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How Many Jobs Were Lost With the Collapse of Ansett?

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Abstract
The objective of this paper is to determine the adverse impact of the collapse of Ansett on employment using the latest Australian input-output table. The indirect contribution of the collapse of Ansett to the creation of unemployment in various industries is quantified by adopting the "shut-down of industry" approach. Ansett operated within the air and space transport industry which possesses strong backward and forward linkages. It is found that due to sectoral multiplier and flow-on effects each job lost in such an important sector leads to a loss of approximately 3 extra jobs in the economy as a whole. The empirical results are broadly consistent with previous studies. Overall, the Ansett collapse brought about an indirect loss of 54880 jobs in 105 sectors of the Australian economy. Losses were particularly marked in the following industries which were the fastest growing industries in terms of employment during the 1985-2000 period: Retail trade; Business services; Education; Health services; Accommodation, cafes and restaurants.

1. Introduction

The demise of Ansett was one of the most reported issues in the Australian media during the last two years. Ansett started service in 1936, but ceased operations in March 2002 soon after the Tesna consortium's withdrawal from a buyout deal (*Aviation Week & Space Technology,* March 4 2002, p.52). Ansett was Australia's second largest airline and had 300 aircraft before its collapse. In fact in 1994 Ansett had about 55 per cent of Australia's domestic market (Shameen, 2001). It is believed that the collapse of Ansett created "a large hole" in the Asia-Pacific region for Star Alliance members because Ansett used to feed a large number of passengers into Star members' international services (Fiorino, 2002).

As a result of the Ansett collapse about 16,000 people lost their job directly (Fiorino, 2002). The Econtech study (Department of Industry, Tourism and Resources, 2002) estimated that the demise of this Australian Icon put 28,000 employees of Ansett and its subsidiaries out of work. In addition to the airline's 16,000 Australian employees, it was estimated that around 40000 workers lost their jobs at suppliers and contractors (Shameen, 2001). In a similar vein, another article anticipated that the Ansett collapse placed 60,000 jobs in jeopardy *(Far Eastern Economic Review*, Hong Kong, September 27, 2001; pp.12 & 2). The *Financial Times* (September 27, 2001, p.7) estimated that the number of indirect job losses could reach 45,000 positions at Ansett's suppliers and the other interrelated industries, raising the total number of job losses to over 60000 (*Financial Times*, September 13, 2001, p.1).

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Martin Foley, of the Australian Services Union, believed that as a result of the Ansett collapse three indirect jobs would be lost for every direct position, whereas Bill Shorten, of the Australian Workers Union, conjectured that based on a recent aviation estimate, this figure was more likely to be around 2.5 positions (Costa, 2002). These findings are broadly consistent with the results obtained in the present paper, supporting the view that each additional job lost in the industry leads to the loss of approximately 3 extra jobs in the economy as a whole. However, none of the previous studies presented a disaggregated analysis as to which sectors of the economy have been hit hardest.

In this paper I do not seek to explain the reasons underlying the collapse of Ansett. This paper in fact substantiates the consequences of this tragic incident on employment and not the roles that the staff and unions, Air New Zealand, Singapore, Qantas, Virgin, Government organisations such as CASA, SACL, and News Corp played in the destruction and/or rescue of Ansett. For a detailed discussion of these issues see Easdown and Wilms (2002).

Easdown and Wilms (2002) in their recent book present anecdotal evidence about the causes of the Ansett collapse, and discuss the devastation the airline's demise caused both employees and the general public. They also examine efforts made by the administrators Mark Korda and Mark Mentha to rescue the airline with various plans. However, the arithmetic proved irrefutable and after 67 years of service this "Icon of Australian Aviation" finally disintegrated. Easdown and Wilms argue "that the struggle to keep Ansett Airlines solvent were futile, as the airline was deeply in debt, had one of the oldest fleets in regular operation in the world which had failed a number of CASA safety inspections and was experiencing large profit downturns as early as 1999" (*Daily Telegraph*, July 27, 2002, Inside Edition, p.30). Despite a vast literature exploring many aspects of the problem, there has been little comprehensive research undertaken on the determination of the indirect impact of the Ansett collapse on the Australian economy.

In the literature there are a number of analysts who have discussed the use of input-output (IO) techniques to measure the significance of a sector in terms of its indirect contribution to output and employment. For example, Jensen and West (1985) have provided a theoretical framework underpinning the measurement of the significance of an industry in terms of output, income, employment and value added. Furthermore, West (1993) in his IO software package (GRIMP) has included an option enabling practitioners to measure the industrial significance at both national and regional levels. By adopting a similar approach, which is referred to as "loss of the industry" or "shut-down of industry", Groenewold, Hagger and Madden (1993), *inter alia*, have employed a 58-industry IO model of the (Australian) State of Tasmania to measure the direct and indirect contributions of various sectors to regional employment.

In this paper, using the latest IO table of Australian economy, the backward and forward linkage indices are calculated for the air and space transport industry in which Ansett operated. The empirical analysis undertaken in this study sheds some light on both direct and indirect contribution of Ansett to Australia's employment before its demise.

The rest of the paper proceeds as follows. Section 2 presents a succinct theoretical discussion of the "shut-down of industry" approach to quantify the indirect contribution of the air and space transport industry to sectoral employment. In this section it is also briefly explained how the

backward and forward indices are computed. Section 3 uses the latest IO table (1996-97) to calculate the indirect job losses associated with the collapse of Ansett in 105 sectors of the Australian economy. Concluding remarks follow.

2. Methodology

The direct or tangible importance of an industry in terms of output or employment can easily be measured by its level of output or the number of people working in the sector. However, the indirect contribution of an industry to either total output or employment is not easily observable unless the multiplier and flow-on effects are taken into account. The share of a particular industry in total employment reveals only the direct contribution of a particular industry and this naive measure overlooks the number of jobs generated indirectly in other sectors as a result of the stimulation of economic activity in the industry concerned.

In order to describe sectoral inter-dependencies between the air and space transport industry and the rest of the Australian economy, a brief analysis of forward and backward linkages would be useful. The domestic Leontief inverse matrix of the 1996-1997 IO table is employed in the computation of net backward and forward indices. Since the sectoral imports are subtracted from the technological matrix, the domestic inter-industry matrix presents the existing or net linkages.

Backward and forward linkage indices were first used by Rasmussen (1956) and Hirschman (1958) to identify key or leading economic sectors. A backward linkage measures the relationship between the activity in a sector and its purchases from other sectors, whereas a forward linkage measures the relationship between the activity in a sector and its sales to other sectors. For instance, a thriving sector with a high backward linkage stimulates the activities in other industries through its increased input demand, which is the other sectors' final output. A booming sector with a high forward linkage can also stimulate the other sectors by means of its output supply, because final output in that sector is the other sectors' inputs. However, the effectiveness (of a sector with higher forward linkage) on economic growth depends upon whether there is enough demand for the output of that sector or not.

The normalised direct and indirect output backward and forward linkages for the j^{th} sector are defined as follows:

$$L_j^B = \frac{\frac{1}{n}\sum_{i=1}^{n} r_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}} \qquad (1)$$

$$L_j^F = \frac{\frac{1}{n}\sum_{j=1}^{n} r_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}} \qquad (2)$$

Where r_{ij} denotes the $(i,j)^{th}$ element of the Leontief open inverse matrix, n is the number of sectors, L^B_j is backward linkage index for sector j, and L^F_j is forward linkage index for sector j.

According to the definition, if L^B for sector j exceeds unity, the investment in this sector yields above average backward linkages. In other words, compared to other sectors, this sector draws more heavily on the system of industries. It is also stated that a sector with a high backward linkage index "require[s] more than average intermediate inputs from other sectors to sustain a unit increase in the sector's final demand" (Karunaratne, 1976, p.291). Similarly if the forward linkage for sector j exceeds unity, the final output in that sector is demanded by the other sectors more than the average of all the industries.

As a result, if the backward and/or forward linkage indices for a sector exceed unity, that sector can be classified as a leading sector. However, adherence to the above-mentioned criteria ($L^B > 1$ and/or $L^F > 1$) is not sufficient for the identification of the key sectors. A dispersion index should also be considered. It is quite possible that a sector, which has high backward and/or forward linkage indices, is linked to only a few sectors. In other words, it is imperative to recognise how evenly other sectors are linked with the sector concerned. This leads to the consideration of the coefficient of variation. Thus, the coefficients of variation (variability indices) for backward and forward linkages are defined as:

$$V_j^B = \sqrt{\frac{\frac{1}{n-1}\sum_{i=1}^{n}\left(r_{ij} - \frac{1}{n}\sum_{i=1}^{n} r_{ij}\right)^2}{\frac{1}{n}\sum_{i=1}^{n} r_{ij}}} \qquad (3)$$

$$V_j^F = \sqrt{\frac{\frac{1}{n-1}\sum_{j=1}^{n}\left(r_{ij} - \frac{1}{n}\sum_{j=1}^{n} r_{ij}\right)^2}{\frac{1}{n}\sum_{j=1}^{n} r_{ij}}} \qquad (4)$$

where V^B_j and V^F_j denotes the coefficient of variation for backward and forward, linkages for the j^{th} sector, respectively.

A low coefficient of variation in sector j means that the investment in this sector can stimulate other sectors in an even manner (Bulmer-Thomas, 1982). Now if one divides the relations (3) and (4) by their corresponding grand means, the normalised output backward spread (S^B_j) index and forward spread (S^F_j) index can be computed. If these indices are less than unity for sector j, it means that, on average, the linkages in this sector are more evenly associated with other sectors. Therefore, a sector can be identified as a key sector, if $L^B_j > 1$ and $S^B_j < 1$ and/or $L^F_j > 1$ and $S^B_j < 1$. For a detailed discussion of linkages see, *inter alia*, Bulmer-Thomas (1982) and Miller and Blair (1985). In the rest of this section a brief discussion of the theoretical and computational foundations of the "shut-down of industry" approach is presented.

If a sector is divorced from other industries (*i.e.* with few backward linkages) and its output is mainly exported overseas with few domestic intermediate uses, it can then be argued that its

indirect contribution to aggregate employment would be small and inconsequential. As a result, the total contribution (direct and indirect) of this sector to total output or employment would be similar in magnitude to its direct contribution. On the other hand, if a sector is well integrated with other industries in the economy with high and evenly distributed linkages, then the shut-down of this industry will have severe adverse repercussions on the other sectors of the economy in terms of output and job losses. Even if we substitute the domestically produced inputs of this sector with an equal amount of the homogeneous imported inputs, due to the inter-relationship among sectors, the significance of an industry is beyond its own output or employment share in the economy.

For example, suppose that sector 1 (air and space transport) in an IO system is to be shut-down. What output and job-loss would result? How do we measure the output and employment losses in other industries? The indirect magnitude of this "loss of the industry" on total output produced in the economy can be evaluated by summing the output loss in all the industries (excluding sector 1) of the economy. The industrial significance of a sector such as sector 1 in terms of its total contribution to output (S_1^Q) is thus measured by the following relation:

$$S_1^Q = \underbrace{x_1}_{\text{direct effect}} + \underbrace{\sum_{i=2}^{n} \Delta x_i}_{\text{indirect effects}} \qquad (5)$$

Where x_i denotes output in sector i. Since the employment to output ratio is given for each sector in an IO table, the overall significance and contribution of an industry to total employment (S^E) can also be calculated by assuming that the sectoral employment ratios are fixed. As can be seen, in order to calculate (S^E) for the air and space transport industry, S^Q first needs to be computed. Therefore, the rest of this section is devoted to the theoretical framework underpinning the measurement of indirect contribution of this industry to total output.

Following Jensen and West (1985), Groenewold, Hagger and Madden (1987, 1993), and West (1993) a theoretical model is postulated to measure the indirect sectoral contribution to aggregate output and employment using an IO system. Let us start from the following relation:

$$\mathbf{(I - A)x = f} \qquad (6)$$

where **A** is the (n x n) technical domestic coefficients; **x** is the (n x 1) column vector of sectoral gross output; and **f** is the (n x 1) column vector of the sectoral final demand.

Equation (2) can also be written as follows:

$$\begin{bmatrix} (1-a_{11}) & -a_{12} & -a_{13} & \text{L} & -a_{1n} \\ -a_{21} & (1-a_{22}) & -a_{23} & \text{L} & -a_{2n} \\ -a_{31} & -a_{32} & (1-a_{33}) & \text{L} & -a_{3n} \\ \text{M} & \text{M} & \text{M} & \text{L} & \text{M} \\ -a_{n1} & -a_{n2} & -a_{n3} & \text{L} & (1-a_{nn}) \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ \text{M} \\ x_n \end{bmatrix} = \begin{bmatrix} f_1 \\ f_2 \\ f_3 \\ \text{M} \\ f_n \end{bmatrix} \tag{7}$$

In order to measure the indirect significance of a particular sector (say sector 1) it is assumed that this sector is "shut-down" and this restriction on the IO system can be imposed in the following manner:

$$\begin{bmatrix} 1 & 0 & 0 & \text{L} & 0 \\ 0 & (1-a_{22}) & -a_{23} & \text{L} & -a_{2n} \\ 0 & -a_{32} & (1-a_{33}) & \text{L} & -a_{3n} \\ \text{M} & \text{M} & \text{M} & \text{L} & \text{M} \\ 0 & -a_{n2} & -a_{n3} & \text{L} & (1-a_{nn}) \end{bmatrix} \cdot \begin{bmatrix} x_1^* \\ x_2^* \\ x_3^* \\ \text{M} \\ x_n^* \end{bmatrix} = \begin{bmatrix} f_1 \\ f_2 \\ f_3 \\ \text{M} \\ f_n \end{bmatrix} \tag{8}$$

However, if sector 1 is removed from the system, the IO table will no longer be balanced. Hence a number of assumptions should be invoked before the indirect output loss can be measured. First, the other n-1 sectors, which used to purchase some intermediate inputs from sector 1, can outsource the required intermediate inputs from abroad through imports. In other words, the loss of output in sector 1 is offset by an equal increase in imports. That is, the intermediate inputs supplied by sector 1 to the other n-1 sectors of the economy are now imported. Second, the shut-down of this sector does not have any effect on the technology of the existing industries, which continue to operate. That is to say, the closure of a particular sector does not change the direct coefficients (input requirements) of the other n-1 sectors. Third, it is also assumed that the distribution of sectoral final demand ($f_2, f_3, ...,f_n$) remains unchanged.

From an IO table one knows the total output produced by sector 1 before its shut-down (x_1), and also the final demand in the other n-1 sectors. Therefore, Equation (7) can be rewritten in such a way that only pre-determined variables appear on the right hand side. That is:

$$\begin{bmatrix} 1 & -a_{12} & -a_{13} & \text{L} & -a_{1n} \\ 0 & (1-a_{22}) & -a_{23} & \text{L} & -a_{2n} \\ 0 & -a_{32} & (1-a_{33}) & \text{L} & -a_{3n} \\ \text{M} & \text{M} & \text{M} & \text{L} & \text{M} \\ 0 & -a_{n2} & -a_{n3} & \text{L} & (1-a_{nn}) \end{bmatrix} \cdot \begin{bmatrix} f_1 \\ x_2 \\ x_3 \\ \text{M} \\ x_n \end{bmatrix} = \begin{bmatrix} (1-a_{11})x_1 \\ f_2 + a_{21}x_1 \\ f_3 + a_{31}x_1 \\ \text{M} \\ f_n + a_{n1}x_1 \end{bmatrix} \tag{9}$$

According to Equation (9), the other n-1 sectors now import their required inputs from abroad rather than purchasing them from sector 1. Relation (9) can be used to calculate the output loss (Δx_i) as a result of the hypothetical removal of any specific sector from the IO system.

As mentioned earlier since x_1 or initial output in sector 1 is known and also $\Delta f_2=\Delta f_3=\Delta f_4=\ldots=\Delta f_n=0$, one can use Relation (9) to compute the changes in sectoral output (Δx_i) as follows:

$$\begin{bmatrix} \Delta f_1 \\ \Delta x_2 \\ \Delta x_3 \\ \text{M} \\ \Delta x_n \end{bmatrix} = \begin{bmatrix} 1 & -a_{12} & -a_{13} & \text{L} & -a_{1n} \\ 0 & (1-a_{22}) & -a_{23} & \text{L} & -a_{2n} \\ 0 & -a_{32} & (1-a_{33}) & \text{L} & -a_{3n} \\ \text{M} & \text{M} & \text{M} & \text{L} & \text{M} \\ 0 & -a_{n2} & -a_{n3} & \text{L} & (1-a_{nn}) \end{bmatrix}^{-1} \cdot \begin{bmatrix} (1-a_{11})x_1 \\ f_2 + a_{21}x_1 \\ f_3 + a_{31}x_1 \\ \text{M} \\ f_n + a_{n1}x_1 \end{bmatrix} \qquad (10)$$

Now Equations (5) and (10) can be employed to calculate the industrial significance of sector 1 in terms of total contribution to output (S_1^Q) and consequently if the fixity of the sectoral employment-output ratios is accepted, one will also be able compute S_1^E.

3. Empirical Results and Policy Implications

The latest IO table (1996-97) of the Australian economy, in which competing imports are directly allocated in the second quadrant of the table, is utilised to generate empirical results. This 106-sector table has been compiled on the basis of the *System of National Accounts 1993*, which is the latest international standard of national accounting (Australian Bureau of Statistics, ABS, 2001, Cat. 5209). All transactions recorded in the table are expressed at basic prices and in millions of Australian dollars.

The backward and forward linkage and spread indices for the air and space transport industry are presented in Table 1. According to this Table, the air and space transport industry, in which Ansett used to operate, possesses strong backward and forward linkages. The backward and forward linkage indices are greater than unity and the corresponding spread indices are less than one. Therefore, it can be hypothesised that the collapse of Ansett adversely impacted upon other sectors of the Australian economy in terms of output and job losses.

Table 1. Linkage and Spread Indices

Index	Linkage	Spread
Backward	L^B=1.06	S^B=0.96
Forward	L^F=1.01	S^F= 0.92

Source: Author's calculations.

The direct or tangible importance of the air and space transport industry in terms of employment is shown in the second column of Table 2 under the heading of "initial or direct effect". The direct effect indicates that in 1996-1997 there were a total of 46163 full-time employees in the industry. It should be noted that according to the ABS (2001) definition, the total number of full-time jobs are measured as full-time positions plus 50 per cent of part-time jobs. Using the theoretical framework discussed in the previous section, one can also quantify the indirect contribution of this industry to aggregate employment (S^E).

[Table 2 about here]

As seen from Table 2, with a hypothetical shut-down of the air and space transport industry (but keeping other tradeable and non-tradeable industries in the system), at first glance, it may seem that only 46163 full time employees, who are directly involved in this industry, would lose their jobs. However, due to sectoral multiplier and flow-on effects, the closure of this industry can bring about a total loss of 158342 jobs in the other 105 sectors indirectly. In this case, the indirect contribution of the air and space transport industry to aggregate employment is three times greater than its direct contribution.

Therefore, it is naive to argue that the closure of Ansett resulted in the loss of only 16000 jobs. According to the results presented in Table 2, with a multiplier of 3.4, one can conclude that a least 48000 (16000 times 3) full-time jobs were indirectly lost in the other 105 industries. On the basis of the total contribution (direct plus indirect effects) of the air and space transport industry to employment in various industries, a sectoral ranking has also been performed in the penultimate column of Table 2. This ranking indicates that the shut-down of this industry can severely affect almost each and every industry, particularly the first 14 industries (on the top of the table) for which the total effect (Column 5 of Table 2) is more than 2 per cent of the total job losses.

It should be noted that figures in Column (3) of Table 2 show the total number of job losses if the entire air and space industry were shut-down. However, given that Ansett used to operate in the air and space transport industry one can argue that the economy would suffer equi-proportionate losses as a result of its collapse. Therefore, the total number of job losses resulting from the Ansett collapse can be approximately computed by multiplying Column (3) of Table 2 by (16000/46163). Column (6) of Table 2 shows these job losses resulting from the collapse of Ansett only. As can be seen, the following industries have been hit hardest by the collapse of Ansett (the figures in parentheses below indicate the number of full-time job losses in the corresponding industries): Air and space transport (16000); Retail trade (4186); Wholesale trade (4016); Legal, accounting, marketing and business management services (3184); Education (2690); Health services (2500); Accommodation, cafes and restaurants (2394); Services to transport, storage (2380); Other construction (2191); Other business services (1993); Scientific research, technical and computer services (1959); Government administration (1878); Road transport (1665); Communication services (1465); and Other property services (1443).

Table 3 shows that the average annual employment growth rate during the period 1985-2000 in the following 8 sectors was greater than the aggregate employment growth rate of 2 per cent per annum: Property & business services (5.9%); Accommodation, cafes & restaurants (4.8%); Cultural & recreational services (4%); Personal & other services (3.1%); Health & community services (3%); Construction (2.6%); Retail trade (2.6%); and Education (2.1%). It is important to recognise that of these 8 fastest growing industries, the following 6 industries have been hit hardest by the closure of Ansett in terms of the magnitude of the employment losses: Retail trade; Business services; Education; Health services; Accommodation, cafes & restaurants; and Construction. Therefore, it can be concluded that to a large extent the demise of Ansett has adversely affected the fastest growing industries in terms of employment.

[Table 3 about here]

4. Conclusion

The paper presents stylized facts concerning the adverse impact of the collapse of Ansett as Australia's second largest airline on the sectoral employment using the latest input-output (IO) table. The "shut-down of industry" approach is employed to substantiate the total number of job losses in various sectors of the Australian economy as a result of the Ansett collapse. Ansett operated within the air and space transport industry, which has relatively strong backward and forward linkages, supporting the view that this incident would have caused a large number of job losses at Ansett's subsidiaries, suppliers, and contractors; and the other inter-related industries such as the tourist industry (accommodation, cafes and restaurants), the retail trade industry, etc.

The research method is based on input-output theory and, as such, enables the flow-on effects of the Ansett collapse be quantified. This study found that due to the domino and multiplier effect, each additional job lost at Ansett led to a loss of more than 3 extra jobs in the economy as a whole. In other words, the closure of Ansett resulted in a total number of 70880 (16000+16000*3.43) job losses, of which 16000 full-time positions were lost directly and the remaining can be referred to as the indirect or invisible job losses in the other 105 industries. This study quantified the distribution of these job losses among 105 sectors of the Australian economy. The empirical results clearly indicate that the impact of these job losses were more pronounced in the following industries, which exhibited the fastest employment growth prior to the demise of Ansett: Retail trade; Business services; Education; Health services; Accommodation, cafes and restaurants. These empirical results are broadly consistent with previous works mentioned at the outset of this paper. One should also note that IO systems are based on the following assumptions: (1) homogeneity of output; (2) zero rates of substitution between inputs; (3) fixed proportions between inputs and outputs; (4) absence of economies of scale; (5) linearity of coefficients; and (6) exogeneity of primary inputs and final demand components. Given these assumptions (particularly the second assumption), one can argue that the reported results represent the maximum number of job losses. Undoubtedly the other rival airliners (such Qantas and Virgin Blue) will have experienced increased demand for their services resulting in increased employment in those airlines and their suppliers.

Table 2 Direct and Indirect Job Losses as a Result of Hypothetical Shutdown of the Air and Space Transport Industry and Ansett (full time job)

Industry	Shutdown of the entire air and space transport industry					Total job losses as a result of the Ansett collapse only
	Initial or direct effect	Flow-on or indirect effect	Total Effect	Rank	% Total	
	(1)	(2)	(3)= (1)+(2)	(4)	(5)	(6)*
Air and space transport	46163	0	46163	1	22.57	16000
Retail trade	0	12077	12077	2	5.91	4186
Wholesale trade	0	11587	11587	3	5.67	4016
Legal, accounting, marketing and business management services	0	9187	9187	4	4.49	3184
Education	0	7760	7760	5	3.79	2690
Health services	0	7214	7214	6	3.53	2500
Accommodation, cafes and restaurants	0	6906	6906	7	3.38	2394
Services to transport; storage	0	6866	6866	8	3.36	2380
Other construction	0	6320	6320	9	3.09	2191
Other business services	0	5750	5750	10	2.81	1993
Scientific research, technical and computer services	0	5653	5653	11	2.76	1959
Government administration	0	5418	5418	12	2.65	1878
Road transport	0	4805	4805	13	2.35	1665
Communication services	0	4227	4227	14	2.07	1465
Other property services	0	4164	4164	15	2.04	1443
Banking	0	3368	3368	16	1.65	1167
Aircraft	0	3009	3009	17	1.47	1043
Other services	0	2388	2388	18	1.17	828
Personal services	0	2081	2081	19	1.02	721
Community services	0	2079	2079	20	1.02	721
Other repairs	0	2024	2024	21	0.99	702
Residential building	0	1993	1993	22	0.97	691
Mechanical repairs	0	1966	1966	23	0.96	681
Fabricated metal products	0	1896	1896	24	0.93	657
Services to finance, investment and insurance	0	1640	1640	25	0.80	568
Other agriculture	0	1623	1623	26	0.79	562
Motor vehicles and parts; other transport equipment	0	1498	1498	27	0.73	519
Printing and services to printing	0	1464	1464	28	0.72	507
Rail, pipeline and other transport	0	1409	1409	29	0.69	488
Petroleum and coal products	0	1301	1301	30	0.64	451
Non-bank finance	0	1273	1273	31	0.62	441
Grains	0	1214	1214	32	0.59	421
Sport, gambling and recreational services	0	1195	1195	33	0.58	414
Defence	0	1194	1194	34	0.58	414
Coal; oil and gas	0	1111	1111	35	0.54	385
Publishing; recorded media and publishing	0	1108	1108	36	0.54	384
Insurance	0	1081	1081	37	0.53	375
Plastic products	0	945	945	38	0.46	328
Electricity supply	0	915	915	39	0.45	317
Furniture	0	892	892	40	0.44	309
Beef cattle	0	858	858	41	0.42	297

Note: * (6)=(3)*(16000/46163).

Table 2 Direct and Indirect Job Losses as a Result of Hypothetical Shutdown of the Air and Space Transport Industry and Ansett (full time job)-Continued

Industry	Shutdown of the entire air and space transport industry					Total job losses as a result of the Ansett collapse only
	Initial or direct effect	Flow-on or indirect effect	Total Effect	Rank	% Total	
	(1)	(2)	(3)= (1)+(2)	(4)	(5)	(6)*
Motion picture, radio and television services	0	841	841	42	0.41	292
Iron and steel	0	835	835	43	0.41	289
Clothing	0	789	789	44	0.39	274
Libraries, museums and the arts	0	721	721	45	0.35	250
Other machinery and equipment	0	706	706	46	0.35	245
Meat and meat products	0	700	700	47	0.34	243
Sheep	0	675	675	48	0.33	234
Structural metal products	0	662	662	49	0.32	230
Sheet metal products	0	592	592	50	0.29	205
Dairy cattle	0	569	569	51	0.28	197
Agricultural, mining and c	0	565	565	52	0.28	196
Other electrical equipment	0	541	541	53	0.26	187
Other wood products	0	476	476	54	0.23	165
Other food products	0	462	462	55	0.23	160
Bakery products	0	459	459	56	0.22	159
Basic chemicals	0	455	455	57	0.22	158
Water supply; sewerage and drainage services	0	440	440	58	0.22	152
Basic non-ferrous metal and products	0	420	420	59	0.21	146
Non-ferrous metal ores	0	417	417	60	0.20	145
Paper containers and products	0	368	368	61	0.18	128
Textile products	0	358	358	62	0.17	124
Electronic equipment	0	355	355	63	0.17	123
Services to agriculture; hunting and trapping	0	324	324	64	0.16	112
Services to mining	0	315	315	65	0.15	109
Water transport	0	298	298	66	0.15	103
Dairy products	0	276	276	67	0.14	96
Sawmill products	0	269	269	68	0.13	93
Other manufacturing	0	266	266	69	0.13	92
Medicinal and pharmaceutical products, pesticides	0	264	264	70	0.13	92
Household appliances	0	219	219	71	0.11	76
Textile fibres, yarns and woven fabrics	0	204	204	72	0.10	71
Paints	0	197	197	73	0.10	68
Other mining	0	196	196	74	0.10	68
Rubber products	0	194	194	75	0.10	67
Commercial fishing	0	191	191	76	0.09	66
Forestry and logging	0	190	190	77	0.09	66
Ceramic products	0	187	187	78	0.09	65
Photographic and scientific equipment	0	185	185	79	0.09	64
Plaster and other concrete products	0	170	170	80	0.08	59
Glass and glass products	0	165	165	81	0.08	57
Flour mill products and cereal foods	0	155	155	82	0.08	54

Note: * (6)=(3)*(16000/46163).

Table 2 Direct and Indirect Job Losses as a Result of Hypothetical Shutdown of the Air and Space Transport Industry and Ansett (full time job)-Continued

Industry	Shutdown of the entire air and space transport industry					Total job losses as a result of the Ansett collapse only
	Initial or direct effect	Flow-on or indirect effect	Total Effect	Rank	% total	
	(1)	(2)	(3)= (1)+(2)	(4)	(5)	(6)*
Other chemical products	0	154	154	83	0.08	53
Gas supply	0	153	153	84	0.07	53
Pulp, paper and paperboard	0	150	150	85	0.07	52
Poultry	0	133	133	86	0.07	46
Wine and spirits	0	129	129	87	0.06	45
Leather and leather products	0	125	125	88	0.06	43
Iron ores	0	124	124	89	0.06	43
Cement, lime and concrete slurry	0	122	122	90	0.06	42
Other non-metallic mineral products	0	118	118	91	0.06	41
Footwear	0	114	114	92	0.06	39
Fruit and vegetable products	0	105	105	93	0.05	36
Confectionery	0	98	98	94	0.05	34
Pigs	0	92	92	95	0.04	32
Soft drinks, cordials and syrups	0	84	84	96	0.04	29
Prefabricated buildings	0	79	79	97	0.04	27
Soap and detergents	0	74	74	98	0.04	25
Knitting mill products	0	69	69	99	0.03	24
Ships and boats	0	68	68	100	0.03	24
Cosmetics and toiletry preparations	0	65	65	101	0.03	23
Beer and malt	0	48	48	102	0.02	17
Railway equipment	0	47	47	103	0.02	16
Tobacco products	0	32	32	104	0.02	11
Oils and fats	0	24	24	105	0.01	8
Ownership of dwellings	0	0	0	106	0.00	0
TOTAL	46163	158342	204505		100	70880
Multiplier	1	3.43	4.43			

Note: * (6)=(3)*(16000/46163).
Source: Author's calculations.

Table 3 Sectoral Employment Growth Rate

Sector	Annual average employment Growth 1985-00 (%)
Agriculture forestry & fishing	0.4
Mining	-1.5
Manufacturing	0.1
Electricity, gas & water	-4.9
Construction	2.6
Wholesale trade	0.5
Retail trade	2.6
Accommodation, cafes & restaurants	4.8
Transport & storage	0.9
Communication services	1.1
Finance & insurance	1.2
Property & business services	5.9
Govt administration & defense	0.6
Education	2.1
Health & community services	3.0
Cultural & recreational services	4.0
Personal & other services	3.1
Total	2.0

Source: Valadkhani (2002).

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