

JOB-SHIFTING IN THE MANUFACTURING SECTOR

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Abstract

This paper focuses on employment movement across the manufacturing sector between 2001 and 2007, based on the Household, Income and Labour Dynamics in Australia (HILDA) Survey panel data. We tracked the 2001 manufacturing and non-manufacturing cohorts, and observed their employment changes during the period by comparing job-shifting between the manufacturing and non-manufacturing cohorts.

The research first looks at attrition rates (due to either leaving the workforce or/and shifting jobs to other sectors) for the manufacturing cohort since 2001, and compares them with those derived from the non-manufacturing cohort. Between 2001 and 2007, the initial 2001 manufacturing cohort contracted by 53%, which compares to a contraction of 18.7% by the initial 2001 non-manufacturing cohort. The significant difference in these attrition rates is caused by manufacturing workers shifting jobs to non-manufacturing industries. Note, however, that the non-manufacturing sector encompasses all other sectors and this masks the extent of movement within the other sectors. To study cohort contraction more accurately, we investigated the 'rate of net flow' for both the manufacturing and non-manufacturing cohorts. There were significant variations in this rate for manufacturing over time. However, for the period from 2001 to 2007, the rate of net flow for the manufacturing cohort is significantly larger than that for the non-manufacturing cohort. This provides evidence that between 2001 and 2007 the manufacturing cohort contracted disproportionately as compared to the non-manufacturing sector. It is also found that during the same period males and females contributed to manufacturing cohort contraction quite differently. There are differences, too, between the different manufacturing sub-sectors.

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Introduction

The major sources of data on changes in the manufacturing workforce in Australia are ABS labour force surveys. The participants in these surveys are selected randomly from the Australian population and so the data derived are cross-sectional. These cross-sectional data provide snapshots of the manufacturing workforce and yield valuable information about the sector's characteristics at different points of time. However, they are often of limited use in helping answer more subtle questions about why and how these characteristics evolve. For example, the extent to which workers have moved between industries cannot be easily derived from cross-sectional manufacturing data.

Panel surveys (where, in contrast to cross-sectional surveys, the members of the survey group are repeatedly surveyed over time) have experienced increasing popularity in recent years, mainly for their potential to address questions about the dynamics of the panel group (e.g. changes in family, income and labour market circumstances). Initiated in 2001, the ongoing Household, Income and Labour Dynamics in Australia (HILDA) Survey, managed by the Melbourne Institute, is one of the few panel surveys ever undertaken in Australia. Sponsored by the Department of Family, Housing, Community Services and Indigenous Affairs (FaHCSIA), HILDA surveys have been undertaken annually for more than 10 000 individuals; and so far eight 'waves' of survey results have been released over eight years. The survey began in 2001 with a random sample of Australian households occupying private dwellings; all members of those households form the basis of the panel to be interviewed in each subsequent wave. The survey covers a wide range of questions about household income, employment, education, training and wellbeing.¹

In this paper, we explore the relevance of HILDA panel data to manufacturing by adopting a simple cohort study, which requires following up the (HILDA) manufacturing cohort from Wave 1 to Wave 7 (effectively from 2001 to 2007).² We directly compare the HILDA manufacturing cohort in the initial wave in 2001 with the rest of the HILDA industry cohort to identify differences in employment attrition and job shifting. These differences provide some straightforward evidence of how the workforce in the manufacturing sector has been affected by structural change.

¹ It is important to know that the industry sector in which an individual is, or was, employed is well-recorded. HILDA data can be disaggregated into different industry cohorts, on the basis of Australian and New Zealand Standard Industry Classification (ANZSIC). The manufacturing cohort is the fourth largest in cohort size for the four largest cohorts based on a balanced panel dataset (a dataset which includes persons who were surveyed in all seven waves): Health and community services (647), Retail trade (636), Property and business services (561), and Manufacturing (545).

² Note that in this preliminary working paper, a decision was made to limit data to Wave 7 (survey taken mid-2007) to avoid influence of the global financial crisis. An update in early 2011 will include two additional waves (Wave 8 and Wave 9), which should begin to accommodate the effects of the crisis.

Data preparation

Survey participants may enter into or exit the HILDA survey for a variety of reasons. However, a high proportion of the initial HILDA survey individuals have been retained in all seven waves of the survey. Among a total of 11 747 individuals in the initial wave, 8409 were surveyed for all seven waves. In this subset, 5271 individuals were initially employed in the first wave, of which 545 were in the manufacturing sector.

The 545 individuals initially employed in the manufacturing sector form the 'manufacturing cohort'. The 4726 individuals not initially employed in the manufacturing sector form the 'non-manufacturing cohort'.

The two cohorts' paths are followed from 2001 to 2007, examining employment outcomes. One would expect individuals within each cohort to respond differently over time to the array of forces impacting on them. The analysis presented here only presents employment outcomes but does not model these factors.

Labour market characteristics of the manufacturing cohort

Labour participation and labour retention in the manufacturing cohort will be affected by the employment choices of those in the survey. There are three types of employment choices: 1) manufacturing workers who leave manufacturing can either remain in, or leave the workforce; 2) non-manufacturing workers who can move to manufacturing; 3) those who left manufacturing can come back to the manufacturing sector. As the HILDA data tracks the labour market status of all individuals, their employment paths can be followed for as long as the data permits. HILDA data also enables direct comparison between manufacturing and non-manufacturing workers.

Table 1 provides counts of the number of manufacturing workers who (a) remained in manufacturing, (b) shifted to non-manufacturing, or (c) left the workforce—by following the 545 people in the initial manufacturing cohort from their situation in the first wave in 2001 through to their situation in 2007.³ In fact, (b) and (c) combined account for all the attrition in the manufacturing cohort.⁴ Listed are cumulative figures in each year (not annual changes). As individuals can leave manufacturing temporarily and then come back later, numbers (in particular those not employed) can either increase or decrease over time. As can be seen, most of the attrition from the manufacturing cohort comes from people moving to non-manufacturing industries.

Table 1: Attrition of the manufacturing cohort

Year	2001 (Base year)	2002	2003	2004	2005	2006	2007
In manufacturing	545	399	354	322	306	294	256
Shifting to non-manufacturing	0	120	152	172	185	195	237
Leaving the workforce	0	26	39	51	54	56	52

Source: HILDA Release 7

³ For 2001 the manufacturing cohort is established, so no individuals shifted to non-manufacturing or left manufacturing in that year.

⁴ Attrition in this paper means a gradual process of losing individuals from a cohort over a period of time.

Similarly, we also looked at the 4726 individuals in the 2001 non-manufacturing cohort, and the results as shown in Table 2.

Table 2: Attrition of the non-manufacturing cohort

Year	2001 (Base year)	2002	2003	2004	2005	2006	2007
In non-manufacturing	4,726	4,148	4,092	4,003	3,958	3,872	3,840
Shifting to manufacturing	0	180	151	167	178	183	159
Leaving the workforce	0	398	483	556	590	671	727

Source: HILDA Release 7

Several findings about labour movements between the manufacturing and non-manufacturing cohorts can be directly obtained from a comparison between Tables 1 and 2. There appears to be a significant workforce shift across both the manufacturing and non-manufacturing cohorts. In 2002, there were more non-manufacturing workers entering manufacturing than the reverse, but in 2007 the net shift changed direction. Between 2003 and 2006, the inflow to manufacturing from non-manufacturing and the outflow from manufacturing to non-manufacturing were similar. However, it is so far premature to ascertain the extent to which these changes were a result of the mining boom before the global financial crisis took hold.

Attrition in proportion to the size of a cohort—the attrition rate—is a useful concept. The attrition rate can be decomposed into two different components: (1) those shifting to the other sector and (2) those leaving the workforce. The same decomposition has been used in Tables 1 and 2. It needs to be emphasised that we are most interested in the attrition rate calculated with reference to the 2001 base year, though the attrition rate may be calculated with reference to any particular year.

The attrition rates due to employees leaving the workforce are compared between the manufacturing and non-manufacturing cohorts in Table 3.

Table 3: Attrition rate due to employees leaving the workforce

Year	2001 (Base year)	2002	2003	2004	2005	2006	2007
Manufacturing cohort	0.00%	4.80%	7.20%	9.40%	9.90%	10.30%	9.50%
Non-manufacturing cohort	0.00%	8.40%	10.20%	11.80%	12.50%	14.20%	15.40%

Source: Tables 1 and 2 derived from HILDA Release 7

The manufacturing cohort appears to have a smaller attrition rate due to workers leaving the workforce. This could be because manufacturing jobs are relatively more stable than average non-manufacturing jobs. Between 2004 and 2007 the attrition rate due to employees leaving the workforce was quite stable for the manufacturing cohort, while the equivalent for the non-manufacturing cohort continued to increase. The results provide some support for the idea that, during this period, manufacturing workers were less likely to be unemployed than non-manufacturing workers. The manufacturing sector in fact outperformed its counterpart—the non-manufacturing cohort—in worker retention. This coincides with a period of low overall unemployment in Australia.

The manufacturing attrition rate due to employees shifting to non-manufacturing is much larger than the non-manufacturing attrition rate due to employees shifting to manufacturing. This is hardly surprising because the non-manufacturing cohort is a combination of all other cohorts except manufacturing.

Table 4 presents attrition rates due to the combined effect of employees leaving the workforce and shifting to non-manufacturing (and vice versa). Manufacturing has a

higher proportion than non-manufacturing, and is trending upwards at a faster rate. The cumulative result is that from 2001 to 2007, 53% of the manufacturing cohort either left the workforce or shifted to non-manufacturing. This is in contrast to only 18.7% of the non-manufacturing cohort who either left the workforce or shifted to manufacturing. Note, however, that the non-manufacturing sector encompasses all other sectors and this masks the extent of movement within the other sectors.

Table 4: Attrition rate due to the combined effect of employees leaving the workforce and shifting to non-manufacturing (manufacturing)

Year	2001 (base year)	2002	2003	2004	2005	2006	2007
Manufacturing cohort	0.00%	26.80%	35.00%	40.90%	43.90%	46.10%	53.00%
Non-manufacturing cohort	0.00%	12.20%	13.40%	15.30%	16.30%	18.10%	18.70%

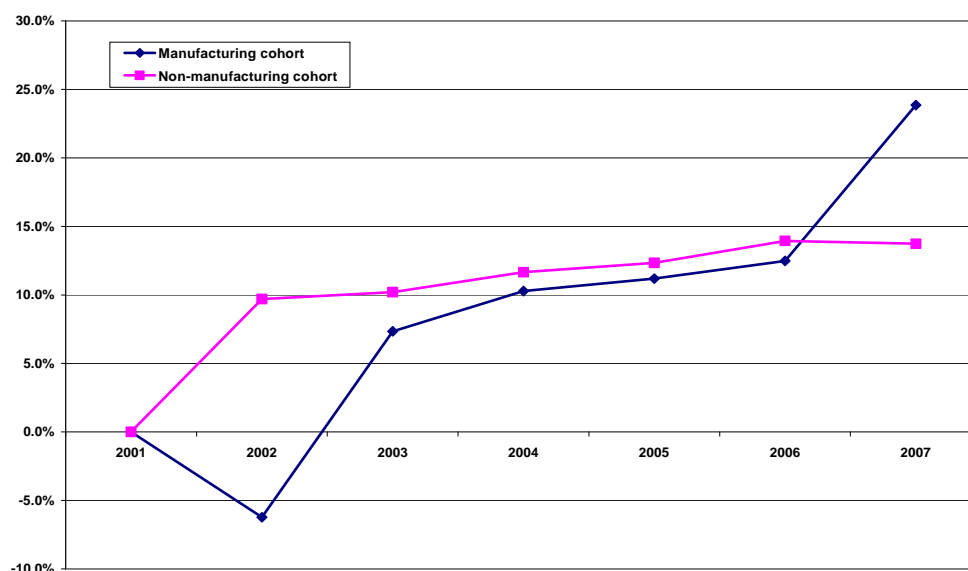
Source: Tables 1 and 2 derived from HILDA Release 7

Rate of net flow of manufacturing workers

It is possible to construct from Tables 1 and 2 'net flows' of manufacturing and non-manufacturing workers. For example, for manufacturing, net flow is defined as the sum of workers shifting to non-manufacturing and out of the workforce, less workers shifting to manufacturing from the non-manufacturing sector. A similar construction applies to non-manufacturing net flows.

However, comparability is best achieved through examination of net flows relative to the 2001 base year cohort totals—creating a rate of net flow, which measures the rate of cohort contraction. Figure 1 plots a direct comparison of the rate of net flow between the manufacturing and non-manufacturing cohorts (a higher positive figure indicates a higher rate of contraction).

Figure 1: Comparison of the rate of net flow between the manufacturing and non-manufacturing cohorts



Source: Tables 1 and 2 above derived from HILDA Release 7

As seen from Figure 1, the non-manufacturing cohort has demonstrated a degree of stability in the rate of net flow (with a flat linear growth). This is expected because the non-manufacturing sector, by definition, includes many different industries, so movements within the sector can cancel each other out. The non-manufacturing

cohort can thus serve as a reference for comparison. Between 2003 and 2006, the manufacturing cohort mimicked the non-manufacturing cohort in the rate of the net flow, though with a smaller value. However, in 2003 and 2007 respectively, the rate of net flow increased dramatically, indicating a significant net outflow of manufacturing workers in these two different years. Noticeably, the rate of net flow of manufacturing workers in 2002 was negative, reflecting a net inflow of manufacturing workers. As shown in Figure 1, the gap in the rate of net flow between the manufacturing and non-manufacturing cohorts increased significantly after 2006. This suggests that manufacturing sector employment may have contracted disproportionately as compared to other sectors (on average). Over the six years 2001 to 2007, a net 24% of the manufacturing cohort individuals left manufacturing, compared to a net 14% of the non-manufacturing cohort individuals leaving the non-manufacturing cohort. Only in 2002 did the opposite occur in the manufacturing cohort, with a cohort expansion about 6%. In fact, the rapid increase in the rate of net flow of manufacturing workers in 2007 was mainly caused by job shifting of manufacturing workers to non-manufacturing, rather than being due to them leaving the workforce.

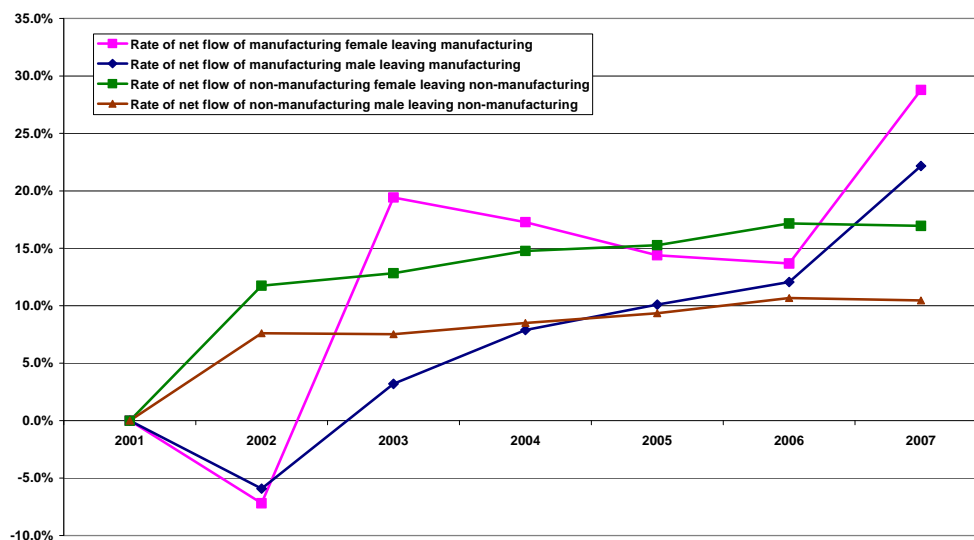
We now look at attrition at disaggregated levels. We focus on gender and the sub-manufacturing sector at the two digital ANZSIC level.

Gender effects

There are 139 females and 406 males in the manufacturing cohort, compared to the much more gender-balanced non-manufacturing cohort (2384 females and 2342 males).

Figure 2 illustrates a split in the rates of net flow by gender. Gender difference is clearly visible: females have higher rates of net flow in both manufacturing and non-manufacturing cohorts. Within the manufacturing cohort the rate of net female flow is more variable than the rate of net male flow.

Figure 2: Differences on rates of net flow between males and females for manufacturing and non-manufacturing cohorts

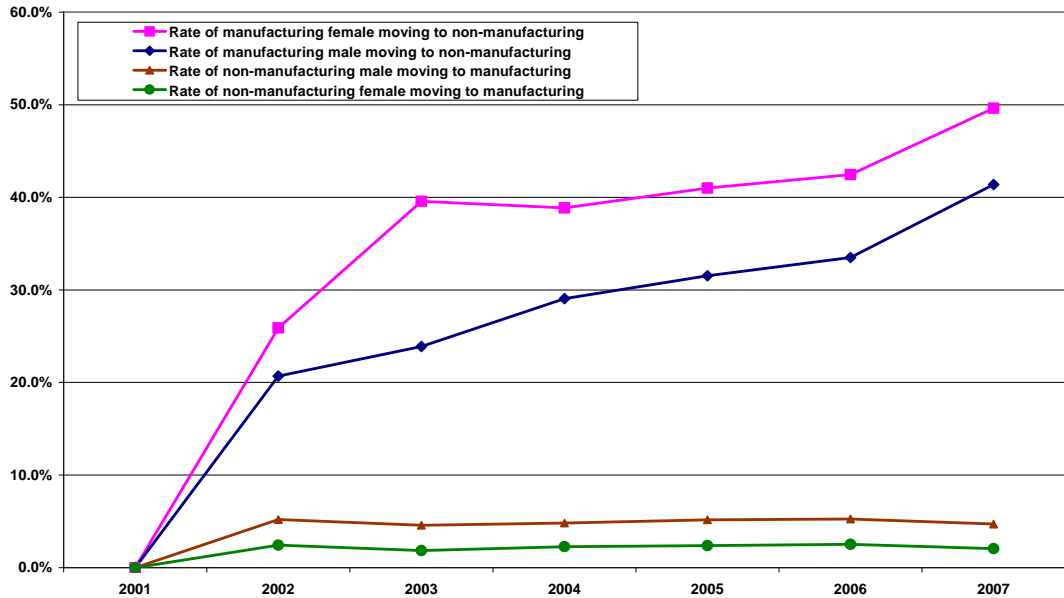


Source: HLIDA Release 7

While it is expected that females are more likely to leave the labour force than males, gender difference is also a significant factor in the rate of job shifting across sectors. In the non-manufacturing cohort, the rate of job shifting into manufacturing is higher

for males than females. This is in contrast to the manufacturing cohort in which there is a higher rate for females moving to non-manufacturing (Figure 3).

Figure 3: Gender difference on rate of shifting jobs across cohort



Source: HILDA Release 7

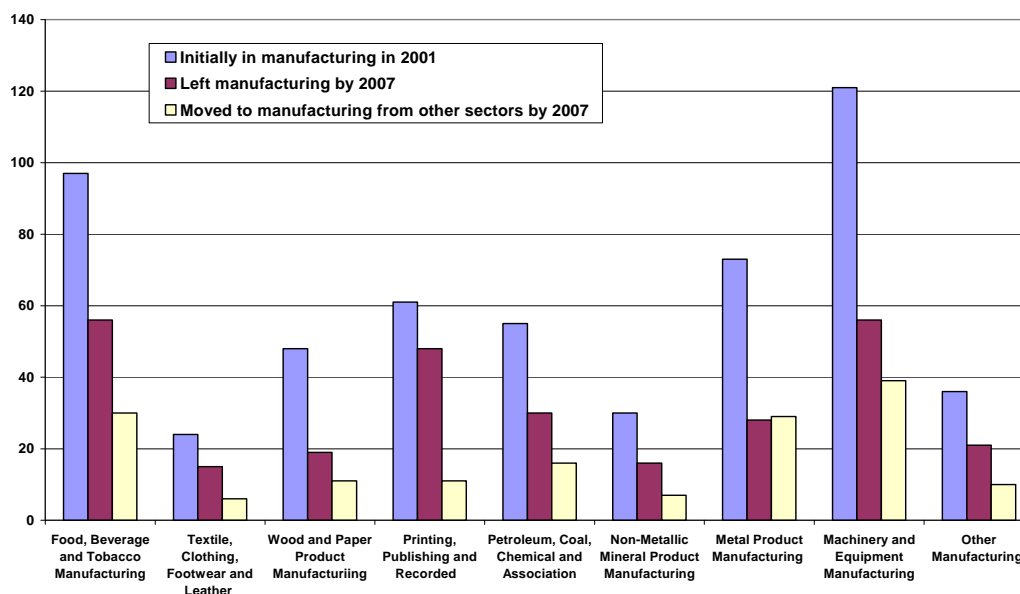
Exploration of manufacturing sub-sectors

Our earlier investigation established that the manufacturing cohort contracted more rapidly from 2002 to 2007 compared with the non-manufacturing cohort (Table 4), reflecting a net loss of manufacturing workers to non-manufacturing. It is now worth examining the movements across manufacturing sub-sectors.

By 2007, there were 289 (of the original 545) manufacturing workers left in the initial manufacturing cohort, which means that 256 individuals had left the manufacturing sector. In the meantime, a total 159 non-manufacturing workers had shifted to manufacturing jobs. Figure 4 compares those three categories of workers at the 2-digital level of ANZSIC.⁵

⁵ The 2006 ANZSIC system has been adopted in the HILDA Wave 7 dataset, while the HILDA Wave 1–6 datasets are based on the 1993 ANZSIC system. For comparison across all HILDA waves, the 2006 ANZSIC manufacturing classification is aggregated into the 1993 ANZSIC manufacturing classification.

Figure 4: Industry disaggregation of the manufacturing cohort



Source: HILDA Release 7

It is apparent that contraction of the manufacturing cohort is not uniform across its sub-sectors. Attrition is relatively significant in 'printing, publishing and recorded media' and 'textile, clothing, footwear and leather'. Non-manufacturing workers shifting into manufacturing were fewer than those who departed in almost all sub-manufacturing sectors—with one exception – 'Metal product manufacturing'.

Concluding remarks

Our cohort investigation is preliminary, so far only focusing on attrition and job-shifting in the initial 2001 cohort of HILDA. But the method of cohort analysis is effective and robust, and can be used for probing other variables/parameters specific to manufacturing. Further, the cohort study builds up a link between conventional analysis based on cross-sectional data and advanced panel data modelling, which is widely used for determining what actually drives a particular type of behaviour. HILDA panel surveys are continuing and further waves of data will become available in future years. Research focusing on long term behaviour change will then be feasible. We note, in particular, that two additional HILDA waves will cover the period of the global financial crisis (GFC), providing data on the impact of GFC on the manufacturing cohort.

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