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THE ROLE OF EXIT AND ENTRY IN AUSTRALIAN PRODUCTIVITY GROWTH

Dean Parham[*]

The central aim of this paper is to report findings from an Australian study of the influence of firm dynamics on labour productivity growth during Australia's productivity surge in the 1990s. Like studies of other countries, the within-firm effects are found to dominate net entry and exit effects. While the time interval is relatively short (three years) and the representativeness of the sample is open to question, the findings suggest that Australian firms behaved more in line with the "US model" than with the "European model". The paper also raises a number of data issues in using the Business Longitudinal Survey for this kind of analysis.

LE ROLE DES ENTREES ET SORTIES D'ENTREPRISES DANS LA CROISSANCE DE LA PRODUCTIVITE EN AUSTRALIE

Dean Parham[*]

L'objet principal de ce document est de rendre compte des conclusions d'une étude australienne relative à l'influence de la dynamique des entreprises sur la croissance de la productivité du travail enregistré en Australie dans les années 90. Comme pour d'autres pays, on constate que les effets intra-entreprise sont plus importants que les effets nets d'entrée et de sortie. La période considérée est relativement courte (3 ans) et la représentativité de l'échantillon n'est pas sans défaut, mais l'étude montre que le comportement des entreprises australiennes a été plus proche du « modèle américain » que du « modèle européen ». Le présent document soulève par ailleurs un certain nombre de questions que pose l'utilisation du Business Longitudinal Survey pour ce type d'analyse.

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[*]   Productivity Commission, PO Box 80, Belconnen, ACT 2616 Australia (dparham@pc.gov.au). Paul Roberts and Paul Taylor assisted with the compilation of material on the availability and uses of firm-level data. Lou Will and Paul Gretton, from the Productivity Commission, provided helpful comments and suggestions on earlier drafts; as did Eden Brinkley, Clem Tozer and Ross Upson, from the Australian Bureau of Statistics. The views expressed are those of the author and do not necessarily reflect the views of the Productivity Commission.

[*]   Productivity Commission, PO Box 80, Belconnen, ACT 2616 Australia (dparham@pc.gov.au). Paul Roberts et Paul Taylor ont aidé à rassembler le matériel relatif à la disponibilité et aux utilisations des données des entreprises. Lou Will et Paul Gretton, de la Commission de la productivité, ont présenté des commentaires et suggestions utiles sur les premières versions du texte, de même qu'Eden Brinkley, Clem Tozer et Ross Upson, de l'Australian Bureau of Statistics. Les points de vue exprimés sont ceux de l'auteur et ne reflètent pas nécessairement ceux de la Commission de la productivité.

1.   The context: structural change and productivity growth

The 1980s and 1990s brought some additional influences on structural change in Australia. First, a series of microeconomic policy reforms were introduced, with wider and more intense application from the mid-1980s. Reforms have included: liberalisation of capital markets, trade and investment barriers; commercialisation of government enterprises that have dominated the provision of economic infrastructure; removal of inappropriate business regulation and enhancement of competition policy; and decentralisation of industrial relations processes to add flexibility to wage determination and operation of labour markets (PC, 1999). Reforms have had a mixture of industry-specific and general application.

Second, Australia embraced the developments in information and communications technologies (ICTs) in the 1990s and became a high user of ICTs by international standards. The use of ICTs has facilitated substantial business restructuring and productivity growth, especially in the distributive trades and financial intermediation (Parham, Roberts and Sun, 2001).

Productivity growth surged in the 1990s. Labour productivity and multifactor productivity (MFP) growth hit record highs. And, by the September quarter of 2000, Australia had notched up nine years of growth at an annual average rate of 4%.

Figure 1 shows the changes in Australia's underlying rates of productivity growth. Productivity growth is measured over peak-to-peak productivity cycles. Annual labour productivity growth rose from 2.0% (1973-74 to 1993-94) to 3.0% in the 1990s (1993-94 to 1999-2000). MFP growth rose from 0.8 to 1.8% a year. It can be seen from the figure that variation in MFP growth has explained nearly all of the variation in labour productivity growth (the capital deepening contribution has been around 1.4 percentage points in all cycles except in the late-1980s).

It is widely accepted that microeconomic policy reforms have made a major – but not the sole – contribution to the productivity surge (PC, 1999; Bean, 2000; OECD, 2001a). In addition, use of ICTs has played a part, encouraged and assisted by reforms (Parham *et al.*, 2001).
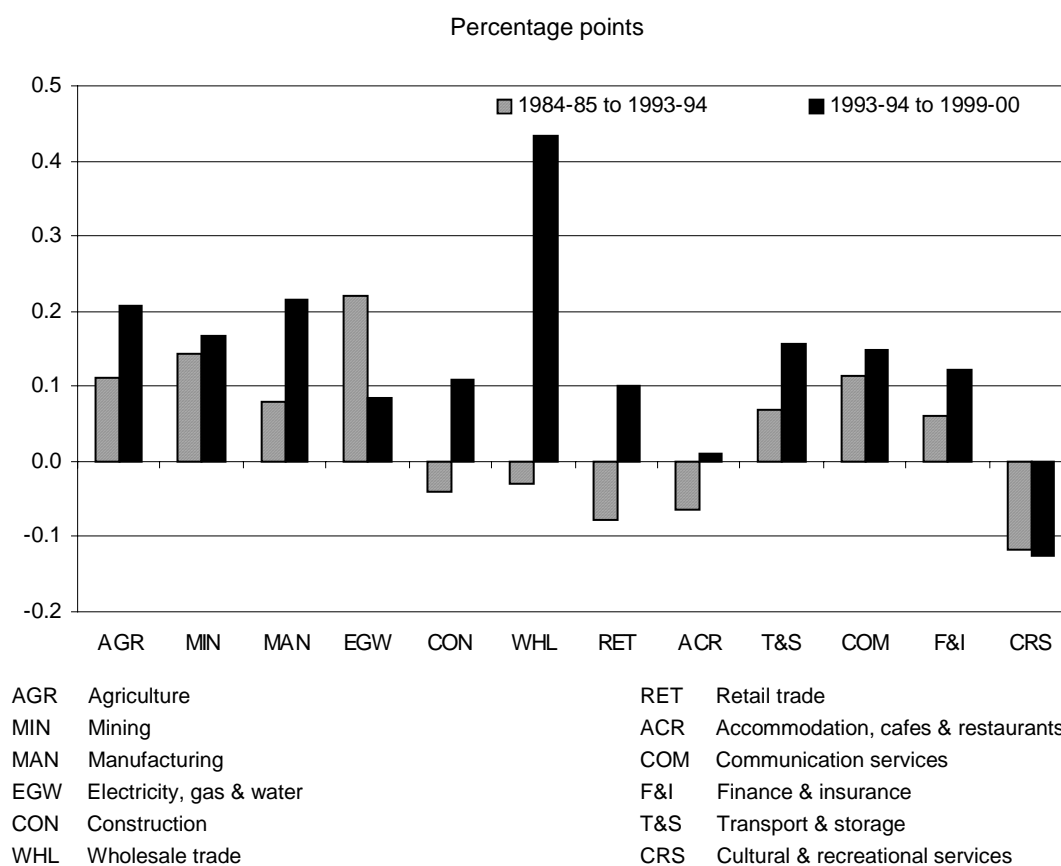
Figure 1. **Growth in labour productivity and MFP over productivity cycles**

Percentage per year
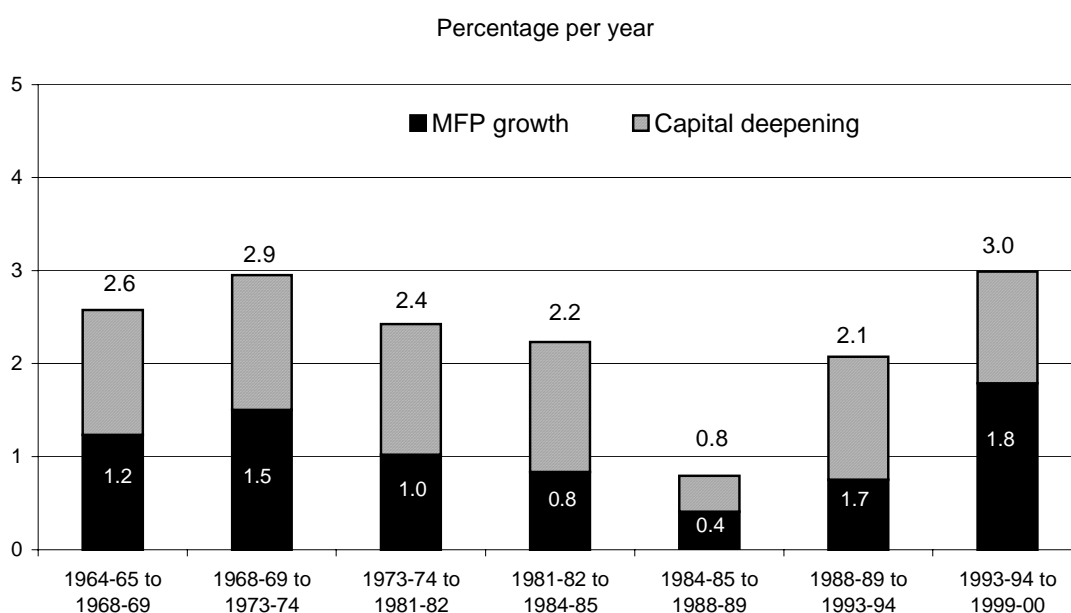
Source: ABS 5204.0.

Contributions to aggregate productivity growth have come from a range of industry sectors, although a different set of service industry contributors came to the fore in the 1990s surge (Figure 2).

Figure 2. **Industry contributions to aggregate MFP growth**

Percentage points

AGR	Agriculture	RET	Retail trade
MIN	Mining	ACR	Accommodation, cafes & restaurants
MAN	Manufacturing	COM	Communication services
EGW	Electricity, gas & water	F&I	Finance & insurance
CON	Construction	T&S	Transport & storage
WHL	Wholesale trade	CRS	Cultural & recreational services

Source: Productivity Commission estimates, based on unpublished ABS data.

The Productivity Commission has undertaken a number of studies to examine factors that have contributed to Australia's productivity growth and to explore implications for living standards and the structure of employment.[1] Analysis of many of the effects of structural reforms and other influences on productivity requires a micro focus. As part of the Commission's research programme, it was decided to undertake a study of firm entry and exit and resource reallocation across firms. It was considered that such a study could not only improve understanding of the firm dynamics underlying productivity growth, but it could also yield policy-relevant insights about the relative importance of "creation" and especially "improvement" (within incumbent firms), as well as the more visible and politically sensitive "destruction". To our knowledge, this kind of study of Australian firms has not been undertaken elsewhere.

The Business Longitudinal Survey (BLS), conducted by the Australian Bureau of Statistics (ABS), was the only possible data source for the study. This paper covers many of the data issues encountered in the study, as well as its results. The intention is to identify issues that may apply to the use of longitudinal micro data sets, in general, for productivity analysis.

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1.   Available from the Commission's Web site at: www.pc.gov.au.

The BLS is described in the next section, together with the data issues encountering in the study. The study, undertaken by Productivity Commission colleagues and reported in Bland and Will (2001), is summarised in Section 3. Conclusions are presented in Section 4. These cover data issues, the findings from the study, plus some indications of future prospects for ABS collections of longitudinal micro data.

2.   The Business Longitudinal Survey

Australian researchers have gone to two main data sources to investigate productivity trends at the firm level:

- The Business Longitudinal Survey compiled by the ABS.

- The Australian Workplace Industrial Relations Survey (AWIRS) conducted by the Department of Employment, Workplace Relations and Small Business.

Use of these data sources is listed in Appendix A. Studies have drawn on the two AWIRS surveys conducted in 1990 and 1995. The BLS is the only longitudinal data set and the only source of data on firm entry and exit.[2]

The BLS design[3]

The BLS was primarily designed to provide longitudinal data relating to the growth and performance of small and medium-sized enterprises (SMEs). The BLS came into existence when the Office of Small Business (OSB) commissioned the ABS and the then Bureau of Industry Economics to design a survey to allow the investigation of SMEs in such areas as employment opportunities, export orientation, innovation and use of government programmes (Tozer, 2000).

The resulting data set is a rich source of information. However, its institutional origins, together with limitations on funding and the reporting load that could be placed on businesses, constrained its development as a "general-purpose" longitudinal micro data set.

- OSB funding limited the BLS to observations for the four financial years 1994-95 to 1997-98. The BLS has ceased and a four-year horizon limits the examination of longer-term trends.

- Although large businesses were included in the sample to permit population estimates, the sample focused on SMEs (Table 1).

- Reflecting the interests of the funding agency, the survey excluded agriculture, government and some other industries (Table 2). Manufacturing and Property and business services were considered a priority and the survey was designed to support more detailed analysis in these industries (Table 3).

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2.   One study not listed in the appendix uses insolvency and bankruptcy data (and BLS data) on firm exits (Bickerdyke *et al.*, 2000).

3.   Description of the BLS is based on Tozer (2000), Bland and Will (2001), and Will and Wilson (2001). Hawke (2000) also provides a general description.

Table 1. **Sample sizes for each year by size of business**

Employment size group	1994-95	1995-96	1996-97	1997-98	Four-year panel[1]
0-4	2 629	1 380	1 394	1 437	993
5-19	2 810	1 658	1 663	1 675	1 297
20-199	3 025	2 074	2 090	2 080	1 625
200 or more	436	458	556	618	330
Total	8 900	5 570	5 703	5 810	4 245

1. The four year panel represents those businesses that operated for the whole four years of the survey.
Source: Tozer (2000).

Table 2. **Industry coverage of the BLS**

Anzsic industry	Anzsic code
Industries included	
Mining	1100-1520
Manufacturing	2100-2949
Construction	4100-4259
Wholesale trade	4500-4799
Retail trade	5100-5329
Accommodation, cafes and restaurants	5700-5740
Transport and storage	6100-6709
Finance and insurance	7300-7520
Property and business services	7700-7869
Cultural and recreational services	(part of) 9100-9330
Personal services	(part of) 9500-9700
Industries excluded	
Agriculture forestry and fishing	0100-0499
Electricity, gas and water supply	3600-3799
Communication services	7100-7199
Government administration and defence	8100-8299
Education	8400-8499
Health and community services	8600-8799
Libraries, museums, parks and gardens	9210-9239
Other services	9600-9634
Private households employing staff	9700

ANZSIC: Australia New Zealand Standard Industrial Classification.
Source: Bland and Will (2001).

Table 3. **Sample sizes for each year by industry**

Industry	1994-95	1995-96	1996-97	1997-98	Four-year panel[1]
Mining	87	80	96	102	58
Manufacturing	3 272	2 043	2 056	2 035	1 568
Construction	471	318	327	361	241
Wholesale trade	1 147	816	847	844	667
Retail trade	938	561	591	605	423
Accomm. cafes & restaurants	335	232	233	255	154
Transport & storage	368	227	232	239	161
Finance & insurance	379	252	261	265	170
Property & business services	1 446	775	786	819	606
Cultural & rec. services	215	139	145	153	106
Personal & other services	242	127	129	132	91
Total	8 900	5 570	5 703	5 810	4 245

1. The four year panel represents those businesses that operated for the whole four years of the survey.
Source: Tozer (2000).

Other main design features of the BLS were as follows:

- Survey respondents were management units – defined as the lowest level of accounting unit in a business for which detailed accounts are maintained. This unit generally corresponds to an ownership entity, although large firms may have several management units corresponding to different lines of business. Each management unit in the survey was classified to the industry which provided its major source of income. Thus, while the measurement unit corresponds to a decision-making unit, it can cover heterogeneous activities and operations. Management units are hereafter referred to as firms.

- The initial set of firms to be surveyed were identified from a random sample on the ABS's Business Register, stratified by industry and employment size. Some historical data were collected in the first survey. (Details on the Business Register were sourced from employer registrations with the Australian Taxation Office.)

- Firms in the initial survey that were identified as innovative, exporters or growing were retained in the second survey (about 3 400 firms). Less than half (2 200) of the remaining firms (5 600) were retained for the second survey. A stratified random sample of about 800 of the firms that had joined the Business Register since the first survey were included in the second survey.[4] Similar principles were applied in subsequent surveys (Tozer, 2000).

- There were three groups of questions or data items:
    - Questions only asked once upon entry to the survey, covering items that did not change or changed predictably (for example, firm age).
    - Core items that were asked each survey.
    - One-off items included in only one survey.

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4.   Weights for the whole sample were adjusted to ensure its representativeness.

Data items

The main headings for data items collected in the survey are listed in Appendix A. The full list of items is presented in Tozer (2000).

Items of particular interest to productivity analysis are as follows:

- *Gross output:* Sales of goods and services; trading stocks (opening and closing).

- *Labour input:* Number of employees (working proprietors, partners or directors; other managerial; other employees; casuals).

- *Capital input:* Non-current assets (property, plant and machinery and other).

- *Intermediate inputs:* Purchases; motor vehicle running expenses; other operating expenses

Access to the BLS database

The BLS data are available, subject to confidentiality restrictions, in the following forms:

- ABS publications:[5]

  – Business Growth and Performance Survey (Cat. No. 8141.0).

  – Australian Exports, A Statistical Profile (Cat. No. 8154).

- A confidentialised unit record file (CURF), a file of unidentifiable unit records from all four surveys, in which:

  – All large businesses (more than 200 employees) are excluded.

  – All financial variables have been subject to perturbation – slight changes to protect identification.

  – Other classificatory, geographic and industry detail is suppressed.

- Remote access, whereby program code prepared by the client is run by ABS staff.

- Requests to the ABS for special tabulations or other data services.

The study sample

In undertaking their study, Bland and Will encountered a number of unforeseen difficulties in using the BLS data. They went to great lengths to "clean" the data. The challenges and approaches to dealing with them are documented in detail in Will and Wilson (2001). Since there is no reason to believe that at least some of these challenges would be confined to the BLS, some of the difficulties encountered are presented in Box 1 for the interest of others.

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5. Estimates are also available in the publication, *A Portrait of Australian Business.* The first issue (1995) was a joint publication of the Industry Commission and Department of Industry, Science and Tourism. Subsequent issues were published by the Office of Small Business.

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┌─────────────────────────────────────────────────────────────────────────────┐
│                    Box 1. Some issues encountered with the BLS                │
│                                                                               │
│ Bland and Will encountered a number of issues upon examination of the BLS     │
│ data set. The difficulties and how they were handled are documented in Bland  │
│ and Will (2001) and Will and Wilson (2001). Those that could possibly apply to │
│ other data sets are mentioned here.                                           │
│                                                                               │
│ Finance and insurance industry                                                │
│                                                                               │
│ Rogers (1998), in an analysis of labour productivity using the BLS, found that │
│ half the firms in the Finance and insurance industry had labour productivity  │
│ of less than zero because the survey excluded net interest income from the    │
│ measure of output.                                                            │
│                                                                               │
│ Property and business services industry                                       │
│                                                                               │
│ Of 902 firms in the Property and business services industry, 97 reported no   │
│ sales figure for either 1995 or 1998.                                         │
│                                                                               │
│ Imputed data                                                                  │
│                                                                               │
│ The ABS imputed missing information on questionnaire responses in order to     │
│ maintain population representativeness.                                       │
│                                                                               │
│ Maintenance of the Business Register                                          │
│                                                                               │
│ Earlier experience shows that problems can arise in business registers. Firms  │
│ on the ABS's Business Register were sourced from employer registrations        │
│ administered by the Australian Tax Office. Although a system was in place to   │
│ check the integrity of additions to the Register, there was no comprehensive   │
│ strategy for removing firms that had ceased. The ABS took steps to improve the │
│ accuracy of its Business Register around 1994-95, but some problems remained.  │
│                                                                               │
│ Illegitimate births and deaths of firms                                       │
│                                                                               │
│ A number of firms were counted as births, but reported an age of greater than  │
│ two years at survey entry. Factors contributing to these "illegitimate" births │
│ could be changes in employment status (triggering tax office registration),    │
│ lags in processing new firms to the Business Register, new management units    │
│ generated from business restructuring, or changes in legal status (ownership   │
│ or incorporation). A number of firms in the BLS also ceased to exist because   │
│ they became new business entities via the same processes that created          │
│ illegitimate births.                                                          │
│                                                                               │
│ Employment estimates                                                          │
│                                                                               │
│ Employer-based estimates of employment can differ from those based on          │
│ population surveys for a number of reasons, including omission or              │
│ understatement of senior executives, irregular casual employees and           │
│ "cash-economy" employees.                                                     │
└─────────────────────────────────────────────────────────────────────────────┘
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Bland and Will worked with the CURF. As noted above, this removed firms with more than 200 employees from the sample. Bland and Will also excluded quite a number of firms deemed to be outliers or for which data were missing. There was significant "noise" in the data that would have corrupted estimates if it were to remain.

However, there was a trade-off. The firms included in the Bland and Will sample accounted for 1.1% of Australia's value added and 1.5% of Australia's workers. With the various exclusions, the sample could not be taken to be representative of the population. The small sample size raised doubts about the representativeness of estimates of birth and death rates. In addition, small sample sizes in some industries restricted the analysis to six industries. The employment and industry distributions in the study sample did not match the population distributions (Table 4).

Table 4. **The employment and industry distribution of firms in the Bland and Will sample, 1997-98**

	Unit	BW sample[1]	Economy
GDP	AUD billion	6.2	564.7
Employment			
Total	Thousands	115	7 650
By firm size (workers)[2]			
1 to 4	%	1.9	19.9
5 to 19	%	11.9	34.9
20 to 99	%	57.8	32.6
100 to 1999	%	28.4	12.6
By industry			
Manufacturing	%	47.9	22.7
Construction	%	4.0	12.8
Wholesale trade	%	19.9	10.9
Retail trade	%	12.0	25.7
Accommodation, cafes & restaurants	%	4.0	8.8
Property and business services	%	12.9	19.0

1. The unweighted sample used by Bland and Will (2001), based on the CURF from the BLS, with outliers and firms with missing data removed.
2. The data on employment by firm size for the economy cover only private sector workers. Firms with more than 200 workers are excluded from the comparison because they are not in the BLS file used for this research.
Source: Bland and Will (2001).

Table 5. **Average labour productivity growth[1] by industry sub-sample, 1994-95 to 1997-98**

	Sample			Population[2]	
	AUD	Unweighted	Weighted	Employment[3]	Hours worked
	thousand	% pa	% pa	% pa	% pa
Manufacturing	-3.0	-1.7	-2.3	2.5	3.9
Construction	-0.2	-0.1	2.0	4.0	3.6
Wholesale trade	10.7	5.9	4.1	4.7	4.9
Retail trade	-0.3	-0.2	4.8	4.3	5.0
Accommodation, cafes & restaurants	-2.6	2.2	-3.7	-0.5	-0.5
Property & business services	5.0	2.6	5.9	-0.1	-0.1
Total	1.0	0.6	2.1	4.0	4.0

1. Growth in average value added per worker in 1994-95 prices.
2. Derived from published ABS data from national accounts sources.
3. Part-time employees were taken be 0.426 full-time equivalents.
Source: Bland and Will (2001), ABS.

There were troubling differences between sample and "population" estimates of labour productivity growth (Table 5). The table shows both unweighted and weighted estimates, where the weights are those used by the ABS to derive population estimates from sample data.[6] The population estimates in Table 5 are derived from national accounts sources. Both an employment and hours worked measure of labour input are included for comparison.

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6.   These weights could not be amended to reflect the fact that large firms were excluded from the CURF and that Bland and Will had excluded a number of other firms from their sample.

The differences in estimates could reflect the combined effects of a number of factors, including:

- The unrepresentativeness of the study sample due to the exclusion of large and outlying firms.

- Differences in unit of measure:

    – The BLS uses management units, whereas the national accounts are based on establishments.

- Differences in price deflation to estimate real output growth:

    – The ABS uses deflators at a detailed industry level (two- and three-digit classifications) in calculating real output. However, in terms of readily-available deflators, Bland and Will had little option but to use broad industry deflators and apply them to value-added estimates.

- Differences in sources of employment estimates:

    – The BLS-based estimates are employer nominated, whereas the national accounts estimates are derived from household surveys.

- Differences in value-added measures:

    – Some intermediate expenditures, for example on financial services and property services are not included in the micro data.

At first glance, it seems surprising that, while firms with high employment and/or sales growth were highly represented in the BLS design, these characteristics do not appear to have translated into higher average productivity growth within the study sample (although it does happen in some industries, especially Property and business services). This may be the result of the various exclusions of firms from the study sample. In fact, firms within the study sample that met the high growth criteria were more likely than those that did not to record a decline in labour productivity (see transition matrix at Appendix B).[7]

The transition matrix also provides evidence of the heterogeneity of labour productivity levels and growth. In 1994-95, average value added per worker at the upper boundary of the lowest decile was AUD 17 800 compared with AUD 84 000 at the lower boundary of the highest decile. Almost 60% of firms in the lowest decile in 1994-95 were in a higher decile in 1997-98. Likewise, around 50% of firms moved from the highest decile into lower deciles over the survey period.

Bland and Will encountered two particular problems that affected their approach – "illegitimate" births and deaths of firms (Box 1). Nearly 50% of firms that entered the data set after year 1 reported an age of greater than two years. These were not new start-ups but rather firms affected by such things as ownership change (merger or acquisition) or incorporation. Similarly, some firms already in the sample that incorporated or underwent a change in ownership had been treated as deaths. In both cases, the relevant firms could be considered for productivity analysis as continuing (although, for other purposes, they could be considered as deaths). However, the *ex-post* identification of illegitimate births and deaths could only be approximate, and a lack of information on firms prior to "entry" and after "exit" prevented

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7. John Baldwin pointed out that Canadian studies have shown that plants with stronger output growth do not show stronger productivity growth over the same period (see, for example, Baldwin and Gu, 2001).

them from being combined with continuing firms. How so-called illegitimate deaths are defined and handled is a vital issue, both conceptually and practically.[8]

The number of firms in Bland and Will's sample, by industry and type of transition, is presented in Table 6. There are more true deaths than true births in the sample, but the numbers are of a similar order of magnitude. The exit rate in the sample was about 9% over the three years from the base year.[9] Deaths are well ahead of births in Manufacturing.

Table 6. **Numbers of firms in the Bland and Will sample, by industry**

	Continuing	True births	True deaths	Illegitimate births	Illegitimate deaths
Manufacturing	1 321	89	128	182	161
Construction	193	30	25	55	27
Wholesale trade	515	51	38	71	58
Retail trade	343	56	54	79	66
Accommodation, etc	119	17	24	38	25
Property, etc	411	38	51	78	52
Total	2 902	281	320	503	389

Source: Bland and Will (2001).

3.   Entry, exit and resource movements

Despite the limitations of the BLS data set for this kind of study, it was judged that the project could generate useful insights and focus some attention on the prospective benefits that could be gained, should the ABS be able to extend its collection of longitudinal micro data in the future.

Bland and Will investigated the effects of entry, exit and resource movements on labour productivity change. Capital stock data were available from the BLS. The analysis of labour productivity change was judged to be sufficiently challenging without encountering further difficulties in using capital data to generate multifactor productivity estimates. Estimates of capital services, needed for consistency with broad industry and aggregate MFP estimates, were not available.

Labour productivity was calculated as the ratio of:

- Output: defined as value-added measured as sales plus change in inventories less purchases of intermediate inputs (see above), at constant 1994-95 prices; to

- Full-time equivalent workers.[10]

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8.   Illegitimate deaths may be better considered as continuing for longitudinal purposes, but the changes in measurement units are relevant to the determination of population estimates from samples at different points.

9.   Calculated as the number of true deaths as a proportion of continuing firms, plus true deaths, plus illegitimate deaths. As will be seen in the next section the base year was 1994-95 and the end year was 1997-98.

10.   It was assumed that a part-time worker was equivalent to 0.426 of a full-time worker (the ratio of hours worked by part- and full-time workers in 1995). Employment estimates were averaged over two years.

Methodology

Bland and Will used the methodology set out in Foster *et al.* (1998). The equation for decomposing changes in labour productivity between $t0$ (1994-95) and $t3$ (1997-98) is as follows:

$$\Delta P_t = \sum_{f \in C} S_{ft0}\Delta P_{ft} + \sum_{f \in C} (P_{ft0} - \overline{P}_{t0})\Delta S_{ft} + \sum_{f \in C} \Delta S_{ft}\Delta P_{ft} +$$
$$\sum_{f \in N} S_{ft3}(P_{ft3} - \overline{P}_{t0}) - \sum_{f \in X} S_{ft0}(P_{ft0} - \overline{P}_{t0})$$

where:

ΔP_t denotes the change in average productivity between $t0$ and $t3$

P_{ftj} denotes a firm's labour productivity in period j ($t0$ or $t3$)

ΔP_{ft} denotes the change in labour productivity for a firm between $t0$ and $t3$

$\overline{P}_{t0}$ denotes average productivity at $t0$

S_{ftj} denotes a firm's employment share in period j ($t0$ or $t3$)

ΔS_{ft} denotes the change in employment share for a firm between $t0$ and $t3$.

The first three terms capture the contribution from continuing firms and are respectively:

- The *within-firm effect*, which captures the contribution of labour productivity changes within firms, holding employment shares constant (at their base period level).

- The *between-firm effect*, which measures the contribution from changes in employment shares (or resource use), holding labour productivity at each firm constant (at its level relative to the group average in the base period).

- The *mix effect*, which accounts for the interaction of changes in employment shares and labour productivity.

Contributions from entering and exiting firms are captured in the fourth and fifth terms. The contributions are specified in terms of the entering or exiting firm's productivity level, relative to the average of firms in operation in the base period.

Results

Implementation of the decomposition shows that growth in average labour productivity is dominated by the contribution from continuing firms, both in aggregate and in each industry sub-sample (Table 7). True entry and exit together contribute little to the change in average labour productivity. The contribution from illegitimate births and deaths is also small relative to that from continuing firms.[11]

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11.   It was assumed that illegitimate births and deaths have similar experiences to the average continuing firm, and they were therefore given no further attention in the analysis.

The dominance of the continuing-firm effect is consistent with the findings in other OECD countries (OECD, 2001b). The OECD study notes that the continuing-firm effect (specifically, the within-firm effect) is more prominent in periods of expansion (see also Barnes *et al.*, 2001). The period covered by the BLS was one of rapid expansion in the Australian economy.

Table 7. **Decomposition of changes in average labour productivity[1] by industry sub-sample, 1994-95 to 1997-98**

AUD thousand

	Net continuing firm effect	Net true entry and exit	Net illegitimate entry and exit	Overall change[2]
Manufacturing	-3.1	0.3	-0.2	-3.0
Construction	0.9	-0.7	-0.3	-0.2
Wholesale trade	8.3	0.3	2.2	10.7
Retail trade	2.4	-0.5	-2.2	-0.3
Accommodation	-1.6	-0.2	-0.9	-2.6
Property, etc.	6.1	0.2	-1.5	5.0
Total	1.1	0.1	-0.2	1.0

1. Growth in average value added per worker in 1994-95 prices.
2. Slight differences between the sum of figures in columns 1 through 3 and the final column reflect rounding.
Source: Bland and Will (2001).

The contribution from entering and exiting firms

True birth firms in all industry sub-samples had lower labour productivity in 1997-98 than the average firm in operation in 1994-95 (Table 8). One explanation may be the short time period covered by the BLS.[12] It is likely that these firms were still approaching effective operation. In fact, inspection of their position on the distribution of labour productivity in 1997-98 reveals that they were disproportionately located in the lowest deciles (Appendix B).

Table 8. **Decomposition of changes in labour productivity[1] by industry sub-sample, 1994-95 to 1997-98**
Decomposition of change among entering and exiting firms; AUD thousand

	True births	True deaths	Net true entry and exit	Illegitimate births	Illegitimate deaths	Net illegitimate entry and exit
Manufacturing	-0.4	-0.7	0.3	-1.0	-0.8	-0.2
Construction	-1.1	-0.4	-0.7	-1.6	-1.3	-0.3
Wholesale trade	-0.2	-0.5	0.3	1.7	-0.5	2.2
Retail trade	-0.6	-0.1	-0.5	-2.9	-0.7	-2.2
Accommodation	-1.0	-0.8	-0.2	-0.7	0.2	-0.9
Property	-0.5	-0.7	0.2	-2.5	-1.0	-1.5
Total	-0.5	-0.6	0.1	-1.0	-0.8	-0.2

1. Growth in average value added per worker in 1994-95 prices.
Source: Bland and Will (2001).

True death firms had lower productivity in 1994-95 than the average firm in operation at that time. In fact, almost a quarter of true deaths was located in the lowest decile of the productivity distribution in 1994-95.

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12.   International research has found that the contribution of net entry rises as the duration of the survey period increases (Baldwin, 1995; OECD, 2001b).

OECD (2001b) and Barnes *et al.* (2001) found a relatively large negative entry effect in the United States and a small positive effect in a number of European countries. The effect of exit on productivity was also much stronger in the United States (exiting firms in the United States are much less productive). These findings were part of the evidence that suggested greater firm experimentation in the US economy.

To the extent that the results of the Bland and Will study are comparable, they suggest that the Australian experience is more in line with that of the United States.

The contribution from continuing firms

The within-firm effect dominates the contribution from continuing firms in each industry sub-sample – productivity changes at continuing firms contributed more to average labour productivity change than changes in firms' employment shares (Table 9).[13] At the aggregate level, there was also a strong between-firm effect, but this was offset by an equally strong mix effect. Barnes *et al.* (2001) find negative mix effects in manufacturing in their sample of OECD countries. The United States shows relatively large (positive) between-firm and (negative) mix effects.

Table 9. **Decomposition terms for continuing firms by industry sub-sample, 1994-95 to 1997-98**

AUD thousand

	Within-firm effect	Between-firm effect	Mix effect	Net continuing firm effect
Manufacturing	-2.8	1.5	-1.8	-3.1
Construction	1.3	-0.3	-0.1	0.9
Wholesale trade	6.8	2.5	-1.0	8.3
Retail trade	2.9	0.1	-0.6	2.4
Accommodation	-0.9	-0.6	-0.1	-1.6
Property, etc.	8.2	1.0	-2.9	6.1
Total	1.1	1.3	-1.3	1.1

Source: Bland and Will (2001).

The positive between-firm effect for the sample suggests that, on average, employment shares fell at firms with below-average labour productivity in the base period, and/or rose at firms with above-average labour productivity. (The negative sign in two industry sub-samples means the dominant effect came from firms in these industries with above-average productivity losing employment and below-average firms attracting employment.)

The negative mix effect for the sample (and each industry sub-sample) means that, on average, labour productivity rose at firms that reduced employment share and/or fell at firms that gained employment share.

The combination of between-firm and mix effects suggests that, on average:

- Firms that had above-average labour productivity levels in the initial period attracted employment but, with that employment growth, labour productivity fell over the period.

- Firms that had below-average labour productivity levels in the initial period lost employment share and that contributed to productivity growth.

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13. Foster *et al.* (1998) report a similar finding for US manufacturing over the period 1977-87.

A taxonomy of firms

Bland and Will had a particular interest in resource movements (change in employment shares) between high- and low-productivity firms. However, reference to the above decomposition equation shows that resource movements are split between the between-firm and mix effects. Bland and Will developed a taxonomy of firms to disentangle these effects. The taxonomy was an extension of the classification of firms employed by Baily *et al.* (1994) in their study of the impact of downsizing on productivity growth.[14] Bland and Will used their taxonomy to analyse whether a shift in employment shares from below-average performers to above-average performers made a positive contribution to labour productivity growth.

Continuing firms were classified into one of eight groups defined by whether the firms had:

- Above- or below-average productivity in the base period.

- Increased or lost employment share over the study period (upsizers and downsizers).

- Reported an increase or decrease in labour productivity over the study period (successful or unsuccessful).

The taxonomy is summarised in Table 10. The first column contains the sign the within-firm effect takes for each group. Columns two and three contain the signs that can be taken by the two components of the between-firm effect, and columns four and five denote the signs that can be taken by the components of the mix effect.

Table 10. **A taxonomy of continuing firms**

		Within-firm effect	Between firm effect		Mix effect	
		$S_0 \Delta P$	$(P_0 - \overline{P_0})$	ΔS	ΔP	ΔS
1	Successful above average upsizers	+	+	+	+	+
2	Unsuccessful above average upsizers	–	+	+	–	+
3	Successful above average downsizers	+	+	–	+	–
4	Unsuccessful above average downsizers	–	+	–	–	–
5	Successful below average upsizers	+	–	+	+	+
6	Unsuccessful below average upsizers	–	–	+	–	+
7	Successful below average downsizers	+	–	–	+	–
8	Unsuccessful below average downsizers	–	–	–	–	–

1. The components of this table reflect the first three terms of Equation 5. Summation signs, and the firm and time subscripts are omitted from the column headings to improve presentation.
Source: Bland and Will (2001).

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14. These authors categorised firms into one of four groups depending on whether the changes in their employment share and productivity were positive or negative.

Table 11. **Distribution of continuing firms and employment across the taxonomy by industry, 1994-95 employment shares in brackets**

Percentages

		Mfg	Const.	W'sale	Retail	Accom.	Property	Total
1	Successful above-average upsizers	2.4 (2.9)	3.6 (5.3)	9.5 (11.6)	1.2 (0.5)	0.8 (4.8)	7.5 (13.6)	4.2 (5.7)
2	Unsuccessful above-average upsizers	12.3 (14.3)	9.3 (14.0)	14.0 (13.5)	7.3 (7.0)	10.1 (8.8)	11.4 (11.3)	11.6 (12.9)
3	Successful above-average downsizers	4.9 (7.6)	2.6 (4.1)	9.5 (13.0)	2.0 (3.6)	3.4 (3.8)	8.8 (11.8)	5.7 (8.5)
4	Unsuccessful above-average downsizers	9.3 (14.9)	6.7 (16.9)	8.4 (9.4)	4.7 (6.3)	5.9 (10.9)	9.0 (14.1)	8.2 (12.7)
5	Successful below-average upsizers	11.4 (8.3)	14.5 (15.9)	15.9 (12.6)	22.7 (26.6)	14.3 (11.6)	17.3 (14.0)	14.7 (12.1)
6	Unsuccessful below-average upsizers	13.7 (10.7)	11.9 (8.4)	8.0 (6.1)	20.4 (16.7)	18.5 (20.7)	7.3 (5.1)	12.7 (10.0)
7	Successful below-average downsizers	27.4 (23.1)	36.3 (26.4)	27.6 (28.4)	28.9 (29.8)	29.4 (28.7)	28.2 (28.4)	28.4 (25.2)
8	Unsuccessful below-average downsizers	18.7 (18.3)	15.0 (9.1)	7.2 (5.4)	12.8 (9.4)	17.7 (10.7)	10.5 (6.9)	14.5 (13.0)
Number of firms		1 321	193	515	343	119	411	2 902
Number of workers		44 252	3 086	17 008	8 972	2 421	9 660	85 399

1. Employment shares are shown in brackets.
Source: Bland and Will (2001).

Table 12. **Contribution of continuing firms to labour productivity growth[1] by taxonomy category**

AUD thousand

	Mfg	Const.	W'sale	Retail	Accom.	Property	Total
Successful above-average upsizers	1.0	0.9	2.8	1.8	0.0	4.0	1.9
Unsuccessful above-average upsizers	-3.5	-2.6	-2.0	-1.4	-0.4	-3.0	-2.6
Successful above-average downsizers	0.9	0.6	1.4	0.8	0.0	1.5	1.1
Unsuccessful above-average downsizers	-2.7	-4.5	-1.2	-2.0	-4.1	-4.2	-2.8
Successful below-average upsizers	1.2	3.1	3.1	1.5	0.1	2.1	1.7
Unsuccessful below-average upsizers	-2.3	-0.7	-1.0	-0.7	-0.2	-0.7	-1.5
Successful below-average downsizers	2.7	4.1	5.4	2.5	2.6	6.4	3.5
Unsuccessful below-average downsizers	-0.3	0.0	-0.1	-0.2	0.4	-0.1	-0.2
Total	-3.1	0.9	8.3	2.4	-1.6	6.1	1.1

1. Growth in average value added per worker in 1994-95 prices.
Source: Bland and Will (2001).

The impact of the movement of resources to high-productivity firms can be assessed by taking the contributions from categories 1 and 2 of the taxonomy. This shows that almost 16% of firms (accounting for 19% of employment) had above-average labour productivity in 1994-95 and raised their employment shares over the period (Table 11). However, labour productivity increased at only about a quarter of these firms. In other words, resources flowed into these better performers but a large majority did not maintain their labour productivity level in the process. As a group, these firms made a negative contribution to average labour productivity change (Table 12). (Note that this conclusion does not apply for all industry sub-samples.)

The movement of resources from low-productivity firms is indicated by categories 7 and 8. Almost 43% of firms (38% of employment) had less than average labour productivity in 1994-95 and decreased

employment shares. Labour productivity increased at two-thirds of these firms and as a group these firms made a large positive contribution to productivity change. (A similar conclusion applies for all industry sub-samples.)

Overall, for the firms in the sample, the movement of resources into firms with above-average labour productivity in 1994-95 and out of firms with below-average labour productivity made a strong positive contribution to average labour productivity growth. Nevertheless, this contribution was driven largely by increases in labour productivity at firms that shed employment.

These flows into more-productive and out of less-productive firms encompass 60% of firms in the sample. A further 14% of firms were above-average downsizers – who detracted from productivity growth over the period. The balance were below-average upsizers – who had little overall impact on productivity growth.

Downsizing was an important part – but not the only part – of the productivity improvement. Firms that started with below-average productivity and downsized were the largest individual group (28%) and made the largest contribution of any group to productivity growth. However, about 19% of firms (in categories 1 and 5) upsized and contributed to the same extent. It would appear that downsizing was forced on many firms (nearly a quarter of the sample) without improvement in their productivity performance.

It is curious that many firms starting with high productivity levels did not maintain their performance. Nearly 30% of firms started above average, but only a third of them increased productivity. Unearthing the reasons for this would require further investigation.

The contribution pattern across industries is quite similar. The Construction and Wholesale trade industries, however, show larger positive contributions from upsizing firms.

4.   Concluding remarks

These concluding remarks cover the data issues encountered in using the BLS, the main findings from the study, and the prospects for longitudinal data in the future. For a more policy-oriented discussion of firm exits, see Bickerdyke *et al.* (2001).

Data issues in using firm-level data

The use of the BLS in this study has raised a number of in-principle issues in relation to the consistency of productivity estimates obtained from micro data sets with those obtained from national accounts sources:

- Differences in measurement unit.

- Comparability in price deflation and availability of suitable price deflators.

- Differences in inclusions in intermediate inputs.

- The need to rely on employment, rather than hours-worked estimates.

- Different sources for measurement of employment.

- The lack of availability of capital services estimates from micro data.

Particular problems were encountered in the measurement of output of two industries:

- Finance and insurance.

- Property and business services (which is excluded from national accounts-based productivity estimates for Australia).

Some statistical issues that have implications beyond productivity analysis were encountered:

- The need for maintenance of business registers, especially recording deaths.

- Difficulties in handling changes, such as mergers and acquisitions (illegitimate births and deaths).

- Perturbation of data to maintain confidentiality and the imputation of missing data to maintain the panel of firms and representativeness.

- The need for an adequate time horizon to analyse some longer-term effects to implement adequate controls in hypothesis testing.

While it is relatively easy to pinpoint problems, pinpointing solutions in many cases is much more difficult. Addressing these issues has also to recognise the reality of the constraints on funding and the political sensitivity towards the loads that can be placed on respondents.

Resource movements and productivity growth

After losing large firms in the CURF and further observations through data cleaning, there are doubts about how well the remaining sample used in this study represents the population. However, some reassurance can be taken from the fact that similar findings in some cases have been reached in overseas studies. The main findings are as follows.

There is considerable heterogeneity in productivity levels and growth across firms, even within the same industry.

Continuing firms provided the dominant contribution to changes in average labour productivity growth – both at the aggregate and industry level.

The within-firm effect was the most important component of the continuing-firm contribution in each industry in the sample. The between-firm and mix effects were slightly higher at the aggregate level, but they were offsetting.

Among continuing firms, the movement of resources into firms with above-average labour productivity and out of firms with below-average productivity was associated with a positive contribution to average labour productivity change.

Two groups had the most influence on the results:

- The positive influence on labour productivity of firms that started with below-average productivity but downsized.

- The negative influence of firms that started out above average, but reduced labour productivity over the period.

However, strong positive contributions to labour productivity growth were also recorded by firms that increased their employment share.

Bearing in mind the measurement difficulties and the representativeness of the sample, the numbers of deaths and births in the sample are of the same order of magnitude, although deaths outweigh births in Manufacturing.

The movement of resources associated with firm entry and exit in the sample accounted for only a small share of labour productivity change. Firms that ceased operation tended to have low labour productivity prior to exiting the sample. Their departure contributed to positive labour productivity growth, but this effect was offset by the fact that firms that began operation also tended to display relatively low labour productivity. The result for entering firms suggests that they require time to become established and show strong labour productivity improvement.

International comparisons have pointed to differences in micro dynamics between the United States and a number of European countries (OECD, 2001; Barnes *et al.*, 2001). Possible explanations have included the greater encouragement of experimentation in the US economy (through ease of firm entry and exit). This in turn points to differences in institutional and regulatory arrangements governing access to venture capital, flexibility of labour market arrangements, bankruptcy provisions, and so on.

To the extent that the Bland and Will study is comparable, it suggests that the Australian experience in the second half of the 1990s has been more in line with the US model.

Future prospects for longitudinal data

Collections for the BLS were terminated from the 1997-98 year. However, one development raises hopes for the future. The introduction of a new tax system in Australia in July 2000 brought new reporting requirements for businesses, in particular, to administer the new broad-based goods and services tax. The ABS has been able to access data submitted to the Australian Tax Office for statistical purposes. It is using the tax registrations to check and improve its Business Register and will move towards the tax-generated register in the future.

Moreover, the ABS is starting to combine regular tax-reporting data with its survey-based data. This enables the ABS to improve the quality and comprehensiveness of its statistics while observing the constraints on funding and reporting burdens on businesses.

This move is already evident in the ABS's use of tax data in conjunction with its annual Economic Activity Survey. A new ABS publication, *Australian Industry* (Cat. No. 8155.0) provides finer industry detail, as well as more detail on expenses, than has previously been possible. Work is underway to encompass more industries and to include more growth and performance indicators. It is expected that at least some longitudinal firm-based data will be available in the near future. The ABS is actively considering ways to satisfy the interest in longitudinal micro data by using tax data for regular information, combined with regular supplementary surveys covering nominated features.

These developments raise the prospects of obtaining more up-to-date and accurate data on firm entry and exit. However, the regular collections of data from tax sources will have a financial orientation and may have measurement units that are not as well suited to some economic analyses. This is likely to frustrate the examination of productivity trends. Researchers with a productivity interest may have to be content with inferior regular measures or more rigorous snapshots at longer intervals, based on supplementary surveys.

Appendix A

SOURCES AND USES OF FIRM-LEVEL DATA

This appendix provides information on the sources available for firm-level data, and their usage.

A.1   Business Longitudinal Survey

The Business Longitudinal Survey (BLS) was conducted by the Australian Bureau of Statistics (ABS) for the financial years 1994-95 to 1997-98.

Coverage

There was a series of questions under each of headings listed in Table A1. The full list is available in Tozer (2000). Each areas was covered in each survey, but some detailed questions changed between surveys.

Uses

The following is a selection of publications which have used the BLS.

- *A Portrait of Australian Business: Results of the 1995 Business Longitudinal Survey*, Industry Commission and Department of Industry Science and Tourism, AGPS, Canberra, 1997.

    – Based upon data from the 1994-95 wave of the BLS, the analysis in this publication sought to highlight the (future) potential uses of the survey data and to provide a summary of the data collected in statistical tables.

- *Why Australia Needs Exports: The Economic Case for Exporting*, T. Harcourt, Discussion Paper of the Australian Trade Commission and the Centre for Applied Economic Research at the University of New South Wales, Sydney, 2000.

    – This paper sought to provide insights into the characteristics of exporting Australian firms, and to demonstrate the benefits and importance of exports to the community and the economy. Data on the BLS from the ABS publication *A Portrait of Australian Exporters*, (Cat. No. 8154.0, 2000) was used.

Table A1. **Business Longitudinal Survey data items**

Variables
Employment
Labour turnover
Contracting out
Locations operated, opened and closed
Legal status
Business age
Foreign ownership
Family businesses
Characteristics of decision maker in businesses with only one decision maker
Franchising
Union membership
Employment conditions
Days and hours of operation
Use of business improvement programmes
Performance comparisons
Business practices
Expenses
Trading stocks
Profit or loss
Assets and liabilities
Equity
Capital expenditure and disposal of assets
Training
Innovation
Business disputes
Health and safety
Membership of industry associations

Source: Tozer (2000).

- *Deriving an Empirical Development Taxonomy for Manufacturing SME's using Data from Australia's Business Longitudinal Survey*, R. McMahon, School of Commerce, Flinders University, Research Paper 00-4, 2000.

  - In this paper the BLS is employed to develop an empirically based taxonomy of firms which is used to identify the growth paths of small to medium-sized enterprises in Australia's manufacturing industry.

- *Gazelles in the 1990s: Why Did They Leap so High? An Analysis of High Growth Firms from the Australian Business Longitudinal Survey 1994-95 to 1997-98,* J. Hall and C. Tozer, ABS Small Business Unit paper presented at the PC-ABS workshop on the BLS, Productivity Commission, 20 June 2000.

  - In this paper the operational characteristics of firms experiencing high growth in income and employment over the BLS survey period are analysed with comparisons being made to other businesses on a range of characteristics.

Melbourne Institute of Applied Economic and Social Research

The Melbourne Institute used the BLS as part of a major study into the performance of Australian enterprises. Here a some papers relating to that project.

- *Enterprise Bargaining and Productivity: Evidence from the BLS*, Y. Tseng and M. Wooden Working Paper No. 8/01, 2001.

  – Uses the BLS to examine the link between enterprise agreements and productivity.

- *Innovation in Australian Enterprises: Evidence from the BLS and IBIS databases,* M. Rogers.

  – The paper investigates data relating to innovation. Data includes questions on whether innovation occurred and expenditure on innovation.

- *Productivity in Australian Enterprises: Evidence from the ABS Business Longitudinal Survey*, M. Rogers.

  – Constructs a measure of labour productivity from the BLS, and examines differences between industry, firm size and firm age.

- *The Performance of Small and Medium Enterprises: An Overview using the Business Longitudinal Survey,* M. Rogers.

  – Provides an overview of the performance of SMEs using three aspects of performance, profitability, productivity and innovation.

- *Exploring SME Performance in Australia: An Analysis of the Business Longitudinal Survey* (Report prepared for the Office of Small Business), M. Harris, M. Rogers and Y. Tseng.

  – Explores performance of SMEs using three aspects of performance, profitability, productivity and innovation. The relationship between firm characteristics and performance by industry and firm size is also investigated.

- *Understanding Innovative Firms: An Empirical Analysis of the GAPS,* M. Rogers, Working Paper No. 8/00, 2000.

  – The determinants of innovation at the firm level are investigated utilising information from the 1994-95 to 1996-97 Business Growth and Performance Surveys (BGAPS).

- *Analysing Firm-level Labour Productivity using Survey Data,* M. Rogers and Y. Tseng, Working Paper No. 10/00, 2000.

  – The determinants of labour productivity in the Australian manufacturing sector are investigated utilising information from the 1994-95 to 1996-97 BGAPS.

A.2   AWIRS

The Australian Workplace Industrial Relations Surveys of 1990 and 1995 were undertaken by the Department of Industrial Relations, now the Department of Employment, Workplace Relations and Small Business.

Coverage

Industry coverage is the non-agricultural ANZSIC divisions.

AWIRS 95 comprises four surveys, each with one or more questionnaires. Table A2 outlines the structure of AWIRS 95.

Table A2. **Structure of AWIRS 95**

Survey	Questionnaire
Main	Employee relations management
	General management
	Union delegate
	Workplace characteristics
Employee	Employee
Small workplace	Small workplace
Panel	Employee relations management
	General management
	Union delegate
	Workplace characteristics

AWIRS 95 was a larger and more complex survey than AWIRS 90 because it included a panel survey and an employee survey. There were a number of other differences as well (see C*hanges of Work: The 1995 Australian Workplace Industrial Relations Survey*, A. Morehead *et al.*, 1997).

Uses

AWIRS database has been used as part of research into many papers, including:

- *Youth Wages and Employment*, Productivity Commission Staff Research Paper, 1998.

  – This paper uses the AWIRS in its analysis of youth wages as a factor in determining youth unemployment.

The Melbourne Institute have also published a number of working papers using the AWIRS, of which a selected few are presented below:

- *Labour Productivity in Australian Workplaces: Evidence from the AWIRS*, J. Loundes, Working Paper No. 19/99, 1999.

  – This paper provides some empirical evidence on the determinants of labour productivity using data from the AWIRS.

- *Innovation in Australian Workplaces: An Empirical Analysis Using AWIRS 1990 and 1995*, M. Rogers, Working Paper No. 3/99, 1999.

  – This paper investigates the determinants of innovation in a panel of 698 Australian workplaces. The data comes from the 1990 and 1995 AWIRS.

A.3   Economic Activity Survey

The Economic Activity Survey (EAS) conducted by the ABS provides key measures on the income and expenditure of Australian industries. The EAS is published at the industry level. However, certain more detailed data are available on request.

Coverage

Industry coverage

The EAS covers all ANZSIC except for:

- Units belonging to the following ANZSIC subdivisions:

    - 81 Government Administration;

    - 82 Defence;

    - 97 Private Households Employing Staff;

- Business classified to the General Government sector.

- Agricultural businesses with an estimated value of agricultural operations of less than AUD 22 500.

Coverage of the survey varies in accordance with other specific collections being undertaken in the reference year. In addition, data from the Australian Tax Office and the Australian Prudential Regulation Authority are incorporated with directly collected data.

Data coverage includes:

- Number of operating management units and employment by industry division.

- Income and expenditure and balance sheet items.

- Industry averages and ratios.

Publications

Estimates are published annually in Business Operations and Industry Performance, Australia, Preliminary (Cat. No. 8142.0) and Business Operations and Industry Performance, Australia (Cat. No. 8140.0)

Other publications include:

Summary of Industry Performance (Cat. No. 8140.055.002)

Industry Concentration Statistics (Cat. No. 8140.040.001)

Australian Industry (Cat. No. 8155.0). This publication presents estimates derived using a combination from the EAS and business income tax data provided to the Australian Tax Office.

A.4   IBIS

The IBIS database is a private sector database compiled by IBIS Business Information Ltd.

Coverage

The database provides information at the industry level, company profiles and the general business environment. Industry coverage is for all ANZSIC divisions. Each industry report includes definition, key statistics, market characteristics, segmentation, conditions, performance, participants, key factors and industry outlook.

IBIS provides information on the top 2 000 Australian companies ranked by turnover. The data provided on each company are company details, company news, personnel, financial, segments, shareholders, subsidiaries, and service providers.

In addition IBIS also provides information on the business environment, such as detailed economic statistics, demographics, labour, etc.

Use

IBS is generally used by corporate researchers, analysts, accountants, auditors, sales and marketing managers, bankers, credit managers and investors.

The Melbourne Institute has used the IBIS in a number of its working papers as part of the Innovation, Productivity, and Profitability of Australian Enterprises programme.

Table A3. **Transition matrix**

Figures in parentheses are percentages

		1	2	3	4	5	6	7	8	9	10	Total cont'ing	Illeg. births	True births	Total 1998
		Productivity deciles in 1995													
Productivity deciles in 1998	1	89	36	20	15	10	2	5	3	1	0	181	107	80	368
		(40.3)	(13.3)	(7.0)	(5.1)	(3.3)	(0.7)	(1.7)	(1.0)	(0.3)	(0.0)	(6.2)	(21.3)	(28.5)	
	2	45	77	42	31	24	17	14	9	10	0	269	64	36	369
		(20.4)	(28.5)	(14.6)	(10.6)	(7.9)	(5.7)	(4.7)	(2.9)	(3.3)	(0.0)	(9.3)	(12.7)	(12.8)	
	3	28	47	58	40	31	26	23	11	12	5	281	54	33	368
		(12.7)	(17.4)	(20.2)	(13.7)	(10.3)	(8.7)	(7.6)	(3.6)	(4.0)	(1.5)	(9.7)	(10.7)	(11.7)	
	4	18	35	49	60	44	36	21	14	8	6	291	44	35	370
		(8.1)	(13.0)	(17.1)	(20.5)	(14.6)	(12.0)	(7.0)	(4.6)	(2.7)	(1.9)	(10.0)	(8.7)	(12.5)	
	5	19	15	40	44	46	42	38	21	20	9	294	51	23	368
		(8.6)	(5.6)	(13.9)	(15.1)	(15.2)	(14.0)	(12.6)	(6.9)	(6.6)	(2.8)	(10.1)	(10.1)	(8.2)	
	6	9	14	30	35	53	47	55	30	21	19	313	44	12	369
		(4.1)	(5.2)	(10.5)	(12.0)	(17.5)	(15.7)	(18.3)	(9.8)	(7.0)	(5.9)	(10.8)	(8.7)	(4.3)	
	7	6	13	21	27	40	50	47	52	45	21	322	35	11	368
		(2.7)	(4.8)	(7.3)	(9.2)	(13.2)	(16.7)	(15.6)	(17.0)	(15.0)	(6.5)	(11.1)	(7.0)	(3.9)	
	8	5	16	12	16	28	36	45	67	53	35	313	38	17	368
		(2.3)	(5.9)	(4.2)	(5.5)	(9.3)	(12.0)	(15.0)	(21.9)	(17.6)	(10.8)	(10.8)	(7.6)	(6.0)	
	9	2	14	10	17	22	27	32	61	70	69	324	28	18	370
		(0.9)	(5.2)	(3.5)	(5.8)	(7.3)	(9.0)	(10.6)	(19.9)	(23.3)	(21.4)	(11.2)	(5.6)	(6.4)	
	10	0	3	5	7	4	16	21	38	61	159	314	38	16	368
		(0.0)	(1.1)	(1.7)	(2.4)	(1.3)	(5.4)	(7.0)	(12.4)	(20.3)	(49.2)	(10.8)	(7.6)	(5.7)	
Total continuing		221	270	287	292	302	299	301	306	301	323	2902	503	281	3686
Illegitimate deaths		63	47	36	39	38	38	36	32	34	26	389			
		(16.2)	(12.1)	(9.3)	(10.0)	(9.8)	(9.8)	(9.3)	(8.2)	(8.7)	(6.7)	(100.0)			
True deaths		76	46	37	31	20	25	23	24	25	13	320			
		(23.8)	(14.4)	(11.6)	(9.7)	(6.3)	(7.8)	(7.2)	(7.5)	(7.8)	(4.1)	(100.0)			
Total 1995		360	363	360	362	360	362	360	362	360	362	3611			

Source: Bland and Will (2001).

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