1996 CENSUS DATA QUALITY: INDUSTRY

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SUMMARY OF FINDINGS

The Industry Paper evaluates the data quality of the industry questions in the 1996 Census. The topics analysed include: the changes made to the industry questions between the 1991 and the 1996 Censuses; non-response rates; levels of undefined coding and coding discrepancies; a comparison with the Monthly Labour Force Survey; and the changes for coding procedures for the 2001 Census.

The main conclusions of the analyses are:

- The non-response rate for industry decreased substantially from 7.0% in 1991 to 2.0% in 1996 due to changes in form design and coding procedures.

- The industry divisions 'Agriculture, Forestry and Fishing', 'Mining' and 'Transport and Storage' contained the highest levels of undefined coding.

- Discrepancy analyses showed that the coders did not fully understand the meaning of the entries in the Australian and New Zealand Standard Industrial Classification (ANZSIC) relating to the industry division 'Property and Business Services'. These were often selected when the coders were unsure how to code the information in the census forms.

- Other analyses showed that coders had difficulty determining whether a 'Construction' response was a 'General Construction' response or a more specialised 'Construction Trade Service' response.

- The discrepancy analysis revealed that in some cases (i.e. 'Personal and Household Good Wholesaling' and 'Government Administration' discrepancies) a more accurate industry code may have resulted if the coder had used the extra information provided in the 'Business Name' question.

- The data reconciliation between the 1996 Census and the August 1996 Labour Force Survey showed that the differences in counts/estimates between the two collections were statistically significant. However, a proportional comparison for industry division by age and industry division by State showed an overall similarity in the data distribution of the two collections.

- For the 2001 Census a two-part industry question is expected to improve the quality of responses by identifying the activity and products of the employer's business rather than the nature of the business. The use of automatic coding and a structured coding index should also result in greater coding consistency.

INTRODUCTION

Data relating to industry have been collected in all Australian censuses since 1911. Employment data by industry are used to analyse and monitor structural change in industry at both the national and local area level. Industry data are also used in the analysis of the labour market, especially when cross-classified with occupation and qualification.

1.1 Background

Industry was initially coded on the basis of the response given to an 'Industry Description' question. Since the 1954 Census, a question has asked the employer's name and address. For the 1971 Census and subsequent censuses, employer's name and address responses have been used to allocate an industry code by matching this information to businesses listed on a subset of the Australian Bureau of Statistics (ABS) Business Register. This process is known as business matching. Information from the 'Industry Description' question was used only where it was not possible to match the employer's details to an entry on the Business Register. This process is referred to as industry description coding.

It is important to note that industry and occupation are two very different concepts. The occupation of a person is the kind of work that person usually performs, whereas a person's industry is the major activity undertaken by the establishment employing that person. For example, a teacher at a primary school and a cleaner at a primary school would both be allocated to the industry code 'Primary Education'.

Before the 1971 Census the ABS used an internally developed industry classification known as the 'Classification of Industries'. From 1971 through to 1991 industry was coded using the Australian Standard Industrial Classification (ASIC). For the 1996 Census industry was coded both to ASIC and to the newly developed Australian and New Zealand Standard Industrial Classification (ANZSIC). ANZSIC was the classification used in all 1996 Census ouput products relating to industry.

1.2 Changes between the 1991 and 1996 Censuses

In the 1991 Census 'Business Name' and 'Business Address' were asked as two separate questions. Testing indicated that this would improve the quality of responses and thus improve the business match rate. The two-question design was shown to reduce the incidence of abbreviations being used, especially to the employer's address question. This was continued for the 1996 Census with some minor question changes (see Appendices 1 and 2 for question wording).

For the 1991 Census, the 'Business Name' question asked for the employer's *trading* name while in 1996, the question asked for the employer's *business* name. This did not affect the intended meaning of the question. In 1996 the instruction 'for government employees, print full name of Department, Division, Branch or Section' was dropped along with the response area to reduce the amount of space taken by the question.

The 1991 Census 'Business Address' question contained an instruction which asked persons with no fixed place of work (for example taxi drivers) to provide the address of

the employer's depot or head office. In 1996 this instruction asked persons with no fixed place of work to write 'no fixed address'. This change was intended to improve 'Journey to Work' coding, but may have had an adverse impact on business matching.

1.3 Quality Issues in Industry Data

This paper discusses the quality of industry data collected in the 1996 Census and contains:

- a description of industry coding procedures used in the 1996 Census and data quality issues associated with these procedures;
- an analysis of non-response rates for industry data;
- an analysis of the frequency of undefined coding used for industry data in the 1996 and 1991 Censuses;
- an analysis of industry coding discrepancies;
- a data comparison between 1996 Census industry data and August 1996 Labour Force Survey industry data; and
- a summary of changes for the 2001 Census.

1.4 List of Acronyms used in this Paper

ABS - Australian Bureau of Statistics

ANZSIC - Australian and New Zealand Standard Industrial Classification

ASIC - Australian Standard Industrial Classification

CD - Collection District

CQI - Continuous Quality Improvement

DPC - Data Processing Centre

NFD - Not Further Defined

QM - Quality Management

TQM - Total Quality Management

2.   INDUSTRY CODING PROCEDURES

2.1   Business Matching and Industry Description Coding

Industry coding to the Australian and New Zealand Standard Industrial Classification (ANZSIC) used either of two types of coding procedures: business matching or industry description coding. Business matching involved matching responses to the 'Business Name' and 'Business Address' questions to information on a listing extracted from the Business Register. If it was not possible to match these with the listing, coders used responses to the 'Industry Description' question. Business matching was regarded as a more desirable means of industry coding for three reasons:

- business matching was likely to yield a more accurate ANZSIC code because it involved less interpretation of responses by coders than industry description coding;
- the Business Register was more likely to reflect the actual industry of the business than the respondent's answer to the Industry Description question; and
- coding using the Business Register made census data consistent with other Australian Bureau of Statistics' (ABS) collections.

The two coding procedures yielded significantly different data distributions. A 2% sample of 1991 Census responses was coded using both business matching and industry description procedures. Results showed that 45% of the responses were allocated different codes at the 4-digit (class) level of the classification on the basis of the coding procedure used. More importantly, 10% of the responses were allocated different 1-digit (division) level codes (see Appendix 3 for an example of the ANZSIC classification).

2.2   Business Matching

2.2.1   Business Matching Procedures

Business matching involved the allocation of an industry code by matching the response to 'Business Name' and if necessary 'Business Address' to a listing extracted from the Business Register. This was a listing of all known establishments in Australia involved in various economic activities carried out by companies, partnerships, sole proprietors or government departments. Each business location listed on the Business Register had an industry code attached to it which related to the major industry carried out by the business at that location. If a business had more than one location and each location was engaged in the same industry, an 'all locations' address entry was provided on the listing.

The first step in industry coding was for the coder to match the business name and address on the census form with businesses listed in the Business Register. An acceptable match occurred if the response on the census form was identical to the Business Register entry. If the business was listed on the Business Register at more than one location, the address provided on the census form would be used to select the correct Business Register entry. Address information was ignored in the case of 'all locations' entries. If no match could be found on the Business Register, the response to the 'Industry Description' question was then used.

2.2.2   Business Matching Data Quality Issues

Matching against the Business Register provided the most accurate possible code. Therefore, the major data quality issue for industry statistics in 1996 was the inability to perform such matching from responses. This was either due to deficiencies in the Business Register or to insufficient information provided by the respondent.

The Business Register used for census coding purposes was a subset of the ABS Business Register and excluded:

- own account workers;
- businesses employing less than five people;
- agricultural establishments employing less than ten people or with a turnover of less than one million dollars;
- businesses with more than one industry code for the one address (these businesses were added to the Data Processing Centre copy of the Business Register as coders became aware of them); and
- businesses which came into existence close to census date but too late to be included in the Census Business Register.

Many trading names were also unavailable on the Business Register. The ABS Business Register contained the legal business names of listed establishments but only their trading names if known. These trading names were provided by respondents when they did not know the legal business names of the establishments, and were added to the Business Register during census processing whenever a match to a legal name could be made.

A change in business matching procedures was implemented during the processing of the 1991 Census because match rates of less than 40% were recorded. The new coding procedure relaxed the requirements for address matching. If all locations of the business had the same industry code, address information could be ignored. This change resulted in match rates of above 50% for New South Wales and Victoria. Users should be aware that processing took place State by State. Thus processing began with smaller States and Territories (Tasmania, the Northern Territory and the Australian Capital Territory), before concluding with the larger States, Queensland, New South Wales and Victoria. Due to this sequential processing there were systematic differences in processing between States, as the procedures were refined over time.

This changed procedure was continued for the 1996 Census, along with a number of other changes to procedures, and resulted in overall business match rates of 54.1%. Business locations were included if more than one industry was undertaken at the same address. When matching to these types of businesses, the 'Industry Description' response was used to determine the correct industry. If this response did not match any industry listed on the Business Register, the industry code of the main industry at the location was allocated and the industry description response ignored.

Table 1: Business Match Rates for Industry, Australia, 1991 and 1996 Censuses

State	1991 Match Rate (%)	1996 Match Rate (%)
New South Wales	52.1	54.8
Victoria	51.5	57.1
Queensland	34.8	47.8
South Australia	39.8	57.7
Western Australia	36.4	52.0
Tasmania	30.8	56.8
Northern Territory	33.2	46.7
Australian Capital Territory	32.8	60.3
Total Australia	**45.3**	**54.1**

2.3 Industry Description Coding

2.3.1 Industry Description Coding Procedures

When an industry code could not be allocated using business matching, responses to the 'Industry Description' question were used. The quality of coding using industry description was largely dependent on the information provided on the census form by the respondent. The coding system allocated the most detailed industry code available that was consistent with the response given. When the response could not be matched directly, a synonym could be substituted and a match attempted. For example, a response of 'car selling' could be replaced by 'motor vehicle retailing' to obtain a match. Coders were provided with a list of synonyms likely to be useful (e.g selling - retailing, supplying- wholesaling).

Responses to 'Business Name', 'Occupation', and 'Main Tasks' could also be used to assist in obtaining a more precise code. If this information contradicted an 'Industry Description' response, the industry description alone was used to determine the industry code.

If there was no response to industry description but responses were available for the 'Occupation', 'Main Tasks' and 'Business Name' questions, the record was referred to an expert coding group. This is referred to as query resolution. This query resolution group was able to access a wider range of material to determine a code.

2.3.2 Industry Description Coding Data Quality Issues

In the 1996 Census 45.9% of industry responses were coded using 'Industry Description' coding procedures. As mentioned earlier, (see section 2.1), 'Industry Description' coding was perceived as being less likely to produce detailed, accurate industry codes than business matching. This was the rationale behind the efforts to increase business matching rates in 1996.

3.   COLLECTION ISSUES

The 1996 Census was a self-enumerated questionnaire completed by respondents with little or no assistance from the census collector. Therefore, data quality relied heavily on the ability of respondents to understand each question and to answer in the appropriate manner with the appropriate amount of detail. It was also crucial to have adequate strategies to process insufficient responses.

3.1   Non-Response Rates

The non-response rate for industry decreased substantially from 7.0% in 1991 to 2.0% in 1996. This was due to improved form design and processing.

The placement of the labour force questions on the 1991 Census form and the sequencing instructions may have increased non-response rates. The 'Looking for Work' question was placed immediately after the 'Full or Part-Time Job' question. Approximately 2% of all employed persons responded 'Yes' to the 'Full or Part-Time Job' question but did not follow the sequencing instructions and unnecessarily responded to 'Looking for Work'. After responding that they were not looking for work, such respondents were sequenced to skip the remaining employment questions. Industry data for these respondents were therefore lost. In the 1996 Census, the 'Looking for Work' question was placed after other employment questions.

Processing methodology with respect to treatment of incomplete answers was changed. In 1991, if there was no match for 'Business Name' and no response was provided for the 'Industry Description' question, a not stated code was allocated. However, in 1996 coders were instructed to refer census forms for query resolution if responses were provided to 'Occupation', 'Main Tasks' and/or 'Business Name' questions. A not stated code was recorded only if no response was present for these questions.

3.2   Explanation of Not Further Defined Coding

The principles of coding to the Australian and New Zealand Standard Industrial Classification (ANZSIC) required responses to be coded to the most detailed level of the classification possible. If a response was not detailed enough to allow coding to the 4-digit level, a 'NFD' (not further defined) code was allocated. The coding structure was:

- the industry classification, or 4-digit level (for example, 7411 for 'Life Insurance'); or
- the industry group, or 3-digit level (for example, 7410 for 'Life Insurance and Superannuation Funds, undefined'); or
- the industry subdivision, or 2-digit level (for example, 7400 for 'Insurance, undefined'); or
- the industry division, or 1-digit level (for example, K000 for 'Finance and Insurance, undefined').

NFD coding only occurred for those responses subject to industry description coding because business matching always provided a code at the most detailed level of the classification. Therefore, NFD coding was more likely to occur for those industries where the Business Register was not comprehensive.

Once a response was referred to 'Industry Description' coding, there were three major reasons why NFD coding occurred:

- lack of sufficiently detailed information from respondents;
- the nature and structure of ANZSIC: some divisions are highly detailed and require precise information from respondents to distinguish one industry class from another; while other divisions have few entries and coding at the class level can be undertaken with the most basic information; and
- failure to follow coding procedures rigorously.

3.3   NFD Coding Analysis for Industry, 1996 Census

Table 2 shows the frequency of NFD coding for each ANZSIC division in 1996. NFD coding percentages have been adjusted to eliminate the effects of the structure of ANZSIC on NFD coding rates. For example, industry codes like the ANZSIC subdivision of 'Rail Transport' (6200) represent the most detailed code and are therefore treated as an ANZSIC class rather than as a subdivision. All responses coded by matching to the Business Register were coded to the 4-digit level, so NFD coding to the 1, 2 and 3-digit level reflects an inability to code to the Business Register and an insufficient response to the industry description question.

Table 2: NFD Coding Rates for Industry (ANZSIC), Australia, 1996 Census

ANZSIC division	% of responses coded to ANZSIC division (1-digit)	% of responses coded to ANZSIC subdivision (2-digit)	% of responses coded to ANZSIC group (3-digit)	% of responses coded to ANZSIC class (4-digit)	Total Persons
Agriculture, Forestry & Fishing	1.1	22.8	9.4	66.8	324,330
Mining	8.0	13.7	7.8	70.4	86,261
Manufacturing	3.5	3.7	7.1	85.7	965,036
Electricity, Gas & Water	0.3	1.1	0.0	98.7	58,699
Construction	6.4	2.6	8.7	82.3	484,084
Wholesale Trade	4.6	0.8	5.6	88.9	446,545
Retail Trade	2.6	1.3	0.5	95.5	1,036,648
Accommodation, Cafes & Restaurants	0.0	7.5	0.0	92.5	355,287
Transport & Storage	5.0	11.6	3.7	79.7	332,078
Communication Services	0.0	1.5	0.2	98.4	150,188
Finance & Insurance	0.1	8.7	0.0	91.2	296,456
Property & Business Services	0.0	0.8	1.0	98.1	750,195
Govt. Admin & Defence	0.8	1.1	0.7	97.4	373,427
Education	0.0	3.8	4.7	91.5	540,063
Health & Community Services	0.9	3.8	1.0	94.3	725,178
Cultural & Recreational Services	1.1	0.8	2.0	96.2	179,055
Personal & Other Services	0.0	0.1	0.1	99.8	277,908
Non-classifiable Economic Units	NA	NA	NA	NA	103,142
Not stated	NA	NA	NA	NA	151,739
Total					**7,636,319**

NA Not Applicable

Table 2 shows that 'Agriculture, Forestry and Fishing' contained the highest level of NFD coding. Only 66.8% of the responses in this division were coded to the ANZSIC class level. A large proportion of respondents (22.8%) were allocated a subdivision code. This can be attributed to the smaller proportion of agricultural businesses on the Business Register therefore reducing the likelihood of business matching. Also, although instructions on the census form encouraged the provision of detailed responses, many respondents in this industry simply wrote 'farmer' with no indication of the products produced.

Mining had the second highest level of NFD coding. Again, failure to specify the mined product contributed to the high rate of NFD coding. A notable industry group was coal mining. ANZSIC separates black coal from brown coal mining, but over 40% of respondents in the coal mining industry failed to specify coal type. However, brown coal mining is restricted to Victoria where there are no black coal mines, so cross-tabulating by State could determine the correct ANZSIC code in most cases.

'Transport & Storage' had the third highest level of NFD coding with 79.7% of the responses coded to the ANZSIC class level. 11.6% of 'Transport and Storage' responses were allocated NFD codes at the subdivision level. The instruction on the census form which asked persons with no fixed place of work to write 'no fixed address' may have lowered the business match rate for this division and contributed to the high level of NFD coding.

The lowest levels of NFD coding occurred in the 'Personal and Other Services', 'Electricity, Gas and Water Supply' and 'Communication' divisions. While there were a large number of individual enterprises engaged in 'Personal and Other Services' industries, most would have been of a corporate structure and size to be listed on the Business Register and to allow business matching. Furthermore, the nature of the activities conducted by these businesses were quite distinct which allowed for easier 'Industry Description' coding. In contrast, 'Electricity, Gas and Water' and the 'Communications' industries were dominated by a few very large corporations, increasing the probability of business matching.

3.4 NFD Coding Comparison for Industry for the 1996 and 1991 Censuses

In 1991 industry was coded using the Australian Standard Industrial Classification (ASIC). In 1996 industry was coded to both ASIC and ANZSIC. In the following analysis 1996 Census ASIC NFD coding is compared to 1991 Census ASIC NFD coding data to determine whether factors other than the change in classification affected NFD coding. Table 3A shows the percentage of responses coded at the ASIC division, subdivision and group level and the percentage of responses coded to the ASIC class level for the 1991 Census. Table 3B shows these data for the 1996 Census.

For the purpose of this analysis NFD coding counts have been adjusted to eliminate the effects of the structure of ASIC on NFD coding rates. Industry codes like the ASIC subdivision of 'Rail Transport' (5200), representing the most detailed code available for such workers, are treated in this analysis as an ASIC class. As in Table 2, matching to the Business Register always resulted in a 4-digit code being assigned. Therefore, the percentage of responses NFD coded when processing used the industry description question was considerably higher than reflected in the tables below.

Table 3A: NFD Coding Rates for Industry (ASIC), Australia, 1991 Census

ASIC division	% of responses coded to ASIC division (1-digit)	% of responses coded to ASIC subdivision (2-digit)	% of responses coded to ASIC group (3-digit)	% of responses coded to ASIC class (4-digit)	Total Persons
Agriculture, Forestry & Fishing	0.1	26.5	9.6	63.8	320,669
Mining	6.3	9.9	1.9	81.9	86,493
Manufacturing	3.3	3.5	5.2	88.0	932,995
Electricity, Gas & Water	0.0	0.0	0.0	100.0	91,341
Construction	3.2	0.6	9.9	86.3	421,303
Wholesale & Retail Trade	0.4	2.1	3.3	94.3	1,336,931
Transport & Storage	4.3	3.0	13.0	79.7	325,665
Communication	0.0	0.0	0.0	100.0	117,405
Finance, Property & Business Services	0.3	1.0	6.2	92.5	788,594
Public Admin. & Defence	1.3	1.1	0.2	97.4	402,241
Community Services	0.6	1.7	5.5	92.2	1,261,544
Recreation, Personal & Other Services	0.5	1.4	9.7	88.5	495,836
Non-Classifiable Economic Units	NA	NA	NA	NA	26,381
Not stated	NA	NA	NA	NA	501,938
Total					**7,109,336**

NA Not Applicable

Table 3B: NFD Coding Rates for Industry (ASIC), Australia, 1996 Census

ASIC division	% of responses coded to ASIC division (1-digit)	% of responses coded to ASIC subdivision (2-digit)	% of responses coded to ASIC group (3-digit)	% of responses coded to ASIC class (4-digit)	Total Persons
Agriculture, Forestry & Fishing	1.1	22.6	12.7	63.7	321,773
Mining	9.7	19.9	0.0	70.4	85,754
Manufacturing	6.9	5.2	4.7	83.3	947,790
Electricity, Gas & Water	0.0	1.2	0.0	98.8	58,638
Construction	6.5	3.2	8.8	81.5	478,133
Wholesale & Retail Trade	0.0	4.7	4.1	91.2	1,497,679
Transport & Storage	5.4	11.9	10.4	72.3	350,838
Communication	0.0	0.0	0.0	100.0	135,160
Finance, Property & Business Services	0.3	3.0	2.4	94.3	956,524
Public Admin. & Defence	0.8	1.1	0.7	97.4	373,417
Community Services	1.0	2.7	3.2	93.1	1,497,526
Recreation, Personal & Other Services	0.0	4.8	8.0	87.1	633,271
Non-Classifiable Economic Units	0.0	0.0	0.0	100.0	103,198
Not stated	NA	NA	NA	NA	151,740
Insufficient link[1]	NA	NA	NA	NA	44,878
Total					**7,636,319**

NA Not Applicable

[1] Some responses coded to the ANZSIC could not be linked to the ASIC because of a lack of concordance between the indexes.

'Agriculture, Forestry and Fishing', the division with the highest rate of NFD coding remained relatively constant with 63.7% of responses being coded to the ASIC class level in 1996 (compared to 63.8% in 1991).

NFD coding for industry division 'Mining' increased in the 1996 Census, in particular at the subdivision level where it increased by 10.0 percentage points. This was due to an increase in coding to 'Coal mining, undefined' from 4,928 persons (or 18.1% of coal miners) in 1991 to 9,941 persons (or 40.7% of coal miners) in 1996. This shows that coders could not determine whether a 'coal mining' response indicated black or brown coal mining. Coal mining businesses were suspected to have a lower Business Match rate in 1996, however this hypothesis could not be proven. This is a minor data quality issue because brown coal mining only occurs in Victoria.

The 'Transport and Storage' subdivision NFD coding increased by 8.9 percentage points in 1996. This contributed to the decrease by 7.4 percentage points at the class level coding. The change in the 'Business Address' instruction asking persons with no fixed place of work to write 'no fixed address' contributed to a low business match rate for this industry division. This resulted in a high rate of industry description coding for this type of response which caused the high frequency of NFD coding. Responses coded to the subdivision of 'Air Transport, undefined' increased from 2,317 persons in 1991 to 20,171 persons in 1996. A change in airline policy since 1991 allowed QANTAS and Ansett to service both domestic and international flights and made it more difficult for coders to determine whether a respondent was employed in the domestic or international air transport industry.

'Manufacturing' experienced a higher level of NFD coding in 1996. This was largely due to a doubling in NFD coding at the division level. 30,754 persons in 1991 were allocated a code of 'Manufacturing, undefined'. 65,027 persons in 1996 were allocated this code. No explanation for this increase is apparent. Construction experienced a similar increase in NFD coding to the division level.

4.   1996 CENSUS DISCREPANCY ANALYSIS FOR INDUSTRY

4.1   Detection of Discrepancies

A Quality Management (QM) system was established to identify coding discrepancies, provide feedback to coders and produce and analyse discrepancy rates by topic.

During the processing of the 1996 Census data, a sample of each coder's work on Collection Districts (the smallest census unit for collection, processing and output of data) was selected for reprocessing by another coder and any mismatches were looked at by an adjudicator who would decide on the correct code. If the adjudicator disagreed with the initial coder, a discrepancy would be recorded. There were 7,636,319 applicable census counts from which 517,730 industry responses (6.8%) were recoded by QM coders. Altogether 48,594 discrepancies (9.4%) were recorded in the Management Information System (MIS) reports.

The QM system in place during processing allowed the detection of discrepancies and the calculation of a crude discrepancy rate. This crude discrepancy rate differs from a true discrepancy rate for the following reasons:

- a higher proportion of 'poor' coders' work was included in the quality monitoring sample;
- the quality management check coders could make the same mistake as the original coder and therefore an error would not be detected;
- there is not always an absolutely correct code for every response; and
- discrepancies were recorded for any difference in coding between the quality management coder and the original coder though discrepancies at industry division level were clearly more serious than those at class level. For example, coding 'Primary Education' (8421) to 'Secondary Education' (8422) was given the same weight as coding the industry division 'Manufacturing' to 'Mining'.

4.2   Discrepancies caused by Queries

Coders were supposed to raise a query when the information in the census form was inadequate to allocate a code. In many cases, the coding system prompted the coder to raise a query. The query was sent for resolution by an expert coding group which had access to a wider range of material than was available to the front line coders.

Two types of discrepancy might arise through the query resolution process:

- queries not raised when they were required:

Tables 5, 6, 7 and 8 show that the most frequent type of discrepancy at all levels of classification resulted from a failure to raise a query when there was insufficient information on the form. The proportion of discrepancies due to a query not being raised varied from 38.5% of all discrepancies at the division level, to 19.8% at the class level. No information is available as to whether the code allocated incorrectly during processing would have differed from a code that might have been allocated during the query resolution process.

- queries raised when they were not required:

when queries were raised when they were not required, it can be assumed that the correct code was allocated during the query resolution process by the expert coders. These queries had no effect on the quality of industry data and they have therefore been excluded from the following analysis of discrepancies. However, it is relevant to analyse which aspects of the index caused problems to coders so that training can be improved. There were 30,475 (22.6% of all discrepancies at the ANZSIC class level) queries raised in the sample where a code could have been allocated by the coder. Table 4 lists the most queried ANZSIC classes to which codes should have been allocated.

Table 4: Most Frequently Codeable Queries for Industry, Australia, 1996 Census

Identifier	ANZSIC Class	Number of codeable queries	% of codeable queries
6110	Road Freight Transport	518	1.7
8112	State Government Administration	518	1.7
5329	Automotive Repair & Services	427	1.4
8440	Other Education	427	1.4
0100	Agriculture, Undefined	366	1.2
7866	Cleaning Services	335	1.1
7855	Business Management Services	335	1.1
4232	Electrical Services	305	1.0
8111	Central Government Admin.	305	1.0
4619	Machinery, Equipment Wholesaling nec[1]	290	1.0

[1] not elsewhere classified

Queries which should have been coded as 'Road Freight Transport' made up 1.7% of codeable queries. The instruction asking persons with no fixed place of work to write 'no fixed address' caused a low business match rate for this industry code. This resulted in a high rate of industry description coding for this type of response and a high rate of codeable queries.

Queries which should have been allocated to either 'State Government Administration' or 'Central Government Administration' also feature in the table. Difficulties in distinguishing between State and Commonwealth Government responses as well as the suspected low business name match rate for Government Administration responses, appear to be the main causes. It should be noted, however, that a proportion of codeable queries for 'State Government Administration' and 'Central Government Administration' responses may have only become codeable once the Business Register subsets were updated.

4.3   Crude Discrepancy Analysis

4.3.1   General information

Discrepancy profile tables could be produced by the QM system to examine which ANZSIC codes had been determined by the adjudicator and which codes had been incorrectly allocated by the coders. Unlike the discrepancy reports, these tables recorded

discrepancies made by the initial coder as well as the QM coder, so that two discrepancies could be recorded for one industry response if the adjudicator disagreed with both the initial coder and the QM coder. These tables have been used for the following analyses of discrepancies as they present more detailed information. The queries which coders had raised incorrectly and which were resolved by query resolution staff have been removed from the total number of discrepancies.

The following analyses examine discrepancies at each level of the ANZSIC hierarchy. Discrepancies at one level also appear at a lower level in the hierarchy (for example, discrepancies at the division level also make up a proportion of subdivision discrepancies).

In order to determine which divisions, subdivisions, groups and classes were more prone to coding discrepancies, a normalised crude discrepancy ratio has been calculated for each table. First the frequency of discrepancies for each classification in the table has been divided by the total number of persons employed in that classification in the labour force to give the proportion of discrepancies for that classification. The classification with the smallest proportion of discrepancies to labour force count was then used as a normaliser which by definition has the value of 1.0.

In the division level analysis all divisions are listed. For subdivisions the codes with the ten highest discrepancy frequencies are listed. For groups and classes the categories with the twenty highest discrepancy frequencies are listed.

4.3.2   ANZSIC Division Level (1 Digit) Discrepancies

The most serious discrepancies occurred when an industry response was coded to an incorrect division level. The discrepancy profile table at the division level contained 62,622 discrepancies where the adjudicator disagreed with either the initial coder or the QM coder.

Table 5 shows which divisions had been incorrectly allocated as a result of coders' selections.

Table 5: Coding Discrepancies for Industry Divisions in Order of Normalised Discrepancy Ratio, 1996 Census

| ANZSIC division and identifier | *Correct division* | | | | *Incorrectly allocated to:* | |
	Frequency in Labour Force	Frequency of discrep's	% of total discrep's	Normalised discrepancy ratio[1]	ANZSIC division and identifier	%
F Wholesale Trade	446,545	3,845	6.1	3.3		
					C Manufacturing	28.7
					G Retail Trade	28.4
					L Property & Business Services	9.2
M Govt Admin. & Defence	373,427	2,901	4.6	3.0		
					L Property & Business Services	19.1
					O Health & Community Services	18.1
					N Education	8.8
D Electr., Gas & Water	58,699	412	0.7	2.7		
					E Construction	22.3
					M Govt Admin. & Defence	18.2
					L Property & Business Services	18.0
P Cultural & Recreational Services	179,055	1,122	1.8	2.4		
					H Accom., Cafes & Restaurants	18.9
					M Govt Admin. & Defence	15.3
					L Property & Business Services	9.5
Q Personal & Other Serv.	277,908	1,633	2.6	2.3		
					O Health & Community Services	20.6
					L Property & Business Services	13.7
					G Retail Trade	10.8
L Property & Business Services	750,195	4,096	6.5	2.1		
					C Manufacturing	9.4
					M Govt Admin. & Defence	9.2
					E Construction	8.8
B Mining	86,261	458	0.7	2.0		
					C Manufacturing	25.3

Industry					Main supplier	
					L Property & Business Services	17.7
					E Construction	9.8
C Manufacturing	965,036	5,024	8.0	2.0		
					F Wholesale Trade	28.0
					G Retail Trade	15.1
					L Property & Business Services	11.2
E Construction	484,084	2,457	3.9	2.0		
					L Property & Business Services	17.4
					C Manufacturing	15.8
					F Wholesale Trade	9.6
I Transport & Storage	332,078	1,667	2.7	1.9		
					C Manufacturing	12.9
					F Wholesale Trade	11.8
					L Property & Business Services	11.2
G Retail Trade	1,036,648	4,929	7.9	1.8		
					F Wholesale Trade	27.7
					C Manufacturing	15.3
					L Property & Business Services	8.6
A Agriculture, Forestry & Fishing	324,330	1,480	2.4	1.7		
					F Wholesale Trade	16.3
					C Manufacturing	14.2
					G Retail Trade	9.3
H Accom., Cafes & Restaurants	355,287	1,528	2.4	1.6		
					G Retail Trade	27.7
					P Cultural & Recreational Services	16.0
					L Property & Business Services	13.4
J Communicat'n Services	150,188	546	0.9	1.4		
					I Transport & Storage	22.2
					L Property & Business Services	18.5
					E Construction	12.1
N Education	540,063	1,960	3.1	1.4		
					L Property & Business Services	19.0
					O Health & Community Services	16.0
					M Government Admin. & Business	16.0

O Health & Community Services	725,178	2,521	4.0	1.3		
					M Government Admin. & Business	20.7
					Q Personal & Other Services	17.0
					N Education	10.9
R Non-classifiable Economic Units	103,142	356	0.6	1.3		
					C Manufacturing	27.2
					L Property & Business Services	23.6
					G Retail Trade	20.2
K Finance & Insurance	296,456	775	1.2	1.0		
					L Property & Business Services	29.2
					M Government Admin. & Business	17.8
					Q Personal & Other Services	10.1
A query should have been raised	NA	24,092	38.5	NA		
					C Manufacturing	13.3
					L Property & Business Services	9.8
					F Wholesale Trade	9.2

[1] The discrepancy ratio for 'Finance & Insurance' = (775/296,456) * (296,456/775) = 1.0. Therefore, the normalised discrepancy ratio for 'Wholesale Trade' = (3,845/446,545) * (296,456/775) = 3.3.
NA Not Applicable

The division 'Wholesale Trade' recorded the highest normalised discrepancy ratio (3.3). 28.7% of these discrepancies were incorrectly allocated to the division 'Manufacturing' and 28.4% to the division 'Retail Trade'.

The division 'Government Administration and Defence' recorded the second highest normalised discrepancy ratio (3.0). The codes allocated instead were within the divisions 'Property and Business Services' and 'Health and Community Services' (19.1% and 18.1% respectively).

The division 'Property and Business Services' was in the top three incorrectly allocated divisions for each division except 'Agriculture, Forestry and Fishing' and 'Health and Community Services'. This shows that the coders did not fully understand the meaning of the entries relating to 'Property and Business Services' in the index and were selecting them when unsure of the information in the census forms.

24,092 queries (38.5% of discrepancies) should have been raised if the coders had followed the correct procedures. The codes were allocated instead within the divisions 'Manufacturing' (13.3%), 'Property and Business Services' (9.8%) and 'Wholesale Trade' (9.2%).

4.3.3 Subdivision Level (2 Digit) Discrepancies

The discrepancy profile table at the subdivision level contained 73,720 discrepancies where the adjudicator disagreed with either the initial coder or the QM coder.

Table 6: Coding Discrepancies for Industry Subdivisions in Order of Normalised Discrepancy Ratio, 1996 Census

ANZSIC subdivision and identifier	Correct subdivision				Incorrectly allocated to:	
	Frequency in Labour Force	Frequency of discrep's	% of total discrep's	Normalised discrepancy ratio[1]	ANZSIC subdivision and identifier	%
General Construction (41)	147,883	1,921	2.6	3.6		
					Construction, undef. (E000)	37.1
					Construction Trade Services (42)	24.7
					Business Services (78)	7.5
Personal & Household Good Wholesaling (47)	152,650	1,756	2.4	3.2		
					Personal & Household Good Retailing (52)	14.9
					Food, Beverage & Tobacco Manufacture (21)	13.4
					Food Retailing (51)	11.3
Govt. Administration (81)	297,157	2,968	4.0	2.7		
					Business Services (78)	15.8
					Health Services (86)	9.7
					Education (84)	8.1
Personal & Household Good Retailing (52)	425,762	2,836	3.8	1.8		
					Retail Trade, undef. (G000)	14.4
					Personal & Household Good Wholesaling (47)	14.1
					Business Services (78)	9.4
Business Services (78)	644,576	3,675	5	1.6		
					Govt. Admin. (81)	7.9
					Education (84)	6.3
					Personal & Household Good Retailing (52)	5.8
Construction Trade Services (42)	304,983	2,200	3.0	2.0		
					General Construct. (41)	23.5
					Construction, undef. (E000)	15.5
					Business Services (78)	7.8
Food Retailing (51)	374,888	1,835	2.5	1.3		
					Personal & Household Good Retailing (52)	20.3

					Accomodation, Cafes & Restaurants [57]	18.3
					Personal & Household Good Wholesaling [47]	14.1
Health Services [86]	546,228	2,112	2.9	1.1		
					Community Serv. [87]	28.0
					Govt. Admin. [81]	15.8
					Health & Community Serv., undefined [O000]	7.9
Education [84]	540,063	1,965	2.7	1.0		
					Business Services [78]	18.4
					Govt. Admin. [81]	15.1
					Community Serv. [87]	11.9
A query should have been raised	NA	24,092	32.7	NA		
					Not Stated	16.5
					Business Services [78]	8.2
					Construction Trade Services [42]	5.2

[1] The discrepancy ratio for 'Education' = (1,965/540,063) * (540,063/1,965) = 1.0. Therefore, the discrepancy ratio for 'General Construction' = (1,921/147,883) * (540,063/1,965) = 3.6.
NA Not Applicable

'General Construction' recorded the highest discrepancy ratio (3.6). 37.1% of these discrepancies were allocated to 'Construction, undefined'. This indicates that coders had difficulty determining whether a 'Construction' response was a 'General Construction' response (incorporating 'Building Construction' and 'Non-building Construction') or a more specialised 'Construction Trade Services' response (incorporating 'Building Structure Services' and 'Installation Trade Services'). 24.7% of 'General Construction' discrepancies were allocated to 'Construction Trade Services' which again indicates some confusion between 'General Construction' and 'Construction Trade Services' responses.

'Personal and Household Good Wholesaling' recorded the second highest (3.2) discrepancy ratio. 14.9% of 'Personal and Household Good Wholesaling' discrepancies were allocated to the 'Personal and Household Good Retailing' subdivision. 13.4% were allocated to the 'Food, Beverage and Tobacco' manufacturing subdivision and 11.3% to the 'Food Retailing' subdivision. This type of discrepancy suggests that coders had difficulties determining whether a respondent's employer was a wholesaler, retailer or manufacturer. The response given to 'Business Name' in some cases may have assisted the coder in determining the correct industry. However, industry description coding procedures, only required that the coder look at the 'Business Name' response to clarify an 'Industry Description' response when a coder had difficulty in determining the correct code. Thus when an 'Industry Description' response was codeable, the 'Business Name' response was generally not looked at.

'Government Administration' recorded the third highest discrepancy ratio (2.7). A possible reason for 'Government Administration' discrepancies, particularly discrepancies to 'Business Services', is the interrelation of government and business services. For

example, the public sector makes extensive use of services such as marketing or computer services. These services can be provided by either public sector employees or private sector contractors. The response given to 'Business Name' by the respondent may have been clarified if the employee working in a government department was a public or private sector employee, however processing procedures did not permit this. A further cause of 'Government Administration' discrepancies may have been a low level of business matching for 'Government Administration' responses. A significant level of manual updating to the Business Register subsets occurred during processing which was focussed on government departments and large employers. This suggests that the Business Register subsets were initially incomplete for these employer groups.

4.3.4   Group Level (3 digit) Discrepancies

The discrepancy profile table at the group level contained 91,562 discrepancies where the adjudicator disagreed with either the initial coder or the QM coder.

Table 7: Coding Discrepancies for Industry Groups in Order of Normalised Discrepancy Ratio, 1996 Census

	Correct group				Incorrectly allocated to:	
ANZSIC group and identifier	Frequency in Labour Force	Frequency of discrep's	% of total discrep's	Normalised discrepancy ratio[1]	ANZSIC group and identifier	%
Education, undefined (840)	20,355	857	0.9	7.9		
					School Education (840)	53.0
					Other Education (844)	19.3
					Govt. Admin. (811)	7.4
Agriculture, undefined (010)	69,209	1,149	1.3	3.1		
					Grain, Sheep & Beef Cattle Farming (012)	55.9
					Not Applicable	7.0
					Other Crop Growing (016)	5.2
Building Construction (411)	97,739	1,458	1.6	2.8		
					Construction, undef. (E000)	39.0
					General Construction, undefined (410)	11.7
					Building Completion Serv. (424)	11.7
Road Freight Transport (611)	72,964	1,078	1.2	2.8		
					Road Transport, undef. (610)	32.9
					Transp't & Storage, undef. (I000)	21.7
					Other Services to Transport (664)	5.7
Other Education (844)	63,708	887	1.0	2.6		
					Education, undefined (840)	18.2
					School Education (842)	13.6
					Post School Education (843)	11.3

Industry	Value				Sub-category	%
Other Health Services (863)	102,995	1,358	1.5	2.5		
					Medical & Dental Services (862)	21.2
					Hospitals & Nursing Homes (861)	18.9
					Health Services, undef. (860)	15.8
Community Care Serv. (872)	103,230	1,272	1.4	2.3		
					Hospitals & Nursing Homes (861)	20.9
					Other Health Services (863)	11.2
					Interest Groups (962)	10.0
Furniture, Houseware & Appliance Retailing (523)	80,924	981	1.1	2.3		
					Builder Supply Wholesaling (453)	10.9
					Machinery & Equipment Wholesaling (461)	8.2
					Household Good Wholesale (473)	8.2
Grain, Sheep & Beef Cattle Farming (012)	92,622	1,051	1.1	2.1		
					Agriculture, undefined (010)	54.5
					Not Applicable	10.8
					Not Stated	5.1
Govt. Admin. (811)	280,177	3,155	3.4	2.1		
					Govt. Admin., undefined (810)	8.1
					Govt. Admin. & Defence, undefined (M000)	6.3
					Other Health Services (863)	4.5
Accomodation (571)	86,509	917	1.0	2.0		
					Accommodation, Cafes & Restaurants, undefined (570)	47.5
					Pubs, Taverns & Bars (572)	9.1
					Cafes & Restaurants (573)	6.3
Marketing & Business Management Services (785)	137,288	1,309	1.4	1.8		
					Other Business Services (786)	7.9
					Technical Services (782)	4.8
					Other Education (844)	3.6
Machinery & Equipment Wholesaling (461)	121,743	1,105	1.2	1.7		
					Furniture, Houseware & Appliance Retail (523)	11.7
					Computer Services (783)	7.7
					Industrial Machinery & Equipment Manufacturing (286)	5.9

Other Business Serv. (786)	180,667	1,380	1.5	1.4		
					Marketing & Business Management Services (785)	10.1
					Other Personal Services (952)	9.1
					Govt. Admin. (811)	5.2
Post-School Education (843)	132,588	917	1.0	1.3		
					Other Education (844)	20.8
					Education, undefined (840)	16.0
					Not Stated	5.0
Cafes & Restaurants (573)	141,413	964	1.1	1.3		
					Specialised Food Retailing (512)	25.8
					Accommodation Cafes & Restaurants, undefined (570)	10.8
					Other Business Services (786)	8.0
Specialised Food Retail (512)	199,184	1,290	1.4	1.2		
					Cafes & Restaurants (573)	19.8
					Food, Drink & Tobacco Wholesaling (471)	14.0
					Bakery Product Manufacturing (216)	12.1
Hospitals & Nursing Homes (861)	311,411	1,814	2.0	1.1		
					Other Health Services (863)	24.8
					Community Care Services (872)	19.6
					Health Services, undefined (860)	9.7
School Education (842)	308,665	1,649	1.8	1.0		
					Education, undefined (840)	39.7
					Other Education (844)	14.4
					Govt. Admin. (811)	8.8
A query should have been raised	NA	24,092	26.3	NA		
					Not Stated	16.5
					Machinery & Equipment Wholesaling (461)	2.7
					Other Business Services (786)	2.2

[1] The discrepancy ratio for 'School Education' = (1,649/308,665) * (308,665/1,649) = 1.0. Therefore, the discrepancy ratio for 'Building Construction' = (1,458/97,939) * (308,665/1,649) = 2.8.
NA Not Applicable

'Education, undefined' had the highest crude discrepancy ratio (7.9). Data show that the adjudicator frequently determined that the coder had allocated a more detailed code than was warranted by the quality of the response. 53.0% of such discrepancies were

allocated to 'School Education' (which incorporates 'Primary Education', 'Secondary Education' and 'Primary and Secondary Education' combined).

'Agriculture, undefined' had the second highest crude discrepancy ratio (3.1). These discrepancies also occurred when coders attempted to code an 'agriculture' response to a more detailed level than was warranted by the quality of the response. Respondents in the agriculture industry frequently answered the industry description with responses like 'agriculture' or 'farming', without specifying the type of farming. Also, many farms were excluded from the Business Register subsets and therefore not subjected to business matching.

The allocation of more precise codes than warranted for 'Education, undefined' and 'Agriculture, undefined' may have been due to the use of other information on the census form such as the occupation and/or business name responses to clarify the nature of the industry.

'Building Construction' and 'Road Freight Transport' shared the third highest discrepancy ratio (2.8). 39.0% of 'Building Construction' discrepancies were allocated to 'Construction, undefined', demonstrating that coders had difficulty selecting more specialised codes. 32.9% of 'Road Freight Transport' discrepancies were allocated to 'Road Transport, undefined' and 21.7% to 'Transport and Storage, undefined'. 'Transport and Storage' responses coded to the subdivision of 'Road Transport, undefined' increased by over 250% (based on a comparison of 1996 and 1991 Censuses coding using ASIC) even though the number of people employed in this industry only increased by 12.7% during that time. In the 1991 'Business Address' question an instruction asked persons with no fixed place of work (e.g. taxi drivers) to provide the address of the depot or head office. In 1996 this instruction asked persons with no fixed place of work to write 'no fixed address'. This change may have improved the quality of work destination zone coding but may have had an adverse impact on the business match rate for persons employed in the transport industry. Persons in this industry were more likely to describe their business address as 'no fixed address' and an accurate address was often needed to obtain a business match.

4.3.5   Class Level (4 Digit) Discrepancies

The discrepancy profile table at the group level contained 121,569 discrepancies where the adjudicator disagreed with either the initial coder or the QM coder.

Table 8: Coding Discrepancies for Industry Classes in Order of Normalised Discrepancy Ratio, 1996 Census

ANZSIC class and identifier	*Correct class*				*Incorrectly allocated to:*	
	Frequency in Labour Force	*Frequency of discrep's*	*% of total discrep's*	*Normalised discrepancy ratio[1]*	*ANZSIC class and identifier*	*%*
Education, undef. [(8400)]	20,355	857	0.7	8.4		
					School Education, undef. [(8420)]	24.6
					Other Education [(8440)]	19.3

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Industry					Related industry	%
					Primary Education (8421)	12.3
School Education, undefined (8420)	24,205	945	0.8	7.8		
					Education, undefined (8400)	26.1
					Primary Education (8421)	22.3
					Secondary Education (8422)	13.2
Accommodation, Cafes & Restaurants (5700)	26,761	682	0.6	5.1		
					Pubs, Taverns & Bars (5720)	34.0
					Accommodation (5710)	32.7
					Cafes & Restaurants (5730)	10.4
Building Construction, undefined (4110)	41,976	1,028	0.8	4.9		
					Construction, undef. (E000)	35.7
					General Construction, undefined (4100)	11.7
					House Construction (4111)	11.1
State Government Administration (8112)	89,643	1,793	1.5	4.0		
					Central Government Administration (8111)	10.5
					Government Admin., undefined (8100)	8.5
					Govt Admin. (except Defence) (8110)	3.2
Agriculture undef. (0100)	69,209	1,149	0.9	3.3		
					Beef Cattle Farm (0125)	19.1
					Grain, Sheep & Beef Cattle Farming, undef (0120)	16.9
					Grain-Sheep & Grain-Beef Cattle Farming (0122)	11.7
Road Freight Transport (6110)	72,964	1,078	0.9	2.9		
					Road Transpt, undef. (6100)	32.9
					Transport & Storage, undefined (I000)	21.7
					Courier Services (7112)	5.4
Other Education (8440)	63,708	887	0.7	2.8		
					Education, undefined (8400)	18.2
					School Education, undef. (8420)	6.1
					Employment Placement Services (7861)	5.3
Non-residential Care Services (8729)	62,464	831	0.7	2.6		

					Residential Care Services, not elsewhere class. (8722)	16.0
					Community Services, undefined (8700)	9.4
					Interest Groups, not elsewhere class. (9629)	8.2
Central Government Administration (8111)	95,109	1,025	0.8	2.1		
					Govt Admin. & Defence, undefined (M000)	12.3
					State Government Administration (8112)	10.8
					Govt Administration, undefined (8100)	8.5
Accommodation (5710)	86,509	917	0.8	2.1		
					Accommodation, Cafes & Restaurants, undef. (5700)	47.5
					Pubs, Taverns & Bars (5720)	9.1
					Cafes & Restaurants (5730)	6.3
Local Government Administration (8113)	92,975	803	0.7	1.7		
					Libraries (9210)	10.7
					Sewerage & Drainage Services (3702)	7.0
					Road & Bridge Constr'n (4121)	6.2
Higher Education (8431)	87,709	701	0.6	1.6		
					Post School Educ. undef. (8430)	12.3
					Education, undefined (8400)	9.4
					Other Education (8440)	9.1
Primary Education (8421)	130,886	953	0.8	1.4		
					School Education, undef (8420)	31.5
					Education, undefined (8400)	19.9
					Secondary Education (8422)	8.1
Second. Education (8422)	116,538	829	0.7	1.4		
					School Education, undef. (8420)	24.7
					Education, undefined (8400)	18.0
					Primary Education (8421)	13.8
Cafes & Restaurants (5730)	141,413	964	0.8	1.4		
					Takeaway Food Retailing (5125)	22.1
					Accommodation, Cafes & Restaurants, undef. (5700)	10.8

					Food Retail, undef. (5100) 6.8
Hospitals (Except Psychiatric Hospitals) (8611)	219,613	1,328	1.1	1.2	
					Hospitals & Nursing Homes, undef. (8610) 15.0
					Health Services, undefined (8600) 11.9
					Community Health Centres (8634) 11.7
Takeaway Food Retail (5125)	121,385	711	0.6	1.2	
					Cafes & Restaurants (5730) 31.5
					Food Retail, undef (5100) 12.0
					Not Stated 6.9
Supermarket & Grocery Stores (5110)	169,161	851	0.7	1.0	
					Department Stores (5210) 23.6
					Clothing Retail (5221) 11.3
					Food Retail, undef (5100) 9.8
A query should have been raised	NA	24,092	19.8	NA	
					Not stated 16.5
					Road Freight Transport (6110) 1.2
					Consulting Engineer Services (7823) 1.1

[1] The discrepancy ratio for 'Supermarket & Grocery Stores' = (851/169,161) * (169,161/851) = 1.0. Therefore, the discrepancy ratio for 'Education, undefined' = (857/20,355) * (169,161/851) = 8.4.
NA Not Applicable

'Education, undefined' recorded the highest normalised discrepancy ratio (8.4). The highest percentage (24.6%) of discrepancies were allocated to 'School Education, undefined', 19.3% to 'Other Education' and 12.3% to 'Primary Education'. 'School Education, undefined' recorded the second highest normalised discrepancy ratio (7.8). The highest percentage (26.1%) of discrepancies were allocated to 'Education, undefined', 22.3% to 'Primary Education' and 13.2% to 'Secondary Education'.

For discrepancies involving 'School Education, undefined' and 'Education, undefined', the adjudicator determined that coders had allocated more detailed codes than was warranted by the industry description question. Similar to subdivision errors, the high discrepancy rate may be due to the use of occupation and/or business name responses to clarify the industry code, which was not in accord with procedures at the time.

'Accommodation, Cafes, Restaurants, undefined' recorded the third highest normalised discrepancy ratio (5.1). The highest percentage of these discrepancies (34.0%) were allocated to 'Pubs, Taverns and Bars' and 32.7% to 'Accommodation'.

5. RECONCILIATION OF 1996 CENSUS INDUSTRY DATA WITH AUGUST 1996 LABOUR FORCE SURVEY DATA

5.1   Data Reconciliation Methodology

The purpose of this section is to explain the differences in the collection of industry data between the labour force survey and the census, to outline the steps taken to reconcile these two data collections and to present the findings from this reconciliation.

Although the census and labour force survey both collect data on industry, they are not strictly comparable due to differences in the scope, coverage, timing, measurement of underlying concepts and collection methodology. Factors contributing to differences in estimates include :

- under-enumeration in the census for which census industry data were not adjusted;
- the use in the labour force survey of population benchmarks derived from incomplete information about population change;
- differing methods of adjustment for non-response to the survey or census;
- the personal interview approach adopted in the survey as opposed to self-enumeration in the census; and
- sampling variability.

To enable reconciliation, the scopes of the 1996 Census and the August 1996 Labour Force Survey were reduced to a common population. Table 9 shows the adjustments made to the labour force survey benchmarks and to census data for industry. For more information on the process used to compare census and labour force survey data please refer to Census Working Paper 99/2, *1996 Census: Labour Force Status*.

Table 9: Adjustments Made to August 1996 Labour Force Survey Benchmarks and 1996 Census to Derive a Common Population for Industry Data

Population Group	Number	Benchmarks	Census
Jervis Bay Territory and external territories	2,029		deducted
Visitors to Australia	125,406		deducted
Defence Force Personnel	73,099		deducted
Not enumerated in Census	239,200	deducted	
Residents temporarily overseas	270,155	deducted	
Not stated for industry	151,739		deducted

5.2   Results of Data Reconciliation

The following analyses are based on the 1996 Census and the August 1996 Labour Force Survey. Comparisons by industry division and age groups, and comparisons by industry division and States are presented below.

The Census used the additional category 'Non-Classifiable Economic Units' when industry responses could not be allocated ANZSIC codes. The interviewer-based Labour Force Survey did not require such a category. Therefore, 103,129 census responses were not distributed to industry divisions and contributed to differences between collections.

Adjusted August 1996 Labour Force Survey figures for total employed persons were 3.3% (or an estimated 247,622 persons) higher than the figures for the 1996 Census. The 3 standard error estimates (27,018 for total employed) indicate that the differences between the adjusted data were statistically significant. This means that one can be more than 99.7% confident that the remaining differences after adjustment between the Census and the Labour Force Survey were not merely due to sampling variability in the labour force survey data.

5.2.1   Comparison of Industry Divisions by Age using Census Counts as a Proportion of Labour Force Estimates

Table 10 presents the Census counts as a proportion of the Labour Force estimates. Tables A1 and A2 in Appendix 4 show the adjusted figures used to derive these proportions. The categories in the Census and in the Labour Force Survey were standardised to reflect the same total population.

Table 10: Industry Division by Age, 1996 Census as a Proportion of August 1996 Labour Force Survey Estimates

Industry Division	*Age Group*						
	15-19	*20-24*	*25-34*	*35-44*	*45-54*	*55 & over*	*Total*
Agriculture, Forestry & Fishing	0.55	0.89	0.95	0.85	0.89	0.85	0.86
Mining	0.82	1.06	0.94	1.32	1.05	1.04	1.08
Manufacturing	0.88	0.99	0.96	0.94	1.05	0.98	0.97
Electricity, Gas & Water Supply	1.02	1.07	0.93	1.10	0.87	0.93	0.97
Construction	1.00	0.96	0.90	0.85	0.94	0.97	0.91
Wholesale Trade	0.94	0.96	1.04	1.05	0.97	1.06	1.02
Retail Trade	0.85	0.91	1.01	0.94	0.98	0.99	0.94
Accommodation, Cafes & Restaurants	1.08	1.02	1.00	1.12	1.08	1.05	1.05
Transport & Storage	0.90	0.89	1.00	0.95	0.92	0.96	0.95
Communication Services	1.05	0.73	1.10	1.03	1.22	0.84	1.03
Finance & Insurance	0.99	1.04	1.05	1.16	0.95	1.31	1.07
Property & Business Services	0.76	1.01	1.04	1.07	1.01	1.18	1.04
Government Admin. & Defence	0.91	0.81	0.88	0.97	0.93	0.82	0.91
Education	1.07	0.92	1.04	1.00	1.08	0.95	1.02
Health & Community Services	0.94	1.08	1.02	1.06	1.08	1.08	1.05
Cultural & Recreational Services	0.81	0.97	1.20	1.12	1.05	1.01	1.06
Personal & Other Services	0.79	1.00	1.02	1.04	1.11	1.01	1.02
Non-Classifiable Economic Units	NA	NA	NA	NA	NA	NA	NA
Total	**0.88**	**0.98**	**1.01**	**1.01**	**1.02**	**1.01**	**1.00**

NA Not Applicable

The above table shows that the greatest difference appeared in the youngest age group. The Census totals for 15-19 year olds were 88% of the totals for the Labour Force Survey.

The industry division 'Agriculture, Forestry and Fishing' recorded the largest proportional difference between the Census and the Labour Force Survey. Overall there were 14% fewer respondents in this category for the Census than for the Labour Force Survey.

Within cross-categories 'industry by age', Labour Force estimates exceeded Census counts by the greatest proportion for 'Agriculture, Forestry and Fishing' for 15-19 year olds (by 11,089 persons), 'Communication Services' for 20-24 year olds (by 5,691 persons) and 'Property and Business Services' for 15-19 year olds (by 9,156 persons). Census counts exceeded Labour Force estimates by the greatest proportion for 'Mining' for 35-44 year olds (by 5,654 persons) and 'Finance and Insurance' for 55 years and over (by 3,550 persons).

It should be noted that many of these cross-categories (particularly for younger age categories) were represented by small groups which exaggerate the proportional differences.

5.2.2 Comparison of Industry Divisions by State using Census Counts as a Proportion of Labour Force Estimates

Table 11 presents the Census counts as a proportion of the Labour Force estimates. Tables A3 and A4 in Appendix 4 show the adjusted figures by State used to derive these proportions. The categories in the Census and in the Labour Force Survey were standardised to reflect the same total population in each State.

Table 11: Industry Division by State, 1996 Census as a Proportion of August 1996 Labour Force Survey

Industry division	State							
	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*
Agriculture, Forestry & Fishing	0.91	0.87	0.86	0.82	0.79	0.84	0.88	1.95
Mining	1.02	1.71	1.28	1.02	0.99	0.70	0.87	NA
Manufacturing	0.93	0.95	1.01	1.03	1.07	0.98	1.25	1.35
Electricity, Gas & Water Supply	0.98	1.10	0.92	0.81	0.95	0.59	3.41	0.66
Construction	0.89	0.93	0.89	0.99	0.87	1.05	1.12	0.83
Wholesale Trade	1.00	0.99	0.96	1.09	1.25	0.90	1.05	0.98
Retail Trade	0.91	0.97	0.95	0.96	0.93	0.90	0.96	0.97
Accommodation, Cafes & Restaurants	1.10	1.01	1.05	1.09	0.97	1.02	0.98	1.08
Transport & Storage	0.97	1.00	0.89	0.92	0.95	1.06	0.65	1.21
Communication Services	1.07	0.91	1.09	1.31	1.06	1.03	0.92	1.01
Finance & Insurance	1.03	1.12	0.98	1.02	1.18	1.14	1.36	1.52
Property & Business Services	1.09	0.99	1.05	0.94	1.02	1.17	1.03	0.99
Government Admin. & Defence	0.87	0.84	1.02	1.01	0.81	1.04	1.23	0.88
Education	0.95	1.07	1.04	1.03	1.08	1.15	1.10	0.99
Health & Community Services	1.11	1.04	1.03	1.03	0.97	1.05	1.35	1.02
Cultural & Recreational Services	1.29	1.03	0.95	0.94	0.92	0.97	0.66	1.50
Personal & Other Services	1.00	1.06	1.07	0.97	1.12	0.96	0.50	0.98
Non-Classifiable Economic Units	NA	NA	NA	NA	NA	NA	NA	NA
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

NA Not Applicable

The major proportional differences between the two collections occurred primarily in the Northern Territory, although notable differences were visible in the Australian Capital Territory and Tasmania. This may reflect sampling variability in smaller States in the Labour Force Survey.

The large proportional difference for 'Mining' in Victoria probably reflects the small population in this category (5,626 persons in the Census and 3,404 persons in the Labour Force estimates).

However, the differences in percentage rates between both collections showed a consistent distribution.

6. 2001 CENSUS INDUSTRY CODING

6.1 The Business Register

The Business Register will not be used for industry coding in the 2001 Census because the Australian Bureau of Statistics (ABS) will not maintain establishment or location information for a number of industries. The subsequent loss of the facility for business match coding was accepted by the Population Census Branch for three reasons:

- only half of industry code allocations in 1996 were a result of matching to the Business Register;
- it is preferable to have a single, universal method of allocating industry codes rather than two distinct approaches; and
- changes to the form design and to the industry description coding procedures should improve the allocation of more accurate and detailed industry codes.

6.2 Form Content

For the 2001 Census, the industry code will be based on responses to two questions. The first question will ask for a description of the business of the employer and will incorporate tick boxes for the most frequent industry divisions as well as a write-in section for other responses. The second question will ask for the main goods produced or services provided by the employer's business. This question has been designed to provide additional information on the activity and products of the employer's business.

6.2 Coding Procedures

A new system will be introduced for data capture of census forms. The Intelligent Character Recognition (ICR) system will scan the census forms, read the hand-printed data, verify and correct the data read from the form, and store the form image and data for additional processing. An automatic coding system will then be used to allocate an Australian and New Zealand Standard Industrial Classification (ANZSIC) code. If the automatic coding system is not sufficient, the census form will be referred to Computer Assisted Coding (CAC) and a code allocated using a structured coding index. During CAC, the response given to the 'Goods and Services' question will be manually entered as the basic word, with the response to the 'Business of Employer' question providing a qualifying word, if needed. The coder will then be presented with a listing of goods and services, and will select the appropriate entry and ANZSIC identifier. In instances where a match cannot be made, the 'Business Name' or 'Occupation' questions may provide additional information.

The structured coding index will replace the non-structured 'string' index used for industry coding in 1996. The new index caused the reformatting of index entries to fit the syntax of structured coding. Before the 2001 Census the index will be redeveloped to include more goods and services. The intention of the structured coding index is to lead coders to the correct class by presenting activity listings from which the coders make a choice. This step-by-step approach intends to find an answer without needing to know the title of the class or its location in the classification hierarchy. A comparison of data coded using the structured coding index and the non-structured 'string' index will be undertaken after census tests to determine the accuracy rates of each method.

7. CONCLUSIONS

This paper has examined the quality of industry data from the 1996 Census. The main conclusions are:

- 54.1% of 1996 Census industry data were coded by matching to subsets of the Business Register whilst the remaining 45.9% of industry data were coded mainly on the basis of the response to the 'Industry Description' question. Users of industry data should be aware that the two coding procedures yielded different data distributions.

- The non-response rate for industry decreased substantially from 7.0% in 1991 to 2.0% in 1996 due to changes in form design and coding procedures.

- The industry division 'Agriculture, Forestry and Fishing' contained the highest level of NFD coding. Only 66.8% of responses in this division were coded to the ANZSIC class level. This can be attributed to the small proportion of agricultural businesses on the Business Register, hence reliance on often inadequate description by respondents (for example, 'farmer').

- 'Mining' had the second highest level of NFD coding. Again failure to specify the mined product contributed to the high rate of NFD coding. Over 40% of respondents in coal mining failed to specify if they were working in the black or brown coal mining industry.

- Instructions to respondents with no fixed workplace address to respond with 'no fixed address', decreased the incidence of business matching for 'Transport and Storage' responses. The more frequent use of industry description coding increased subdivision level NFD coding for this division.

- Responses coded to 'Air Transport, undefined' in 1996 accounted for 52.0% of workers in 'Air Transport'. In the 1991 Census only 8.6% of Air Transport responses were coded to 'Air Transport, undefined'. The change in airline policy since 1991 which has allowed QANTAS and Ansett to service both domestic and international flights made it more difficult for coders to determine whether a respondent was employed in the domestic or international air transport industry.

- Discrepancy analyses showed that the coders did not fully understand the meaning of the entries in the ANZSIC relating to the industry division 'Property and Business Services'. These were often selected when the coders were unsure how to code the information in the census forms.

- Other analyses showed that coders had difficulty determining whether a 'Construction' response was a 'General Construction' response (incorporating 'Building Construction' and 'Non-building Construction') or a more specialised 'Construction Trade Service' response (incorporating 'Building Structure Services' and 'Installation Trade Services').

- The discrepancy analysis revealed that in some cases (i.e. 'Personal and Household Good Wholesaling' and 'Government Administration' discrepancies) a more accurate

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industry code may have resulted if the coder had used the extra information provided in the 'Business Name' question response.

- Data reconciliation between the 1996 Census and the August 1996 Labour Force Survey showed that the differences in counts/estimates between the two collections was statistically significant. However, a proportional comparison for industry division by age and industry division by State showed an overall similarity in the data distribution of the two collections.

- The new arrangements for industry coding are expected to improve the quality of industry data for the 2001 Census in at least three ways:

  - the two-part industry question is expected to improve the quality of responses, as respondents might better identify the activity and products of the employer's business than the nature of the business;
  - automatic coding and the structured coding index should reduce inconsistencies in coding that individual coders can introduce with varying levels of knowledge and different attitudes; and
  - the use of the structured coding index for industry data employs similar techniques to those used for occupation and qualifications data. Consistency of coding for those three topics will make procedures easier to follow.

APPENDIX 1: 1991 Census Industry Questions

36 **For the main job held** *last week,*   Business or trading name
       what was the employer's trading name?   ....
       For self-employed persons, print name of business.   ....
       For government employees, print full name of
       Department and Division, Branch or Section.   Division, Branch or Section (if any)
       For teachers, print name of school.   ....

37 **For the main job held** *last week***,**   Street no. and name
       what was the employer's workplace   ....
       address?   Suburb or rural locality
       For persons with no fixed place of work, provide   ....
       address of depot or office.   City or town
                                                             ....
       .   State   Postcode
                                                             ....

38 **What kind of industry, business or**   Industry, business or service of employer
       service is carried out *by the employer*   of employer
       at that address?   ....
       Describe as fully as possible, using two words or more ....
       for example, dairy farming, footwear manufacturing.   ....

APPENDIX 2: 1996 Census Industry Questions

34   **For the main job held** *last week*,
         what was the employer's business name?

         For self-employed persons, print name of business.

         For teachers, print name of school.

Business name

....

....

....

35   **For the main job held** *last week*,
         what was the employer's workplace
         address?

         For persons with no fixed place of work, (e.g.. taxi driver,

         pilot, courier) write 'no fixed address'.

         This information is used to accurately code the number of

         people employed in different industries.

Street number and name

....

Suburb or rural locality

....

City or town

....

State/Territory   Postcode

....

36   **What kind of industry, business or**
         service is carried out *by the employer*
         at that address?

         Describe as fully as possible, using two words or more

         for example, dairy farming, footwear manufacturing.

Industry, business or service of employer
of employer

....

....

....

....

APPENDIX 3: Example of Australian and New Zealand Standard Industrial Classification (ANZSIC) : Division, Subdivision, Group and Class

E CONSTRUCTION
41 General Construction
410 General Construction, undefined
       4100 General Construction, undefined
       4111 Building Construction
       4112 Residential Building Construction, undefined
       4113 Non-Residential Building Construction
412 Non-Building Construction
       4120 Non-Building Construction
       4121 Road & Bridge Construction
       4122 Non-Building Construction, not elsewhere classified
42 Construction Trade Services
420 Construction Trade Services, undefined
       4200 Construction Trade Services, undefined
421 Site Preparation Services
       4210 Site Preparation Services
422 Building Structure Services
       4220 Building Structure Services, undefined
       4221 Concreting Services
       4222 Bricklaying Services
       4223 Roofing Services
       4224 Structural Steel Erection Services
423 Installation Trade Services
       4230 Installation Trade Services, undefined
       4231 Plumbing Services
       4232 Electrical Services
       4233 Air Conditioning, Heating Services
       4234 Fire, Security System Services
424 Building Completion Services
       4240 Building Completion Services, undefined
       4241 Plastering & Ceiling Services
       4242 Carpentry Services
       4243 Tiling & Carpentry Services
       4244 Painting & Decorating Services
       4245 Glazing Services
425 Other Construction Services
       4250 Other Construction Services, undefined
       4251 Landscaping Services
       4259 Construction Services, not elsewhere classified
E0 Construction, undefined
E00 Construction, undefined
       E000 Construction, undefined

APPENDIX 4: Reconciliation between 1996 Census and August 1996 Labour Force Survey

Table A1: Adjusted Figures for Industry Division by Age, 1996 Census

	15-19	20-24	25-34	35-44	45-54	55 & over	Total
Agriculture, Forestry & Fishing	12,670	23,039	60,511	74,557	73,842	79,704	324,323
Mining	1,688	7,776	25,345	26,384	19,400	5,565	86,158
Manufacturing	43,998	109,373	263,309	257,308	201,421	89,613	965,022
Electricity, Gas & Water Supply	867	4,049	14,036	18,847	15,838	5,046	58,683
Construction	22,826	54,964	132,698	132,070	97,514	43,942	484,014
Wholesale Trade	16,808	50,466	125,147	117,605	94,459	42,050	446,535
Retail Trade	219,279	164,623	216,495	199,287	164,992	71,891	1,036,567
Accom., Cafes & Restaurants	42,929	72,597	85,669	72,707	56,366	24,810	355,078
Transport & Storage	6,695	28,232	88,119	92,426	80,175	36,380	332,027
Communication Services	2,082	13,856	43,963	45,759	33,950	10,572	150,182
Finance & Insurance	6,981	41,751	105,522	76,026	49,311	16,854	296,445
Property & Business Services	25,094	85,719	203,350	199,963	161,955	74,083	750,164
Government Admin. & Defence	4,195	22,270	76,757	94,169	75,114	27,494	299,999
Education	7,755	36,460	108,446	182,969	153,885	50,438	539,953
Health & Community Services	16,444	67,371	175,044	223,790	173,238	69,224	725,111
Cultural & Recreational Services	13,669	27,428	50,595	43,128	29,741	14,357	178,918
Personal & Other Services	15,373	34,249	77,982	71,508	54,872	23,880	277,864
Non-Classifiable Economic Units	5,808	11,425	25,161	25,979	22,285	12,471	103,129
Total	**465,161**	**855,648**	**1,878,149**	**1,954,482**	**1,558,358**	**698,374**	**7,410,172**

Table A2: Adjusted Figures for Industry Division by Age, 1996 Labour Force Survey

	15-19	*20-24*	*25-34*	*35-44*	*45-54*	*55 & over*	*Total*
Agriculture, Forestry & Fishing	23,759	26,617	66,006	90,286	85,444	97,054	389,167
Mining	2,127	7,570	27,808	20,730	19,009	5,551	82,794
Manufacturing	51,928	114,527	283,052	284,274	197,545	94,861	1,026,186
Electricity, Gas & Water Supply	875	3,914	15,678	17,785	18,874	5,588	62,713
Construction	23,653	59,436	152,181	160,963	107,695	46,761	550,688
Wholesale Trade	18,494	54,349	123,978	115,991	100,256	40,876	453,943
Retail Trade	266,656	186,292	221,933	218,006	174,288	75,308	1,142,482
Accom., Cafes & Restaurants	40,938	73,242	88,399	67,236	53,904	24,436	348,154
Transport & Storage	7,680	32,789	90,643	100,404	89,850	39,205	360,571
Communication Services	2,059	19,547	41,404	45,886	28,675	12,977	150,548
Finance & Insurance	7,280	41,587	103,850	67,797	53,668	13,304	287,485
Property & Business Services	34,250	88,051	202,118	193,049	165,460	64,966	747,893
Government Admin. & Defence	4,742	28,457	89,723	100,771	83,138	34,669	341,501
Education	7,501	40,818	107,723	188,835	147,333	55,069	547,280
Health & Community Services	18,074	64,353	176,935	219,020	166,379	66,384	711,146
Cultural & Recreational Services	17,457	29,232	43,396	39,858	29,136	14,750	173,829
Personal & Other Services	20,073	35,317	79,315	70,964	51,222	24,526	281,417
Non-Classifiable Economic Units	NA	NA	NA	NA	NA	NA	NA
Total	**547,546**	**906,098**	**1,914,141**	**2,001,854**	**1,571,873**	**716,283**	**7,657,794**

NA Not Applicable

Table A3: Adjusted Figures for Industry Division by State, 1996 Census

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Agriculture, Forestry & Fishing	92,552	74,179	72,229	33,526	37,187	12,108	2,001	541
Mining	21,633	5,626	22,279	3,556	28,377	1,871	2,718	98
Manufacturing	312,069	308,642	147,668	89,141	77,197	22,285	3,113	4,907
Electricity, Gas & Water Supply	22,030	13,497	10,013	4,656	6,753	846	490	398
Construction	163,650	111,471	101,356	29,619	54,614	10,721	5,559	7,024
Wholesale Trade	160,224	116,077	78,033	33,823	43,413	8,377	2,782	3,806
Retail Trade	341,805	261,679	199,447	79,482	103,317	25,046	8,724	17,067
Accom., Cafes & Restaurants	126,846	72,636	77,166	25,366	32,618	8,452	4,833	7,161
Transport & Storage	121,521	73,799	69,078	21,839	30,425	7,022	3,737	4,606
Communication Services	53,731	43,119	23,841	10,610	12,638	2,696	1,180	2,367
Finance & Insurance	122,165	78,037	41,379	19,493	24,823	5,216	1,449	3,883
Property & Business Services	272,205	187,889	130,092	50,273	75,622	12,099	5,821	16,163
Government Admin. & Defence	86,341	59,996	56,450	20,958	26,203	11,676	9,183	29,192
Education	173,548	132,070	101,441	43,724	55,548	14,469	5,842	13,311
Health & Community Services	238,938	176,610	129,917	67,665	71,396	20,009	8,617	11,959
Cultural & Recreational Services	59,929	44,841	32,915	12,887	16,313	4,763	2,311	4,959
Personal & Other Services	91,363	65,817	50,289	23,699	30,130	6,979	3,169	6,418
Non-Classifiable Economic Units	33,890	29,464	19,572	5,491	11,629	1,524	860	699
Total	**2,494,440**	**1,855,449**	**1,363,165**	**575,808**	**738,203**	**176,159**	**72,389**	**134,559**

Table A4: Adjusted Figures for Industry Division by State, August 1996 Labour Force Survey

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Agriculture, Forestry & Fishing	104,395	87,872	86,400	43,124	49,643	15,073	2,374	286
Mining	21,780	3,404	17,902	3,672	29,969	2,824	3,244	0
Manufacturing	342,216	336,469	150,761	90,753	75,727	23,936	2,597	3,727
Electricity, Gas & Water Supply	22,964	12,712	11,232	6,044	7,473	1,520	149	618
Construction	187,566	124,138	117,114	31,628	65,641	10,687	5,170	8,745
Wholesale Trade	163,589	121,115	83,551	32,698	36,432	9,808	2,763	3,988
Retail Trade	384,952	280,563	215,901	87,515	116,546	29,414	9,473	18,118
Accom., Cafes & Restaurants	117,919	74,577	75,309	24,550	35,137	8,738	5,098	6,825
Transport & Storage	128,741	76,390	79,936	25,022	33,645	6,945	5,993	3,899
Communication Services	51,443	48,978	22,548	8,564	12,546	2,740	1,328	2,402
Finance & Insurance	121,158	72,354	43,297	20,033	22,101	4,809	1,104	2,629
Property & Business Services	256,517	196,734	127,142	56,603	77,398	10,845	5,885	16,769
Government Admin. & Defence	101,241	73,758	56,988	21,912	33,785	11,832	7,740	34,245
Education	187,620	128,411	99,820	44,779	53,997	13,279	5,502	13,873
Health & Community Services	221,289	175,112	129,424	69,408	77,258	19,949	6,625	12,081
Cultural & Recreational Services	47,461	45,285	35,772	14,486	18,635	5,156	3,635	3,399
Personal & Other Services	93,993	64,385	48,212	25,738	28,155	7,651	6,530	6,755
Non-Classifiable Economic Units	NA	NA	NA	NA	NA	NA	NA	NA
Total	**2,554,841**	**1,922,255**	**1,401,308**	**606,529**	**774,089**	**185,204**	**75,209**	**138,360**

NA Not Applicable

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99/6   *1996 Census Data Quality: Occupation*

00/1   *1996 Census Data Quality: Journey to Work*

00/2   *1996 Census Data Quality: Qualification Level and Field of Study*

If you would like a copy of any of these papers, or have any other queries relating to the papers, please contact Rosa Gibbs on (02) 6252 5942 or email: rosa.gibbs@abs.gov.au

The papers are also available on the ABS website at www.abs.gov.au