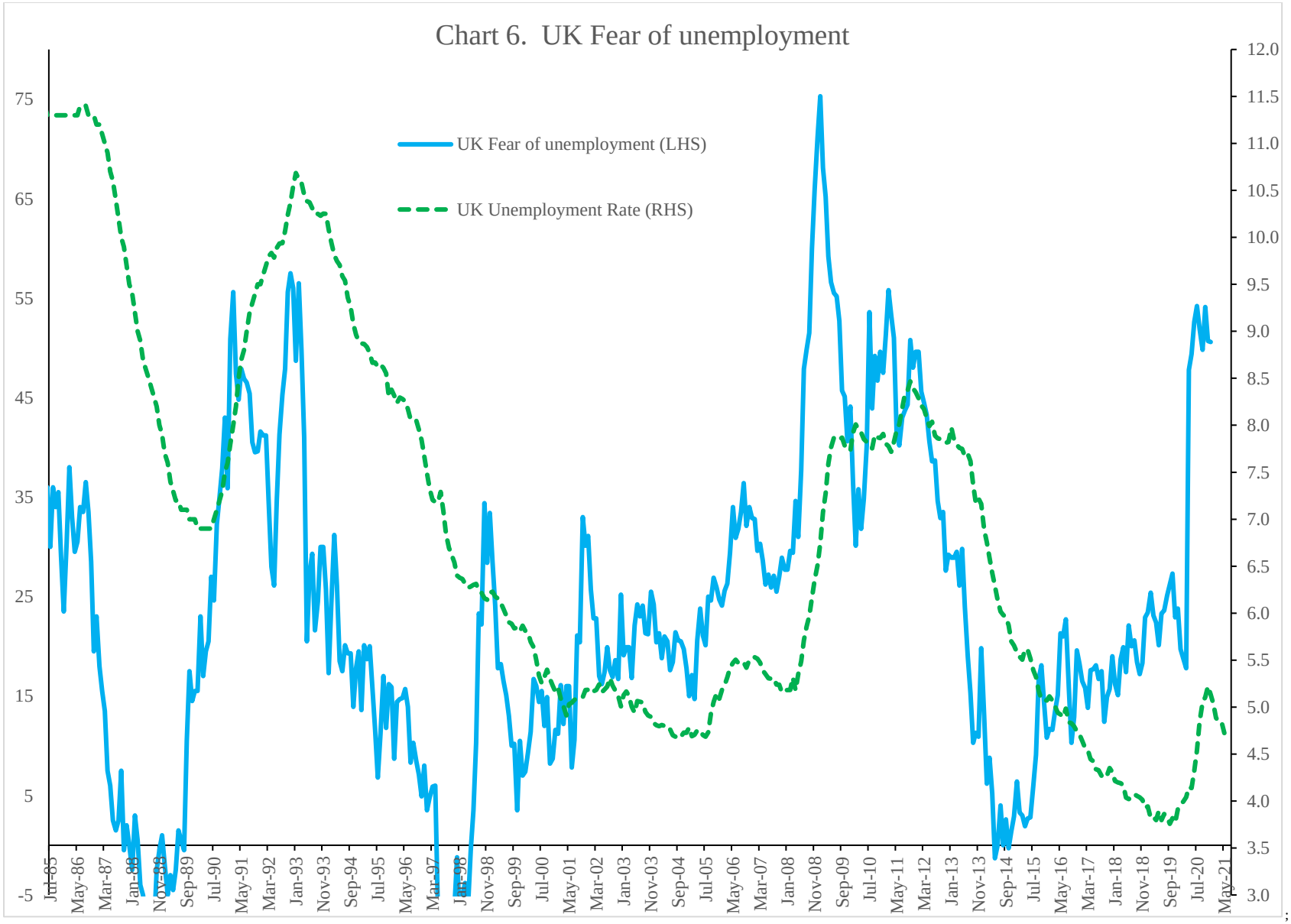


Chart 6. UK Fear of unemployment
UK Fear of unemployment (LHS)
UK Unemployment Rate (RHS)
75
65
55
45
35
25
15
5
-5
12.0
11.5
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
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6.0
5.5
5.0
4.5
4.0
3.5
3.0
Jul-85
May-86
Mar-87
Jan-88
Nov-88
Sep-89
Jul-90
May-91
Mar-92
Jan-93
Nov-93
Sep-94
Jul-95
May-96
Mar-97
Jan-98
Nov-98
Sep-99
Jul-00
May-01
Mar-02
Jan-03
Nov-03
Sep-04
Jul-05
May-06
Mar-07
Jan-08
Nov-08
Sep-09
Jul-10
May-11
Mar-12
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Sep-14
Jul-15
May-16
Mar-17
Jan-18
Nov-18
Sep-19
Jul-20
May-21

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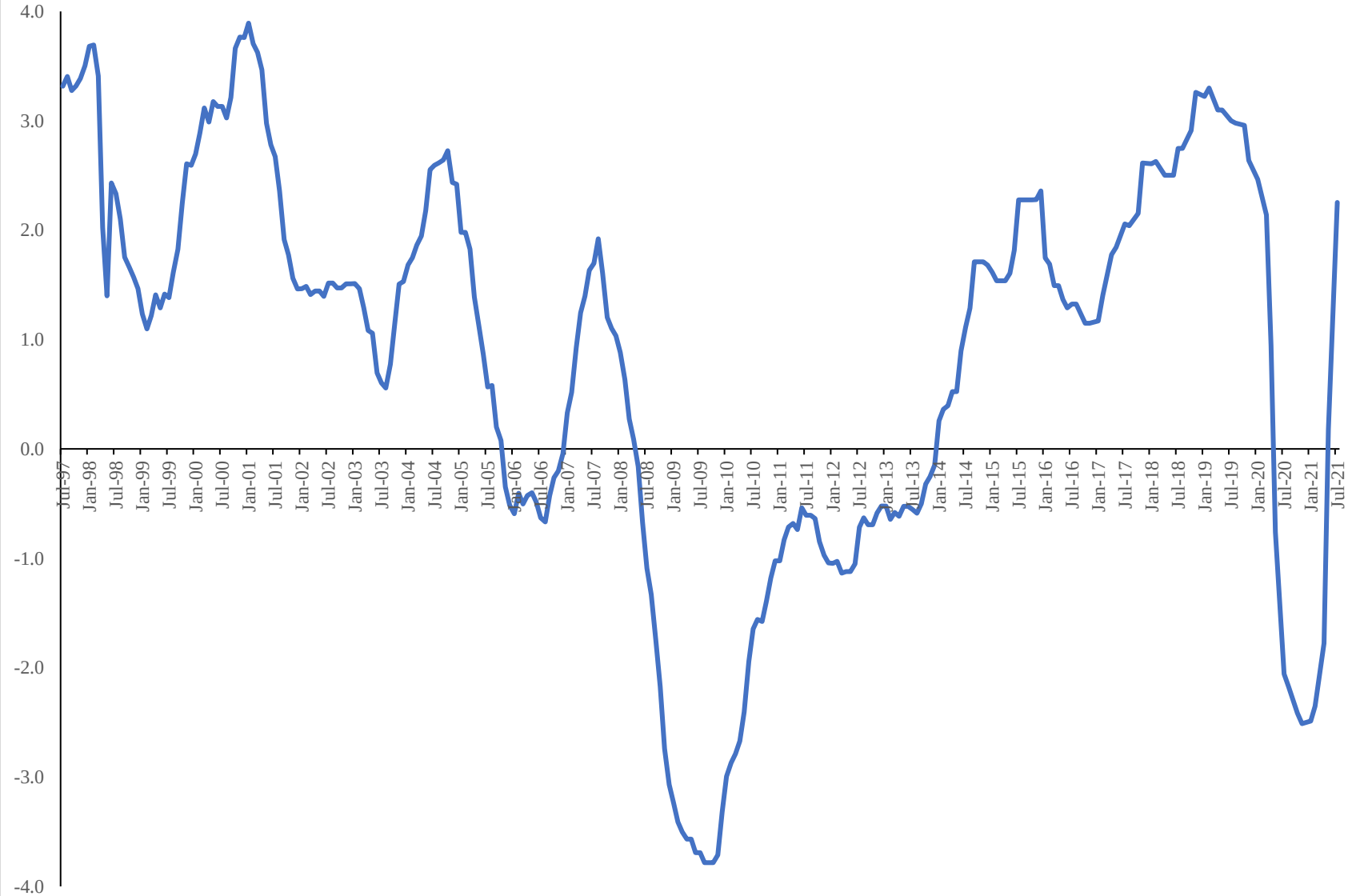
Chart 7. Bank of England Agents' Scores on Recruitment Difficulties



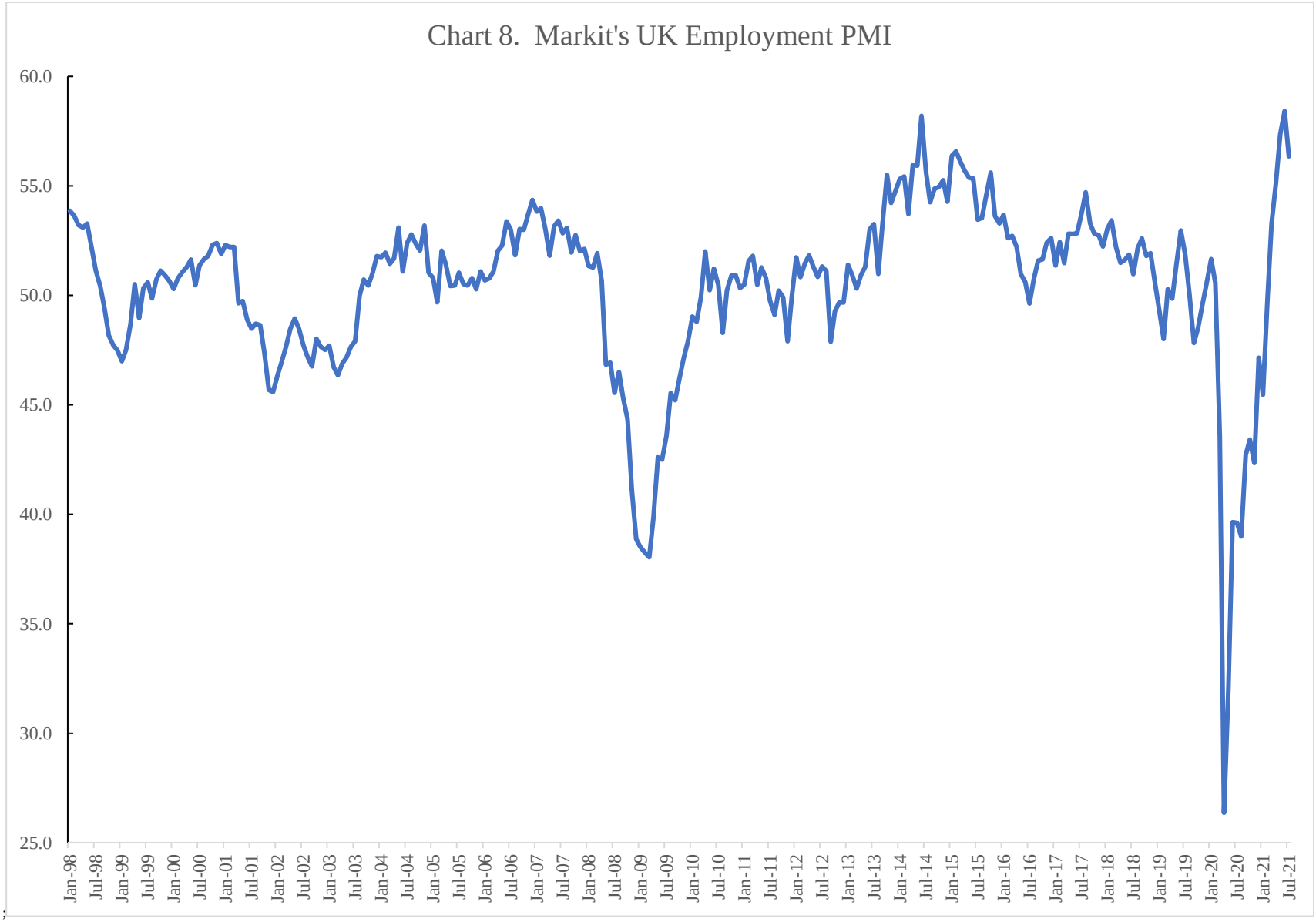


Chart 8. Markit's UK Employment PMI
60.0
55.0
50.0
45.0
40.0
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25.0
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Jul-98
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
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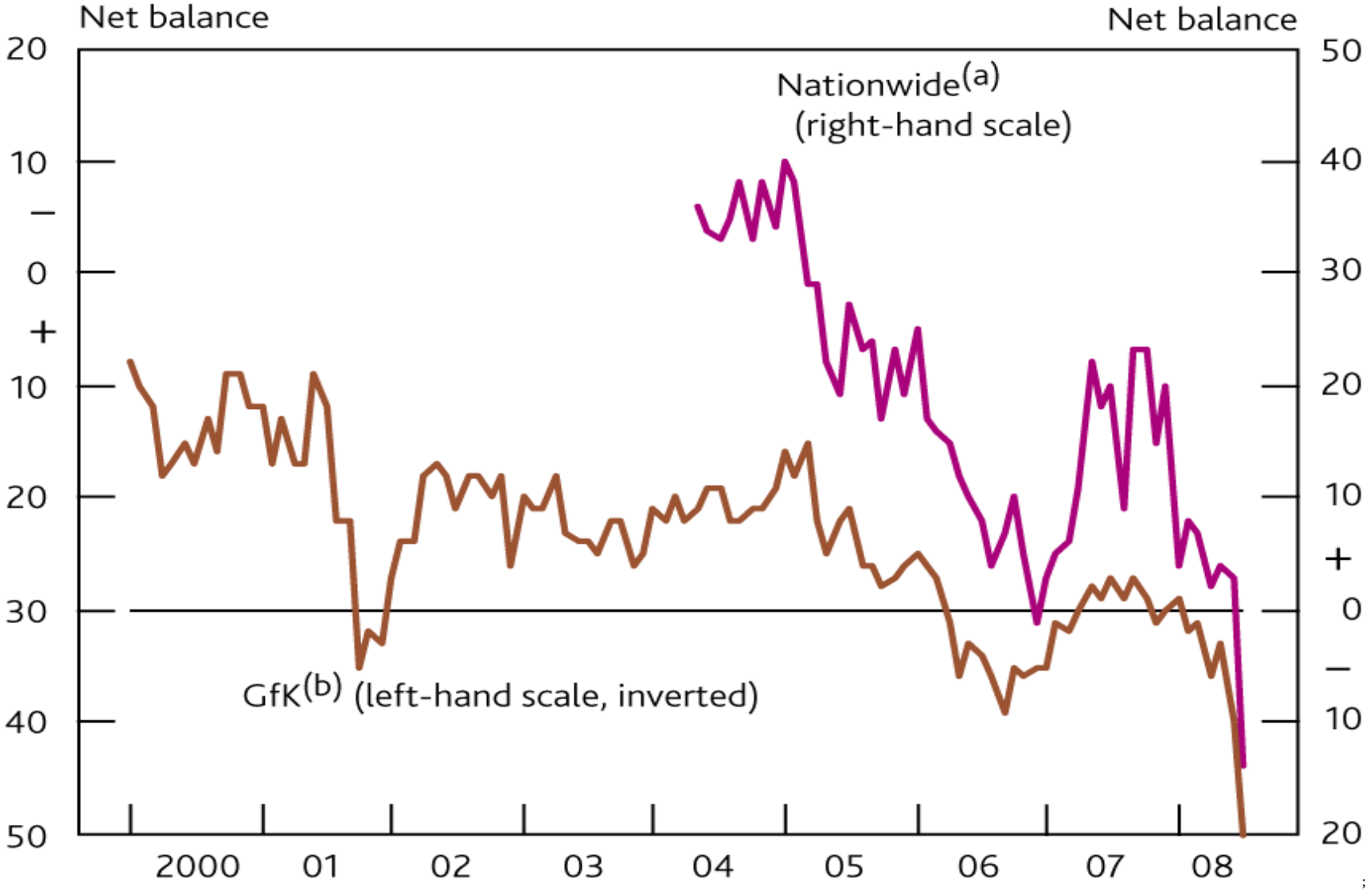
Jan-20
Jul-20
Jan-21
Jul-21

Chart 9. MPC's Indicator of household's employment expectations, August 2008.



Sources: Nationwide and research carried out by GfK NOP on behalf of the European Commission.; (a) The Nationwide survey asks respondents whether they think there will be many or few jobs available in six months' time.; (b) Non seasonally adjusted. The GfK survey asks respondents how they expect unemployment to evolve over the next year. The series has been inverted, such that a lower net balance reflects an increase in unemployment expectatio

Appendix Table 1. Monthly Unemployment rates December 2007-April 2009 OECD and EU Countries. Green shows Sahm Rule month>0.5.

	Dec 2007	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	Jul 2008	Aug 2008	Sep 2008	Oct 2008	Nov 2008	Dec 2008	Jan 2009	Feb 2009	Mar 2009	Apr 2009
Australia	4.3	4.2	4.0	4.1	4.3	4.3	4.2	4.3	4.0	4.3	4.3	4.5	4.6	4.9	5.3	5.7	5.5
Austria	4.5	4.7	4.6	4.3	4.3	4.1	3.9	4.4	4.4	4.3	4.4	4.8	5.1	5.0	4.9	5.3	5.7
Belgium	7.1	7.1	6.9	6.7	6.5	6.5	6.9	7.5	7.6	7.4	6.9	6.7	6.9	7.5	7.8	8.0	7.9
Bulgaria	6.1	6.1	6.1	5.9	5.9	5.9	5.7	5.6	5.5	5.3	5.1	5.0	5.3	5.6	5.9	6.2	6.2
Canada	6.1	5.9	6	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.2	6.6	6.9	7.4	8.0	8.2	8.3
Croatia	9.3	9.2	9.0	8.9	8.7	8.6	8.6	8.4	8.4	8.4	8.3	8.3	8.4	8.5	8.7	8.9	9.1
Czechia	4.8	4.8	4.5	4.3	4.4	4.1	4.6	4.3	4.1	4.4	4.1	4.4	4.8	5.2	5.6	5.9	6.3
Denmark	3.3	3.2	3.2	3.3	3.3	3.5	3.7	3.8	3.9	3.8	3.9	4.2	4.7	4.9	5.1	5.5	5.9
Estonia	4.1	4.3	4.4	4.3	4.5	3.9	4.2	5.2	6.3	6.8	6.9	7.6	9.3	10.3	11.0	11.9	12.5
Finland	6.6	6.5	6.1	6.4	5.7	6.4	6.4	6.1	6.4	6.7	6.3	6.7	6.7	7.0	7.4	7.7	8.3
France	7.5	7.4	7.2	7.2	7.3	7.3	7.4	7.4	7.5	7.5	7.6	7.8	8.1	8.3	8.6	8.8	9.0
Germany	8.1	7.9	7.8	7.7	7.6	7.5	7.4	7.3	7.1	7.0	7.0	7.1	7.2	7.3	7.5	7.6	7.7
Greece	8.4	7.7	7.7	8.4	7.8	7.2	7.8	7.5	7.5	8.0	7.6	7.8	8.6	9.0	9.1	9.0	9.4
Hungary	8.1	8.0	7.9	7.7	7.8	7.7	7.5	7.5	7.7	7.6	7.8	8.1	8.4	8.7	9.3	9.9	9.4
Iceland	2.7	2.8	2.8	2.8	2.9	3.0	3.2	3.5	3.8	4.0	4.4	4.9	5.4	6.1	6.7	7.1	7.4
Ireland	5.3	5.3	5.3	5.5	5.6	5.9	6.3	6.9	7.4	7.8	8.1	8.5	9.0	10.1	10.9	11.6	12.2
Italy	6.6	6.6	6.7	6.4	6.9	6.8	6.9	6.6	6.8	6.8	7.0	7.1	6.8	7.2	7.3	7.7	7.5
Japan	3.7	3.9	4.0	3.8	3.9	4.0	4.0	3.9	4.1	4.0	3.8	4.0	4.4	4.3	4.6	4.8	5.0
Korea	3.2	3.0	3.0	3.0	3.1	3.2	3.1	3.1	3.3	3.2	3.3	3.4	3.4	3.3	3.3	3.5	3.6
Latvia	5.6	6.2	6.5	6.4	6.3	6.4	6.6	7.0	7.6	8.4	9.6	10.6	11.3	12.4	13.7	14.9	16.0
Lithuania	4.1	4.2	4.2	4.1	4.1	4.3	4.8	5.6	6.4	7.1	7.7	8.3	9.0	9.8	10.7	11.6	12.6
Luxembourg	4.2	4.3	4.5	4.4	4.7	4.8	4.9	4.9	5.0	5.1	5.2	5.2	5.3	5.4	5.4	5.4	5.3
Mexico	3.8	3.8	3.8	4.0	3.7	3.6	3.7	3.8	3.9	4.0	4.0	4.7	4.8	4.8	5.2	5.1	5.4
Netherlands	3.9	3.8	3.6	3.6	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.7	3.7	3.8	3.9	4.1
Norway	2.5	2.5	2.5	2.4	2.4	2.6	2.7	2.8	2.8	2.9	3.0	3.1	3.1	3.1	3.0	3.1	3.2
Poland	8.3	7.8	7.5	7.3	7.2	7.2	7.0	6.9	6.8	6.7	6.6	6.8	7.0	7.4	7.7	7.9	7.9
Portugal	9.2	9.0	8.9	9.0	9.0	9.1	9.3	9.2	9.4	9.4	9.4	9.4	9.7	10.0	10.2	10.5	10.8
Romania	6.0	5.6	5.5	5.6	5.5	5.7	5.7	5.5	5.5	5.5	5.7	5.5	5.8	5.8	6.1	6.0	6.0
Slovakia	10.5	10.4	10.3	10.2	10.2	10.2	9.9	9.4	9.0	8.8	8.7	8.9	9.1	9.6	10.2	10.7	11.0
Slovenia	4.7	4.8	4.7	4.6	4.4	4.4	4.3	4.3	4.3	4.2	4.2	4.3	4.3	4.6	4.9	5.2	5.5
Spain	8.8	9.1	9.3	9.5	10.0	10.4	10.8	11.1	11.5	12.0	12.9	13.8	14.8	15.9	16.8	17.5	17.8
Sweden	6.0	6.0	5.8	5.8	5.6	5.8	6.6	6.2	5.9	6.4	6.3	7.0	6.8	6.8	7.7	7.8	7.8
Turkey	9.3	9.3	9.5	9.4	9.2	9.2	9.6	9.9	9.8	10.2	10.6	11.5	1.02	12.6	13.0	13.7	14.0
UK	5.2	5.2	5.2	5.3	5.2	5.4	5.5	5.7	5.9	6.0	6.2	6.4	6.5	6.7	7.1	7.3	7.6
USA	5.0	5.0	4.9	5.1	5.0	5.4	5.6	5.8	6.1	6.1	6.5	6.8	7.3	7.8	8.3	8.7	9.0

	Netherlands	Korea
Feb-09	3.8	3.3
Mar-09	3.9	3.5
Apr-09	4.1	3.6
May-09	4.2	3.9
Jun-09	4.3	3.9

	Ireland	Spain	Hungary
Sep-07	4.9	8.3	7.3
Oct-07	5.1	8.4	7.5
Nov-07	5.2	8.6	7.8
Dec-07	5.3	8.8	8.1

Appendix Table 2. Employment change 2007, for states with >1 negative month

	Alabama	Alaska	Arkansas	Delaware	DC	Florida	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky
Jan-07	-550	64	821	68	867	10,350	-506	1,374	-2,701	-3328	-1120	278	962
Feb-07	-2,179	-103	-19	-225	500	4,699	-933	1,217	-3,918	-5827	-1821	-188	-793
Mar-07	-3,216	-225	-863	-390	171	-437	-1298	1,077	-2,387	-7293	-1740	-474	-2232
Apr-07	-3,411	-277	-1307	-321	-17	-4,697	-1519	967	962	-7411	-1187	-525	-3135
May-07	-2,934	-175	-1377	-95	-82	-8,055	-1502	833	4,592	-6617	-567	-324	-3456
Jun-07	-2,001	22	-1106	128	-19	-9,427	-1297	596	7,247	-4958	176	87	-3081
Jul-07	-1,026	256	-521	298	352	-9,031	-1048	210	8,155	-2484	742	484	-2462
Aug-07	-223	457	308	403	780	-6,995	-616	-182	7,339	453	1147	741	-1749
Sep-07	318	557	1281	475	1,082	-3,601	-1	-484	6,391	3816	1706	878	-629
Oct-07	66	561	1938	522	1,133	-1,803	569	-742	5,039	5880	2167	687	66
Nov-07	-707	502	2192	634	988	-1,928	1053	-941	4,631	6363	2431	434	102
Dec-07	-1,673	513	2212	714	721	-3,952	1347	-1,064	4,722	6181	2579	371	-179
	Louisiana	Maine	Maryland	MA	MI	Minnesota	Mississippi	Missouri	Montana	NJ	NM	NY	NC
Jan-07	1,926	-198	-395	1,900	-5006	-219	-200	285	1638	-538	1,082	-736	4539
Feb-07	67	-707	-1815	1,196	-7213	-1,759	-852	-1085	1262	-2,805	608	-5,295	1773
Mar-07	-1,219	-1122	-2310	584	-8193	-2,897	-938	-2147	680	-4,153	233	-8,413	-378
Apr-07	-1,725	-1417	-1728	160	-8074	-3,337	-484	-2539	164	-3,896	-15	-8,780	-791
May-07	-1,408	-1417	-373	-182	-7713	-3,166	247	-2313	-148	-2,311	-67	-6,711	-172
Jun-07	-33	-1086	1421	-249	-7293	-2,597	1154	-1721	-196	-226	123	-3,013	410
Jul-07	2,238	-575	2914	-191	-6766	-2,142	2062	-945	-79	1,409	403	1,622	745
Aug-07	4,445	-25	3837	-33	-5930	-1,832	2811	-72	136	2,410	763	5,894	1386
Sep-07	5,826	523	4688	648	-4744	-1,341	3244	736	420	3,451	1,170	10,112	2673
Oct-07	5,686	871	4936	1,480	-4202	-744	2993	647	665	4,242	1,378	11,392	3458
Nov-07	4,619	1018	4652	2,540	-3759	41	2317	50	759	4,885	1,421	10,654	3977
Dec-07	3,523	1005	4307	3,182	-4258	720	1455	-544	738	4,831	1,376	8,888	4057
	Ohio	Oklahoma	Oregon	PA	RI	SC	SD	Tennessee	Vermont	WV	Wisconsin		
Jan-07	2598	861	3,538	3,381	275	3,000	216	3352	-448	-507	344		
Feb-07	366	-30	1,906	315	-63	569	54	455	-535	-860	-481		
Mar-07	-636	-909	220	-1,257	-445	-1,561	-49	-1581	-558	-818	-848		
Apr-07	-1465	-1,369	-902	-1,082	-783	-2,782	-70	-2652	-553	-448	-803		
May-07	-3061	-1,381	-1,362	88	-976	-3,168	-22	-2976	-560	61	-603		
Jun-07	-3989	-767	-1,086	1,886	-958	-3,028	49	-2578	-572	556	-341		
Jul-07	-3833	81	-88	3,527	-793	-2,739	113	-2272	-553	844	67		
Aug-07	-3336	961	1,449	4,829	-630	-2,474	185	-2154	-460	939	608		
Sep-07	-1356	2,006	2,934	6,113	-587	-2,033	306	-1891	-271	978	1397		
Oct-07	442	2,700	3,718	6,215	-757	-1,560	364	-2298	-127	845	2158		
Nov-07	1586	3,076	4,036	6,065	-988	-1,075	388	-2619	-27	618	3284		
Dec-07	2237	3,468	4,027	6,733	-1240	-598	408	-2131	46	525	4478		

Appendix Table 3. US quarterly GDP growth rates (%)

Q2-1947[1]	***-0.3***	Q3-1958	2.3	*Q4-1969*[5]	***-0.5***	Q1-1981	2	Q2-1992	1.1
Q3-1947	***-0.2***	Q4-1958	2.3	*Q1-1970*	***-0.1***	Q2-1981	**-0.7**	Q3-1992	1.0
Q4-1947	1.6	Q1-1959	1.9	Q2-1970	0.1	Q3-1981	1.2	Q4-1992	1.0
Q1-1948	1.5	Q2-1959	2.3	Q3-1970	0.9	*Q4-1981*[8]	***-1.1***	Q1-1993	0.2
Q2-1948	1.7	Q3-1959	0.1	Q4-1970	**-1.1**	*Q1-1982*	***-1.6***	Q2-1993	0.6
Q3-1948	0.6	Q4-1959	0.3	Q1-1971	2.7	Q2-1982	0.5	Q3-1993	0.5
Q4-1948	0.1	Q1-1960	2.2	Q2-1971	0.5	Q3-1982	**-0.4**	Q4-1993	1.4
Q1-1949[2]	***-1.4***	Q2-1960	**-0.5**	Q3-1971	0.8	Q4-1982	0	Q1-1994	1.0
Q2-1949	***-0.3***	Q3-1960	0.5	Q4-1971	0.2	Q1-1983	1.3	Q2-1994	1.4
Q3-1949	1.0	Q4-1960	**-1.3**	Q1-1972	1.8	Q2-1983	2.3	Q3-1994	0.6
Q4-1949	**-0.8**	Q1-1961	0.7	Q2-1972	2.3	Q3-1983	2.0	Q4-1994	1.1
Q1-1950	3.9	Q2-1961	1.7	Q3-1972	0.9	Q4-1983	2.1	Q1-1995	0.4
Q2-1950	3.0	Q3-1961	1.9	Q4-1972	1.7	Q1-1984	2.0	Q2-1995	0.3
Q3-1950	3.9	Q4-1961	2.0	Q1-1973	2.5	Q2-1984	1.7	Q3-1995	0.9
Q4-1950	1.9	Q1-1962	1.8	Q2-1973	1.1	Q3-1984	1.0	Q4-1995	0.7
Q1-1951	1.4	Q2-1962	0.9	Q3-1973	**-0.5**	Q4-1984	0.8	Q1-1996	0.7
Q2-1951	1.7	Q3-1962	1.2	Q4-1973	0.9	Q1-1985	1.0	Q2-1996	1.7
Q3-1951	2.1	Q4-1962	0.3	Q1-1974	**-0.9**	Q2-1985	0.9	Q3-1996	0.9
Q4-1951	0.2	Q1-1963	1.1	Q2-1974	0.2	Q3-1985	1.5	Q4-1996	1.0
Q1-1952	1.1	Q2-1963	1.1	*Q3-1974*[6]	***-0.9***	Q4-1985	0.7	Q1-1997	0.6
Q2-1952	0.2	Q3-1963	2.2	*Q4-1974*	***-0.4***	Q1-1986	0.9	Q2-1997	1.7
Q3-1952	0.7	Q4-1963	0.7	*Q1-1975*	***-1.2***	Q2-1986	0.5	Q3-1997	1.3
Q4-1952	3.3	Q1-1964	2.1	Q2-1975	0.7	Q3-1986	1.0	Q4-1997	0.9
Q1-1953	1.9	Q2-1964	1.1	Q3-1975	1.7	Q4-1986	0.5	Q1-1998	1.0
Q2-1953	0.8	Q3-1964	1.6	Q4-1975	1.3	Q1-1987	0.7	Q2-1998	0.9
Q3-1953[3]	***-0.6***	Q4-1964	0.3	Q1-1976	2.2	Q2-1987	1.1	Q3-1998	1.3
Q4-1953	***-1.5***	Q1-1965	2.4	Q2-1976	0.7	Q3-1987	0.9	Q4-1998	1.6
Q1-1954	***-0.5***	Q2-1965	1.3	Q3-1976	0.5	Q4-1987	1.7	Q1-1999	0.9
Q2-1954	0.1	Q3-1965	2.2	Q4-1976	0.7	Q1-1988	0.5	Q2-1999	0.8
Q3-1954	1.1	Q4-1965	2.3	Q1-1977	1.2	Q2-1988	1.3	Q3-1999	1.3
Q4-1954	2.0	Q1-1966	2.4	Q2-1977	1.9	Q3-1988	0.6	Q4-1999	1.6
Q1-1955	2.9	Q2-1966	0.3	Q3-1977	1.8	Q4-1988	1.3	Q1-2000	0.4
Q2-1955	1.6	Q3-1966	0.8	Q4-1977	0	Q1-1989	1.0	Q2-2000	1.8
Q3-1955	1.4	Q4-1966	0.8	Q1-1978	0.3	Q2-1989	0.8	Q3-2000	0.1
Q4-1955	0.6	Q1-1967	0.9	Q2-1978	3.9	Q3-1989	0.7	Q4-2000	0.6
Q1-1956	**-0.4**	Q2-1967	0.1	Q3-1978	1.0	Q4-1989	0.2	Q1-2001	**-0.3**
Q2-1956	0.8	Q3-1967	0.9	Q4-1978	1.3	Q1-1990	1.1	Q2-2001	0.6
Q3-1956	**-0.1**	Q4-1967	0.8	Q1-1979	0.2	Q2-1990	0.4	Q3-2001	**-0.4**
Q4-1956	1.6	Q1-1968	2.0	Q2-1979	0.1	Q3-1990	0.1	Q4-2001	0.3
Q1-1957	0.6	Q2-1968	1.7	Q3-1979	0.7	*Q4-1990*[9]	***-0.9***	Q1-2002	0.8
Q2-1957	**-0.2**	Q3-1968	0.8	Q4-1979	0.3	*Q1-1991*	***-0.5***	Q2-2002	0.6
Q3-1957	1.0	Q4-1968	0.4	Q1-1980	0.3	Q2-1991	0.8	Q3-2002	0.4
Q4-1957[4]	***-1.0***	Q1-1969	1.6	*Q2-1980*[7]	***-2.1***	Q3-1991	0.5	Q4-2002	0.1
Q1-1958	***-2.6***	Q2-1969	0.3	*Q3-1980*	***-0.1***	Q4-1991	0.3	Q1-2003	0.5
Q2-1958	0.7	Q3-1969	0.7	Q4-1980	1.9	Q1-1992	1.2	Q2-2003	0.9

Appendix Table 4. US quarterly GDP growth rates (%) (continued)

Q3-2003	1.7	Q4-2013	0.7
Q4-2003	1.2	Q1-2014	**-0.4**
Q1-2004	0.6	Q2-2014	1.3
Q2-2004	0.8	Q3-2014	1.2
Q3-2004	0.9	Q4-2014	0.4
Q4-2004	1.0	Q1-2015	0.8
Q1-2005	1.1	Q2-2015	0.6
Q2-2005	0.5	Q3-2015	0.3
Q3-2005	0.8	Q4-2015	0.1
Q4-2005	0.6	Q1-2016	0.6
Q1-2006	1.3	Q2-2016	0.3
Q2-2006	0.2	Q3-2016	0.6
Q3-2006	0.2	Q4-2016	0.5
Q4-2006	0.8	Q1-2017	0.5
Q1-2007	0.3	Q2-2017	0.6
Q2-2007	0.6	Q3-2017	0.7
Q3-2007	0.6	Q4-2017	0.9
Q4-2007	0.6	Q1-2018	0.8
Q1-2008	-0.4	Q2-2018	0.8
Q2-2008	0.6	Q3-2018	0.5
Q3-2008[10]	***-0.5***	Q4-2018	0.2
Q4-2008	***-2.2***	Q1-2019	0.6
Q1-2009	***-1.2***	Q2-2019	0.8
Q2-2009	***-0.2***	Q3-2019	0.7
Q3-2009	0.4	Q4-2019	0.5
Q4-2009	1.1	*Q1-202*[11]	***-1.3***
Q1-2010	0.5	*Q2-2020*	***-8.9***
Q2-2010	1.0	Q3-2020	7.5
Q3-2010	0.8	Q4-2020	1.1
Q2-2021	1.6	Q1-2021	1.5
Q4-2010	0.5	Q2-2014	1.3
Q1-2011	**-0.2**		
Q2-2011	0.7		
Q3-2011	0		
Q4-2011	1.1		
Q1-2012	0.8		
Q2-2012	0.5		
Q3-2012	0.2		
Q4-2012	0.1		
Q1-2013	0.9		
Q2-2013	0.1		
Q3-2013	0.8		

Notes: numbers identify start of recession, based on two negative quarters GDP growth.

Appendix Table 5. UK Economic Conditions May 2004-March 2008. Source: Blanchflower (2008)

a) UK consumer confidence

	Nationwide consumer confidence	GFK balance	GFK future economic situation	GFK major purchases
May-04	100	-2	-14	12
Sep-04	106	-7	-14	5
Jan-05	110	1	-10	11
Jan-06	94	-3	-15	10
Sep-06	92	-7	-21	9
Dec-06	84	-8	-19	2
Mar-07	88	-8	-10	2
Apr-07	90	-6	-18	4
May-07	99	-2	-10	4
Jun-07	95	-3	-10	7
Jul-07	96	-6	-13	-5
Aug-07	94	-4	-15	3
Sep-07	99	-7	-19	-2
Oct-07	98	-8	-17	-2
Nov-07	86	-10	-21	-3
Dec-07	85	-14	-26	-8
Jan-08	81	-13	-26	-20
Feb-08	78	-17	-29	-21
Mar-08	77	-19	-32	-21
Series average	96	-7	-8	8

b) Labor market survey - REC demand for staff

28-Feb-05	54.5	30-Sep-06	56.8
31-Mar-05	55.0	31-Oct-06	59.3
30-Apr-05	55.9	30-Nov-06	61.2
31-May-05	56.3	31-Dec-06	61.8
30-Jun-05	55.4	31-Jan-07	60.8
31-Jul-05	54.7	28-Feb-07	59.0
31-Aug-05	55.1	31-Mar-07	62.3
30-Sep-05	53.8	30-Apr-07	60.5
31-Oct-05	54.7	31-May-07	59.4
30-Nov-05	55.4	30-Jun-07	63.2
31-Dec-05	55.9	31-Jul-07	64.1
31-Jan-06	54.3	31-Aug-07	60.1
28-Feb-06	52.3	30-Sep-07	60.2
31-Mar-06	54.6	31-Oct-07	57.4
30-Apr-06	55.2	30-Nov-07	53.7
31-May-06	57.4	31-Dec-07	50.7
30-Jun-06	57.0	31-Jan-08	51.4
31-Jul-06	59.1	29-Feb-08	49.0
31-Aug-06	58.2		

Appendix Table 6. Annual OECD unemployment rates for 30 countries (https://data.oecd.org/unemp/unemployment-rate.htm)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	5.0	4.8	4.4	4.2	5.6	5.2	5.1	5.2	5.7	6.1	6.1	5.7	5.6	5.3	5.2	6.5
Austria	6.0	5.6	5.2	4.4	5.7	5.2	4.9	5.2	5.7	6.0	6.2	6.5	5.9	5.2	4.8	6.0
Belgium	8.4	8.3	7.5	7.0	7.9	8.3	7.2	7.6	8.5	8.5	8.5	7.9	7.1	6.0	5.4	5.6
Canada	6.8	6.4	6.1	6.2	8.4	8.1	7.6	7.3	7.1	6.9	6.9	7.1	6.4	5.9	5.7	9.6
Czechia	7.9	7.1	5.3	4.4	6.7	7.3	6.7	7.0	7.0	6.1	5.1	4.0	2.9	2.3	2.0	2.6
Denmark	4.8	3.9	3.8	3.7	6.4	7.8	7.8	7.8	7.4	6.9	6.3	6.0	5.8	5.1	5.1	5.7
Finland	8.4	7.7	6.9	6.4	8.4	8.5	8.0	7.8	8.3	8.8	9.5	8.9	8.8	7.4	6.7	7.7
France	8.9	8.9	8.0	7.4	9.1	9.3	9.2	9.8	10.3	10.3	10.4	10.1	9.4	9.0	8.4	8.0
Germany	11.3	10.3	8.5	7.4	7.6	7.0	5.8	5.4	5.2	5.0	4.6	4.1	3.8	3.4	3.2	
Greece	10.0	9.0	8.4	7.8	9.6	12.8	17.9	24.5	27.5	26.6	25.0	23.6	21.5	19.3	17.3	16.4
Hungary	7.2	7.5	7.4	7.8	9.7	10.8	10.7	10.7	9.9	7.5	6.6	5.0	4.1	3.6	3.3	4.1
Iceland	2.9	3.2	2.5	3.3	8.0	8.3	7.7	6.6	5.8	5.4	4.5	3.3	3.3	3.1	3.9	6.4
Ireland	4.6	4.8	5.0	6.8	12.7	14.6	15.4	15.5	13.8	11.9	9.9	8.4	6.7	5.8	5.0	5.9
Israel	9.0	8.4	7.3	6.1	7.5	6.6	5.6	6.9	6.2	5.9	5.2	4.8	4.2	4.0	3.8	4.3
Italy	7.8	6.9	6.2	6.8	7.9	8.5	8.5	10.9	12.4	12.8	12.0	11.8	11.3	10.7	10.0	9.3
Japan	4.4	4.1	3.8	4.0	5.1	5.1	4.6	4.4	4.0	3.6	3.4	3.1	2.8	2.4	2.4	2.8
Korea	3.8	3.5	3.3	3.2	3.6	3.7	3.4	3.2	3.1	3.5	3.6	3.7	3.7	3.8	3.8	3.9
Luxembourg	4.7	4.6	4.2	4.9	5.1	4.6	4.8	5.1	5.9	6.1	6.5	6.3	5.6	5.5	5.6	6.7
Mexico	3.6	3.6	3.7	4.0	5.5	5.4	5.2	5.0	4.9	4.8	4.4	3.9	3.4	3.3	3.5	4.4
Netherlands	5.9	5.0	4.2	3.7	4.4	5.0	5.0	5.8	7.2	7.4	6.9	6.0	4.9	3.8	3.4	3.8
New Zealand	3.8	3.9	3.6	4.0	5.9	6.2	6.0	6.5	5.9	5.4	5.4	5.1	4.7	4.3	4.1	4.6
Norway	4.5	3.4	2.6	2.7	3.3	3.7	3.4	3.3	3.8	3.6	4.5	4.8	4.2	3.9	3.7	
Poland	17.9	14.0	9.6	7.0	8.1	9.7	9.7	10.1	10.3	9.0	7.5	6.2	4.9	3.9	3.3	3.2
Portugal	9.2	9.3	9.6	9.2	11.2	12.6	13.5	16.6	17.2	14.7	13.0	11.5	9.2	7.2	6.7	7.1
Slovakia	16.4	13.5	11.2	9.6	12.1	14.5	13.7	14.0	14.2	13.2	11.5	9.7	8.1	6.5	5.8	6.7
Spain	9.2	8.5	8.2	11.3	17.9	19.9	21.4	24.8	26.1	24.5	22.1	19.7	17.2	15.3	14.1	15.5
Sweden	7.6	7.0	6.1	6.2	8.3	8.6	7.8	8.0	8.0	7.9	7.4	7.0	6.7	6.3	6.8	8.3
Turkey	9.5	9.1	9.2	10.0	13.0	11.2	9.1	8.4	9.1	9.9	10.3	10.9	10.9	10.9	13.7	13.1
UK	4.8	5.4	5.3	5.7	7.6	7.9	8.1	8.0	7.6	6.2	5.4	4.9	4.4	4.1	3.8	4.6
USA	5.1	4.6	4.6	5.8	9.3	9.6	9.0	8.1	7.4	6.2	5.3	4.9	4.4	3.9	3.7	8.1

Appendix Table 7. Annual Employment change versus 2006 level ('000s)

Country	2006 level	2007-2006	2008-2007	2009-2008	2010-2009	2011-2010
Australia	10,124	310	297	74	217	192
Austria	3826	98	70	-12	34	36
Belgium	4264	116	66	-25	68	21
Brazil	87,878	1,353	2,847	425		
Bulgaria	3,110	143	108	-107	-178	-110
Canada	16,375	344	240	-274	222	264
Chile	6,340	299	197	-54	350	356
Costa Rica	1,807	92	24	-36	-2	-53
Croatia	3,173	-1,439	37	-14	-67	-65
Cyprus	357	21	5	0	12	3
Czech Republic	4,828	94	81	-68	-49	19
Denmark	2,802	-1	3	-86	-58	-1
Estonia	653	6	-1	-62	-26	35
Finland	2,467	44	43	-76	-12	28
France	25,672	442	355	-265	78	38
Germany	37,250	833	559	-63	255	-3
Greece	4,528	37	46	-54	-166	-335
Hungary	3,928	-27	-53	-100	-16	27
Iceland	165	7	1	-11	-1	1
Indonesia	95,317	3,440	3,545	2,377	3,129	1,924
Ireland	2,039	177	-22	-182	-90	-36
Israel	2,823	113	104	47	97	85
Italy	22,758	137	196	-392	-172	71
Japan	63,840	290	-280	-1,040	-230	-2,820
Korea	23,188	373	213	-87	345	494
Latvia	1,031	26	-2	-146	-58	11
Lithuania	1,429	23	-24	-110	-70	6
Luxembourg	195	8	-1	15	4	4
Macedonia	570	20	19	21	8	7
Malta	151	4	3	1	3	4
Mexico	43,378	853	712	492	686	1,017
Netherlands	7,950	233	189	3	-85	1
New Zealand	2131	37	7	-29	10	32
Norway	2353	81	80	-14	1	35
Poland	14,594	647	560	69	-395	89
Portugal	5,079	14	24	-148	-70	-158
Romania	9,291	62	16	-126	-531	-185
Russian Federation	69,169	1,602	233	-1,593	523	923
Slovak Republic	2,301	56	76	-68	-48	-2
Slovenia	961	24	11	-15	-15	-30
South Africa	13,419	48	1,274	-406	-396	256
Spain	19,939	641	-110	-1,363	-382	-303
Sweden	4,427	117	52	-95	23	102
Switzerland	4,051	71	107	39	-60	90
Turkey	20,421	318	455	83	1316	1,517
United Kingdom	28,953	318	154	-430	52	126
United States	144,426	1619	-684	-5,484	-813	803
EU27	189,003	2,535	2,285	-3,490	-2,009	-734
Euro area	142,851	2,939	1,482	-2,963	-739	-610