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Tracking Unemployment in the North West Through Recession and Forecasting Recovery

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Tracking Unemployment in the North West Through Recession and Forecasting Recovery

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Abstract
This paper applies a business cycle dating algorithm to monthly North West county and local authority district claimant count data to assess turning points in the economic cycle of sub-regions. We date the transition of all districts of the North West into recession beginning in June 2007. By utilising manufacturing and service sector survey information in a logistic regression model we forecast the continuation of the recession for North West region's employment cycle in the first quarter of 2010. A longer term forecast with the Land Registry's house price index predicts a transition to an expansion phase in the fourth quarter of 2010.

Keywords: classical business cycles, survey data, forecasting.

Note: our results are preliminary, please do not cite without permission from the authors. We would like to thank Mike Doocey of Manchester's Commission for the New Economy for producing the maps presented in Figure 4.

1. Introduction

Business cycles are of interest to policy makers, businesses and at a regional level to the North West Development Agency to assess how the local economy is progressing in the current recession. We study the pattern of cyclical activity for the North West regional business cycle as measured by the unemployment claimant count. These series are used because no localized high frequency series of output are available.

Our measure of the cycle is defined analogously to the classical business cycle, and as such is focussed on absolute deviations of the unemployment series rather than on deviations from its trend. We apply the classical business cycle dating algorithm of Artis, Marcellino and Proietti (2004) to monthly North West district and county level claimant count data in order to compare and assess turning points in the economic cycle of the sub-regions. We discover that, as at June 2009, all parts of the region have entered recession and none have left this phase of the cycle yet. Burnley and Rossendale in Lancashire have lead the way in June 2007 and these areas have a larger share of manufacturing jobs than the North West average. Calculating a Spearman's rank test we find no significant relationship between higher concentration of manufacturing and early entry to recession but do find some evidence for regions with a greater share of financial service employees having an earlier entry to this credit-crunch recession.

We perform a forecasting exercise for the North West economy using a logistic regression model to predict the phase of the employment cycle. We utilise the Land Registry's house price index and regional survey data (from the British Chamber of Commerce and the Confederation of British Industry) to act as leading indicators of regional economic activity. We discover that the service sector survey data forecasts the regional economy more accurately but our preferred model combines house price inflation, service and manufacturing sector data. We forecast the continuation of the recession in the first quarter of 2010 in the North West region. We provide a one year ahead forecast from a model of just house price inflation and predict a transition to an expansion phase for quarter four 2010.

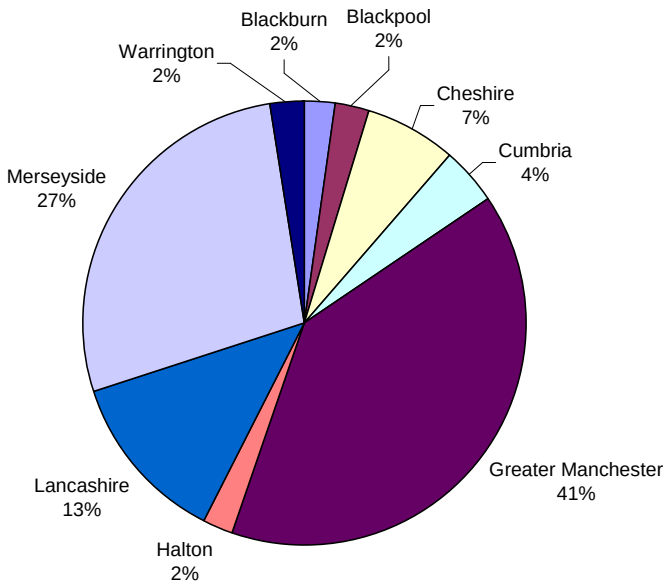
In the next section we discuss our claimant count data and in Section 3 we present the dates of turning points in these series. In section 4 we analyse the results

from the logistic model for the North West economy and present graphs of relevant survey data for our models. Finally section 5 offers some conclusions.

2. North West Claimant Count

In order to place experience in the current cycle in perspective we gauge how parts of the region fared in the last national recession of the early 1990s and start our analysis from January 1988 using monthly data until June 2009. A list of all the sub-regions analysed across the North West is presented in a table in Appendix A.

Figure 1: Percentage of North West claims, average over July 2008-June 2009



We downloaded local authority district level claimant count data from the NOMIS web-site[1] for the North West. The claimant count records the number of people claiming Jobseeker's Allowance (prior to October 1996 it included all unemployment-related benefits). At the sub-region level the data is seasonally unadjusted[2] so we adjust this using the X12 seasonal adjustment method[3] on the

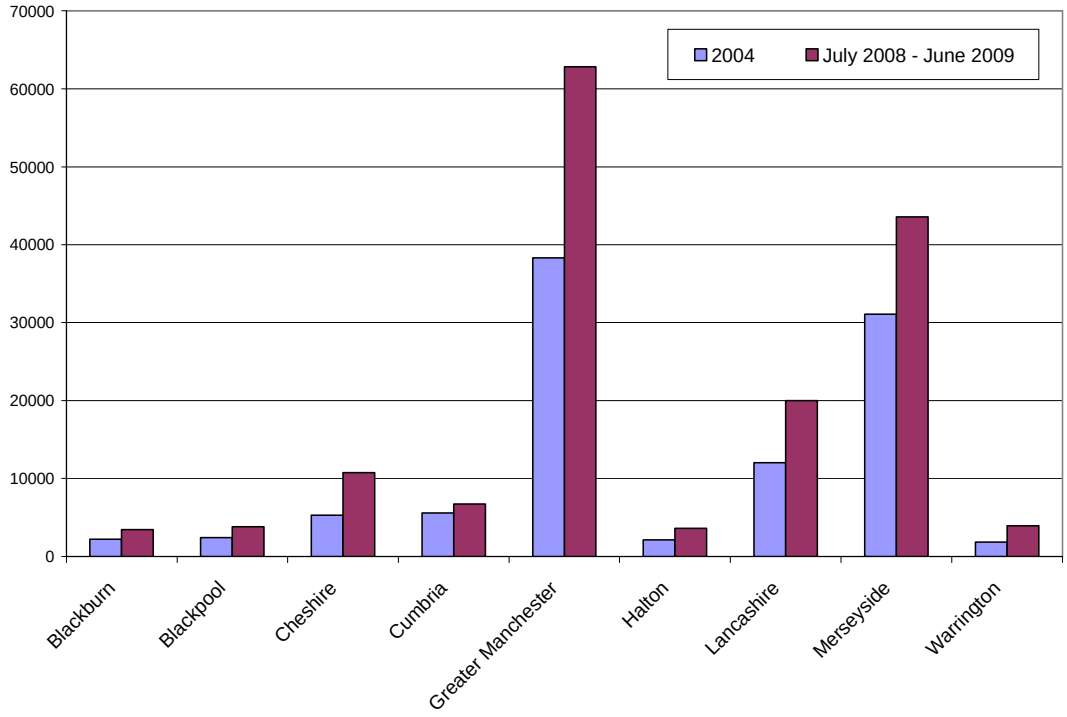
[1] NOMIS: https://www.nomisweb.co.uk/.

[2] The seasonally unadjusted data includes 16 year olds in the claimant count up to 1988, after that a rule change to the benefits system only 18 years olds and over are included.

natural logarithms of the data and the graphs of these series are shown in Appendix B. Here we observe a marked seasonal pattern for regions that rely on tourist trade like Blackpool and South Lakeland, Cumbria.

In Figure 1 we show the percentage of claimant count distributed around the North West for the average over a year from July 2008 to June 2009. Here we see the largest share of claims is from the Greater Manchester area which has the highest concentration of population in the North West.

Figure 2: Comparing average claims over business cycle expansion (2004) and recession phases (2008-9) by North West sub-region



To compare how these sub-regions have fared between times of business cycle expansion in 2004 when claims were at a lower level and during recession (July 2008 to June 2009) we compare these average amounts in Figure 2. Here we can see that Greater Manchester claims have increased between 2004 to 2008/9 by 64%, Cumbria by 21%, Halton by 68%, Merseyside by 40%, Lancashire by 66%, Blackburn by 56% and Blackpool by 59%. In Cheshire and Warrington claims have more than doubled between these two phases by 104% and 115% respectively (as this recession was led by the financial crisis these areas with the highest increase in claims have high

[3] The X12-arima 2.09 package used is from Givewin, Doornik and Hendry (2001).

amounts of people working in sector "finance, IT and other business activities" as reported by the National Statistic's Annual Business Inquiry (ABI), see Table 2).

3. Business Cycle Turning Points in North West Claimant Count

We compute the classical business cycle turning points by applying the algorithm detailed in Artis, Marcellino and Proietti (2004)[4] to the natural logarithms of the claims. The algorithm seeks to identify business cycles rather than permitting any old fluctuation in the data (which might be due for example to a strike) to count as a cycle and to this end imposes some phase duration constraints. The dating rules impose a minimum duration of a phase of 5 months and the minimum length of the entire business cycle (from peak to peak) to be 30 months. Whilst our analysis of the cycle in the highly localized areas will (necessarily) rely on claimant count data, employment data are available for analysis of the region and the major sub-regions.

Table 1: Cycle turning points for North West and sub-regions, 1988m1-2009m6

Turning Point	North West Employment	North West Claims	Greater Manchester South	Greater Manchester North	Blackburn	Halton
Peak	1990m10	1990m5	1990m5	1990m6	1990m6	1990m6
Trough	1995m10	1992m12	1992m12	1992m12	1992m12	1992m12
Peak	1997m2		2001m9		1997m11	2001m8
Trough	1998m4		2003m3		1999m6	2002m8
Peak		2005m1	2005m2	2004m10	2004m10	2004m1
Trough		2006m10	2006m10	2006m10	2006m6	2006m6
Peak	2006m8	2008m2	2008m2	2008m1	2008m3	2008m1

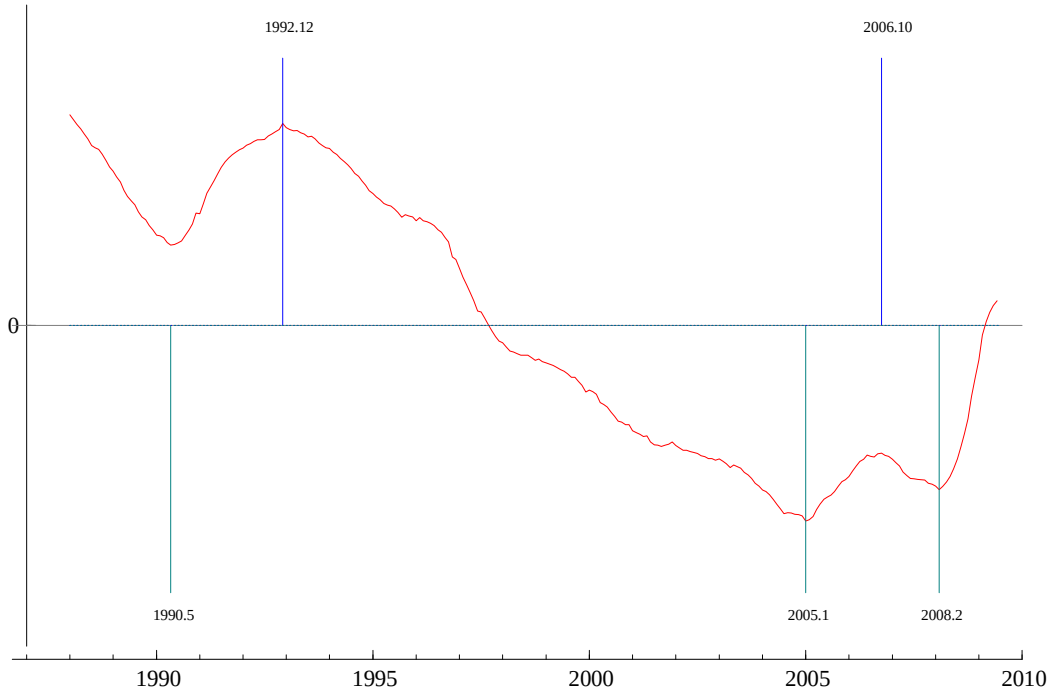
Table 1: continued

Turning Point	Greater Manchester	Blackpool	Cheshire	Cumbria	Lancashire	Merseyside	Warrington
Peak	1990m6	1990m6	1990m6	1990m6	1990m6	1990m8	1990m6
Trough	1992m12	1993m9	1992m12	1993m9	1992m12	1992m12	1992m12
Peak	2004m11	2004m9	2004m12	2005m2	2004m11	2004m12	2005m1
Trough	2006m10	2006m9	2006m12	2006m6	2006m6	2006m9	2006m6
Peak	2008m2	2007m11	2008m2	2008m2	2008m1	2008m1	2007m12

[4] We use code produced by Tommaso Proietti in OX.

The turning points dates from this analysis are listed in Table 1[5] and a chart illustrating these turning points for the North West is in Figure 3. The first column of Table 1 details the turning points dates of the North West employment data which are presented in Artis and Sensier (2009). (These are the dates for the recession that we use in the Section 4 forecasting exercise with a logistic model).

Figure 3: North West Claimant Count classical turning points



Comparing the first two columns of Table 1 it can be seen that the start of the 1990s recession[6] is 5 months earlier at June 1990 in the North West claimant count data than in the employment data at November 1990. The recession phase for claims lasts just over 2 years, whereas the recession in employment is dated to last 5 years followed by a smaller downturn in 1997-98. The North West claims data again experiences an increase during 2005-06 which we date as a further recession in this series and for all other sub-regions. The current recession is dated in the employment data to start in September 2006, much earlier than the claims start date in March 2008.

[5] Note that we date *peaks* in claimant count data *at local minima* and *troughs* at the *local maxima* as unemployment is inversely related to output and movements in it are a contra-cyclical measure of the business cycle.

[6] Recessions are dated as beginning in the month following the peak.

This is closer to start of the national business cycle as dated by the Economic Cycle Research Institute (ECRI: www.businesscycle.com) at June 2008.

We divide the large Greater Manchester sub-region into North and South (which is the NUTS 3 breakdown) and here see some differences with the North entering the 1990s recession one month later in July 1990 but one month earlier for the current recession in February 2008. A further recession is dated for Greater Manchester South in 2001-03. The districts within these sub-regions are also dated with the business cycle algorithm and the tables of these dates can be found in Appendix C. Table C.1 shows the business cycle turning point dates for the ten districts of Greater Manchester and here we can see the 2001-03 increase in claimant count is found for most south Manchester regions apart from Trafford. Further small recessions are found in Bolton and Oldham in 1998-9 but these are lost when these regions are aggregated to the north measure. The northern Greater Manchester regions generally enter the current recession earlier with Bury being the first in September 2007.

Table 2 details the percentage of employees in the manufacturing and service sectors of each sub-region and lists them in the order that they enter recession with the index (t) signifying when the North West claims data enters recession and the other regions are shown to either lead, for example Chorley leads by 7 months (t-7), or lag (t+1 for Preston). The earliest districts in the North West to enter recession are within Lancashire - Burnley and Rossendale in June 2007 (t-9). These two districts have a higher percentage of employees in manufacturing jobs according to the ABI than the North West average of 12.4%, Burnley has 21% and Rossendale 25%.

The 1990s recession in the claims data lasts for just over 2 years for most North West sub-regions in Table 1 apart from Blackpool and Cumbria where it lasts just over 3 years with both having the recession trough dated as September 1993. We can see that within Cumbria most districts (apart from Carlisle) also date the trough of the 1990s recession in 1993. Copeland was the earliest district in Cumbria to enter the current recession in September 2007 (t-6). This region has a high concentration of employment in the nuclear industry and its share of employees in manufacturing is very high at 36.4%.

Table 2: Proportion of Employee Jobs by Industry in the North West, 2007

Recession Date	Areas	Manufacturing	Services	Finance, IT, other business activities
2007m6	Burnley	21%	75.1%	12.2%
(t-9)	Rossendale	25.1%	67.3%	13.3%
2007m7 (t-8)	Hyndburn	19.5%	74.6%	9.5%
2007m8 (t-7)	Chorley	7.5%	84.5%	24.8%
2007m9	Bury	12.7%	82.8%	12.5%
(t-6)	Copeland	36.4%	58%	12%
2007m11 (t-4)	Eden	10%	75.8%	9.9%
2007m12	Blackpool	6.6%	90.1%	10.8%
(t-3)	Bolton	15%	77.6%	17.7%
	Sefton	6.1%	89.2%	15%
	St. Helens	12.8%	78%	12.3%
2008m1	Allerdale	18.5%	71.8%	10.6%
(t-2)	Oldham	16.7%	75.3%	13%
	Rochdale	16.6%	76.5%	16%
	Trafford	9.1%	83.8%	31.6%
	Warrington	8.2%	82.6%	25.8%
	West Lancs.	17%	74.2%	14.1%
	Wirral	10.9%	84.3%	16.6%
2008m2	Halton	13.5%	81.1%	21.4%
(t-1)	Lancaster	6.1%	85.2%	13%
	Liverpool	5.2%	91.5%	21.7%
	Stockport	10.8%	81.4%	22.9%
	Tameside	20.8%	72.9%	11%
	Wigan	14.7%	76.4%	15.3%
	Wyre	10.7%	80.6%	11.1%
2008m3	North West	12.4%	81.6%	19.4%
(t)	Carlisle	12.4%	80.9%	13.9%
	Cheshire East	16.9%	77.1%	21.6%
	Cheshire West	10.5%	82.8%	22.9%
	Manchester	4.5%	93.4%	30%
	Salford	8.2%	85.4%	26.8%
	South Lakeland	10.9%	80.8%	12.3%
	South Ribble	16.3%	73%	13.8%
2008m4	Blackburn	21.7%	74.8%	13.8%
(t+1)	Fylde	31.9%	63.6%	18.8%
	Knowsley	20.7%	74.7%	15.7%
	Pendle	34.5%	60.8%	11%
	Preston	10.2%	85.2%	19.7%
2008m7 (t+4)	Barrow-in-Furness	22.2%	71.9%	11.4%
	Great Britain	10.6%	83%	21.6%

Source: Nomis, ONS Annual Business Inquiry (survey of 78,000 businesses in December each year at location of employees workplace). Employee jobs excludes self-employed, government supported trainees and HM Forces. (t=NW Recession).

The last district to enter the current recession is Barrow-in-Furness which starts in September 2008. Barrow is a district which lost many jobs from the ship building industry over the 1980s and 1990s and a case study by Beatty and Fothergill (2002) suggests this area has a large number of hidden unemployed who have been moved from the claimant count to incapacity benefits. However, in a more recent study of Fothergill (2009) Barrow is shown to have a small reduction in the numbers of hidden unemployed between January 2007 and August 2009[7].

Within Merseyside Liverpool claims lead the North West by one month and here we have a high amount of employees in the finance sector at 21.7%. Knowsley, with a larger share of manufacturing (20.7%), lags the cycle by one month.

We investigate if there is a significant statistical relationship between districts leading the way into recession and the concentrations of sectoral employment by calculating the Spearman's rank test in Stata 11. This test computes a correlation coefficient and significance level between the order districts enter recession and the proportion of labour employed in the different sectors. Table 3 details the results of our Spearman's coefficients where the recession order is taken from Table 2. He we can see there is a strong negative association between manufacturing and service sectors which is expected, and to a lesser extent this is also the case for manufacturing and the finance sector. Areas that have higher amounts of people employed in services also have larger proportions of employment in financial services. There is no significant relationship between the order of regions going into recession and the proportions of manufacturing or services, but at the 15% level of significance we could accept that areas with higher concentration of people employed in financial services have entered recession earlier.

Table 3: Spearman's Rank Correlation Coefficients

	Recession order	Manufacturing	Service Sector
Manufacturing	0.0762 (0.6494)		
Service Sector	-0.0328 (0.8450)	-0.9307 (0.0000)	
Finance Sector	0.2486 (0.1323)	-0.4438 (0.0053)	0.5357 (0.0005)

Notes: rho statistics reported with p-values in brackets.

To illustrate how the sub-regions move into recession through the North West we chart the progression over time in a sequence of maps in Figure 4 (as Crone, 2006,

[7] Urban regeneration projects may be working, see http://www.westlakesrenaissance.co.uk.

produces for US States). Initially our maps progress at a quarterly frequency as a few regions fall into recession. Then the first quarter of 2008 is split over 2 maps as here the majority of regions join the recession. Finally map 6 shows the last few regions to have entered recession by September 2008, Barrow is the last region in July 2008. (Note that our algorithm fails to date the latest recession in one region – the Ribble Valley, Lancashire – but this region has experienced the same large increase in claimant count so will assume that this district is also experiencing the UK recession[8]). The role of industrial structure in affecting the timing of the cycle in the different districts and sub-regions might deserve more extensive investigation (as for example has been carried out by Hamilton and Owyang, 2009 and Owyang, et al., 2009, for the states of the US), in the context of a nation-wide study which would promote more variation in cyclical timing.

4. Forecasting the North West Economy

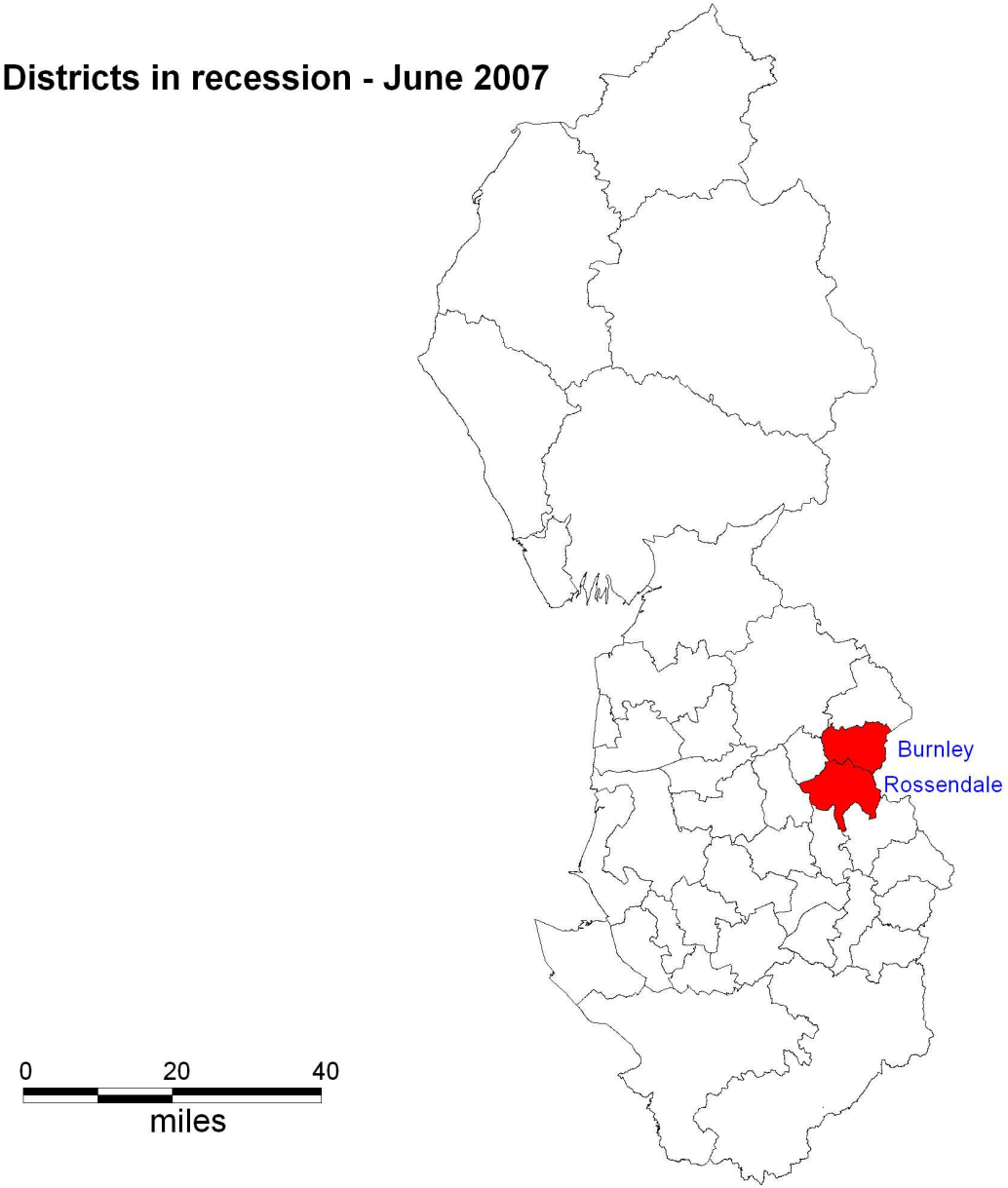
We want to conclude this paper by forecasting the date when the employment cycle of the North West region as a whole will make the transition to expansion. To do this we utilise a logistic regression model, the details of the methodology and search routines for this model can be found in Sensier, et al (2004). To specify and estimate the logistic regression model we need the business cycle chronologies to be known for the sample period. Our interest is in recessions versus expansions since we believe that policy makers and private agents are more concerned about absolute declines and increases rather than movements around an arbitrary trend (growth cycle).

Our business cycle phases are represented by a binary variable that is unity in expansion and zero in recession, this is our dependent variable. Our aim is to predict the probability that a specific future period will be within an expansion, with the recession probability being one minus the expansion probability. Note that once the model is estimated we need no further regime information for prediction purposes, since the regime probability then depends only on the observed values of the leading indicator. A large number of studies have used leading indicator data to help predict the business cycle; the history of this work dates back to Burns and Mitchell (1946).

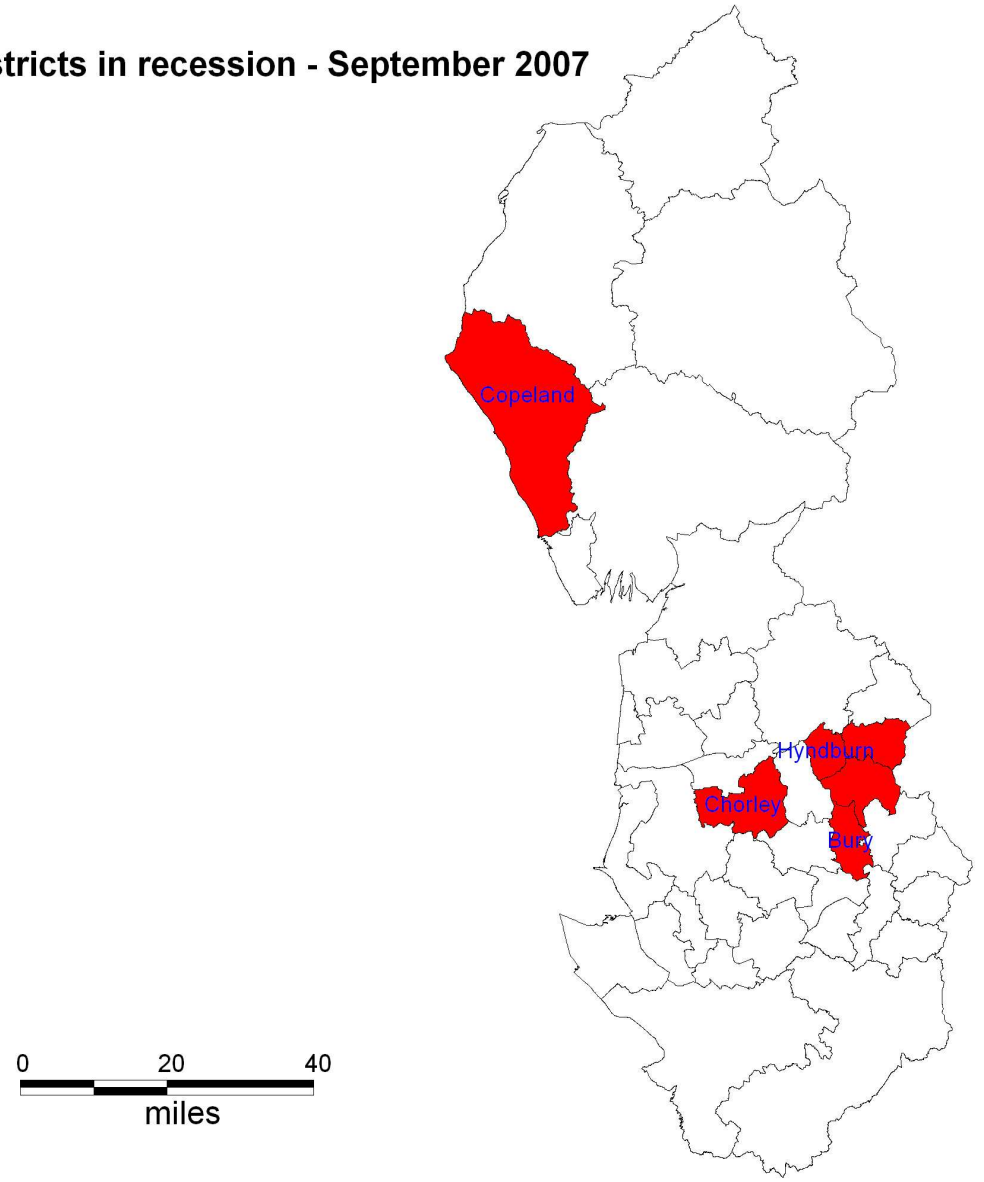
[8] The Ribble Valley employment shares are manufacturing 27.1%, services 66.4% and financial services 8.7%.

Figure 4: Progression of Recession in the North West

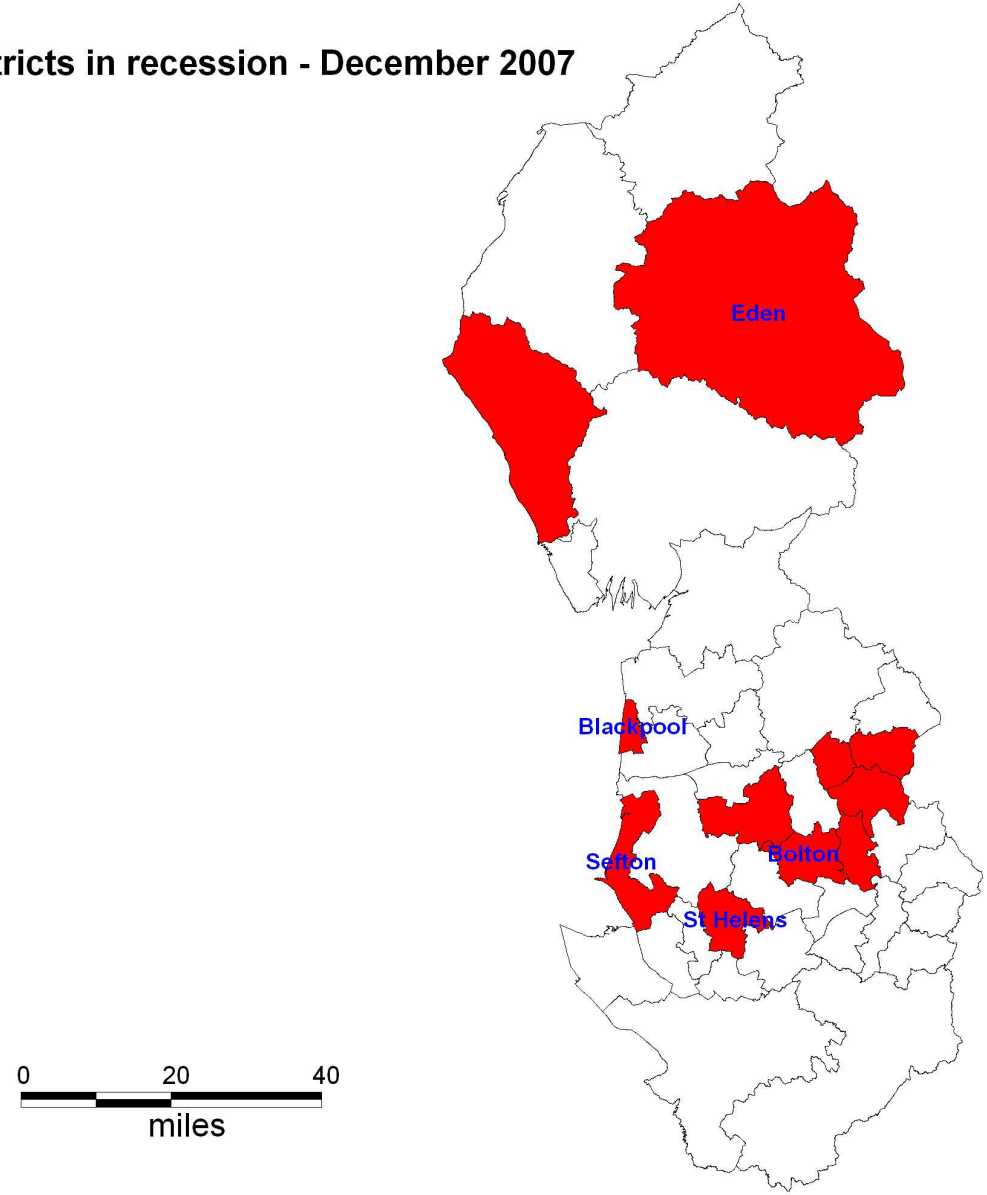
Districts in recession - June 2007



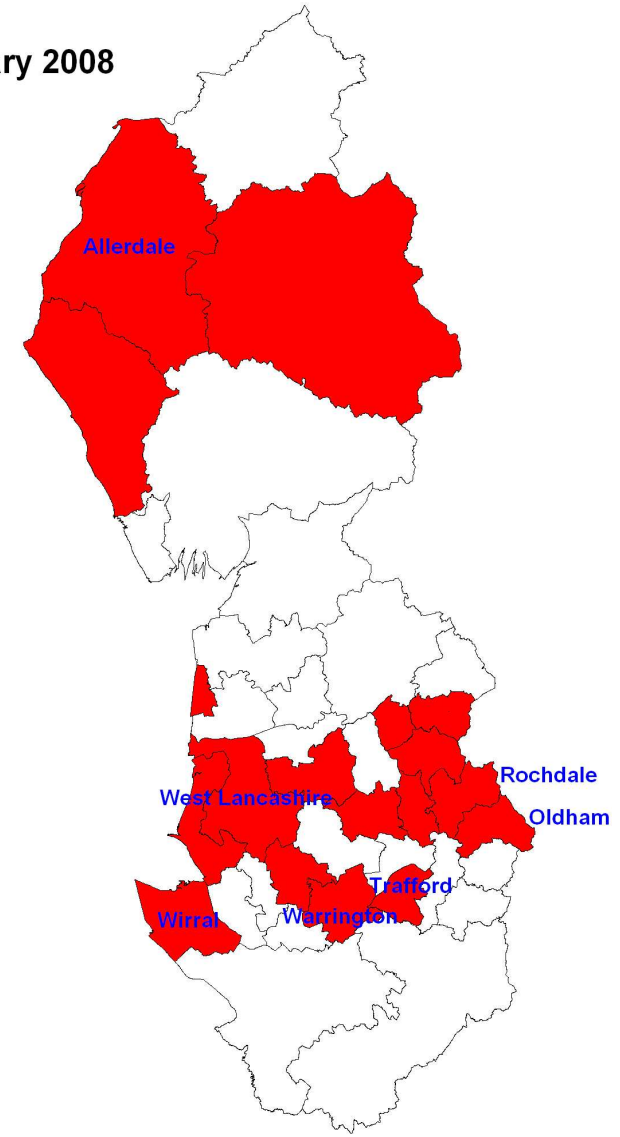
Districts in recession - September 2007



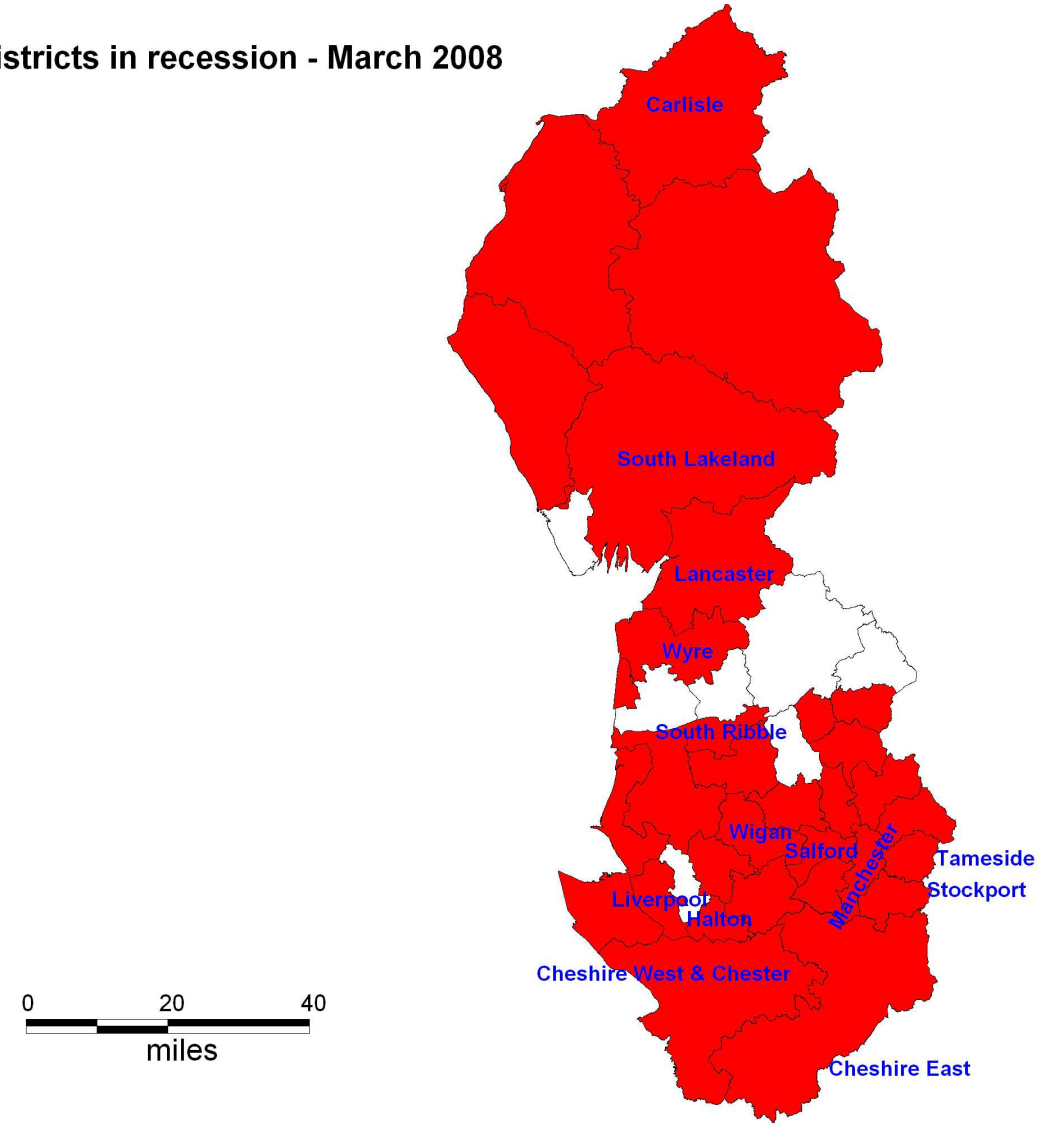
Districts in recession - December 2007



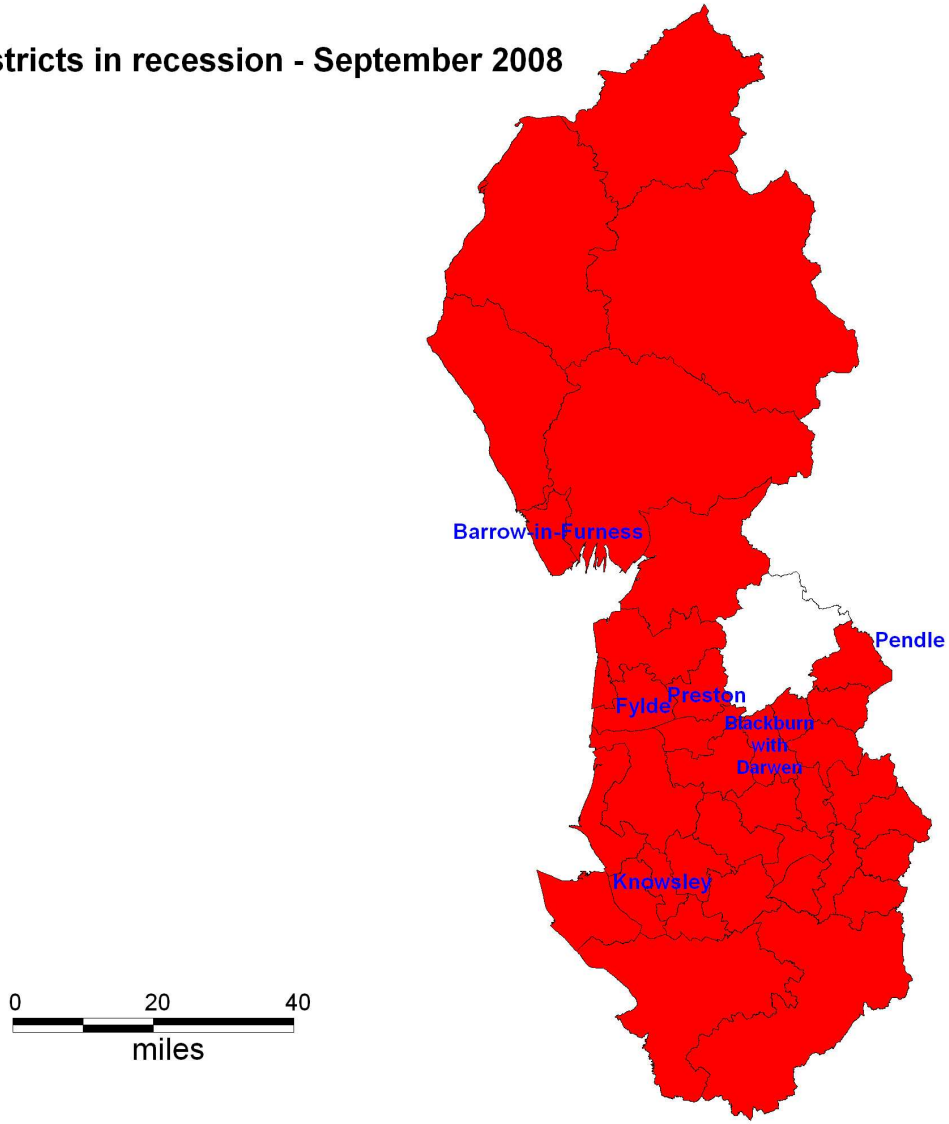
Districts in recession - January 2008



Districts in recession - March 2008

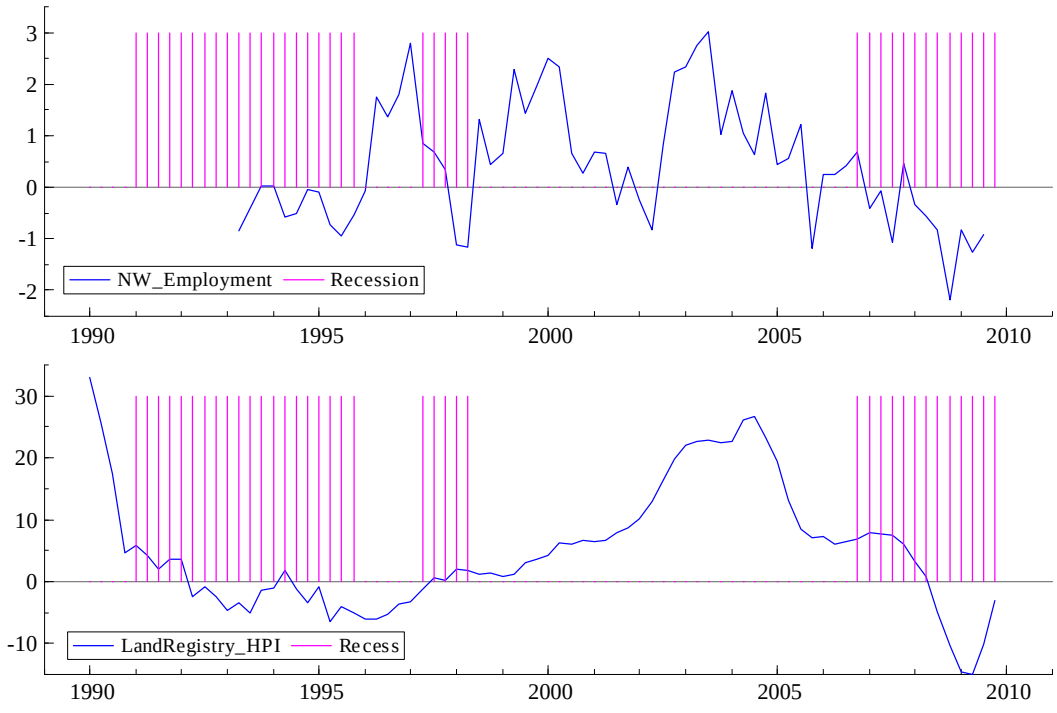


Districts in recession - September 2008



The usual methodology for producing a leading indicator is based on combining a range of individual leading indicators into a single composite indicator, as Crone and Clayton-Matthews (2005) estimate for US States. In principle we could consider a structural econometric model that allows for structural changes across regimes within cycles. However, Clements and Hendry (1999) have argued that, in the presence of structural change, the use of non-structural relationships may significantly improve the performance of forecast models. In common with other leading indicator analyses, we make no attempt here to construct a structural model of economic activity rather we concentrate on identifying stable statistical relationships between leading indicators and business cycle regimes. The regime prediction probability from this model can itself be interpreted as a composite leading indicator of the business cycle regime for the North West employment cycle.

Figure 5: Annual change of North West Employment and Land Registry House Price Inflation



In Artis and Sensier (2009) we apply the classical business cycle dating algorithm of Artis, et al. (2004) to UK Government Office Region's employment data from the Labour Force Survey. From this study we take the turning points presented

for North West employment (ONS code YCJQ) to date our expansion phases. The turning point dates are listed in Table 1 and shown in Figure 5 as index lines along with the annual change employment. These are converted to quarterly dates (as we use quarterly data in our forecasting exercise) so the first recession runs from 1991q1 to 1995q4, the small late 1990s recession is from 1997q2 to 1998q2 and the current recession commences in 2006q4.

To forecast economic activity at the regional level we need indicator variables available in a timely manner for our region. We find that survey data is useful in this respect and also can provide an indication of future expectations of businesses in a region. We use two business surveys: the Confederation of British Industry (CBI)/ Experian Regional Trends Survey and the British Chamber of Commerce (BCC) Quarterly Economic Survey[9].

The Chamber of Commerce's Quarterly Economic Survey (QES) is found to give the most reliable results in our forecasting model. This is the UK's largest and most representative survey of commerce. The last survey used in our sample is Q3 2009 with results lagged by one and two quarters in our model. Businesses are surveyed using postal and on-line questionnaires for a three week period towards the end of the quarter of interest. The questions in the survey take the form of "Excluding seasonal variation, domestic sales over the past 3 months are: up/same/down", the response from this question is what we refer to as the variable "HomeSalesM" in Table 4 (the "M" refers to the manufacturing sector and "S" to services). The QES reports balance figures in response to the questions which are determined by subtracting the percentage of companies reporting decreases from those reporting increases.

We also analyse house price index data from the Land Registry which begins in 1995[10]. As our shortest survey sample for BCC commences in 1990 we extend back our house price series using the Nationwide[11] index (this series includes the North East but is the only available series as the Department for Communities and Local Government North West house price index begins in 1999). The Land Registry

[9] The CBI survey data is from Datastream and the BCC data is purchased from them but further details are at: http://www.britishchambers.org.uk/zones/policy/reports/quarterly-economic-survey.html.

[10] See http://www.landreg.gov.uk/houseprices/.

[11] Data from http://www.nationwide.co.uk/hpi/historical.htm.

house price index is available seasonally unadjusted so we take the annual difference of this to proxy house price inflation in the North West. This is shown in the second chart in Figure 5 along with business cycle phases. Taylor and Bradley (1994) find strong interaction between the housing market and the labour market for GB counties. Their research suggests that in the 1990s recession counties with the largest fall in house prices and highest amount of home ownership subsequently experienced the largest increase in unemployment. Their sample ended in mid-1992 and beyond this many regions saw further increases in unemployment. Cameron and Muellbauer (2001) identify a strong link between the housing market and unemployment for GB regions. Using annual data they find a rise of 10% in relative house prices raises relative unemployment rate by 0.16 percentage points with a lag of 3 years. They suggest that two housing market channels are affecting unemployment: the cost of location effect when land price rises discourage potential movers to the region and the wealth effect on restricting regional spending, via the collateral role of housing equity on credit constrained households and firms.

The in-sample period for our logistic analysis is from 1990q3 to 2005q4 and out of sample period is from 2006q1 to 2009q4, so the recent recession is dated in our forecast sample. We then present 2010q1 as a one-step ahead forecast out of sample. We use two search methods to arrive at the variables selected. The first is sequential elimination were the least significant variables are dropped and the model is re-estimated sequentially until the minimum Schwarz Information Criterion (SIC) is reached. The second method is n-search which runs every possible combination of variables with a maximum model size specified (n=6 in this case). The results of our forecast model are presented in Table 4 where four models are compared that search over a sub-set of the regional data that is available. The first model searches over CBI manufacturing survey data only, the second model uses the house price inflation (HPI) and BCC manufacturing surveys, the third model utilises HPI and BCC service industry survey data and the final model combines all information.

The models are presented in Table 4 are in order of their SIC with the minimum value signalling the best model. The first model shown uses only CBI survey data because when the HPI data are included the CBI series are not selected. The only CBI series in this model is the future new export orders that increase one and eight quarters before a recession. The probability chart for this model is not

shown as it poorly predicts the phases of the business cycle in and out of sample and the forecast from this model in 2010q1 is a return to an expansion phase which currently seems unlikely for the North West with a recent release of unemployment data in 2009q3 still increasing year on year (see the ONS Labour Market Statistics Bulletin Table 18(1), January 2010).

Table 4: One quarter ahead forecast for the North West with survey information

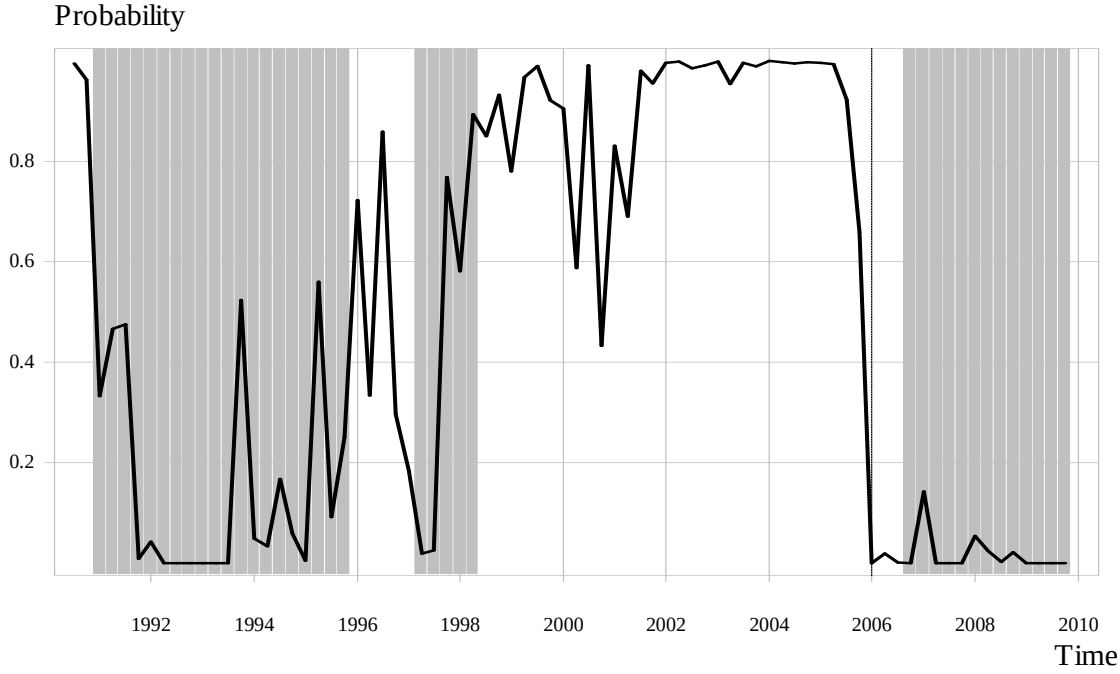
Variables:	**CBI only Manufacture Survey**	**HPI & BCC Manufacture Survey**	**HPI & BCC Service Survey**	**Combination Manu. & Service**
Intercept	0.498	0.378	0.896	1.142
Δ_4(LandRegistryHPI)$_{-1}$		3.632	3.37	4.47
Δ_4(LandRegistryHPI)$_{-12}$		-3.727	-2.062	-4.358
(CBI_ExportsFuture)$_{-1}$	-0.689			
(CBI_ExportsFuture)$_{-8}$	-0.714			
(BCC_HomeSalesM)$_{-2}$		-3.088		-3.456
(BCC_InvestPlantM)$_{-2}$		2.751		
(BCC_EmployPastS)$_{-1}$			3.225	3.205
(BCC_ExportSalesS)$_{-2}$			-1.545	
(BCC_ConfProfitS)$_{-2}$			-1.951	
Summary Statistics:				
RMSE Sample	0.4433	0.2984	0.2464	0.2610
Log Likelihood	-35.29	-16.48	-13.9	-13.13
SIC	82.95	53.6	52.56	46.89
Errors In-Sample:				
Expansion	22% (8/37)	11% (4/37)	5% (2/37)	8% (3/37)
Contractions	52% (13/25)	20% (5/25)	16% (4/25)	8% (2/25)
Errors Out-of-Sample:				
Expansion	33% (1/3)	100% (3/3)	33% (1/3)	100% (3/3)
Contractions	100% (13/13)	(0/13)	31% (4/13)	(0/13)
Prediction:				
Forecast 2010q1	0.7971	0.0105*	0.2945*	0.0034*

Notes: In sample data set: 1990q3-2005q4 and out of sample data set: 2006q1-2009q4. * Indicates a warning of recession, as the forecast probability is less than 0.5.

The second model searches over HPI and the BCC manufacturing survey information. Here we uncover a positive relationship at one quarter lag with HPI, indicating a fall in annual house price inflation before the onset of the recession and a significant rise three years before the recession, which supports the long lag picked up by Cameron and Muellbauer (2001). Two variables are selected from the BCC manufacturing survey. Home sales has a negative coefficient so actually increases 2

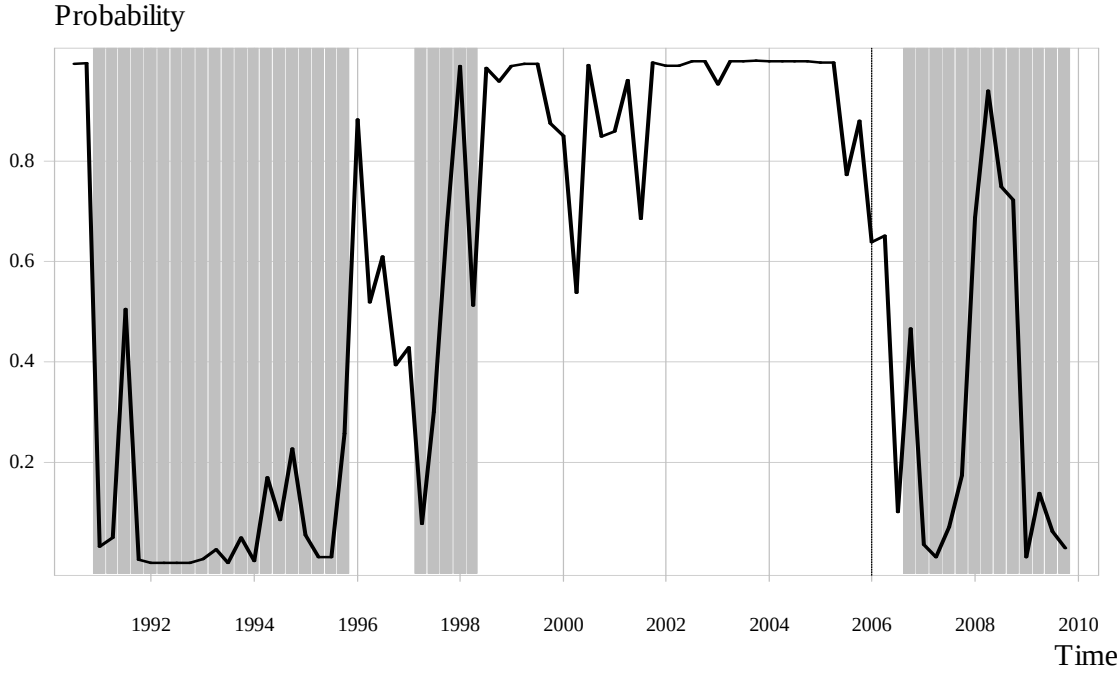
quarters before a recession and investment in plant and machinery declines 2 quarters before the downturn. Figure 6 shows the expansion probabilities for this model which predicts the start of the current recession too early but this signals that the manufacturing sector was in recession from early 2006. The forecast for 2010q1 is a continuation of the recession phase.

Figure 6: Expansion Probabilities for HPI & BCC Manufacturing Survey Model



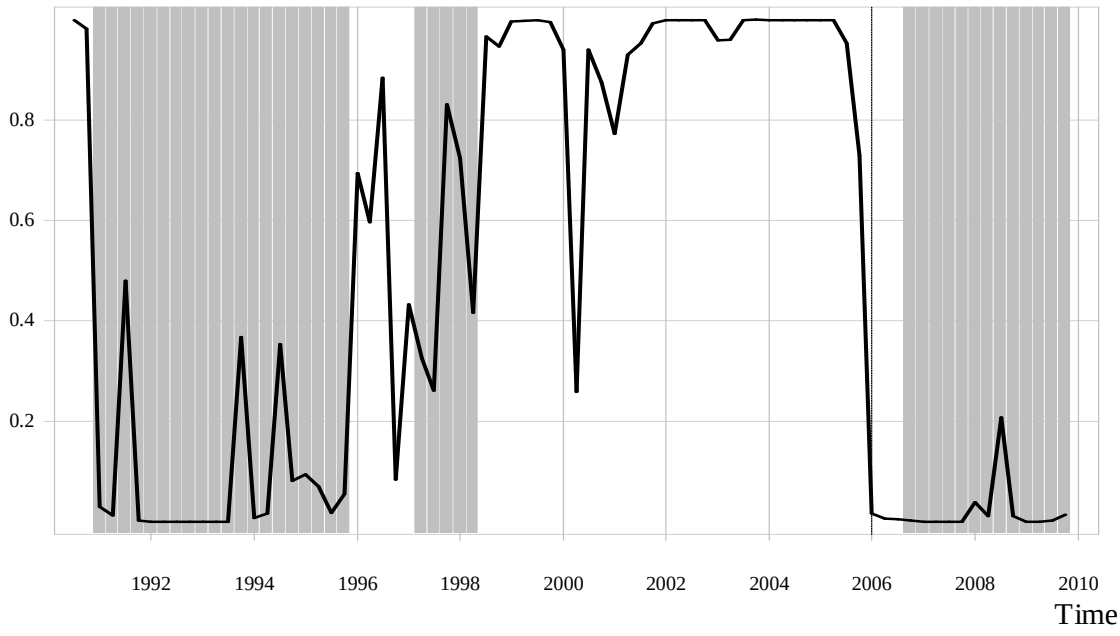
The third model presented in Table 2 includes the BCC service sector survey data along with house prices. The variables selected from the BCC service survey are employment from the last three months, export sales and confidence in business profit. There is a positive relationship with past employment so this falls one quarter before the recession. Export sales and confidence in profit in the service sector increase two lags before the onset of a recession (possibly due to a falling exchange rate). The expansion probabilities are shown for the third model in Figure 7, here we can see that this model predicts the early 1990s recession well and some of the late 1990s recession. For the current recession we get a double-dip with the beginning of the phase correctly forecast and then emerging briefly in 2008 to plunge back in during 2009 with a forecast for 2010q1 for a continuation of the recession phase.

Figure 7: Expansion Probabilities for HPI & BCC Service Sector Survey Model



The fourth model includes a combination of HPI and BCC manufacturing and service sector survey data. The variables selected are home sales from the manufacturing sector and from the service survey past employment. Manufacturing sales again appear to increase 2 quarters before the downturn with past employment in services falling one quarter before. The expansion probabilities for this model are shown in Figure 8 with a continuation of recession forecast for 2010q1.

Figure 8: Expansion Probabilities for HPI & BCC Surveys Model



From Table 4 we can see that the last model combining all information is the preferred model in terms of minimising the SIC and having the smallest number of errors in sample, also it matches the out of sample performance with the model which uses just manufacturing data. These results indicate that the recession in employment that started in the North West in 2006 may have been led by job losses in the manufacturing sector ahead of job losses in the service sector which would have followed the crisis in UK financial markets in the second half of 2008.

Table 5: Long-term Forecast for the North West

Variables:	**HPI & BCC Manufacture Survey**	**HPI & BCC Service Survey**	**Combination Manu. & Service**	**Four Quarters Ahead**
Intercept	-0.039	0.324	0.676	0.460
Δ_4(LandRegistryHPI)$_{-2}$	3.692	1.397	2.075	
Δ_4(LandRegistryHPI)$_{-4}$				5.676
Δ_4(LandRegistryHPI)$_{-6}$				-3.687
Δ_4(LandRegistryHPI)$_{-12}$	-4.895	-1.817	-2.106	-1.93
(BCC_InvestPlantM)$_{-2}$	2.044			
(BCC_EmployPastM)$_{-2}$	-2.377			
(BCC_ExportOrderM)$_{-2}$			1.44	
(BCC_ExportSalesS)$_{-2}$			-1.755	
(BCC_%FullCapyS)$_{-2}$		1.375	1.998	
Summary Statistics:				
RMSE Sample	0.3163	0.3191	0.2828	0.3495
Log Likelihood	-18.62	-20.15	-15.87	-23.3
SIC	57.88	56.81	56.51	63.12
Errors In-Sample:				
Expansion	14% (5/37)	11% (4/37)	11% (4/37)	8% (3/37)
Contractions	20% (5/25)	22% (6/25)	12% (3/25)	28% (7/25)
Errors Out-of-Sample:				
Expansion	100% (3/3)	100% (3/3)	(0/3)	100% (3/3)
Contractions	(0/13)	15% (2/13)	38% (5/13)	(0/13)
Prediction:				
Forecast 2010q1	0.0052*	0.0231*	0.0089*	0.0017*
Forecast 2010q2	0.0020*	0.0005*	0.0000*	0.0075*
Forecast 2010q3				0.2082*
Forecast 2010q4				0.9027

Notes: see Table 4.

Finally we analyse longer term forecasts from a logistic model eliminating one quarter lags from our data search to forecast two quarters ahead and forecasting one year ahead with house price inflation. Table 5 presents the results from this analysis

comparing forecasts using data from the BCC surveys and HPI. The first models in Table 5 is similar to the model with the manufacturing survey data in Table 4 but past employment is selected instead of home sales, this also increase 2 quarters before the recession.

The model with just service sector survey data in Table 5 selects the percentage of businesses working at full capacity variable which falls before the downturn. Combining all variables we find a role for manufacturing export orders, past employment and service sector export sales and percent working at full capacity. Manufacturing export orders fall but service sector export sales increase 2 quarters before the recession. All models predict a continuation of the recession phase for the first half of 2010. The final model with just house price inflation data predicts return to an expansion phase for the last quarter of 2010.

6. Conclusions

This paper applies the classical business cycle dating algorithm of Artis, Marcellino and Proietti (2004) to monthly North West district and county claimant count data to assess turning points in the economic cycle of sub-regions. As of June 2009 all districts of the North West have entered a recession and none have left this phase. The recession began in 2007 in the claimant count data but was dated in the employment data to have commenced in 2006. The speculation that areas intensive in financial and related business services have lead the way in the current recession has some support from a spearman's rank correlation coefficients using data from the Annual Business Inquiry of 2007.

This paper makes a useful contribution in dating business cycles at the local authority district level where we can see a greater occurrence of recessions. When we analyse the business cycles of districts we generally find more recessions than in the sub-regions, for example Bolton and Oldham experience small recessions at the end of the 1990s but in the Greater Manchester North aggregate these cycles are lost. Regional policy could target the districts more prone to recessions and introduce structural policy to ease labour market frictions in those areas.

The strongest predictions for the North West business cycle come from house price inflation in the Land Registry's house price index and from British Chamber of Commerce manufacturing and service industry survey data. We uncover a prominent

role for house price inflation in the North West leading the cycle by three years, as documented by Cameron and Muellbauer (2001). We find that our model which only includes the CBI manufacturing survey forecasts expansion for the first quarter of 2010. Using just manufacturing information in the North West region where 82% of people are employed in the service sector is unrealistic. Our best model combines house prices, Chamber of Commerce manufacturing and service survey information and we report a high probability for the continuation of the recession for the first half of 2010. When looking at a longer forecast horizon with house price inflation we predict a return to an expansion phase for the North West in the fourth quarter of 2010.

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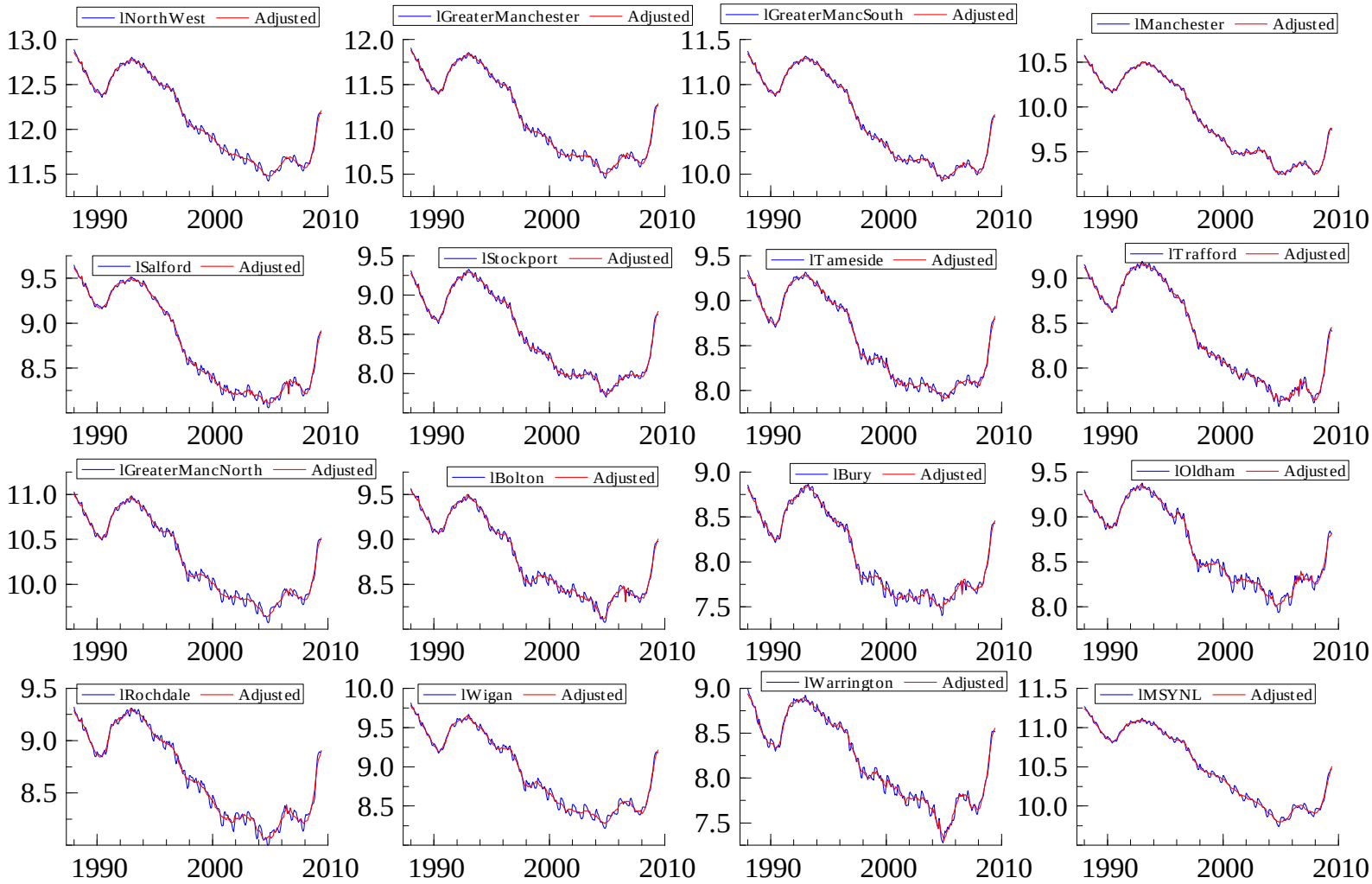
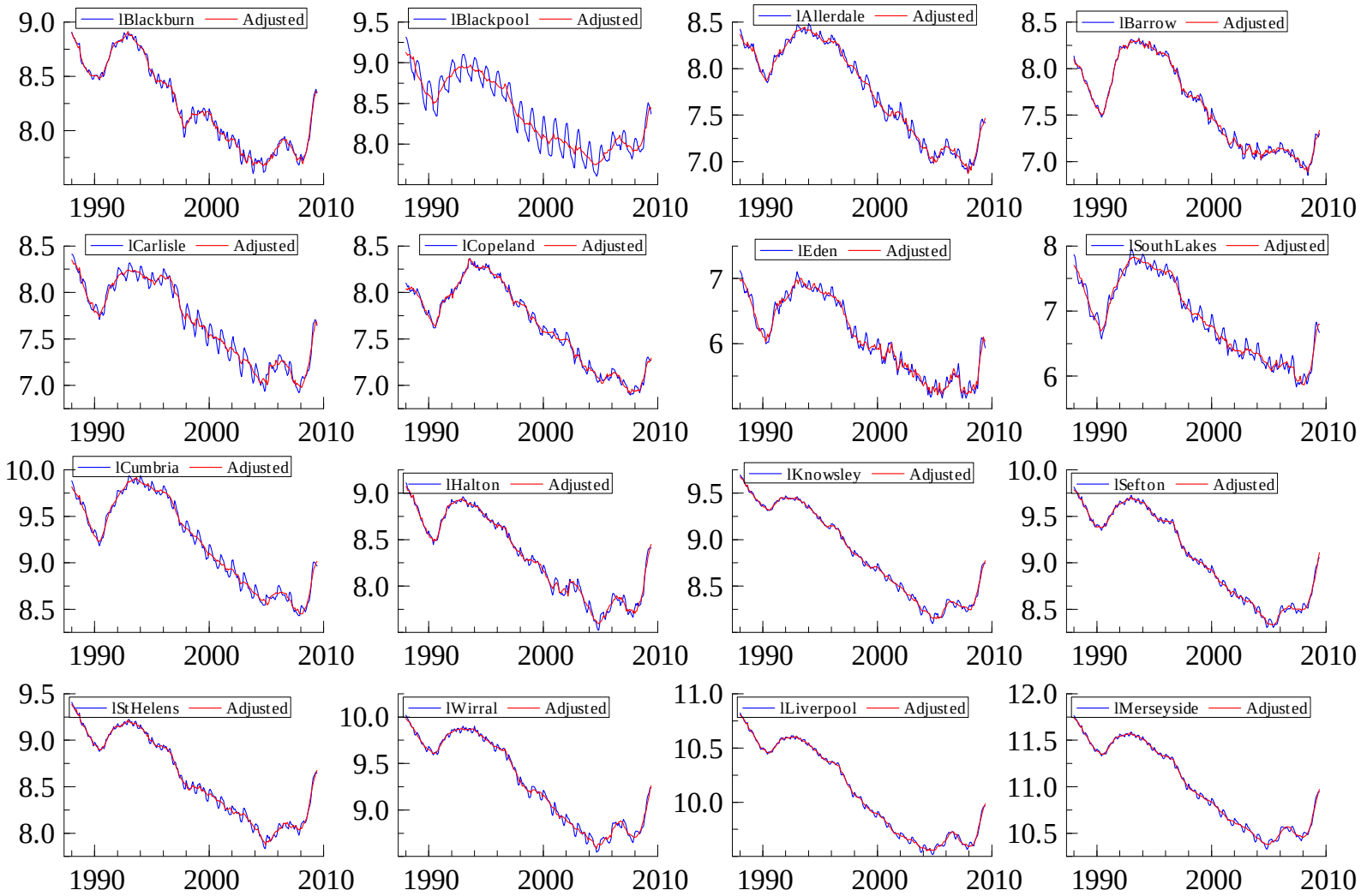
Appendix A: North West Areas

Areas/ County	**Districts/ Unitary Authorities**
Blackburn with Darwen	Blackburn with Darwen
Blackpool	Blackpool
Cheshire	Cheshire East
	Cheshire West and Chester
Cumbria	Allerdale
	Barrow-in-Furness
	Carlisle
	Copeland
	Eden
	South Lakeland
Greater Manchester	Bolton
	Bury
	Manchester
	Oldham
	Rochdale
	Salford
	Stockport
	Tameside
	Trafford
	Wigan
Halton	Halton
Lancashire	Burnley
	Chorley
	Fylde
	Hyndburn
	Lancaster
	Pendle
	Preston
	Ribble Valley
	Rossendale
	South Ribble
	West Lancashire
	Wyre
Merseyside	Knowsley
	Liverpool
	Sefton
	St Helens
	Wirral
Warrington	Warrington

Appendix B: Seasonal Adjustment graphs

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lCopeland
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lSouthLakes
Adjusted
lCumbria
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lHalton
Adjusted
lKnowsley
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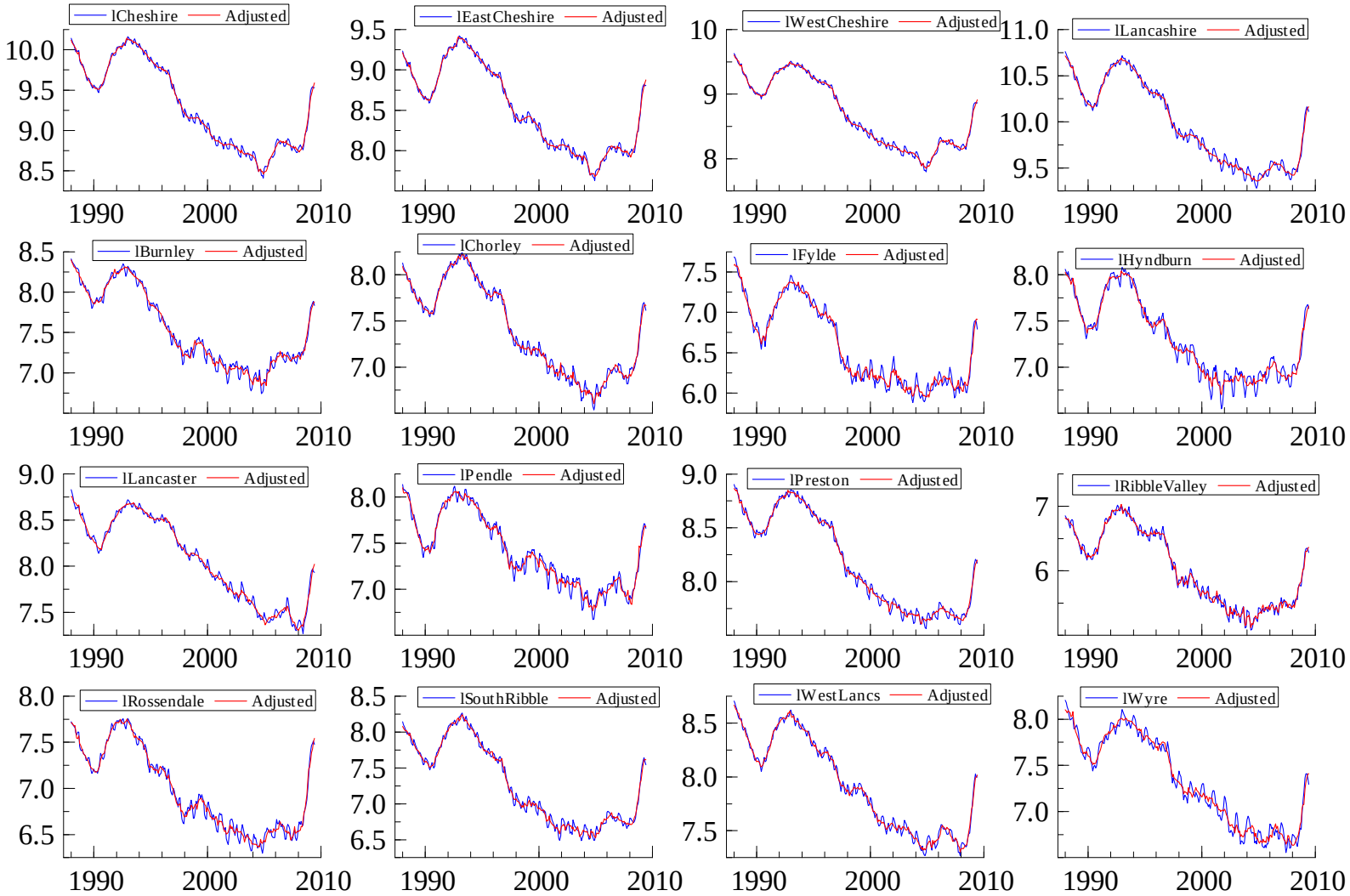
lSefton
Adjusted
lStHelens
Adjusted
lWirral
Adjusted
lLiverpool
Adjusted
lMerseyside
Adjusted
1990
2000
2010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lBurnley Adjusted
lChorley Adjusted
lFylde Adjusted
lHyndburn Adjusted
lLancaster Adjusted
lPendle Adjusted
lPreston Adjusted
lRibbleValley Adjusted
lRossendale Adjusted
lSouthRibble Adjusted
lWestLancs Adjusted
lWyre Adjusted
1990
2000
2010

Appendix C: Classical Cycle Turning point dates for North West districts

Table C.1: Cycle turning points for Greater Manchester Authorities Claimant Count for 1988m1-2009m6

Turning Point	Manchester	Salford	Stockport	Tameside	Trafford	Bolton	Bury	Oldham	Rochdale	Wigan
Peak	1990m5	1990m4	1990m5	1990m6	1990m5	1990m6	1990m5	1990m3	1990m4	1990m6
Trough	1992m12	1992m12	1992m11	1992m12	1992m12	1992m12	1993m4	1992m12	1992m12	1992m12
Peak						1998m5		1998m2		
Trough						1999m6		1999m7		
Peak	2001m9	2001m11	2002m5	2002m8			2001m1		2001m8	
Trough	2003m5	2003m2	2003m5	2003m2			2003m6		2002m10	
Peak	2005m2	2004m12	2005m1	2005m3	2004m11	2004m9	2004m11	2004m8	2004m6	2004m11
Trough	2006m9	2006m10	2007m4	2007m1	2006m10	2006m6	2006m10	2006m10	2006m6	2006m9
Peak	2008m2	2008m2	2008m1	2008m1	2007m12	2007m11	2007m8	2007m12	2007m12	2008m1

Table C.2: Cycle turning points for Cumbria Claimant Count for 1988m1-2009m6

Turning Point	Allerdale	Barrow-in-Furness	Carlisle	Copeland	Eden	South Lakeland
Peak	1990m4	1990m6	1990m6	1990m8	1990m4	1990m5
Trough	1993m9	1993m9	1992m12	1993m8	1993m5	1993m2
Peak			1995m4			
Trough			1995m10			
Peak	2004m12	2004m5	2004m7	2005m3	2005m4	2005m4
Trough	2005m12	2005m11	2005m11	2006m3	2006m9	2005m9
Peak	2007m12	2008m6	2008m2	2007m8	2007m10	2008m2

Table C.3: Cycle turning points for Cheshire and Merseyside Claimant Count for 1988m1-2009m6

Turning Point	Cheshire East	Cheshire West & Chester	Knowsley	Liverpool	Sefton	St. Helens	Wirral
Peak	1990m5	1990m6	1990m8	1990m8	1990m5	1990m7	1990m7
Trough	1992m12	1992m12	1992m6	1992m12	1992m12	1992m12	1992m12
Peak							
Trough							
Peak	2004m12	2004m12	2005m3	2004m5	2005m5	2004m12	2004m9
Trough	2006m12	2006m12	2006m6	2006m7	2006m10	2006m11	2006m10
Peak	2008m2	2008m2	2008m3	2008m1	2007m11	2007m11	2007m12

Table C.4: Cycle turning points for Lancashire Claimant Count for 1988m1-2009m6

Turning Point	Burnley	Chorley	Fylde	Hyndburn	Lancaster	Pendle	Preston	Ribble Valley	Rossendale	South Ribble	West Lancs	Wyre
Peak	1990m2	1990m5	1990m6	1989m12	1990m9	1990m6	1990m3	1989m12	1990m3	1990m6	1990m6	1990m6
Trough	1992m10	1993m4	1992m12	1992m12	1993m7	1992m12	1992m10	1992m12	1992m12	1993m4	1992m12	1993m5
Peak	1998m7		1999m3			1998m3		1995m5	1998m1		1998m3	
Trough	1998m12		1999m8			1999m6		1995m11	1999m6		1998m8	
Peak			2001m7	2001m10	2005m2					2001m11		2003m9
Trough			2002m2	2003m7	2007m1					2002m8		2004m6
Peak	2004m10	2004m11	2005m1	2004m1		2004m10	2004m7	2004m5	2004m8	2004m7	2004m9	2005m2
Trough	2006m6	2006m10	2006m7	2006m5		2007m2	2006m6		2006m6	2006m6	2006m5	2006m7
Peak	2007m5	2007m7	2008m3	2007m6	2008m1	2008m3	2008m3		2007m5	2008m2	2007m12	2008m1