



Centre of Full Employment and Equity

Working Paper No. 05-13

The dynamics of job creation and destruction in Australia

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November 2005

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1. Introduction

Several studies reveal that labour markets in countries like Australia are in a constant state of flux (for example, U.S. studies by Blanchard and Diamond, 1990; Davis and Haltiwanger, 1990, 1992; Ritter, 1993, 1994; Davis, Haltiwanger and Schuh, 1996; U.K. studies by Konings, 1995; Blanchflower and Burgess, 1996; and Australian work by Borland, 1996; Mumford and Smith, 2003). Specific jobs are continually created and destroyed as firms expand, adjust to changing labour force characteristics, restructure, contract or close. This process of job creation and destruction (JC&D) is mirrored by movements of workers between labour force states. Analysis of employment dynamics using macroeconomic data typically focuses on measures of net employment changes over time. However, this aggregate focus prevents an understanding of flows noted above (numbers of jobs created and destroyed and movements of workers across labour force categories).

This paper is the first in a series, which explores the cyclical nature and determinants of job dynamics in Australia, and concentrates on two views of these dynamic processes: (a) employment flows by broad industry sector (goods production; wholesale and retail; and other services); and (b) employment flows by full- and part-time status.

Most authors to date use manufacturing data to compute measures of JC&D to study their evolution across the business cycle. The U.S. evidence indicates that gross job flows are both highly cyclical and asymmetric. Job destruction increases sharply during recessions, while job creation is less volatile and varies both counter- and pro-cyclically (Davis and Haltiwanger, 1992). Borland's (1996) Australian study focuses on job creation and job destruction in Manufacturing. Borland finds that JC&D occurs simultaneously in disaggregated sectors. Moreover, those sectors experiencing high rates of job creation also have higher rates of job destruction. Job creation varies pro-cyclically with changes in net employment while job destruction varies counter-cyclically, with the latter marked by relatively greater cyclical sensitivity. The persistence of JC&D also displays strong cyclical patterns (see Mitchell, 2001).

However, with manufacturing employment declining in absolute and relative importance and most new jobs being created in the service sector, it is important to pitch a study at the sectoral level so that economy-wide trends can be decomposed to reveal what might otherwise be offsetting processes of JC&D occurring within individual industries. Ritter (1994) shows the benefits of industry disaggregation for the US. He concludes that patterns within manufacturing and other goods-producing industries contribute disproportionately to changes in overall JC&D, especially during recessions. Moreover, cyclical asymmetries between JC&D in the goods-producing sector do not carry over to other sectors. Finally, he observes that job creation and job destruction fell notably during the early 1990s recession in the US.

A further consideration, not reflected in previous work, relates to the dramatic changes labour markets have undergone over the last 25 years (see Mitchell, Muysken and Welters, 2005). In Australia, part-time jobs now constitute the majority of new (net) employment, while full-time job opportunities declined substantially over the 1990s (although 1,009.8 thousand full-time jobs and 668.6 thousand part-time jobs were created between December 1979 and December 1989, in the following decade the net change in

full-time employment amounted to 388.4 thousand with 668.9 thousand part-time jobs created net, a process that continued apace over the next five years). This trend towards increasingly fractionalised employment has eroded career opportunities for increasing numbers of Australian workers (see Mitchell, Muysken and Welters, 2005), creating a dualistic labour market structure (DeBelle and Swan, 1998; Song and Webster, 2003). The quality of the work experience has also deteriorated given the characteristics of many part-time 'non-standard' jobs – precarious tenure, low pay, non-standard working hours (Borland, Gregory and Sheehan, 2001).

We aim to investigate whether the relative increase in the importance of part-time work has changed the processes of JC&D. To this end we exploit survey data on employment, which extends from 1983 to 2001, thus including two recessions. The data also allows for decompositions of sectoral rates of job creation and destruction into both part-time and full-time employment. We reveal that it is this differential responsiveness of part-time and full-time employment to the movement of GDP over the business cycle - the sensitivity is captured by measures of asymmetry and persistence - which dominates as an influence over both sectoral and aggregate patterns of job creation and destruction.

The paper is organised as follows. Section 2 defines the gross job flow measures to be used. Section 3 examines the behaviour of full-time and part-time employment over the business cycle as motivation for the more detailed sectoral breakdown in Section 4 and full- and part-time analysis in Section 5. Stylised facts are presented in both Sections 4 and 5 and regressions exploring the cyclical sensitivity of job creation and destruction are reported. Section 6 investigates the persistence of job creation and destruction across sectors and by full-time and part-time status. Concluding remarks follow.

2. Data issues and gross labour flow measures

2.1 Data sources

We use the ABS Survey of Employment and Earnings (SEE), which provides quarterly industry employment data from August 1983, although the private sector was dropped from the survey after December 2001. Total employment is public plus private in this paper. Though collected from establishments, only industry employment totals are available, but additional breakdowns include the type of employment, firm size, gender, public/private, and state at various ANZSIC levels. The SEE data offers some advantages over other establishment data (such as the manufacturing survey used in Borland, 1996) because it is quarterly so that the netting out problem, which arises when dynamic behaviour hidden by net changes, is less severe relative to annual data. Moreover, the longer time series spans two clear business cycles permitting the analysis of the cyclical variations in job flow.

The most disaggregated level of breakdown available over the longest period is at 2-digit ANZSIC (data for 53 industries) level. We use this data to group industry employment into three broad sectors (see Ritter, 1994): (a) a goods-producing sector (G) comprising Manufacturing, Construction and Mining; (b) a wholesale and retail trade sector (T); and (c) an other services sector (R) comprising Transport; Electricity, Gas and Water; Communications; Finance and Insurance; Property and Business Services; Accommodation, Café and Restaurants; Education; Cultural and Recreational Services;

and Personal and Other Services (excluding Private households employing staff which was unavailable). The SEE data also allows a full-time/part-time split for two-digit industry employment data to be computed.

2.2 Measuring gross job creation and destruction

The analysis in this paper is based on the widely used job creation rate (*JCR*) and job destruction rate (*JDR*) measures introduced by Davis and Haltiwanger (1990, 1992). Davis and Haltiwanger (1992: 827-8) calculate “gross job creation by summing the employment gains at expanding and new establishments within a sector. Similarly, we calculate gross job destruction by summing employment losses at shrinking and dying establishments within a sector.” These job flows are converted to rates by dividing by sector size.

The size of sector *i* is defined as average employment in sector *i* at time *t* and *t*-1:

$$(1) \quad \bar{E}_{it} = 0.5(E_{it} + E_{it-1})$$

where E_{it} is sector *i* employment at time *t*. Total employment in all sectors at time *t* is E_t .

The rate of employment growth in sector *i* at time *t* (g_{it}) is defined as:

$$(2) \quad g_{it} = \frac{E_{it} - E_{it-1}}{E_{it}} = \frac{\Delta E_{it}}{E_{it}}$$

Gross job creation and destruction rates over any subset of sectors within an industry can be calculated from this growth rate. Thus for sector *s*:

$$(3) \quad JCR_{st} = \sum_{i \in I} \left(\frac{\bar{E}_{it}}{\bar{E}_{st}} \right) g_{it} \quad g_{it} > 0$$

$$JDR_{st} = \sum_{i \in I} \left(\frac{\bar{E}_{it}}{\bar{E}_{st}} \right) |g_{it}| \quad g_{it} < 0$$

where I_s is the set of sectors in group *s*, and \bar{E}_{st} is average employment in all sectors in group *s* in periods *t* and *t*+1. Aggregate gross job flow measures are then computed by summing over all sectors in an industry (or over industries).

The total job reallocation rate is defined as the sum of the JCR_t and JDR_t , such that:

$$(4) \quad JRA_t = JCR_t + JDR_t$$

We also define net employment growth, NET_t as the difference between JCD_t and JDR_t .

2.3 Data anomalies

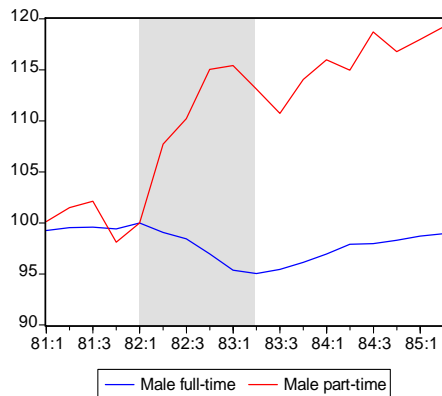
For industry employment analysis, the SEE industry-level data is superior to the LFS due to the application of objective measures rather than respondent descriptions of each industry. However, the SEE data revealed a marked increase in both the level and volatility of JC&D over the mid-1990s, which happened to coincide with a major overhaul of the data to correct for various deficiencies, including the coverage of small businesses. While 1- and 2-digit industry data was back revised, 3- and 4-digit industry

data was not. A comparison was made of changes in aggregate employment between the LFS and SEE data over the relevant sample period to confirm that these level changes were reflected in economic behaviour rather than being a statistical artefact. We also made modifications to levels of full-time and part-time employment in at least 11 industry sectors to remove specific spikes that were obvious anomalies. A full list of modifications is available from the authors.

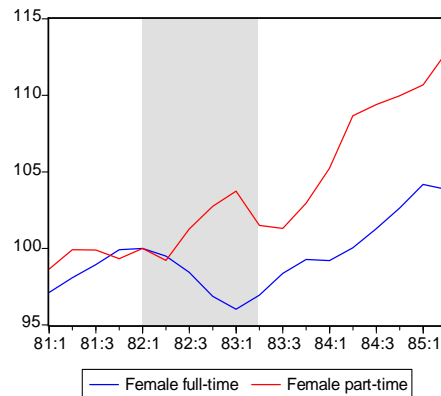
3. Cyclical swings in full-time and part-time employment

By way of motivation, Figure 1 depicts ‘butterfly’ plots which trace movements in full-time and part-time employment in Australia for males and females over the 1982 and 1991 recessions. The plots begin 4-quarters before the peaks in GDP activity, then trace the behaviour from peak to trough and then 8-quarters following the trough (dating is explained in Mitchell, 2001). The shaded areas indicate the period between peak and trough in each cycle. The employment series are index numbers with the base coinciding with the peak GDP quarter.

Figure 1 Full-time and part-time employment for males and females over 3 recessions



(a) Males 1981:1 to 1985:2



(b) Females 1981:1 to 1985:2



(c) Males 1989:4 1993:3



(d) Females 1989:4 1993:3

Note: see Mitchell (2001) for an explanation of the shaded areas.

Several points are worth noting. First, during recessions a marked switch from full-time work to part-time work for both males and females occurs resulting in a greater proportion of workers in short-duration jobs. This is accentuated for males. In the period immediately prior to each of the two peaks the full-time/part-time ratio is relatively stable for males and females. During the recession and subsequent recovery, the ratio rises rapidly before stabilising at the higher level with the underlying trend towards increased part-time work then reasserting itself.

Second, male employment adjustments begin with part-time work increasing rapidly in the last quarter of the expansion and accompanied by a slowing, then substantial decline in full-time employment. The pattern is repeated in the 1991 recession. For females, the slowdown in part-time employment growth in late 1981 leads the decline in full-time work. Both pre-date the contraction.

Third, full-time employment declines almost lockstep with the turn in GDP and persists before weak recovery begins. Part-time work, however, continues to increase as GDP moves from peak to trough, until it also succumbs to the effects of demand deficiency. In the recovery phase, the economy initially generates strong growth in part-time work.

Fourth, although recessions have been likened to ‘taking a pitstop’ so that managers can streamline business processes, declining productivity during recessions seems to contradict this interpretation (Perry, 1990). Employment also recovers very slowly following the trough. Perry (1990: 153) says that “If the amount of job creation and destruction is relatively constant in the temporary jobs, then the destruction is taking place in the long-duration jobs. This view provides a harsher picture of what happens during a recession than one would get if the change in job composition were ignored.”

4. Sectoral job dynamics – is manufacturing representative?

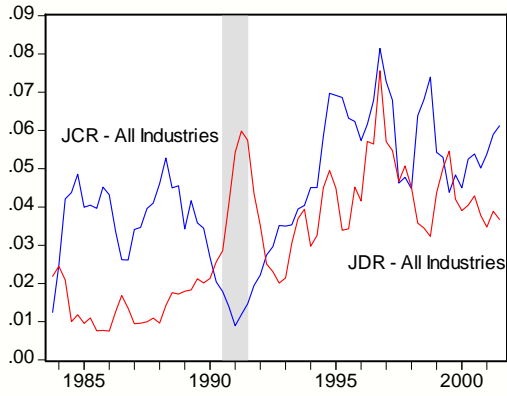
Using these findings as motivation, we now seek to more fully understand the dynamics of JC&D at the sectoral level.

4.1 Job creation and destruction by sector – graphical evidence

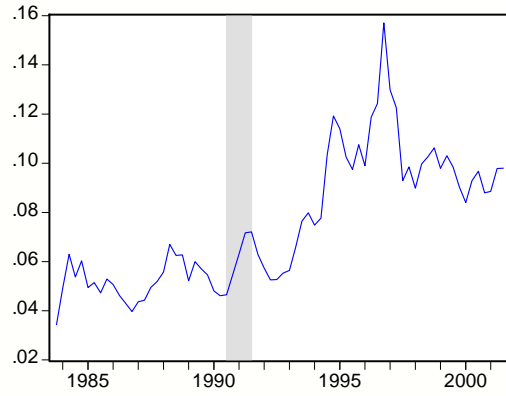
Ritter (1993) found that manufacturing job flows dominate the counter-cyclical nature of job reallocation in the U.S. To examine whether there are sectoral differences in gross job flows across broad sectors in Australia, we aggregated 2-digit industry employment data into three broad sectors (goods-producing, wholesale and retail trade and the remaining services) to compute the *JCR* and *JDR* measures. We seek to determine whether the growing importance of service sector employment has altered the nature of employment flows. The demarcation has economic meaning because wholesale and retail trade is likely to be more closely related to goods-production (via inventory cycles) than other services and exhibit gross flow dynamics similar to manufacturing.

Figure 2 (panel a) shows the All Industries *JCR* and *JDR* measures from 1983 to 2001 (included the shaded 1991 recession). Job creation dominated the 1980s growth period although it began falling long before GDP peaked (start of shading). The *JDR* rose sharply during the recession and continued rising throughout the trough. However, consistent with the evidence in Figure 1, the *JCR* began its recovery mid-recession.

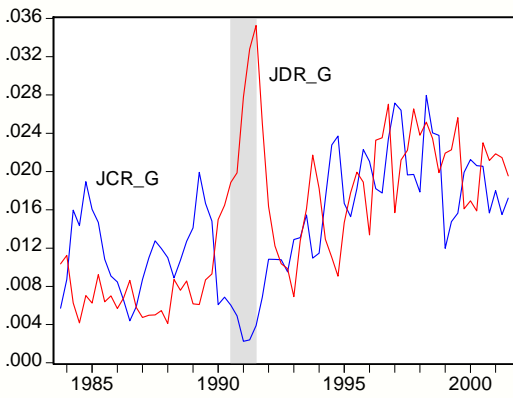
Figure 2 Job creation and destruction rates, various industry sectors, 1983-2001



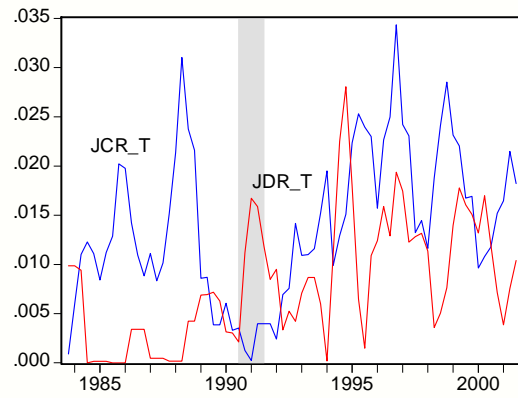
(a) JCR and JDR, All Industries



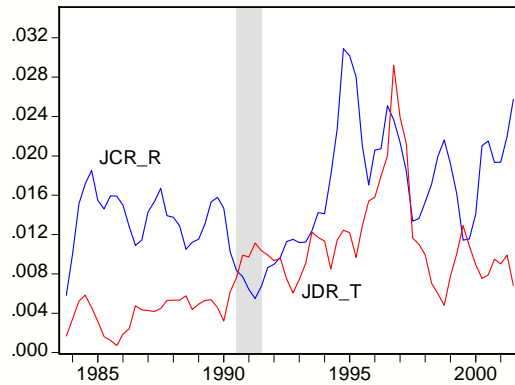
(b) Job reallocation rate, All Industries



(c) Goods producing sector (G)



(d) Wholesale and Retail sector (T)



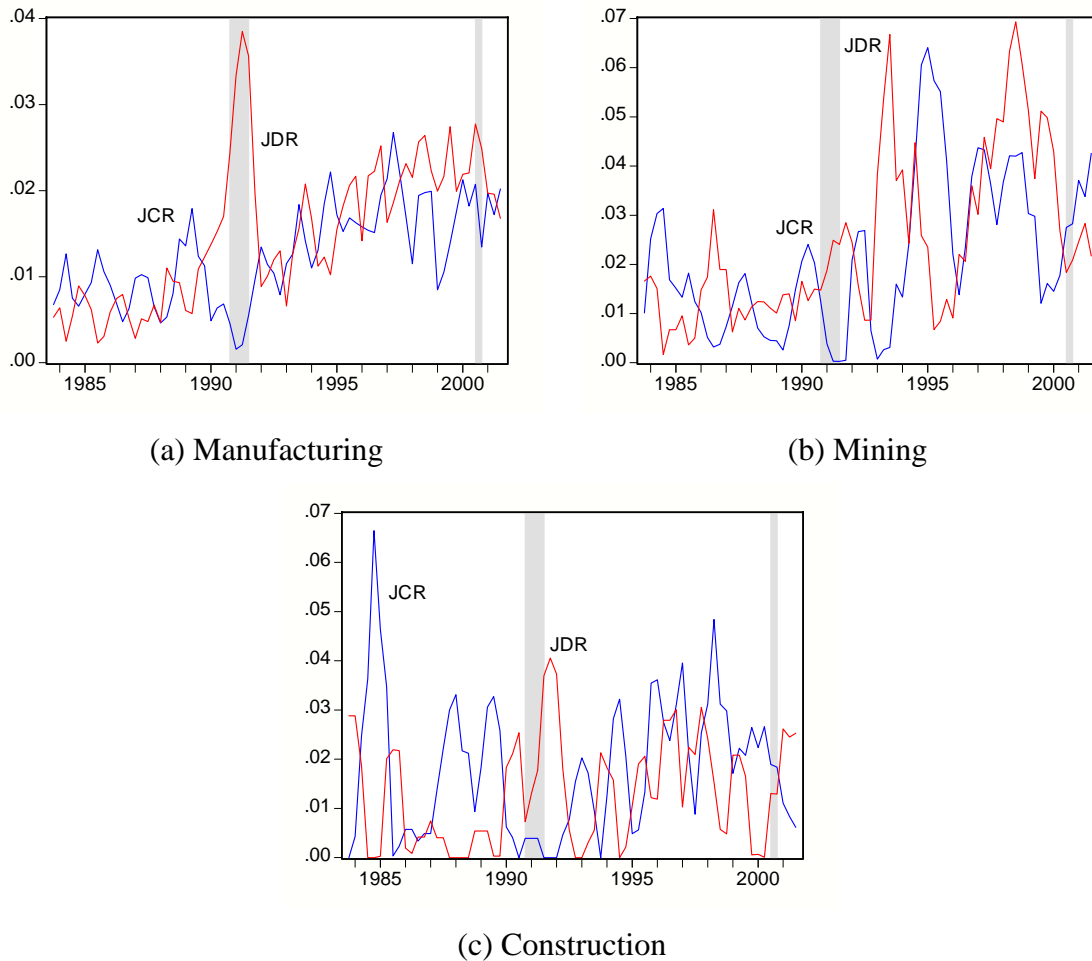
(e) Other services sector (R)

Source: see Figure 1. Data is for public and private sectors and industry groups defined in Section 2.

In the 1990s growth period, job flows from both sources are higher reflecting the relative increase in part-time (and casualised) work (more transitory jobs created). Panels (c) to (e) shows the three-month centred moving averages of the *JCR* and *JDR* for the three industry groupings: goods production (G); wholesale and retail (T); and other services (R). Ritter (1994) found that job flow rates were far more volatile in the G sector than in the T and R sectors. This finding is confirmed for Australia. For this sector the *JCR* and *JDRs* move in marked opposition to one another. Moreover, where job destruction peaked during the early 1990s recession, job creation plummeted to new lows. This volatility and the employment share of the sector combine to explain the disproportionate contribution it has made to fluctuations in aggregate gross flows. While similar movements can be observed in other sectors, here job creation is clearly in the ascendancy, and the net job loss over the recessionary period is less pronounced.

Ritter (1994) also found that goods production accounted for more of the cyclical changes in overall JC&D. Further decomposition of the G sector showed that the manufacturing sector was responsible for most of this volatility (Ritter, 1994, Graph 7: 11). Figure 3 confirms this behaviour is reproduced for the Australian SEE data.

Figure 3 Job creation and job destruction breakdown for G sector, 1983 to 2001



Source: see Figure 1

Table 1 Summary statistics, job creation and destruction rates, by broad industry sector, various periods

	Job creation rate				Job destruction rate			
	Goods production	Wholesale and retail	Other services	All Industries	Goods production	Wholesale and retail	Other services	All Industries
1983:3-1990:2								
Mean	0.011	0.012	0.013	0.036	0.008	0.003	0.004	0.014
Std. Dev.	0.008	0.011	0.005	0.016	0.006	0.006	0.002	0.009
Observations	28	28	28	28	28	28	28	28
1990:3-1991:3								
Mean	0.003	0.003	0.007	0.013	0.027	0.010	0.011	0.048
Std. Dev.	0.003	0.005	0.002	0.007	0.011	0.013	0.002	0.018
Observations	5	5	5	5	5	5	5	5
1991:4-2001:4								
Mean	0.018	0.017	0.018	0.052	0.018	0.011	0.011	0.041
Std. Dev.	0.008	0.011	0.008	0.019	0.009	0.010	0.007	0.017
Observations	41	41	41	41	41	41	41	41
Full sample								
Mean	0.014	0.014	0.015	0.043	0.015	0.008	0.008	0.031
Std. Dev.	0.009	0.011	0.007	0.021	0.010	0.010	0.006	0.020
Observations	74	74	74	74	74	74	74	74

Note: Std. Dev is the standard deviation. Data is for public and private sectors and industry groups defined in Section 2.

4.2 Average rates of job creation and destruction by sector

Table 1 shows descriptive statistics for job creation and destruction rates for the three industry sectors and total economy broken down into four samples: (a) 1983:3 to 1990:2 – the 1980s growth period up to the GDP peak in 199; (b) 1990:3 to 1991:3 – the peak to trough in GDP corresponding to the recession; (c) 1991:4 to 2001:4 – the post-1991 recession, growth period; and (d) the full sample – 1983:3 to 2001:4. Table 2 provides supplementary information relating to the share of job destruction in total job reallocation over each period.

Several features are worth noting. First, from 1984 to 2001, the average rate of job creation overall was 4.3 per cent while the average job destruction rate was 3.1 per cent. In the 1980s period, the average rate of job creation overall was 3.6 per cent while the average job destruction rate was 1.4 per cent. While average job destruction rates were relatively higher than were job creation rates in the 1990s compared to 1980s, it is clear that the rate of job reallocation was also comparatively higher in all sectors over this period. Second, the goods sector has around twice the job destruction rate of the other sectors but about the same average job creation rate. Similar patterns prevailed in both the 1980s and 1990s. Third, while there is no evidence that the job creation rates have a higher variation than the job destruction rates across the sectors overall, they tended to be more variable in the 1990s than in the 1980s. Fourth, the recession stands out as a period where average job destruction rates rose substantially, albeit mostly in the goods sector and job creation rates fell substantially across all sectors. Finally, job destruction dominates the recession period employment flows and has increased in importance over the 1990s.

Table 2 Job destruction by broad industry sector as a share of the rate of job reallocation

	Goods production	Wholesale and retail	Other services	All Industries
1980s	40.7	20.7	22.3	28.6
1991 recession	89.1	76.3	61.8	78.6
1990s	51.1	40.1	38.4	43.8
Full sample	51.3	36.6	35.2	41.9

Source: see Figure 1.

Table 3 provides a comparison between job creation and destruction rates and some derivative measures (job reallocation and net employment growth) in addition to pairwise correlations between the gross and net job flow measures. The additional points of interest are, first, that rates of JC&D are much larger than net employment growth, especially in the goods sector. Second, although the job creation rate is positively related to net employment growth in all sectors (which in turn is strongly negatively related to the job destruction rate in all sectors), the job destruction rate is positively correlated to the job destruction rate in Retail and Total but negatively related in the Goods and Trade sectors.

Table 3 Job flow measures and net employment growth, by broad industry sector 1983-2001

	Goods production	Wholesale and retail	Other services	All Industries
Job creation rate				
Mean	0.014	0.014	0.015	0.043
Std. Dev.	0.006	0.007	0.005	0.017
Job destruction rate				
Mean	0.015	0.008	0.008	0.031
Std. Dev.	0.007	0.006	0.005	0.017
Job reallocation rate	0.029	0.021	0.023	0.073
Net employment growth	-0.001	0.006	0.007	0.012
ρ (JCR, JDR)	-0.038	-0.102	0.258	0.265
ρ (JCR, NET)	0.666	0.784	0.682	0.630
ρ JDR, NET)	-0.771	-0.698	-0.530	-0.582

Note: Job reallocation rate = job creation rate + job destruction rates. Net employment growth = job creation rate - job destruction rate. ρ = correlation coefficient between respective gross flow measures.

4.3 Cyclical sensitivity of job creation and job destruction rates by sector

Borland (1996) found positive correlation between JC&D across sectors. He also found “The rate of job destruction is negatively related to net employment growth, and the rate of job creation is weakly positively related to net employment growth” (Borland, 1996: 52).

From Figure 2, it is clear that the amplitude of the fluctuations in the series varies over time especially during recession. In this section we examine the cyclical sensitivity of the JC&D rates more closely using regression analysis. The strength of the demand side of the economy is captured by the annualised (detrended) rate of growth of real GDP. To test for asymmetrical reactions to the business cycle we create two dummy variables by segmenting GDP growth into its positive and negative observations. We also define a recession dummy taking the value of unity between 1990:3 and 1991:3 and zero otherwise. The inclusion of this variable is intended to highlight whether the 1991 recession had an additional impact on the gross job flows.

We specifically wish to examine: (a) whether there are differences in cyclical job creation and destruction behaviour across the industrial sectors; (b) whether there is evidence of cyclical asymmetry between job creation and job destruction in the goods-producing

sector and whether it carries over to other sectors; and (b) whether job creation and job destruction were dampened during the early 1990s recession (see Ritter, 1994).

The regression results are shown in Table 4 for All Industries and Table 5 for the Goods, Retail, and Trade sectors. We summarise the main results only. Equations 5.1 and 5.3 (Table 5) suggest that job creation is more sensitive to real GDP growth than job destruction. However, when tested for asymmetry (Columns 5.2 and 5.4), more precision emerges. Job creation is clearly asymmetric over the business cycle and is significantly affected, other things equal, by the 1991 recession. Job destruction does not react to positive GDP growth in any significant way but rises sharply when GDP growth is negative. The recession also impacted significantly on job destruction.

Table 4 Cyclical sensitivity of job creation and destruction, All Industries, 1983:3 to 2001:4

Variable	JCR_Total (1)	JCR_Total (2)	JDR_Total (3)	JDR_Total (4)
GDP growth (annualised)	0.404 (4.84)		-0.035 (0.33)	
GDP growth positive		0.397 (4.68)		0.024 (0.26)
GDP growth negative		0.714 (2.07)		-2.492 (4.49)
1991 Recession	-0.014 (3.12)	-0.013 (3.13)	0.001 (7.24)	0.001 (7.52)
Adjusted R ^{squ}	0.611	0.606	0.665	0.694
Std Err % Mean Dep Var	22.9	23.1	29.8	28.5
No of Observations	69	69	69	69

Note: Detrended 3-qtr centred moving average GDP growth is used throughout. The 1991 recession took value 1 from 1990:3 to 1991:3 and zero otherwise. *t*-statistics in parentheses. Constant and trend terms not reported.

Table 5 reports the results for the disaggregated sectors. Column 1 shows that job creation in all sectors is significantly pro-cyclical although the G sector has a stronger response. Column 3 confirms the All Industry result that the regression cannot pick up the cyclical sensitivity of job destruction. However, the asymmetric regressions (Columns 2 and 4) reveal more interesting results. Job creation in the G and R sectors exhibits strong asymmetric behaviour being more responsive (negatively) to GDP decline than to GDP growth. Conversely, the T sector is more responsive to positive than to negative GDP growth. However, the 1991 recession is a strongly independent negative factor for job creation in all sectors. Column 4 shows clearly that negative GDP growth increases job destruction, with the G sector responding more strongly than the other sectors. The 1991 recession only worsens job destruction in the G and T sectors.

Table 5 Cyclical sensitivity of job creation and destruction, G, T, and R, 1983:3 to 2001:4

Sector/variable	JCR	JCR	JDR	JDR
	(G1)	(G2)	(G3)	(G4)
Goods producing (G)				
GDP growth (annualised)	0.169 (7.19)		-0.054 (1.12)	
GDP growth positive		0.167 (6.66)		-0.022 (0.61)
GDP growth negative		0.256 (4.37)		-1.37 (4.66)
1991 Recession	-0.003 (3.40)	-0.003 (3.63)	0.013 (4.01)	0.009 (4.54)
Adjusted R ^{squ}	0.642	0.637	0.713	0.752
Std Err % Mean Dep Var	25.7	25.8	27.2	25.3
Wholesale and Retail Trade (T)	(T1)	(T2)	(T3)	(T4)
GDP growth (annualised)	0.139 (2.33)		0.032 (0.59)	
GDP growth positive		0.140 (2.23)		0.055 (0.95)
GDP growth negative		0.125 (0.55)		-0.903 (3.58)
1991 Recession	-0.006 (2.03)	-0.006 (2.12)	0.007 (2.62)	0.004 (2.07)
Adjusted R ^{squ}	0.317	0.306	0.410	0.432
Std Err % Mean Dep Var	44.0	44.4	62.4	61.2
Other services (R)	(R1)	(R2)	(R3)	(R4)
GDP growth (annualised)	0.096 (2.67)		-0.013 (0.35)	
GDP growth positive		0.090 (2.49)		-0.008 (0.20)
GDP growth negative		0.333 (3.00)		-0.218 (2.28)
1991 Recession	-0.005 (2.72)	-0.004 (2.69)	0.002 (1.27)	0.001 (1.09)
Adjusted R ^{squ}	0.377	0.370	0.296	0.287
Std error as % mean dep var	27.6	27.7	50.0	50.3
Number of observations	69	69	69	69

Notes: see Table 5. *t*-statistics are in parentheses. Std error as % mean dep var is the standard error expressed as a percentage of the mean of the dependent variable. Constant and trend terms not reported.

5. Full-time and part-time job creation and destruction by sector

5.1 Stylised facts of full- and part-time job creation and destruction

Full-time and part-time rates of JC&D were calculated for all-industries and each sector, for the entire sample as well as before, during and after the recession (see Table 6). Several features are worth noting. First, from 1984 to 2001, the average rate of job creation overall was 4.3 and 9.7 per cent for full-time and part-time respectively, while the average rate of job destruction was 3.7 and 6.3 percent. Thus, the average rates of JC&D for part-time were much greater than total rates. This result is evident in both the 1980s and 1990s as well as within each sector for those periods, with the exception of job destruction rates of the trade services sector which are somewhat closer to either full-time or total rates.

For job creation, the same trend is manifest during the recession (that is, part-time job creation rates are much greater than either full-time or total rates). However, part-time job destruction rates fall below their full-time counterparts overall; equalling full-time rates in the remaining services sector; and falling well below full-time rates in the trade services sector.

Second, for both full-time and part-time average job destruction rates were relatively higher in the 1990s (compared to 1980s) as were job creation rates. However this was more evident for part-time rates where the rise in the rate of job creation was less than for full-time (0.114/0.077 vs. 0.053/0.029), while the rise in average job destruction rates was more than for full-time (0.086/0.034 vs. 0.049/0.023).

Third, job creation rates for the goods sector are similar to other sectors for full-time (as with total), however these rates are around double the other sectors for part-time, although this occurs to a lesser extent through the 1980s and the recession periods with remaining services having a rate three-quarters that of the goods sector. Job destruction rates for the goods sector are around one-third greater than the rates of the other sectors for full-time (total was twice as high). However part-time rates of job destruction are much greater than the other sectors, with this effect continuing throughout every period including the recession.

Fourth, as a measure of variability, the standard deviation for all-industry rates of job destruction is greater than those for rates of job creation for every period except the recession. In every period, including the recession, part-time variability is greater for rates of job destruction than job creation.

Fifth, as for total employment, the recession stands out as a period where average job destruction rates rise and job creation rates fall substantially across all sectors for both full-time and part-time employment. However, while full-time rates of job destruction either fall or level out after the recession, part-time rates of job destruction continue to rise into the 1990s. In addition, the relative fall in job creation from the 1980s to the recession is greater for part-time than full-time; and the relative rise from either the 1980s or the recession to the 1990s is less for part-time.

Table 6 Full-time and part-time job flow measures, 1983-2001

	Goods production		Wholesale and retail		Other services		All Industries	
	FT	PT	FT	PT	FT	PT	FT	PT
1983:3-1990:2								
Job creation								
Mean	0.010	0.035	0.010	0.015	0.010	0.026	0.029	0.077
Std. Dev.	0.007	0.019	0.010	0.014	0.005	0.013	0.016	0.030
Job destruction								
Mean	0.010	0.022	0.007	0.003	0.006	0.009	0.023	0.034
Std. Dev.	0.009	0.019	0.011	0.006	0.004	0.007	0.020	0.022
Observations	32	32	32	32	32	32	32	32
1990:3 1991:3								
Job creation								
Mean	0.004	0.024	0.004	0.011	0.006	0.017	0.014	0.051
Std. Dev.	0.004	0.018	0.007	0.010	0.002	0.006	0.009	0.019
Job destruction								
Mean	0.029	0.037	0.018	0.007	0.013	0.013	0.060	0.056
Std. Dev.	0.013	0.029	0.019	0.011	0.003	0.004	0.026	0.031
Observations	5	5	5	5	5	5	5	5
1991:4 2001:4								
Job creation								
Mean	0.017	0.057	0.019	0.027	0.017	0.030	0.053	0.114
Std. Dev.	0.009	0.031	0.016	0.027	0.008	0.015	0.025	0.052
Job destruction								
Mean	0.019	0.052	0.016	0.018	0.014	0.016	0.049	0.086
Std. Dev.	0.009	0.033	0.017	0.022	0.008	0.012	0.025	0.044
Observations	41	41	41	41	41	41	41	41
Full sample								
Job creation								
Mean	0.014	0.048	0.015	0.022	0.014	0.028	0.043	0.097
Std. Dev.	0.009	0.028	0.014	0.023	0.008	0.014	0.024	0.047
Job destruction								
Mean	0.015	0.039	0.012	0.011	0.010	0.013	0.037	0.063
Std. Dev.	0.011	0.031	0.015	0.018	0.008	0.011	0.026	0.044
Observations	74	74	74	74	74	74	74	74

Note: see Table 1 for sources and explanations.

5.2 Cyclical sensitivity of full-time and part-time employment flows

In this section we use regression analysis to explore the cyclical sensitivity of full-time and part-time job creation and destruction across industry sectors. We are also seeking to test for evidence of cyclical asymmetries. Table 7 reports the All Industries results. Equation (7.1) shows that full-time job creation is positively related to GDP growth but asymmetries are present – it declines more when GDP growth is negative than it rises when GDP growth is positive. The 1991 recession also impacted severely on both full-time and part-time job creation. However, apart from the recession impact, business cycle influences over part-time job creation are not evident. More work is needed to investigate this result. Full-time job destruction is highly asymmetric and rises sharply when GDP growth is negative. Part-time job destruction is driven by a trend (not reported) and more work is required to understand this result.

Table 7 Cyclical sensitivity of full-time and part-time job creation and destruction, All Industries, 1983:3 to 2001:4

Variable	JCR_Total	JCR_Total	JDR_Total	JDR_Total
	Full-time	Part-time	Full-time	Part-time
	(1)	(2)	(3)	(4)
GDP growth positive	0.475 (5.32)	0.142 (0.51)	0.067 (0.51)	0.192 (1.01)
GDP growth negative	0.606 (1.89)	0.927 (0.83)	-3.261 (4.51)	0.354 (0.85)
1991 Recession	-0.009 (2.22)	-0.036 (3.42)	0.020 (3.77)	0.008 (1.50)
Adjusted R ^{squ}	0.568	0.351	0.646	0.580
Std Err % Mean Dep Var	29.0	26.1	31.6	34.5
No of Observations	69	69	69	69

Note: Detrended 3-qtr centred moving average GDP growth is used throughout. 1991 recession took value 1 from ... and zero otherwise, *t*-statistics in parentheses. Constant and trend terms not reported (full results available from authors).

Table 8 reports the results from the industry sector breakdown. As expected, full-time job creation across all sectors is cyclically sensitive although evidence of significant asymmetry is only found in the R sector, which was also negatively impacted by the recession. Part-time job creation is less cyclically sensitive in all but the R sector. However the 1991 recession reduced the rate of part-time job creation in goods production. There is clear asymmetry in job destruction in the G and T sectors although in the case of goods production part-time job destruction is lower when GDP growth is negative while full-time job destruction is strongly positive. The goods sector appears to adjust to cyclical slowdown, in part, by substituting part-time jobs for full-time. The 1991 recession worsened job destruction rates for full-time in both the G and T sectors and part-time in G.

Table 8 Cyclical sensitivity of job creation and destruction, G, T, and R, 1983:3 to 2001:4

Sector/variable	JCR	JCR	JDR	JDR
	Full-time	Part-time	Full-time	Part-time
Goods producing (G)	(G1)	(G2)	(G3)	(G4)
GDP growth positive	0.217 (6.91)	-0.221 (1.58)	-0.021 (0.51)	0.070 (0.79)
GDP growth negative	0.171 (1.65)	0.881 (1.29)	-1.623 (5.02)	0.926 (3.82)
1991 Recession	0.000 (0.35)	-0.027 (5.19)	0.009 (4.36)	0.008 (2.59)
Adjusted R ^{sqd}	0.621	0.392	0.713	0.598
Std Err % Mean Dep Var	28.5	31.0	27.6	32.9
Wholesale and Retail Trade (T)	(T1)	(T2)	(T3)	(T4)
GDP growth positive	0.174 (2.78)	0.221 (1.90)	0.088 (0.93)	0.128 (1.27)
GDP growth negative	0.062 (0.31)	-0.312 (0.57)	-1.386 (2.98)	-0.566 (2.17)
1991 Recession	-0.005 (1.78)	-0.004 (0.72)	0.008 (2.46)	0.002 (0.62)
Adjusted R ^{sqd}	0.310	0.138	0.337	0.292
Std Err % Mean Dep Var	52.0	56.6	68.9	95.2
Other services (R)	(R1)	(R2)	(R3)	(R4)
GDP growth positive	0.084 (2.71)	0.141 (1.96)	0.000 (0.01)	-0.006 (0.09)
GDP growth negative	0.373 (2.52)	0.359 (2.13)	-0.252 (1.75)	-0.006 (0.03)
1991 Recession	-0.004 (2.46)	-0.005 (1.98)	0.002 (1.35)	-0.001 (0.73)
Adjusted R ^{sqd}	0.447	0.168	0.339	0.158
Std error as % mean dep var	30.7	26.2	48.7	50.0
Number of observations	69	69	69	69

Notes: see Table 5.

6. Persistence of job creation and destruction

Many labour market time series exhibit both persistence and asymmetry in relation to their response to shocks (Mitchell and Muysken, 2003). In this section we examine the degree of persistence in JC&D rates by sector and by full-time and part-time status. We are also interested in determining whether this persistence is cyclically sensitive. Davis and Haltiwanger (1992: 835) explore whether high rates of JC&D “reflect primarily transitory or persistent establishment level employment changes.” The question has relevance for the way in which firms adjust to fluctuations in aggregate activity. If JC&D are responses to ephemeral variations in employment levels at the firm level then firms are likely to use layoffs and recalls as their primary adjustment tool. However, if these firm-level employment changes persist then the gross dynamics underpin long-term unemployment or reallocations of workers across firms (and industries). Davis and Haltiwanger (1992: 837) define persistence in job creation as the “fraction of newly created jobs in March of year t that continue to be present in March of year $t + 1$.”

We follow the Davis and Haltiwanger measure for persistence and calculate it at August in each year (rather than March). Let E_{it} denote employment in sector i at time t . Newly created jobs in i at t equal $E_{it} - E_{it-1}$, as long as the difference is positive. If $E_{it+1} > E_{it}$, then all the newly created jobs in t are present in $t + 1$. Conversely, if $E_{it+1} < E_{it}$, then none of the newly created jobs in t are present in $t + 1$. If $E_{it+1} \in [E_{it-1}, E_{it}]$, then $E_{it+1} - E_{it-1}$ of the newly created jobs are present in $t + 1$. The summation of this measure for each growing industry within a sector (weighted by industry size over sector size) generates the persistence of job creation for that sector. Job destruction persistence is similarly defined. Computing this for all growing industries in t and dividing by the JC_t generates the persistence measure.

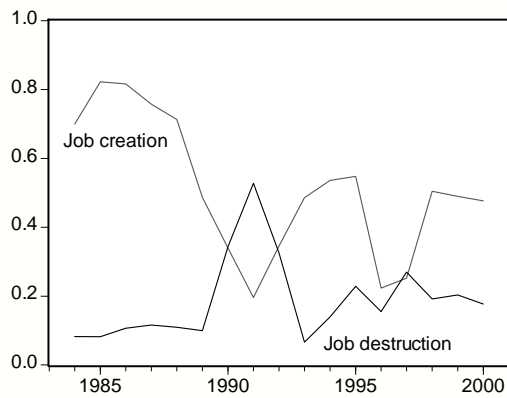
From Table 9, we conclude that around 51 per cent of jobs across All Industries still exist a year later. Job destruction is noticeably less persistent (19 per cent of all industries jobs destroyed remain destroyed a year later). Conversely, for goods production, job destruction is more persistent than job creation, while the services sectors have strongly persistent job creation dominating weakly persistent job destruction. The 1980s and 1990s growth periods exhibit different behaviour across all sectors with job creation decreasing and job destruction increasing in persistence.

Figure 4 allows us to gauge the cyclical nature of the persistence of JC&D across each sector. The disturbance created by the 1991 recession is evident in the All Industries series (panel a), Goods production (panel b) and Wholesale and Retail Trade (panel c). Generally, persistence of job creation was relatively high in the 1980s fell dramatically around the recession and only slightly recovered in the 1990s. In contrast, job destruction persistence rose strongly during the recession.

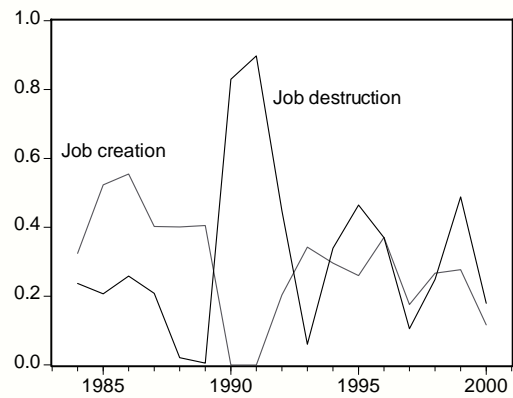
Table 9 Average persistence of job creation and job destruction, G, T, and R sectors

	Full sample 1984-2000		1980s growth period 1984-1989		1990s growth period 1992-2000	
	JC	JD	JC	JD	JC	JD
Goods production (G)	0.289	0.316	0.435	0.156	0.257	0.300
Wholesale & retail (T)	0.608	0.150	0.828	0.093	0.490	0.178
Other services (R)	0.494	0.162	0.766	0.041	0.423	0.142
All Industries	0.511	0.190	0.716	0.099	0.429	0.195

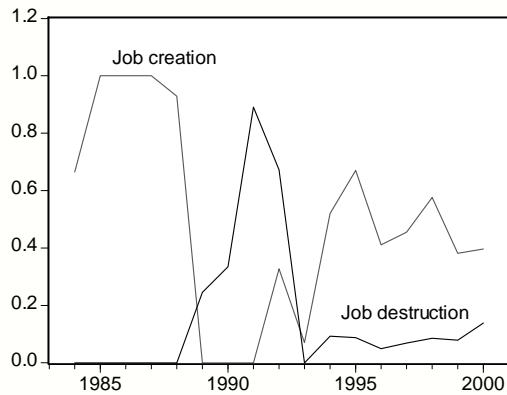
Figure 4 Persistence of job creation and job destruction: All Industries, Goods production (G), Wholesale and Retail Trade (T), and Other services (R), 1982-2001



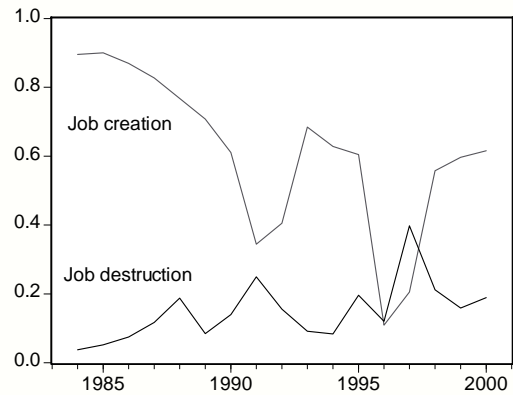
(a) All industries



(b) Goods production (G)



(c) Wholesale and Retail Trade (T)



(d) Other services (R)

Source: see Figure 1.

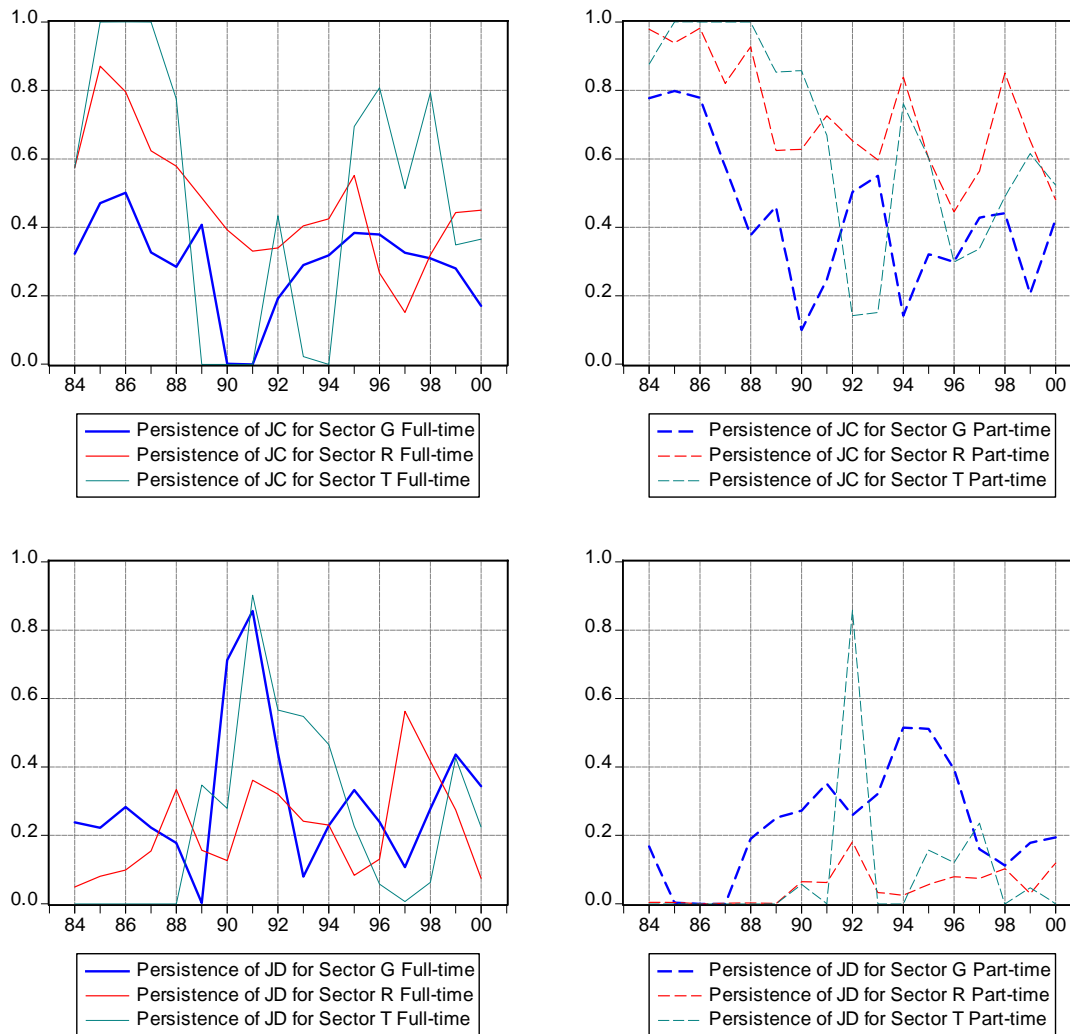
It is likely that some of the behaviour captured in the sectoral analysis reflects the transition towards more part-time work. Section 2 shows that this transition accelerated during the 1991 recession. Accordingly, Table 10 shows persistence measures for full-time and part-time JC&D (see also Figure 5). The persistence of part-time job creation is higher than persistence of full-time job creation across the full sample, although this gap reduces in the 1990s growth period for goods and trade service sectors. The persistence of job destruction for full-time is generally higher than that for part-time. Persistence of job destruction for both part-time and full-time increases across the sample for all sectors.

Table 10 Average persistence of job creation and job destruction, full- and part-time.

	Full sample 1984-2000		1980s growth period 1984-1989		1990s growth period 1992-2000	
	JC	JD	JC	JD	JC	JD
Goods production						
full-time	0.292	0.306	0.386	0.191	0.294	0.276
part-time	0.437	0.228	0.628	0.102	0.368	0.294
Wholesale & Retail						
full-time	0.490	0.242	0.725	0.058	0.442	0.287
part-time	0.657	0.087	0.955	0.000	0.436	0.157
Other services						
full-time	0.471	0.217	0.655	0.146	0.372	0.259
part-time	0.724	0.049	0.879	0.002	0.632	0.078

Source: see Figure 1.

Figure 5 Persistence of job creation and job destruction, full-time and part-time status



Source: see Figure 1.

7. Conclusion

This paper, motivated by the differential behaviour of part-time and full-time employment over the business cycle, constructed sectoral patterns of job creation and destruction that distinguish between part-time and full-time employment. Full-time job creation is positively related to GDP growth but asymmetries are present – it declines more when GDP growth is negative than it rises when GDP growth is positive. In the case of goods production part-time job destruction is lower when GDP growth is negative. Full-time job destruction is highly asymmetric and rises sharply when GDP growth is negative, especially in the Goods and Trades sectors. Part-time job creation is less volatile. Generally, persistence of job creation was relatively high in the 1980s, fell dramatically around the recession and only slightly recovered in the 1990s. In contrast, job destruction persistence rose strongly during the recession, especially in the Goods sector. The persistence of part-time job creation is higher than persistence of full-time job

creation across the full sample, although this gap reduces in the 1990s growth period for goods and trade service sectors. The persistence of full-time job destruction is generally higher than that for part-time. The policy implications of these cyclical sensitivities are straightforward. What is lost through net job loss during the downturn takes much longer to recover from in the upturn. Moreover, recessions appear to leave a residue of underemployment, largely through their differential influence over the composition of part-time and full-time employment.

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