What is the value of an overlapping seam?
Calendar matching in HILDA

Nicole Watson
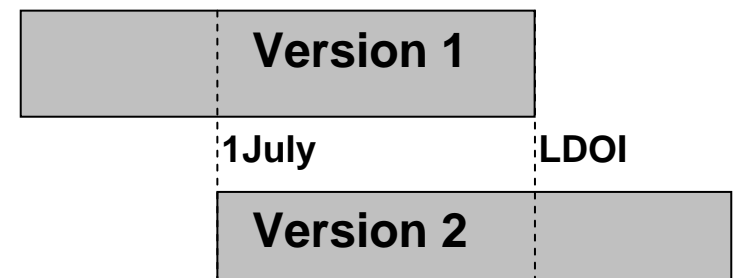
HILDA's activity calendar

- **Properties**
  - Activities: studying FT/PT, all jobs, unemployed, not in labour force
  - Start & end – no other characteristics
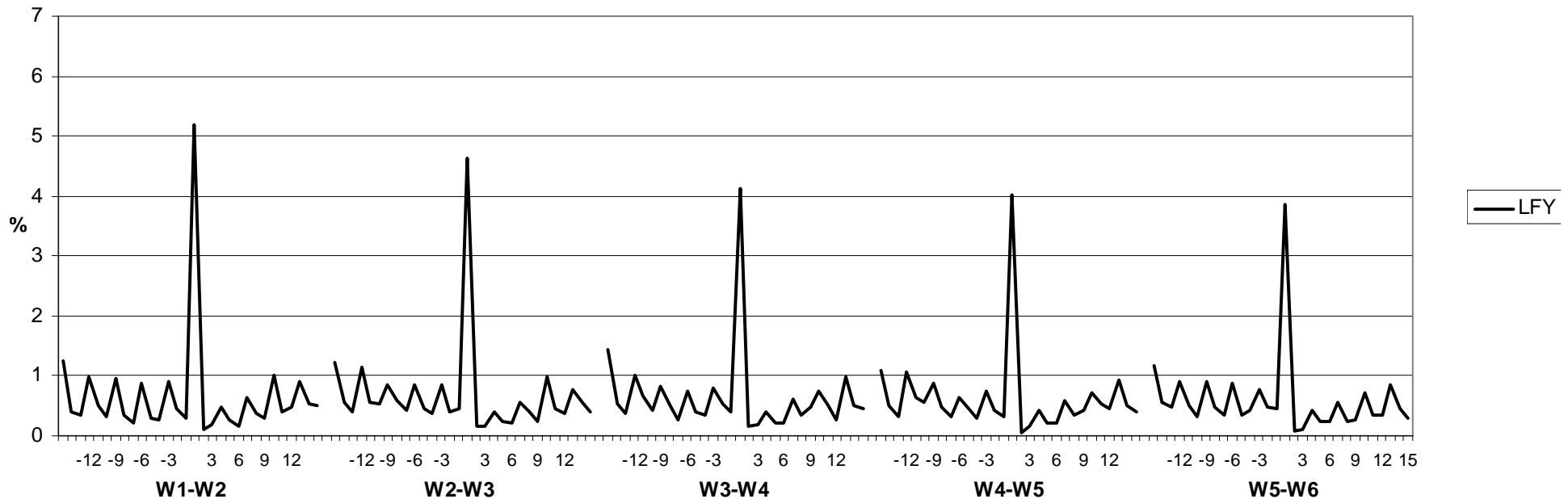 - Overlapping seam of 2-6 months
- **Matching**
  - Start of calendar
  - Last date of interview
  - Reconciled (generous matching criteria)

	Version 1	
1July		LDOI
Version 2		

Transitions – job starts centred at seam

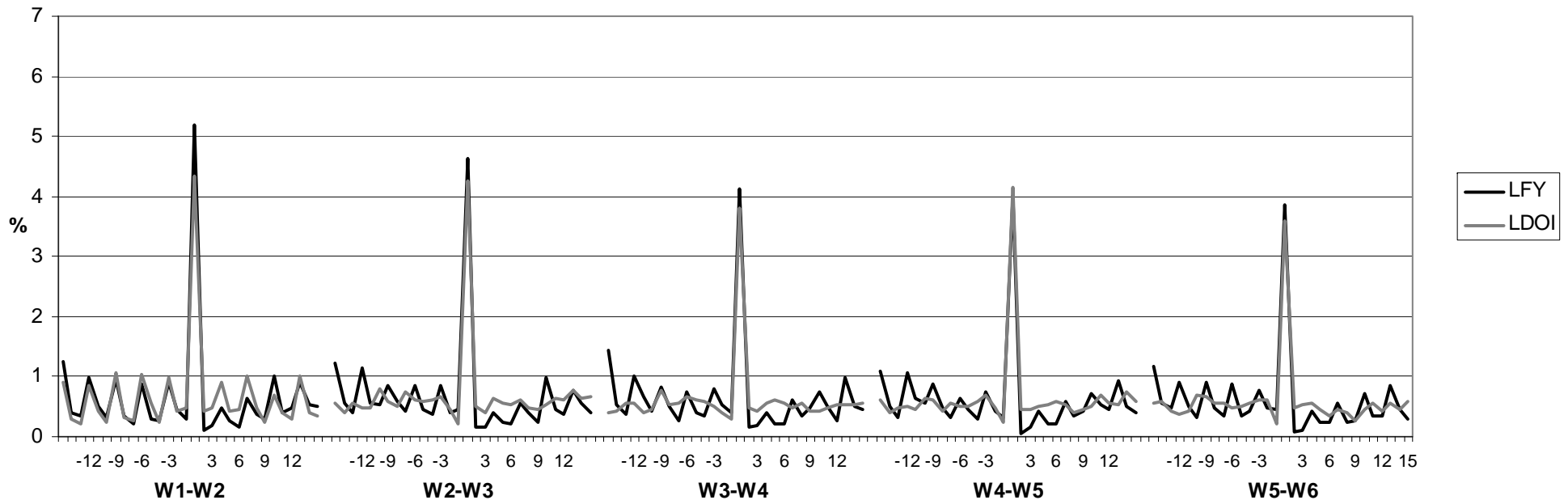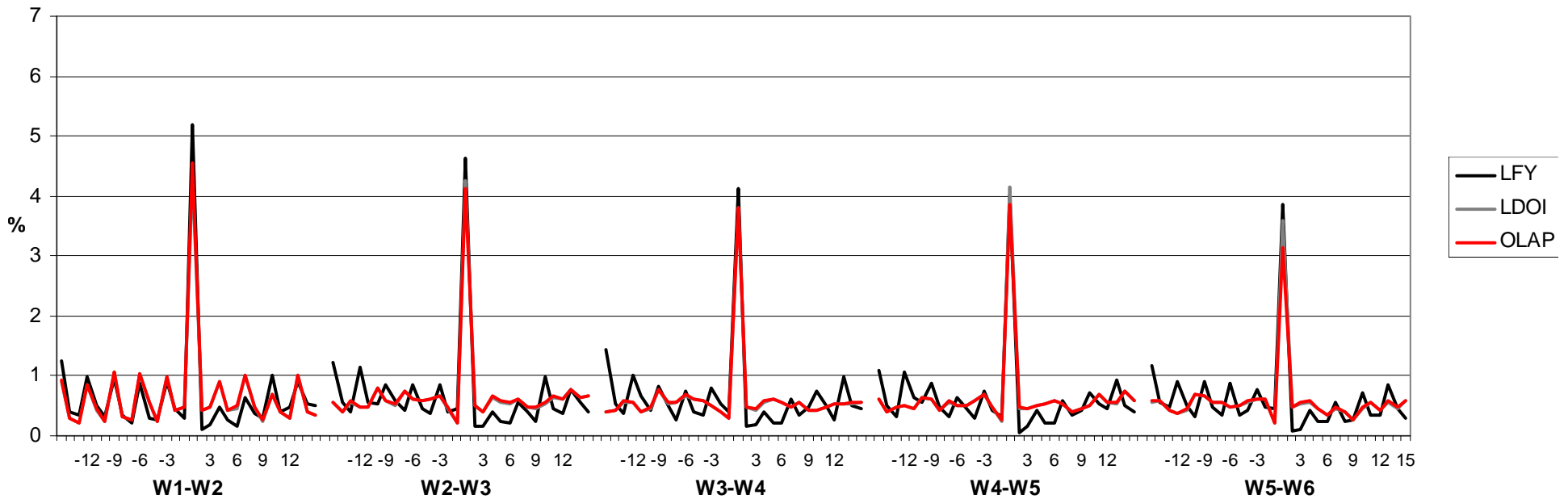**Number of job starts - centred at seam**

Transitions – job starts centred at seam

Number of job starts - centred at seam

Transitions – job starts centred at seam

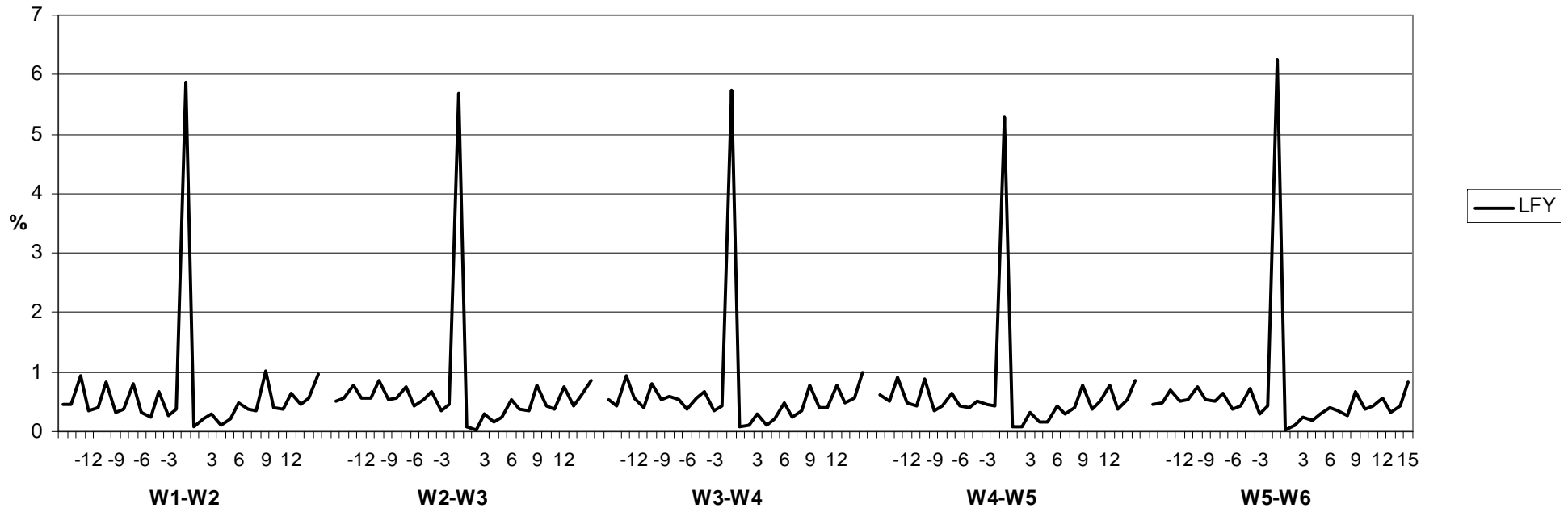Number of job starts - centred at seam

Transitions – job ends centred at seam

Number of job ends - centred at seam

Transitions – job ends centred at seam

Number of job ends - centred at seam
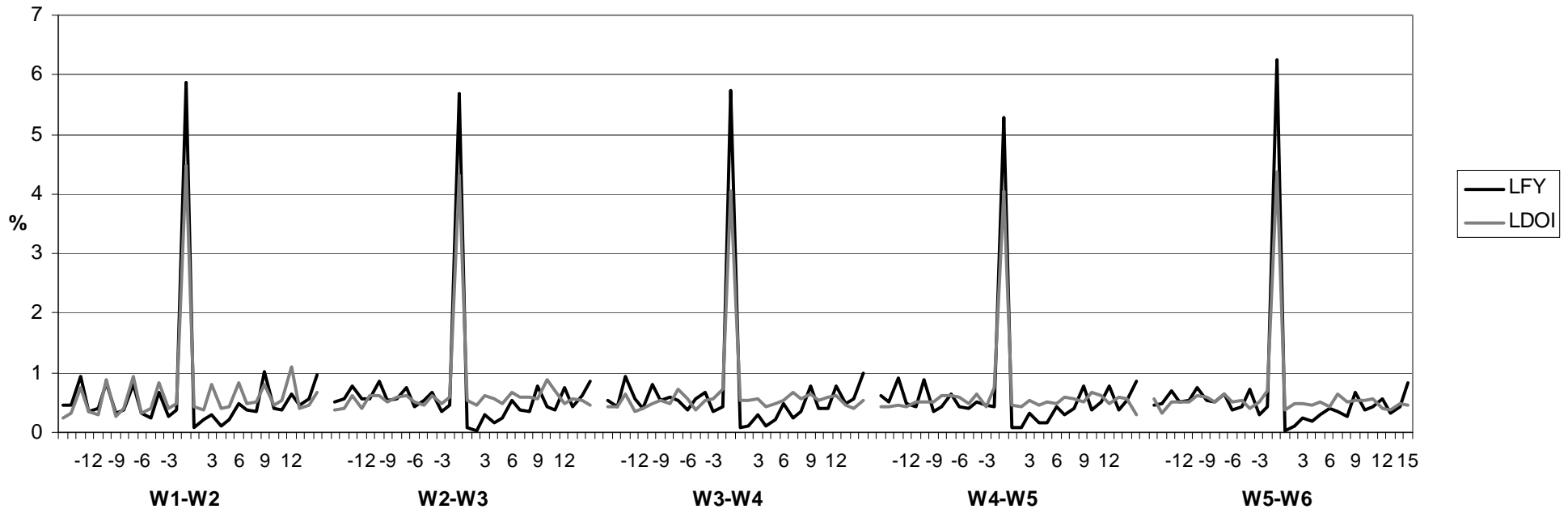
Transitions – job ends centred at seam

Number of job ends - centred at seam

Matching methods

Version 1

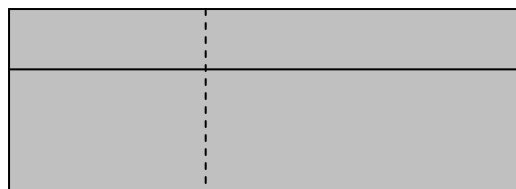**LFY method**

Version 2

1July   LDOI

LDOI method
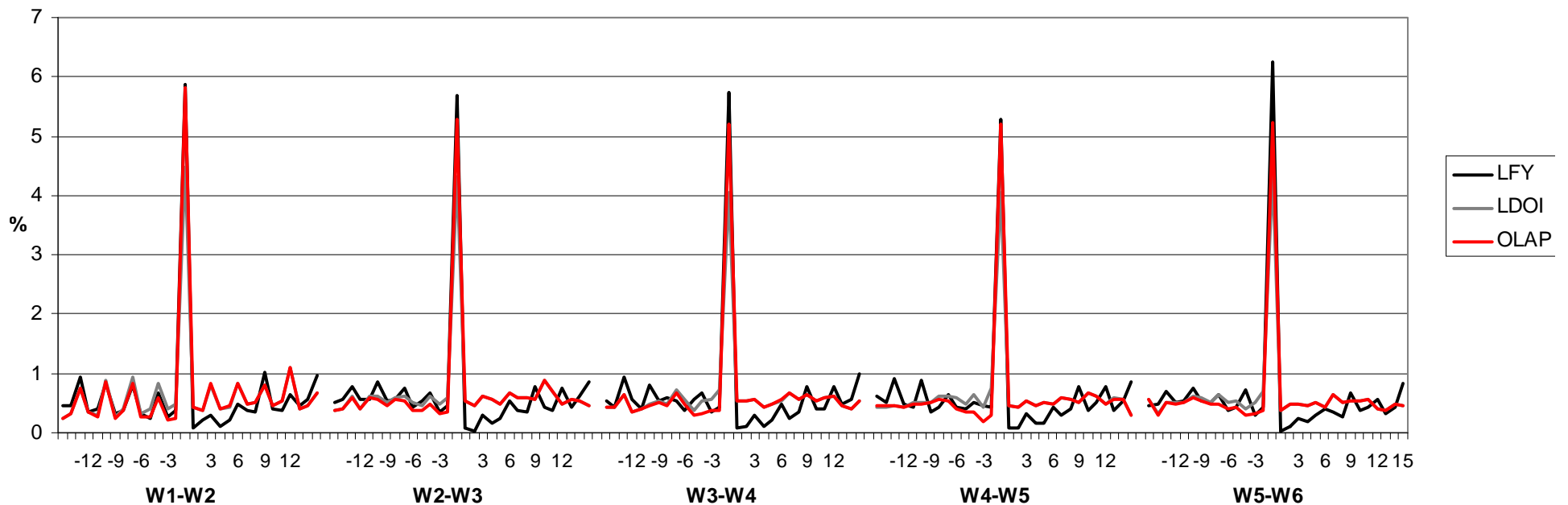
Reconciled method

Matching methods

Version 1

1July　　**LDOI**
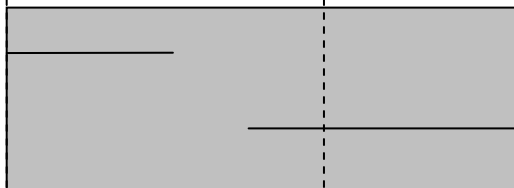
Version 2
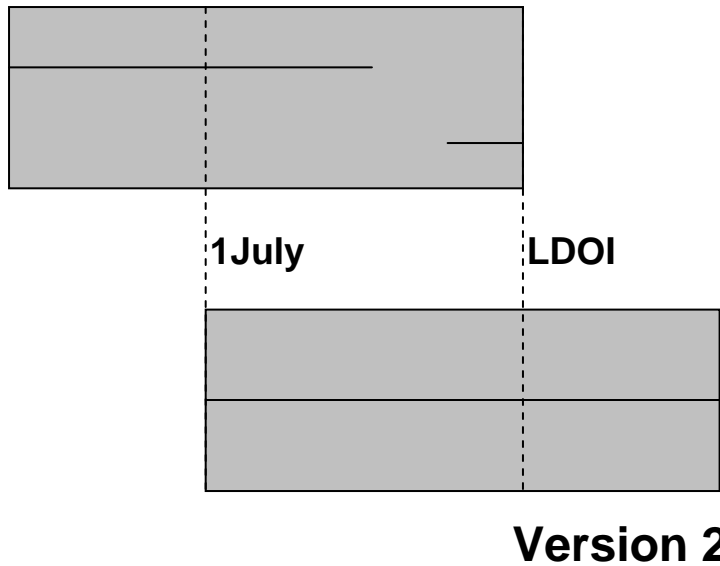
LFY method

LDOI method
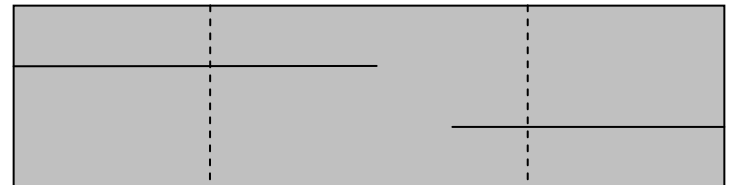
Reconciled method V1
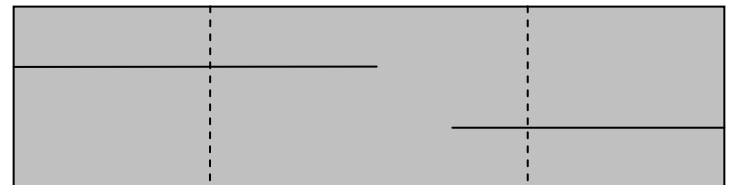
Reconciled method V2

Recall problems

	Lose	Modify	Gain		Lose	Modify	Gain
Unemp	+	-	+	F_prime	.	.	+
NLF	+	.	+	F_old	-	-	.
EdPT	+	-	+	Hed_uni	.	.	.
EdFT	+	.	+	Hed_Y12/Voc	.	.	+
Spell_len	-	-	-	Coop	-	.	.
N_spells	+	+	+	Underst	.	.	.
Olap_len	+	+	+	PQlen	+	+	+
Recall_len	+	.	+	Extrov	.	-	.
Wave	.	.	-	Agree	.	.	.
M_prime	.	.	.	Consc	.	.	.
M_old	.	-	.	Emot	.	.	.
F_young	+	.	.	Open	+	.	+

Future directions

- Recall
  - Whether the same people make the same mistakes over time
- Improve method using the overlap
  - Look at PSID matching method
- Effect of 3 methods on users
  - Summary variables
  - Transitions between labour market states
  - Duration analysis
  - Wage returns to experience/tenure (maybe)

What is the value of an overlapping seam?
Nicole Watson, University of Melbourne

Handout for Methodology of Longitudinal Surveys Workshop, 14-15 July 2008

The labour market activity calendar in the Household, Income and Labour Dynamics in Australia (HILDA) Survey has been underutilized. Motivated by a desire to provide users with a spell file that might make the data more accessible, I have embarked on the challenge of matching the calendars across waves. HILDA, like the BHPS, collects information from a fixed point in the previous calendar year to the date of interview. This results in two reports for some portion of the calendar with different recall periods (what I refer to as the 'overlapping seam'). This paper aims to establish what impact different methods of matching the HILDA calendars across waves has for users. The overlapping seam also gives us the opportunity to study recall error over time and identify whether the same people make the same mistakes over time.

Please note that this work is still in early days. Any comments or suggestions are very welcome!

The HILDA Calendar
Each wave, respondents are asked to recall the various jobs they have had, time spent in unemployment and time spent not in the labour force. In addition, spells of full-time and part-time education are also collected. Start and finish times are recorded by whether they are at the start, middle or end of each month. The calendar covers all months from 1st July of the preceding year to the date of the current interview (covering between 14 and 18 months).[1] All job spells should be included on the calendar (not just the main spell). Periods of full-time or part-time education can overlap with other types of spells. Where two or more jobs are recorded as having occurred at the very beginning of the calendar, their start dates are also collected to assist matching across waves.

The grid used to collect this spell information in the personal interview for the HILDA Survey is provided in Figure 1 (the example is from wave 6). The wave 1 calendar was slightly different and aimed to collect whether jobs were full or part time or a mixture but this was not particularly successful and was dropped in later waves.

Table 1 provides a brief comparison of the key aspects of the labour market activity calendars collected in BHPS, GSOEP, PSID and HILDA.

This analysis using the HILDA aims to follow spell matching work undertaken by other researchers on other datasets, notably Paull (2003), Maré (2006) and Halpin (1998) who use the BHPS data. While the HILDA Survey does not collect the same level of detail about the jobs (such as industry, occupation, wages, etc) that can be used to help match the job, we do collect information about concurrent jobs and jobs that occur at the same time as education activities. We also do not have any missing dates reported in the calendar (the respondents and interviewers resolve any missingness in dates by providing their 'best guess' of what happened – the design of the grid may therefore cause some inconsistencies between the two reports).

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[1] Interviews are conducted from mid August to March, with 96-98% of the interviews completed by December.

Figure 1: Labour activity calendar used in HILDA

E. Calendar

E1 I am now going to go over your work and study activities again so I can record these on a calendar.

NOTES: - Record data for the period up to, and including, time of interview.
- The 3 boxes for each month represent the start, middle and end of the month.
- Holidays should not be treated as a break in the usual activity.

a. Since July 2005, have you been enrolled in school or any course of study? IF YES: Was that full-time or part-time?

Yes .... 1 - FILL IN CALENDAR FOR ALL TIME PERIODS ENROLLED
No 2

- F/t or p/t study is determined by enrolment status (not hours).
- Only record courses or study that lead to a qualification.

b. Since July 2005, how many different jobs (employers) have you had?

No. of jobs [ ]

And what period did you work in [each / that] job? FILL IN TIME PERIOD FOR EACH JOB
- Use a new line for each new job / employer (no. of lines used must match no. of jobs).
- For periods of paid leave (e.g., long service, paid maternity leave) record as employed.
- If more than 1 job at start of calendar, record initial start dates for each job.

At any time since July 2005, have you been:

c. … not employed BUT looking for work?
Yes .... 1 - FILL IN CALENDAR AT CODE 15
No 2

d. … not employed and not looking for work?
Yes .... 1 - FILL IN CALENDAR AT CODE 16
No 2

	2005						2006											
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec

	Enrolled in school / educational course	
01	On FT basis	
02	On PT basis	
	Record start date (month and year) if more than 1 job at start of calendar.	
03	Mth: ___ Yr: ___	
04	Mth: ___ Yr: ___	
05	Mth: ___ Yr: ___	
06	Mth: ___ Yr: ___	
07	Mth: ___ Yr: ___	
08	Mth: ___ Yr: ___	
09	Mth: ___ Yr: ___	
10	Mth: ___ Yr: ___	
11	Mth: ___ Yr: ___	
12	Mth: ___ Yr: ___	
13	Mth: ___ Yr: ___	
14	Mth: ___ Yr: ___	
15	Not employed but looking for work	
16	Neither employed nor looking for work	

NOTE: THERE NEEDS TO BE A MARK AGAINST EVERY TIME PERIOD IN THE CALENDAR PRIOR TO THE DATE OF INTERVIEW

Table 1: Labour market activity calendars in BHPS, GSOEP, PSID, and HILDA

	BHPS	GSOEP	PSID	HILDA
Period covered in calendar	1 Sept of proceeding year to date of interview	12 months in proceeding year	1 Jan two years prior to date of interview	1 July of proceeding year to date of interview
Fieldwork period	Sept-Dec (most waves)	?	March-Nov	Aug-March (96-98% completed by Dec)
Overlap in spells recalled	1 to 9 months (median 2 months)	None	3 to 11 months (median ? months)	2 to 6 months (median 2.7 months)
Activity recorded at each time point	Main only	Multiple categories. Some allowance for multiple jobs.	Main and others	Main and others
Level of detail in start and end dates	Exact date, but most analysis collapses this to month	Month	Month and third of month	Month and third of month
Type of instrument	List of questions going back in time from current spell	Grid of activities which can be completed forwards or backwards	Event history calendar (using other significant events to help recall) See Belli et al (2001).	Grid of activities which can be completed forwards or backwards.
Details collected about the spells	Industry, occupation, wage, etc.	None	Industry, occupation, type and size of company, wage, hours, etc	None
Questionnaire	Pages 86-96 of the 2006 Individual Questionnaire[2]	Page 23 of the 2008 Individual Questionnaire[3]	Pages 7-17 of the 2007 Questionnaire[4]	Page 17 of the 2006 Continuing Person Questionnaire and Page 21 of the 2006 New Person Questionnaire[5]

[2] http://www.iser.essex.ac.uk/ulsc/bhps/doc/pdf_versions/questionnaires/bhpsw16q.pdf.
[3] http://www.diw.de/documents/dokumentenarchiv/17/85645/personen_2008_en.pdf.
[4] ftp://ftp.isr.umich.edu/pub/src/psid/questionnaires/q2007.pdf.
[5] http://www.melbourneinstitute.com/hilda/qaires/ContinuingPersonQuestionnaireW6.pdf and
http://www.melbourneinstitute.com/hilda/qaires/NewPersonQuestionnaireW6.pdf.

The following table provides some more information on the overlap in the HILDA calendar data for people interviewed all 6 waves. Each person contributes five overlapping seams. The length of the overlap ranges from 1 months to 6 months, with the average being 2.9 months.

Table 2: Overlap in the HILDA activity calendar

Thirds of month	Frequency	Percent
3 (1 month)	105	0.24
4-6 (2 months)	7,887	17.8
7-9 (3 months)	23,590	53.2
10-12 (4 months)	9,237	20.8
13-15 (5 months)	2,713	6.1
16-18 (6 months)	787	1.8
Total	44,319	
Mean	2.9 months	
Median	2.7 months	

Matching Methods

To investigate the value of the overlapping seam, three matching methods are evaluated using the first 6 waves of the HILDA data:

i) Match the jobs at 1st July (allowing for the maximum recall errors to be seen);

ii) Match the jobs at the date of last interview (giving precedence to the information collected closest to the period being recalled);

iii) Reconcile spell reports between the two versions of events reported approximately one year apart.

In the first two matching methods, the alternative version of spells reported for the same period is ignored. Where multiple spells from one wave could be matched to one spell in another, a match was randomly chosen.[6] Spells are matched within each type of spell (being full-time education, part-time education, job, unemployment, and not in the labour force). Multiple jobs can be recorded for the same period.

The third matching method seeks to use the two reports to produce a reconciled view of the overlapping period. The first version of events (recalled closest to the period when they occurred) is taken in precedence over the second. However, spells recorded in the second version of events are matched with those in the first to identify (and remove) inconsistent reports that result in a job spell being misplaced. The second report is assumed to be incorrect (as it occurs further away from the period when the spell occurred). This method cannot resolve any situation where a spell in the first version is failed to be recalled in the second version of events or visa versa. Spells are matched within

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[6] Note we could have chosen the longest spell to match on the assumption that this would have been the most memorable for the respondent. This could bias the duration of the spells upwards. The chosen approach could bias the duration of the spells downwards.

each type of spell. A match score is created to help identify which spells should be matched to which. The specification[7] score is the sum of:

  i) 1 if the start of the spell match within the overlapping seam;
  ii) 1 if the end of the spell matches within the overlapping seam;
  iii) 3 times the ratio of the length of the spells (with the longest in the denominator).

Spells with the highest match score are matched first. The remaining spells are then matched in the same way until no more spells can be matched. Spells with a match score of less than 1.3 are not matched (for example a spell of 1/3 of a month in July could not be matched to one in the second version of events to one occurring for all of August).

Initial Results

Figure 2 shows the (unweighted) number of job starts and ends for those interviewed in each of the first six waves of the HILDA Survey. Some observations about these graph of job starts:

- The black line shows the number of job starts when the spells are matched at the start of July (method 1 [LFY]). The red line shows the results for when the spells are matched at the date of last interview (method 2 [LDOI]) and the barely visible grey line is when the spells are reconciled (this method 3 [OLAP] behaves very much like method 2).

- Respondents tend to report fewer job starts and job ends at the beginning of the calendar (this can be seen in the results for method 1 (black line) between July and October each year. Perhaps this has to do with better recall of events that have occurred in the current calendar year but not in the previous calendar year. When spells for this period are taken from the respondent's first report of the events, this difference is eliminated (this can be seen in July and early August before the effect of the seam at the last date of interview occurs in mid August to December figures).

- Respondents tend to report jobs that start at the beginning of a month and end at the end of the month, resulting in a spike in the graph each month. While there might be a real effect for jobs to start and finish in this way, it is probably accentuated by recall error. Note that this tendency seems to be become less in the later waves.

- More job starts seem to occur at the start of July and January than other months and end at the end of June and December. Again, this might be a real effect, particularly for people working on contracts. (The June/July effect can be seen in the results for method 2 and 3 as it is obscured in method 1 by the seam effect.)

- There is also more heaping of job starts and ends for method 2 and 3 at the end of wave 1 (around August to November 2001) due to instructions given to the interviewers in wave 1 to record activities up until the end of the month prior to the date of the interview.

- The seam effect is most obvious for method 1 (occurring at the beginning of July), but the seam for methods 2 and 3 are spread over the interview periods. It is not clear from these graphs whether the seam effect for method 2 and 3 is actually less than method 1.

- The differences between methods 2 and 3 are very minor. The additional work in attempting to reconcile the first and second reports appears to have little effect. This reconciliation will only

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[7] I could look at different specifications of the match score to see whether this makes any difference, but I have not done this as yet.

affect spells that appear to have been misdated, which suggests that unreported in one version of events is the major contributor to the seam effect rather than misdated spells.

To help identify whether methods 2 or 3 reduce the effect of the seam (or just disguise it by spreading it across the interview period), Figure 3 centres the count of job starts and ends at the seam. The counts of job starts and ends for each method at the seam are reported in Table 3. Some observations from these graphs and the table:

- o Method 2 has more job starts at the seam than Method 1 (this is because there are more jobs reported later in the calendar than earlier). Method 3 has fewer job starts than Method 2 because it has attempted to reconcile jobs that are in the commonly reported period and brings forward some jobs into this period that have been misplaced.

- o In terms of job ends, Method 3 has the most placed at the seam. There is a corresponding decline in job ends in the period just prior to the seam in Method 3 compared to 2. (This seems odd and needs some more investigation.)

Figure 2: Number of job starts and job ends, July 2000 to June 2006
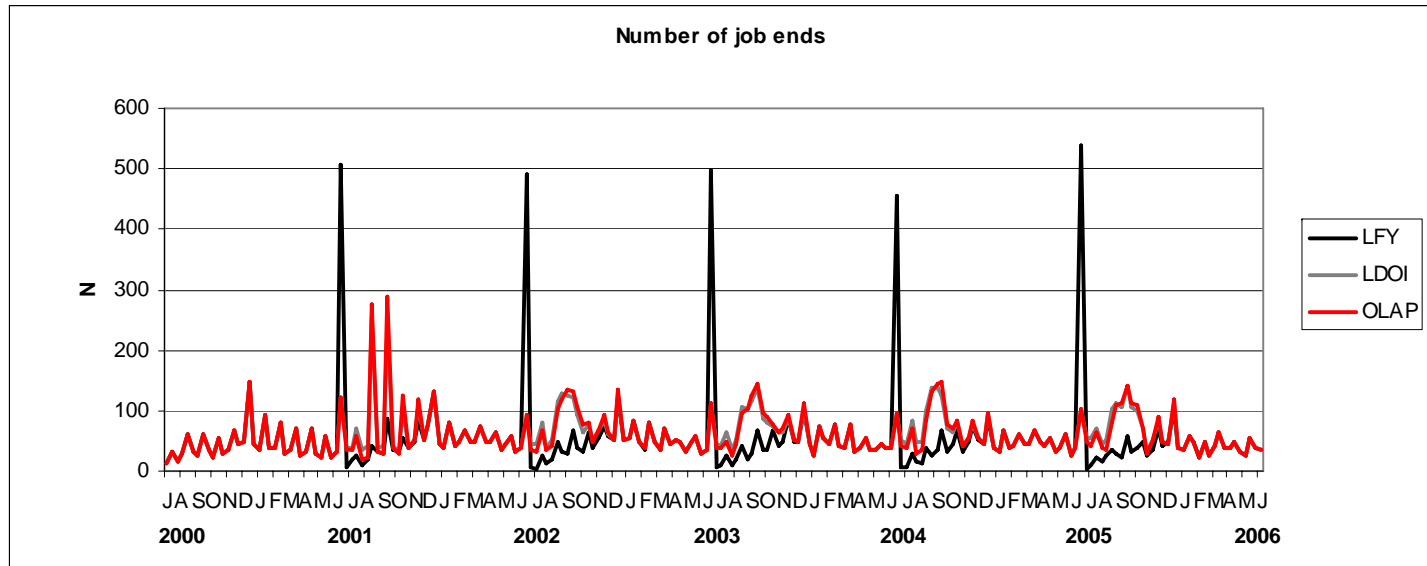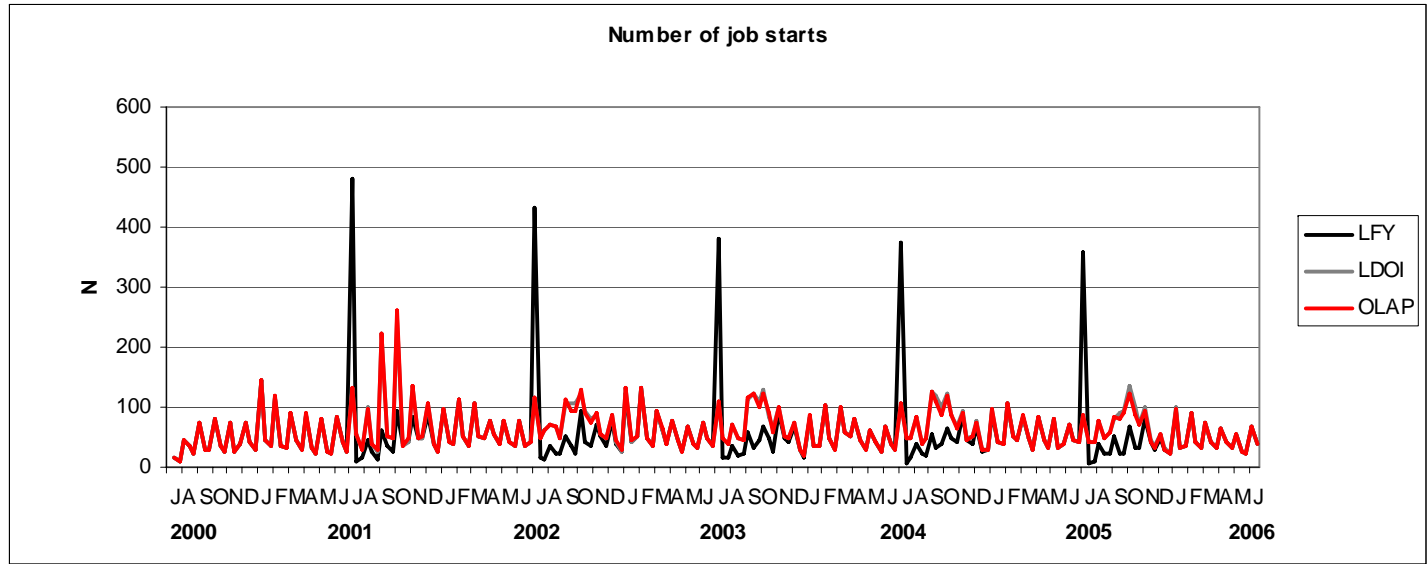
Figure 2: Number of job starts and job ends, centred at seam between each wave
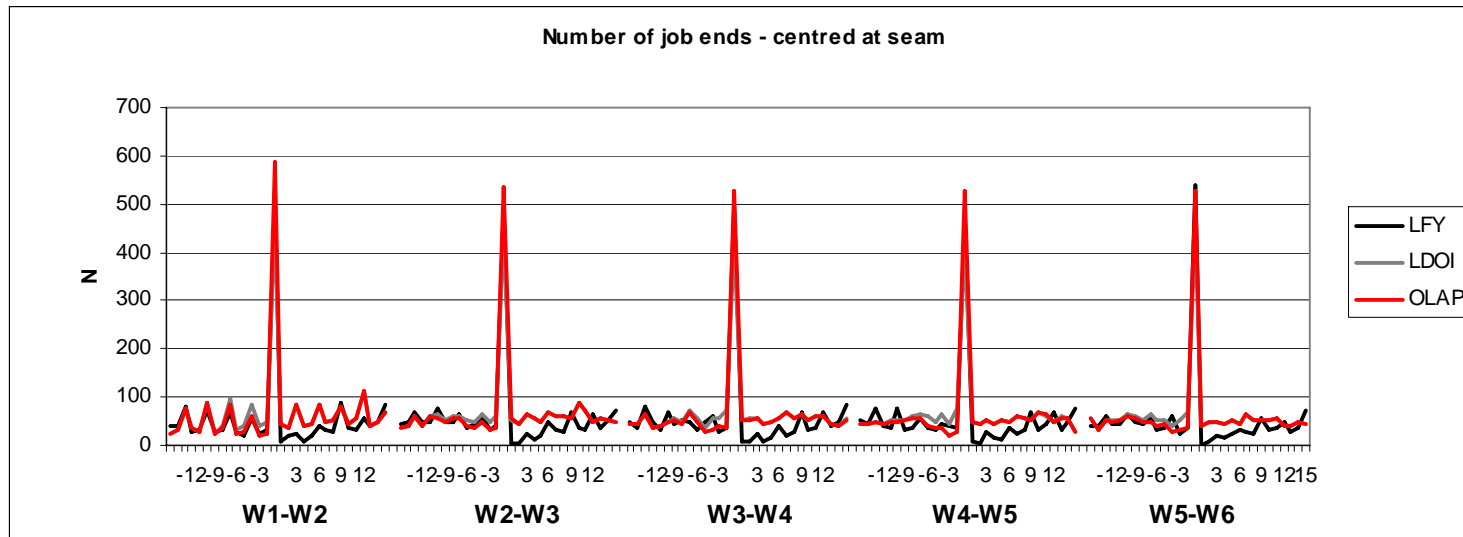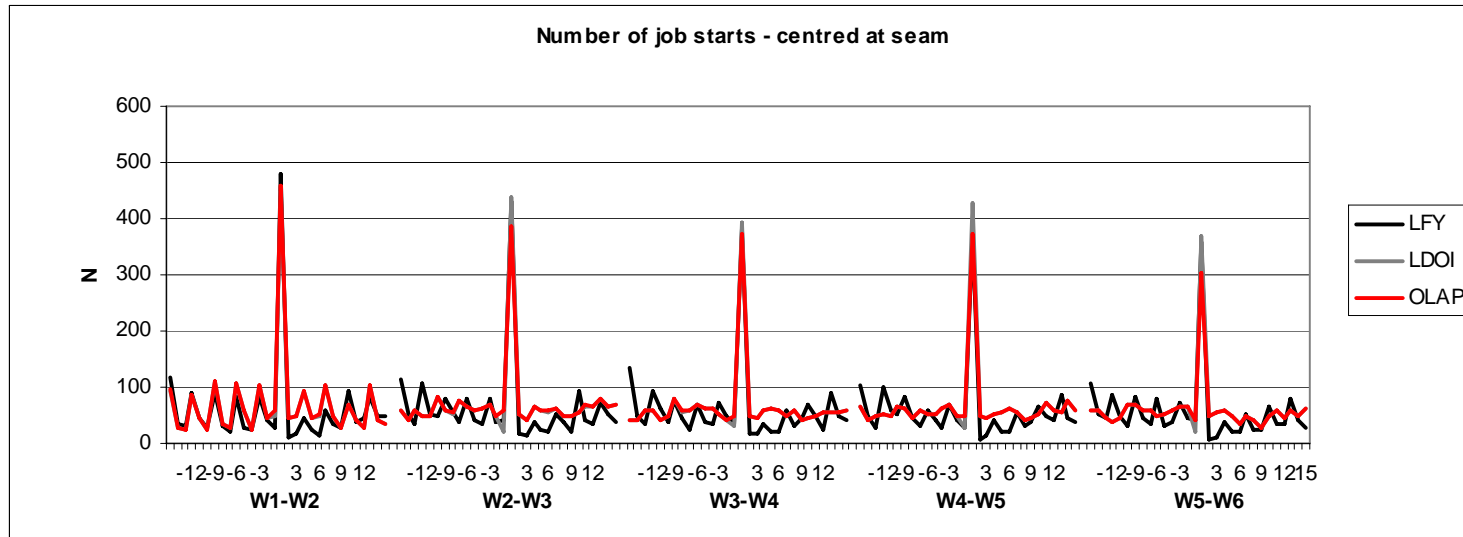
Table 3: Number of job starts and ends at the seam, by wave and method

	start			end		
	Method 1: LFY	Method 2: LDOI	Method 3: OLAP	Method 1: LFY	Method 2: LDOI	Method 3: OLAP
W1-W2 seam	481	448	459	508	457	589
W2-W3 seam	431	438	386	492	440	536
W3-W4 seam	382	393	371	496	413	527
W4-W5 seam	374	429	372	457	412	526
W5-W6 seam	358	370	302	540	446	529
Total	2026	2078	1890	2493	2168	2707

Future Directions

Using the structure proposed by Jäckle (2008) for the causes of errors in dating events, I intend to model the likelihood that a respondent would:

- o report a spell in the first version of events and not in the second;
- o report a spell in the second version of events and not in the first; and
- o misplace a spell in the second version of events compared to the first.

The characteristics considered for inclusion into the model include:

- o length of the spell;
- o type of spell;
- o duration of the overlapping seam;
- o characteristics of the respondent that may affect their recall ability, such as age, sex, eduation, personality, complexity of their situation (estimated by the number of spells in the seam in the first version of events);
- o characteristics of the interview that may affect the respondent's recall, such at the interviewer's experience, respondent's co-operation, interview length.

It will also be interesting to see whether the same respondents make the same mistakes over time.

I also need to do some more work on method 3 to refine the match score and ensure I am not creating more spells that end at the seam than there should be.

Following Paull (2002), I intend to test what effect the three methods have in practice for the users. I plan to look at:

- o derived variables for the combined time spent in employment, unemployment, and not in the labour force;
- o transition between labour market states;
- o survival models for spells of labour market activity;
- o wage returns to experience and tenure (possibly – the history prior to wave 1 in HILDA is reasonably crude).

References

Belli, R.F., Shay, W.L., and Stafford, F.P. (2001), 'Event History Calendars and Question List Surveys', *Public Opinion Quarterly*, Vol. 65, pp. 45-74.

Halpin, B. (1998), 'Unified BHPS Work-Life Histories: Combining Multiple Sources into a User-Friendly Format', *Bulletin de Méthodologie Sociologique*, No. 60, pp. 34-79.

Jäckle, A. (2008), 'The Causes of Seam Effects in Panel Surveys', Institute for Social and Economic Research Working Paper Series, No. 2008-14.

Mare, D. (2006), 'Constructing Consistent Work-life Histories: A guide for users of the British Household Panel Survey', ISER Working Paper Series, No. 2006-39.

Paull, G. (2002), 'Biases in the Reporting of Labour Market Dynamics', The Institute for Fiscal Studies Working Paper Series, No. 02/10.