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Structural Change, the Demand for Skilled Labour and Lifelong Learning

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ABSTRACT

In a recent report, the Organisation for Economic Cooperation and Development has argued that certain key developments, including globalisation, population ageing and the diffusion of information technologies, are causing a shift in the demand for labour in modern advanced economies. Demand is thought to be moving away from relatively low-skilled agricultural and production occupations in favour of highly-skilled professional, technical, administrative and managerial occupations. Moreover, rising turnover in the labour market is tending to increase the rate at which existing skills are rendered obsolete. Hence workers in OECD countries are coming under mounting pressure to adapt and enhance their skills on an ongoing basis; that is, today's workers must participate in lifelong learning.

This paper investigates the quantitative evidence for the proposition using, as a case study, the distribution of employment across occupations in Australia. Three changes in this distribution are considered: the change that actually occurred between 1986-87 and 1994-95, a forecast of the change that is likely to occur between 1994-95 and 2002-03, and an estimate of the change that will result from trade liberalisation proposals advanced by the Asia Pacific Economic Cooperation forum. In each case the change in the occupational distribution is used to infer the effect on the demand for labour differentiated by qualification level, qualification field and age group. Unlike much of the structural analysis that accompanies discussions of lifelong learning, the approach here is comprehensive. The analysis is not restricted to occupations thought on *a priori* grounds to have a particular affinity to lifelong learning, but considers changes in employment across all occupations. Hence the role of particular occupations, such as those associated with information technology, for example, are able to be placed in a an economy-wide perspective.

The analysis reveals that the factors driving the demand for labour are numerous and diverse, and suggests that generalisations and "stylised facts" are likely to be of only limited usefulness in determining training priorities.

J.E.L. Classification Numbers: C68, D58, E47, F17, J21, I20, J23.

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STRUCTURAL CHANGE, THE DEMAND FOR SKILLED LABOUR AND LIFELONG LEARNING

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1. Introduction

In January 1996, the Education Committee of the Organisation for Economic Cooperation and Development (OECD) met at Ministerial Level to consider the theme "Making Lifelong Learning a Reality for All". Subsequent to the meeting, the OECD published a background report (OECD, 1996) providing detailed information on all the topics discussed by the Ministers. One function of the report was to establish the context for lifelong learning through an analysis of a wide range of social, economic and educational data. In this regard, the report argues

> "the ideas that underpin the broad principle (of lifelong learning) need to be grounded in an analysis of key facts and developments, and not merely founded on an assertion of anticipated benefits." (p. 29)

Prominent among the 'key facts and developments' identified by the OECD are globalisation, population ageing, the diffusion of information technologies, and changes in industrial, occupational and qualification structures of modern advanced economies. According to the report, these developments contribute to a trend in the demand for labour away from relatively low-skilled agricultural and production occupations in favour of highly-skilled professional, technical, administrative and managerial occupations. Moreover, rising turnover in the labour market is tending to increase the rate at which existing skills are rendered obsolete. Hence workers in OECD countries are coming under mounting pressure to adapt and enhance their skills on an ongoing basis. That is, if they are to maintain their employment opportunities in the face of rapid and escalating economic change, today's workers must participate in lifelong learning.

The purpose of this paper is to investigate some of these ideas in more quantitative detail than that attempted by the OECD, using the Australian economy as a case study. As a small, open, developed economy, Australia has been subject in recent times to all the key developmental pressures mentioned above and, to that extent, its experience can be considered of general relevance to OECD countries. Indeed, local commentators on lifelong learning have raised the same kind of considerations as the OECD in the Australian context. For example, in a review of pressures on Australian university graduates to continue learning after graduation, Candy *et al.* (1994) nominate the following trends as being of particular significance: occupational mobility and the emergence of new occupations, the explosion of knowledge and technology, the shift to an information society, increasing internationalisation and microeconomic reform.

In the same vein, Clare and Johnson (1993) offer this assessment of the imperative for ongoing education:

> "In many vocational areas, techniques and skills are constantly evolving. Keeping skills up to date is necessary for Australia to maintain or enhance levels of competitiveness, and to supply the quality of goods and services that is increasingly being expected. In addition, Australia's population is ageing, and the proportion of young people in work is declining. The trend towards an older population will effect the overall levels of knowledge that are held by the workforce. All knowledge suffers from some level of depreciation or obsolescence, and depreciation rates for knowledge have increased as technology changes many facets of the work we perform. Therefore the stock of knowledge in the workforce will decline unless more knowledge is gained by existing workers, through experience and training, to counteract the effects of knowledge depreciation." (p.48)

The focus of the present analysis of the quantitative evidence is the distribution of employment across occupations. Three changes in this distribution are considered: the change that actually occurred between 1986-87 and 1994-95 (which shall be referred to as the *historical simulation*), a forecast of the change that is likely to occur between 1994-95 and 2002-03 (the *forecast simulation*), and an estimate of the change that will result from trade liberalisation proposals advanced by the Asia Pacific Economic Cooperation forum (the *APEC simulation*). In each case the change in the occupational distribution is used to infer the effect on the demand for labour differentiated by qualification level,

qualification field and age group. In order to facilitate a comparison of the three simulations, the analysis abstracts from the role of the business cycle in determining the *level* of employment; that is, the analysis is concerned with the effects of *structural* change as embodied in changes in the *distribution* of employment. Unlike much of the structural analysis that accompanies discussions of lifelong learning, the approach here is comprehensive. The analysis is not restricted to occupations thought on *a priori* grounds to have a particular affinity to lifelong learning, but considers changes in employment across all occupations. Hence the role of particular occupations, such as those associated with information technology, for example, are able to be placed in a an economy-wide perspective.

In the balance of the paper, methodological details are provided in Section 2, results are presented in Section 3 and conclusions are drawn in Section 4.

2. Methodology

The simulations begin with a (282 x 330) matrix of employment by occupation and qualification taken from the 1991 Census of Population and Housing. 1991 is the most recent year for which the required data is available.[1] The 282 occupations comprise the unit groups of the Australian Standard Classification of Occupations (ASCO) and are described in the ASCO Dictionary published by the Australian Bureau of Statistics (ABS, 1987). All but one of the 330 qualification categories are obtained by dividing each of 47 qualification fields between 7 qualification levels. The qualification levels and fields are described below in Tabes 1 and 3, respectively. The remaining category, namely *No post-school qualification*, is included for the sake of completeness. This matrix, i.e., the matrix of actual employment levels in 1991, will be referred to as the *base matrix*. Its main function is to define the distribution of qualifications within each occupation.

2.1 The Historical Simulation

The historical simulation is based on quarterly employment data for the ASCO unit groups taken from the ABS Labour Force Survey and covers the period

[1] A more recent census was conducted by the Australian Bureau of Statistics in 1996 but processing of that information is still in progress.

August 1986 to May 1995. After first converting the data into four-quarter moving averages, ordinary least squares regression is used to determine the trend change in employment for each occupation between 1986-87 and 1994-95.

Given the qualification distributions defined by the base matrix, it would be possible to compute the corresponding changes in employment by qualification immediately. However, in order to compare the effects of the historical changes with those of the forecast and APEC simulations, the occupational employment changes must be imposed on a common base. Moreover, for purposes of the present study, interest is focussed on the effects of changes in the distribution, rather than the level, of employment. Hence the *historical matrix* is computed by first scaling each row of the base matrix separately to conform to the trend occupational changes (i.e., the historical employment changes are imposed on the 1991 employment levels) and then scaling the entire matrix to recover the 1991 level of aggregate employment.

The historical simulation is completed by comparing the column sums of the historical and base matrices. The differences between the column sums represent the changes in employment by qualification that can be attributed to the change in the distribution of employment across occupations between 1986-87 and 1994-95.[2]

2.2 The Forecast Simulation

The forecast simulation proceeds in four stages. It begins with a forecast for the macroeconomy derived from the views of two of Australia's leading commercial forecasting agencies, Syntec Economic Services and Access Economics.[3] This forecast identifies, *inter alia*, the prospects for Gross Domestic Product (GDP) and its components (i.e., investment, private consumption, government expenditure, exports and imports), and for aggregate employment, over the forecast period 1994-95 to 2002-03.

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[2] Of course, the results are conditional on the particular qualification distributions embodied in the base matrix. However, these distributions vary sufficiently across occupations to suggest that the important structural characteristics of the matrix persist over the time periods in question.

[3] Both organisations regularly publish medium-term macro forecasts for the Australian economy. The forecasts presented here draw on Syntec Economic Services (1996) and Access Economics (1996).

At the second stage, the aggregate forecasts are converted into forecasts of output and employment for 112 industries.[4] This conversion is achieved by treating the macro forecast as an exogenous input to a large, dynamic, applied general equilibrium model of the Australian economy, the *MONASH* model. Additional informed opinion about the outlook for particular industries is also included at this stage. For example, although Australia is a developed economy, its overall economic prospects continue to depend to a significant extent on its export-oriented primary sector. Hence, a considerable effort is made by the Australian Bureau of Agricultural and Resource Economics to anticipate developments in the relevant world commodity markets. The Bureau's assessments are published on an annual basis[5] and are incorporated into the present forecasts.

Of particular importance among the range of informed opinion is a view about future technical change. Technical change cannot be observed directly but must be inferred from movements in other variables. In an independent study, the *MONASH* model has been used to estimate the technical change that must have occurred in the Australian economy during the period 1986-87 to 1993-94 to support consistency between a wide variety of observations including[6]

- outputs for 90 industries,
- employment for 80 industries,
- capital growth for 30 industries,
- investment for 25 industries,
- import and export volumes and prices for 114 commodities,
- value-added prices for 17 industries,
- consumer prices for 26 commodities,
- consumption volumes for 38 commodities,
- tariff rates for 114 commodities, and
- public expenditures for 114 commodities.

This study informs the forward estimates of technical change at the industry level, such as intermediate-input-saving technical change and primary-factor-

[4] In the forecast scenario, labour is assumed to be in excess supply so that employment is demand determined. In other words, references to employment forecasts should, strictly speaking, be taken to mean forecasts of the demand for labour.

[5] See Australian Bureau of Agricultural and Resource Economics (1996).

[6] The MONASH model identifies 112 industries which produce 114 commodities. The numbers of industries and commodities in this list refer to the level of aggregation at which the indicated data were available.

saving technical change. By and large, the rate of technical change that has obtained in the recent past is assumed to continue in the forecast period, although a limited number of adjustments have been made on the basis of anecdotal information. The methodology employed in the historical study is described in Dixon and McDonald (1993) and Dixon *et al*. (1996).

At the third stage of the forecast simulation, the 112 industry employment forecasts are converted into employment forecasts for 282 occupations. Changes in the distribution of employment across occupations within an industry are treated as a type of technical change. To estimate this type of change, a quarterly time series was assembled for each industry showing the 282 occupational employment shares between August 1986 and May 1995, inclusive.[7] This data was derived from the ABS Labour Force Survey and from the 1986 and 1991 Censuses of Population and Housing. Simple linear time trends in the occupational shares were then determined using ordinary least squares regression. The occupational forecasts are obtained by extrapolating these trends into the forecast period.

The final stage consists of computing the *forecast matrix* in a manner analogous to the computation of the historical matrix; that is, the changes in employment by occupation over the forecast period are imposed on the rows of the base matrix and the resulting matrix is scaled to recover the 1991 level of aggregate employment.

The *MONASH* forecasting system that underlies the forecast simulation has been under development at the Centre of Policy Studies at Monash University since 1991 and is documented in Adams *et al*. (1994). The particular set of forecasts presented here is a slightly revised version of the set described in Dixon and Rimmer (1996).

2.3 The APEC Simulation

In the Bogor Declaration of November 1994, the member countries of the Asia Pacific Economic Cooperation (APEC) forum[8] committed themselves to free

[7] Data availability meant that the estimation was conducted for an 88-industry classification rather than the full 112-industry classification of the *MONASH* model. Details of the estimation procedure are contained in Meagher (1997).

[8] The APEC members are Canada, the United States, Mexico, New Zealand, Australia, the five ASEAN countries, Hong Kong, China, Taiwan, Korea and Japan.

and open trade within the group by the year 2020. Adams *et al.* (1996) have recently conducted an analysis of the consequences for Australia of such a change in trading relations using the GTAP model of world trade (Hertel, 1997).[9] In particular, the GTAP model is used to calculate how production levels, bilateral trade flows and prices of thirty seven commodities are affected when all tariffs (and the tariff equivalents of other trade barriers) on APEC sourced imports are removed by each APEC country. The GTAP results are then treated as exogenous inputs to a complementary simulation using the *MONASH* model. In this arrangement, the function of GTAP is to determine the effect of the introduction of trade liberalisation on the supply curves facing Australia's importers and the demand curves facing its exporters, while the function of *MONASH* is to determine the effect of the changes in foreign demands and supplies on the employment of labour by industry and occupation. In the present context, the changes in employment by occupation are used to compute the *APEC matrix*, i.e., the employment matrix obtained by imposing the changes on the rows of the base matrix and then scaling the resulting matrix to recover the 1991 level of aggregate employment. As with the other simulations, the end product of the APEC simulation is obtained by computing the difference between the column sums of the APEC matrix and the column sums of the base matrix.

In the historical and forecast simulations, the structural change considered represents differences between the state of the economy at two different points in time. In the APEC simulation, it represents differences between two alternative states of the economy at the same point of time. The two alternatives are the state that will evolve if the trade liberalisation is actually implemented and the state that will evolve if it is not. If the reform were to occur now, it would take the economy a number of years to adjust to the change (i.e., to return to equilibrium), exactly how long depending on the kind of adjustment mechanisms that are allowed in the simulation (i.e., on the closure of the model). Adams *et al.* report results for a medium-run closure and a long-run closure. In the former, the size of the capital stock and the labour force in each GTAP region[10] are treated as being unaffected by the reform. Thus the medium run is a period of time long enough to allow the reorganisation of production and distribution within the regional economies but not long enough

[9] The GTAP model is maned after the Global Trade Analysis Project located at Purdue University in the United States.

[10] In the APEC simulation, the 15 APEC countries are combined into 10 regions.

to allow the sizes of the regional economies to change (that is, to diverge from the sizes they would have assumed in the absence of the reform). In the long-run closure, these restrictions are relaxed to the extent that the global quantity of capital and its regional distribution are allowed to respond to the changed profit opportunities created by APEC. It is in the nature of the kind of comparative static analysis involved here that the elapsed calender times during the medium and long runs are not explicitly stated. However, Adams *et al.* believe that periods of about 5 to 7 years and about 15 to 20 years, respectively, may be appropriate. In this paper, APEC results are reported only for the medium run, as it represents an adjustment period that corresponds more closely to the other two simulations.

3. Results

3.1 Employment by Qualification Level

Table 1 shows the changes in the distribution of employment between persons with various qualification levels that result from each of our three simulations. Here we consider only the first two, the APEC simulation being discussed separately in Section 3.4 below. The table is to be interpreted as follows. Changes in the distribution of employment across occupations during the period 1986-87 to 1994-95, had they occurred in 1991, would have resulted in the employment of an additional 18862 persons with a higher degree. Similarly, forecast changes in the distribution of employment during the period 1994-95 to 2002-03, had they occurred in 1991, would have resulted in the employment of an additional 4477 persons with a higher degree. Two general observations are pertinent. Firstly, the table offers little support for the idea that structural change is progressively favouring the employment of more highly skilled workers, at least in so far as skill can be associated with level of qualification. It is true that, compared to the historical simulation, the forecast simulation indicates a shift from *QL07 Basic vocational* to *QL06 Skilled vocational*, but it also indicates a shift away from the employment of persons with degrees and diplomas and a shift towards the employment of persons with no post-school qualifications. Secondly, the patterns of the employment redistributions for the two simulations have very little in common.

Table 1. Employment Changes by Qualification Level, Persons

Code	Description	Historical Simulation	Forecast Simulation	APEC Simulation
QL01	Higher degree	18862	4477	-872
QL02	Post-graduate degree	9043	-2439	-886
QL03	Bachelor degree	56934	14375	-4997
QL04	Undergraduate diploma	14294	-13423	-998
QL05	Associate diploma	5726	3950	-762
QL06	Skilled vocational	-93311	-21672	-5218
QL07	Basic vocational	748	-8255	-1364
QL08	No post-school qualification	-12296	22987	15097
	Total	0	0	0

A different appreciation of the relationship between the simulations emerges in Table 2, where the results are expressed as percentages of total employment. According to this table, the actual distribution of employment in 1991 is no more than mildly disrupted by any of the three simulations, with no category changing its employment share by more than one and a half percentage points. Hence the dissimilarities between the columns of results in Table 1 are more apparent than substantive, and arise primarily because each column represents the *difference* between two (not particularly dissimilar) distributions.

Table 2. Employment Shares by Qualification Level, Per Cent

Code	Description	Actual 1990-91	Historical Simulation	Forecast Simulation	APEC Simulation
QL01	Higher degree	1.71	1.97	1.77	1.70
QL02	Post-graduate degree	1.68	1.81	1.65	1.67
QL03	Bachelor degree	9.89	10.69	10.10	9.82
QL04	Undergraduate diploma	6.21	6.41	6.02	6.19
QL05	Associate diploma	2.40	2.48	2.46	2.39
QL06	Skilled vocational	16.64	15.33	16.34	16.57
QL07	Basic vocational	7.20	7.22	7.09	7.19
QL08	No post-school qualification	54.27	54.09	54.57	54.47
	Total	100.00	100.00	100.00	100.00

The economic forces driving the results in Table 1 can be better understood by identifying separately the contributions which various occupations make to changes in employment by qualification level. Table 3 shows the relevant occupation by qualification matrix for the historical simulation[11], the entries in the last row (i.e., the column sums) of the table corresponding to the entries in the first column of Table 1. Table 4 contains the analogous information for the forecast simulation. Two general observations are again pertinent. Firstly, persons with qualifications of a particular level are distributed across numerous occupations. Secondly, the changes in the distribution of employment across occupations in the two simulations are quite diverse. Together, these two observations imply that the effect of structural change on the skill composition of employment cannot to be satisfactorily explained by reference to "stylised facts", intuitively appealing though they may be. Rather, because it is multi-layered, the relationship between cause and effect tends to be quite opaque and, in general, can only be revealed by means of a somewhat tedious multi-step analysis. Three examples will be provided.

3.1.1 QL03 Bachelor degree

Both the historical and the forecast simulations favour the employment of persons with bachelor degrees, but the former does so much more than the latter. From Table 1, the difference is (56934-14375) or 42559 persons. From Tables 3 and 4, this difference is mainly accounted for by the occupations

- *27 Business professionals* (29051-17145=11906 persons),
- *23 Health diagnosis and treatment practitioners* (9445),
- *26 Social professionals* (6504) and
- *24 School teachers* (6090).

All the remaining occupations account for 8614 persons.

Employment growth for a particular occupation can be usefully decomposed into a component (the *industry growth effect*) due to industry employment growth and a component (the *occupational share effect*) due to changes in the distribution of employment across occupations within industries. In the case of *Business professionals*, the difference between the historical and forecast employment growth rates reflects almost entirely a difference in the

[11] To conserve space, the table shows only the 52 ASCO minor groups rather than the 282 unit groups.

Table 3: Employment Changes by Qualification Level[(a)] and Occupation, Historical Simulation, Persons

	Occupation	QL01	QL02	QL03	QL04	QL05	QL06	QL07	QL08	Total
11	Legislators and government appointed officials	-90	-47	-517	-40	-10	-52	-30	-211	-996
12	General managers	-871	-291	-2949	-1044	-466	-2216	-935	-5491	-14263
13	Specialist managers	2359	2315	11140	4707	2258	3953	2857	15488	45076
14	Farmers and farm managers	-311	-329	-1977	-2986	-939	-5502	-2586	-38434	-53065
15	Managing supervisors (sales and service)	137	137	997	633	316	2082	943	9811	15056
16	Managing supervisors (other business)	127	86	890	534	239	5453	766	6143	14238
21	Natural scientists	1164	167	1770	162	85	40	8	190	3585
22	Building professionals and engineers	-427	-148	-3618	-696	-641	-1413	-177	-1145	-8265
23	Health diagnosis and treatment practitioners	683	760	1741	2407	513	215	519	1699	8537
24	School teachers	-779	-4088	-7604	-4150	-598	-145	-108	-683	-18153
25	Other teachers and instructors	7582	1352	6115	2220	605	1039	1174	6668	26755
26	Social professionals	1657	1932	10732	1691	531	411	699	3126	20780
27	Business professionals	4858	4061	29051	5717	4024	6304	6242	35007	95266
28	Artists and related professionals	157	135	1133	1156	224	1015	380	1287	5487
29	Miscellaneous professionals	2524	1970	6690	1431	577	489	1121	4028	18830
31	Medical and science technical officers and technicians	384	261	2448	1462	1745	1549	2868	6625	17344
32	Engineering and building associates and technicians	-105	-75	-988	-995	-3699	-9519	-2034	-4980	-22395
33	Air and sea transport technical workers	-58	-20	-277	-1099	-282	-819	-824	-1105	-4483
34	Registered nurses	-16	-35	-810	-3226	-14	-15	-211	-266	-4592
35	Police	0	-2	-7	-4	-8	-29	-30	-117	-198
39	Miscellaneous para-professionals	-241	132	-1301	833	-1014	-3021	-1474	-12052	-18139
41	Metal fitting and machining tradespersons	-26	-20	-282	-200	-420	-22852	-637	-7840	-32278
42	Other metal tradespersons	-13	-14	-104	-108	-114	-11287	-404	-6378	-18421
43	Electrical and electronics tradespersons	23	67	562	192	94	-12631	-35	-4901	-16630
44	Building tradespersons	-13	-19	-108	-124	-111	-15429	-519	-6259	-22582
45	Printing tradespersons	-16	-14	-88	-90	-32	-4404	-273	-2546	-7464
46	Vehicle tradespersons	-6	-5	-39	-41	-81	-8367	-225	-3119	-11882
47	Food tradespersons	17	27	273	373	101	445	595	5159	6991

Table 3 (continued): Employment Changes by Qualification Level[(a)] and Occupation, Historical Simulation, Persons

	Occupation	QL01	QL02	QL03	QL04	QL05	QL06	QL07	QL08	Total
48	Amenity horticulture tradespersons	0	-6	-12	-29	-11	-13	-13	-89	-172
49	Miscellaneous tradespersons	-19	-31	-173	-255	-103	-9367	-796	-9863	-20607
51	Stenographers and typists	-117	-289	-1927	-2216	-843	-917	-15319	-40996	-62623
52	Data processing and business machine operators	43	78	758	538	305	517	2298	10654	15191
53	Numerical clerks	32	58	432	319	363	392	667	5028	7291
54	Filing, sorting and copying clerks	-17	-63	-219	-137	-112	-31	-383	-1733	-2695
55	Material recording and despatching clerks	-21	-22	-288	-178	-131	-764	-757	-5153	-7315
56	Receptionists, telephonists and messengers	96	226	1726	2364	772	860	8560	29713	44317
59	Miscellaneous clerks	-168	-345	-2302	-1102	-559	-1508	-1784	-15560	-23329
61	Investment, insurance and real estate salepersons	132	58	1036	48	253	1778	-253	1349	4401
62	Sales representatives	100	111	1140	643	335	2746	1058	9115	15247
63	Sales assistants	41	101	717	606	245	1823	1480	20356	25369
64	Tellers, cashiers and ticket salespersons	28	33	512	391	207	634	1395	20382	23584
65	Miscellaneous salespersons	53	127	1426	1146	554	2021	2738	22586	30650
66	Personal service workers	351	1029	4258	5527	2984	9283	4972	53221	81624
71	Road and rail transport drivers	-25	-32	-265	-183	-94	-2089	-1644	-9675	-14008
72	Mobile plant operators (excluding transport)	0	-2	-19	-41	-33	-918	-172	-1516	-2701
73	Stationary plant operators	-27	-20	-202	-154	-356	-4180	-2162	-9949	-17049
74	Machine operators	-118	-111	-1151	-665	-348	-5904	-1958	-33720	-43976
81	Trades assistants and factory hands	-35	-59	-462	-274	-140	-2754	-716	-15469	-19908
82	Agricultural labourers and related labourers	1	-6	-78	-61	-82	-169	-219	-3764	-4378
83	Cleaners	-11	-15	-141	-127	-49	-457	-317	-4687	-5804
84	Construction and mining labourers	-23	-53	-381	-261	-180	-6465	-2215	-20487	-30065
89	Miscellaneous labourers and related workers	-131	-15	-324	-320	-137	-3124	-1382	-11747	-17181
99	All occupations	18862	9043	56934	14294	5726	-93311	748	-12296	0

(a) The Qualification Level codes are defined in Table 1.

Table 4: Employment Changes by Qualification Level[(a)] and Occupation, Forecast Simulation, Persons

	Occupation	QL01	QL02	QL03	QL04	QL05	QL06	QL07	QL08	Total
11	Legislators and government appointed officials	-143	-79	-874	-59	-16	-68	-47	-311	-1598
12	General managers	-1634	-547	-5535	-1960	-874	-4158	-1754	-10304	-26766
13	Specialist managers	1549	1065	8383	3118	1855	5841	2946	16489	41246
14	Farmers and farm managers	-323	-342	-2055	-3103	-976	-5719	-2688	-39950	-55157
15	Managing supervisors (sales and service)	277	164	1724	630	579	1682	922	12789	18767
16	Managing supervisors (other business)	293	199	2054	1232	551	12584	1767	14176	32857
21	Natural scientists	-532	-52	-1227	-142	-76	-43	-113	-225	-2410
22	Building professionals and engineers	-70	-73	-1644	-298	-240	-555	-74	-645	-3599
23	Health diagnosis and treatment practitioners	-3195	-298	-7704	296	143	17	137	144	-10460
24	School teachers	-1326	-7681	-13694	-9296	-1704	-255	-203	-1380	-35539
25	Other teachers and instructors	4850	816	3954	1346	424	709	867	5076	18041
26	Social professionals	251	664	4228	-168	123	-45	84	600	5736
27	Business professionals	2564	2052	17145	3006	2291	2842	3045	17397	50341
28	Artists and related professionals	83	50	253	419	52	362	18	-396	841
29	Miscellaneous professionals	1144	838	3440	840	345	312	670	2492	10081
31	Medical and science technical officers and technicians	192	109	1289	640	818	834	1394	3321	8597
32	Engineering and building associates and technicians	-77	-41	-713	-767	-2944	-6020	-1287	-3598	-15447
33	Air and sea transport technical workers	-46	-19	-249	-1145	-118	-643	-742	-1332	-4292
34	Registered nurses	-59	-125	-2940	-11715	-50	-53	-766	-965	-16674
35	Police	-13	-96	-309	-164	-340	-1223	-1254	-4923	-8323
39	Miscellaneous para-professionals	424	674	3992	1865	1837	2112	2667	18470	32043
41	Metal fitting and machining tradespersons	-16	-13	-173	-107	-239	-13057	-357	-4652	-18614
42	Other metal tradespersons	1	2	3	5	13	245	26	-53	241
43	Electrical and electronics tradespersons	24	54	472	219	320	979	339	-116	2292
44	Building tradespersons	13	17	126	145	47	8500	349	5946	15142
45	Printing tradespersons	-16	-14	-82	-85	-33	-4660	-278	-2417	-7584
46	Vehicle tradespersons	-6	-3	-27	-23	-35	-6617	-193	-2970	-9873
47	Food tradespersons	-1	-5	51	130	31	-6743	52	-3181	-9665

Table 4 (continued): Employment Changes by Qualification Level[(a)] and Occupation, Forecast Simulation, Persons

	Occupation	QL01	QL02	QL03	QL04	QL05	QL06	QL07	QL08	Total
48	Amenity horticulture tradespersons	13	8	97	72	56	700	182	2054	3183
49	Miscellaneous tradespersons	-8	-13	-71	-147	-59	-11030	-818	-8180	-20326
51	Stenographers and typists	-102	-268	-1810	-2003	-797	-833	-15529	-42997	-64338
52	Data processing and business machine operators	39	64	716	467	283	456	2099	10742	14866
53	Numerical clerks	140	221	2072	1300	1237	1315	3018	21700	31004
54	Filing, sorting and copying clerks	-60	-162	-778	-421	-312	-331	-1127	-7021	-10211
55	Material recording and despatching clerks	-19	-19	-279	-176	-126	-691	-782	-4817	-6907
56	Receptionists, telephonists and messengers	50	128	987	1462	454	113	5334	14945	23475
59	Miscellaneous clerks	-168	-354	-2223	-1197	-581	-1567	-1802	-16040	-23932
61	Investment, insurance and real estate salepersons	251	126	2056	319	383	1512	131	3586	8364
62	Sales representatives	189	210	2161	1218	635	5203	2005	17273	28893
63	Sales assistants	8	20	145	123	50	370	300	4129	5146
64	Tellers, cashiers and ticket salespersons	52	62	818	515	410	726	2250	28957	33789
65	Miscellaneous salespersons	84	157	1517	1590	613	2364	3298	22809	32432
66	Personal service workers	89	293	1093	94	831	2978	-3203	13038	15214
71	Road and rail transport drivers	81	88	881	691	377	8950	525	34772	46365
72	Mobile plant operators (excluding transport)	4	-2	8	-12	-11	212	-29	5042	5212
73	Stationary plant operators	-26	-21	-180	-141	-299	-3685	-2331	-8172	-14853
74	Machine operators	-94	-86	-888	-457	-258	-3920	-1430	-22642	-29774
81	Trades assistants and factory hands	-14	-59	-274	-198	-85	-1556	-347	-8536	-11068
82	Agricultural labourers and related labourers	-3	-12	-134	-123	-102	-480	-335	-5442	-6631
83	Cleaners	-28	-38	-361	-324	-125	-1168	-809	-11974	-14827
84	Construction and mining labourers	-15	-48	-302	-212	-141	-4607	-1767	-13736	-20828
89	Miscellaneous labourers and related workers	-198	-48	-767	-724	-271	-3862	-2615	-25986	-34470
99	All occupations	4477	-2439	14375	-13423	3950	-21672	-8255	22987	0

(a) The Qualification Level codes are defined in Table 1.

contributions of the occupational share effect. During the historical period, employment growth for the occupation is, on average, about 3.5% per annum greater than would have been expected on the basis of industry growth alone.[12] However, the differential declines during the period and, as explained in Section 2.2, the trend established during the historical period is assumed to persist into the forecast period. Consequently the average contribution of the occupational share effect during the latter period is only 1.6% p.a.

As an aside, it is worth noting that the minor group *Business professionals* includes the unit group *Computing professionals*, an occupation that is often singled out as having especially good employment prospects because of its association with information technology. The decline in the occupational share effect during the historical period is even more pronounced for the unit group than it is for the minor group, causing a fall in its average employment growth rate from 8.1% p.a. during the historical period to 5.8% p.a. during the forecast period. Of course, this result depends crucially on the assumption that historical trends in the occupational shares within industries are maintained, and no stronger claim is made for this assumption than that it is a reasonable one. Other reasonable assumptions may lead to different results.

For the occupation *Health practitioners*, employment increases by 2.5% p.a. during the historical period but falls by 0.3% p.a. during the forecast period. Of this difference, the industry growth effect is responsible for 1.3 percentage points and the occupational share effect for 1.5 percentage points. Not surprisingly, more than 80% of *Health practitioners* are employed in the *Health* industry, and the change in the industry growth effect over time closely reflects developments in that industry.[13] Notwithstanding the ageing of the population, output growth for the industry is less during the forecast period than during the historical period because of slower consumption growth and cuts in government expenditure. Moreover, the growth in labour productivity is higher due to economies associated with the proliferation of medical centres and the regionalisation of hospitals. As before, the change in the occupational share effect for *Health practitioners* reflects historical trends in the occupational shares within industries.

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[12] Again to conserve space, occupational growth rates are only reported as required for the exposition.

[13] All industry employment shares referred to in the paper are for 1994-95.

Turning to *Social professionals*, employment growth is 4.9% p.a. during the historical period but falls to only 2.3% p.a. during the forecast period. This time the industry growth effect is dominant, accounting for 2.1 percentage points of the difference. Most *Social professionals* are employed in the industries *Legal, accounting and other business services* (41%) and *Welfare and other community services* (36%). For the former, employment growth is lower during the forecast period than it is during the historical period mainly because labour productivity growth is expected to be higher. For the latter, employment growth in the forecast period is enhanced by increasing demand for child care and accommodation for the aged. But, when all services produced by the industry are taken into account, households have been *reducing* its share in their budgets in recent years. Furthermore, as we have already noted with respect to *Health*, government expenditures on social services are in decline, and hence so is employment growth in *Welfare and other community services*.

Like *Health practitioners*, *School teachers* are concentrated in a single industry, namely *Education*. In recent history, the experience of the *Education* industry has been conditioned by slow growth in government spending, an offsetting shift in the composition of household spending, and rapid growth in the export of educational services. These trends are expected to continue in the forecast period with the exception that government expenditure growth is likely to become negative. Hence, output growth in *Education* is lower in the forecast period than in the historical period. The negative effect on the employment of *School teachers* is exacerbated by increasing labour productivity growth in *Education* and by a declining occupational share effect (from -1.4% p.a. in the historical period to -2.0% p.a. in the forecast period).

3.1.2 QL06 Skilled Vocational

In the historical simulation, the employment of persons with *Skilled vocational* qualifications falls by 93311 persons. In the forecast simulation, employment also falls but by a more modest 21671 persons. From Tables 3 and 4, the main occupations involved in accounting for the improvement of 71640 persons are

- *44 Building tradespersons* (8500+15429=23929 persons),
- *43 Electrical and electronic tradespersons* (13610),
- *42 Other metal tradespersons* (11532),

- *71 Road and rail transport drivers* (11039) and
- *41 Metal fitting and machining tradespersons* (9795).

It follows that the remaining occupations account for 1735 persons.

For *Building tradespersons*, average employment growth is 0.2% p.a. during the historical period but 2.2% during the forecast period. Here, the industry growth effect contributes 1.8 percentage points to the difference and the occupational share effect contributes 0.2 percentage points. Employment for the occupation is provided mainly by the industries *Building construction* (18%), *Concreting, bricklaying and tiling* (11%) and *Other special trade construction* (46%). The relatively good employment prospects for the construction sector during the forecast period reflect the timing of the investment cycle. During the historical period, residential construction grows at a faster rate than GDP whereas non-residential construction grows very slowly. In the forecast period this situation is reversed, with non-residential construction recovering strongly from a cyclically low level in 1994-95. The low base for non-residential construction at the beginning of the forecast period underpins the strong net positive employment growth for the sector as a whole during the period.

The relative strength of *Non-residential construction* during the forecast period is also responsible for the improved employment prospects of the other tradespersons in the list, as their occupations are concentrated in industries (such as *Structural metal products*, *Sheet metal products*, *Other fabricated metal products* and *Construction machinery*) which supply the construction sector. *Electrical and electronic tradespersons* derive an additional impetus from an expected slowing down of the previously very rapid labour productivity growth in the *Communications* and *Electricity* industries.

International trade grows much faster than domestic production in both the historical and forecast periods, and transport services are used intensively to facilitate the flows of imports from ports of entry and exports to ports of exit. Hence the transport sector experiences better than average output growth in both periods. However, the main source of the additional employment of *Road and rail transport drivers* in the forecast period is the sluggish capital growth forecast for the road transport sector. For a given output growth rate, slow capital growth implies slow labour productivity growth and rapid employment growth.

3.1.3 QL08 No Post-School Qualification

For unskilled workers, employment falls by 12296 persons in the historical simulation but rises by 22987 persons in the forecast simulation. This time the most important contributions (both positive and negative) to the improvement come from the occupations

- *71 Road and rail transport drivers* (34772+9675=44447 persons),
- *66 Personal service workers* (-40183),
- *39 Miscellaneous paraprofessionals* (+30522),
- *27 Business professionals* (-17610),
- *53 Numerical clerks* (+16672), and
- *63 Sales assistants* (-16227).

Here it will suffice to remark only on the diversity of the results, with unskilled workers faring relatively well or relatively poorly according to their particular occupation. The complexity of the economic forces driving the changes in the employment prospects of the different skill groups is by now apparent.

3.2 Employment by Qualification Field

Table 5 shows the changes in the distribution of employment between persons with various qualification fields for the three simulations. It is to be interpreted in the same way as Table 1 for qualification levels. It would be possible to identify the occupational contributions for each qualification field separately, just as they were for the qualification levels in Tables 3 and 4. However, as the nature of the analysis has already been amply illustrated, an exposition at the same level of detail will not be repeated. In any case, the preceding discussion of qualification levels can also be applied to an understanding of some of the important results for qualification fields.

Of the 47 qualification fields listed in Table 5, the difference between the level of employment in the forecast and historical simulations exceeds ten thousand persons in seven cases, namely:

- *QF00 No post-school qualification* (22987+12296=35283 persons),
- *QF72 Building construction* (+31575),
- *QF64 Mechanical engineering* (+27726),
- *QF31 School teacher training* (-24369),

Table 5. Employment Changes by Qualification Field, Persons

Code	Description	Historical Simulation	Forecast Simulation	APEC Simulation
QF11	Management	9276	5637	-634
QF12	Management support services	1264	-3089	-1052
QF13	Sales and marketing	5135	5930	-387
QF14	Financial services	6481	13114	-1514
QF21	Medicine	-1037	-8781	-237
QF22	Nursing	3469	-17681	-270
QF23	Health Science	5668	-789	-80
QF24	Dental science	5041	762	-85
QF25	Veterinary studies	525	-188	40
QF29	Other health	720	235	-59
QF31	School teacher training	6031	-18338	-1895
QF32	Post-school teacher training	286	-391	-101
QF39	Other teaching	930	-832	-97
QF41	Behavioural studies	13061	4518	-441
QF42	Welfare	15782	4824	-165
QF43	Librarianship	-98	350	-86
QF44	Language and area studies	2871	532	-283
QF45	Religion and philosophy	2177	-1428	-64
QF46	Economics	2980	2617	-240
QF47	Law	6118	3633	-423
QF48	Visual and performing arts	4949	2462	-551
QF49	Other society and culture	4950	768	-249
QF51	Life science	4843	1638	-128
QF52	Physical science	5985	1688	-349
QF53	Mathematics and statistics	3017	1676	-189
QF54	Computer science	16339	11368	-551
QF59	Other natural science	1886	522	3
QF61	Surveying and cartography	-1962	-1799	-92
QF62	Civil engineering	-1515	-1203	-285
QF63	Electrical & electronic engineering	-19339	274	-2254
QF64	Mechanical engineering	-39877	-12151	-4224
QF65	Metallurgical & mining engineering	80	948	-172
QF66	Printing	-4050	-3480	-272
QF67	Automotive engineering	-11872	-5156	318
QF68	Textiles, clothing and footwear	-2255	-923	-400
QF69	Other engineering	-3176	1496	-775
QF71	Building design	240	218	-181
QF72	Building construction	-20270	11305	-476
QF79	Other architecture and building	-735	19	-3
QF81	Agriculture	-5746	-4298	4392
QF82	Horticulture	-213	278	331
QF89	Other Agriculture & related fields	-149	-183	27
QF91	Hairdressing and beauty therapy	840	-7460	-759
QF92	Food and hospitality services	1374	-4956	-154
QF93	Transport	-4433	-4190	21
QF99	Other miscellaneous	-3290	-2480	-55
QF00	No post-school qualification	-12296	22987	15097
	Total	0	0	0

- *QF22 Nursing* (-21150),
- *QF63 Electrical and electronic engineering* (+19613), and
- *QF42 Welfare* (-10958).

The unskilled category is, of course, common to both the qualification level and qualification field classifications, and the occupational breakdown presented in Section 3.1.3 remains relevant. Of the remaining six categories, three (QF72, QF64 and QF63) fare better in the forecast simulation because of their association with the construction sector, and three (QF31, QF22 and QF42) fare worse because of their association with the government-dominated industries *Education*, *Health* and *Welfare and community services*. The factors influencing employment opportunities in all these industries have been canvassed in Sections 3.1.1 and 3.1.2. Note that persons with qualifications in the field *QF54 Computer science* are heavily concentrated in the occupation *Computing professionals*; hence the earlier explanation of the relatively poor employment prospects in the forecast simulation for the occupation also pertains to the qualification field.

3.3 Employment by Age Group

In this section the analysis is extended to address the question of "knowledge depreciation" by considering how structural change affects the demand for the qualifications held by persons in different age groups. For this purpose a person's employment opportunities are assumed to be entirely determined by his/her qualification level and qualification field. Thus, in the historical simulation, the results reflect not the change in the distribution of employment between age groups that actually occurred, but the change that would have occurred if employment had depended only on qualifications. The results are shown in Table 6 and, again, they are quite mixed. The historical simulation favours the employment of prime age workers (i.e., workers between the ages of 20 and 44) at the expense of the very young (15 to 19) and the middle aged (45 to 64), whereas the forecast simulation favours the employment of the young (15 to 24) at the expense of all other groups. However, compared to its effects on employment by qualification (as reported in Tables 1 and 5), structural change has relatively little impact on the distribution of employment by age group. Some of the major factors underlying the results in Table 6 can be identified by reference to the same set of seven qualification fields discussed in Section 3.2.

Table 6. Employment Changes by Age Group, Persons

Age Group	Historical Simulation	Forecast Simulation	APEC Simulation
15 to 19	-1130	2529	1533
20 to 24	1035	2209	645
25 to 34	2254	-344	-1040
35 to 44	5061	-2026	-1255
45 to 54	-2731	-1602	-146
55 to 64	-4645	-696	166
65+	156	-70	97
Total	0	0	0

Table 7 shows the age by qualification matrix obtained by taking the difference between the corresponding matrices for the forecast and historical simulations. In this matrix the qualification fields of Table 5 have been aggregated into four groups: the *Construction related fields* (QF72, QF64, and QF63), the *Government related fields* (QF22, QF31 and QF42), the *No post-school qualifications* field (QF00) and all other fields. For reasons already canvassed, the employment opportunities for persons with construction-related qualifications or with no post-school qualifications are better in the forecast

Table 7. Employment Changes by Age Group and Qualification Field Forecast Simulation minus Historical Simulation, Persons

Age Group	Construction Related Fields	Government Related Fields	No Post School Qualification	Other Fields	Total
15 to 19	1004	-476	3973	-842	3659
20 to 24	7642	-5017	4989	-6440	1174
25 to 34	24039	-17078	8273	-17832	-2598
35 to 44	22086	-19383	8431	-18221	-7087
45 to 54	15526	-10776	6119	-9742	1127
55 to 64	7699	-3245	2911	-3416	3949
65+	918	-502	587	-1227	-224
Total	78914	-56477	35283	-57720	0

simulation than in the historical simulation, while the opportunities of those with government-related qualifications are worse. For persons with other qualification fields taken as a group, the differential impact of the two simulations is quite similar to that for persons with government-related qualifications. Bearing in mind the decomposition in Table 7, the differences between the historical and forecast simulations in Table 6 can now be understood in terms of our preceding discussion.

3.4 APEC Simulation

The direct effect of the APEC trade liberalisation initiative is to change the prices (measured in domestic currency) that Australian economic agents receive for their exports and pay for their imports. On the export side, the removal of tariffs and non-tariff barriers on Australian processed food products, especially in Japan, is the most important development. For given prices paid by foreign consumers, the prices received by Australian producers increase. Hence the output of food products, and of the primary agricultural commodities which supply inputs to food processing industries, increase strongly. Against this, the removal of protection against foreign commodities in Australian markets causes the competitive position of some import-competing industries to deteriorate, with consequent reductions in output and employment. The industries most seriously affected are *Textiles, clothing and footwear* and *Passenger motor vehicles*. It turns out that, on balance, the world prices of Australia's exports increase relative to the world prices of its imports, i.e., Australia's terms of trade improve, providing a net stimulus to production and employment in Australia.

The improvement in the terms of trade also leads to a real appreciation of the Australian dollar which tends to reduce the international competitiveness of all export-oriented and import-competing industries. Thus the direct effect is offset to some extent for the food processing industries and exacerbated for the previously protected manufacturing industries. Because of the induced appreciation, the APEC initiative has a negative impact on activity in mining and in tourism-related industries such as hotels, entertainment and transport.

Two aspects of our employment results for the APEC simulation stand out. Firstly, although the period of adjustment is similar to that for the historical and forecast simulations, the size of the adjustment is generally much smaller. Hence, when considering the need for different types of training, the role of trade liberalisation may tend to be overemphasised if it is not carefully located within a more comprehensive analysis of the factors driving structural change. Secondly, in Australia's case at least, the role of the agricultural sector is crucial. From Table 5, only two of the 47 qualification fields benefit from significant employment redistributions, namely, *QF81 Agriculture* and *QF00 No post-school qualification.* Moreover, only two of the 52 ASCO minor groups benefit from the redistribution across occupations[14], namely, *14 Farmers and farm managers* and *89 Miscellaneous labourers and related workers*. An examination of the redistribution between the ASCO unit groups shows that it is farm labourers that are responsible for the favourable outcome for the latter minor group. Because most farmers and farm labourers do not hold post-school qualifications, agriculture also lies behind the favourable outcome for unqualified workers in category QF00.

The increase in the employment share of agricultural workers is achieved mainly at the expense of workers in other export-oriented and import-competing industries. As those industries together employ a broad mix of occupations and qualifications, the reductions in employment induced by the trade liberalisation are also broadly distributed across occupations and qualifications. From Table 5, the qualification fields for which employment contracts the most are *QF63 Electrical and electronic engineering* and *QF65 Mechanical engineering*. Both are associated with import-competing manufacturing industries via the occupations *41 Metal fitting and machining tradespersons*, *42 Other metal tradespersons* and *43 Electrical and electronics tradespersons*. Note that, notwithstanding the depressing effect of the currency appreciation on the tourism industry, the qualification field *QF93 Transport* is one of the few to expand its employment share. This is because trade liberalisation leads to an increase in the share of international trade (both exports and imports) in GDP, and hence to an increase in the margins usage of transport services. The positive result for the field *QF67 Automotive engineering* is associated with the repair, rather than the production, of motor vehicles.

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[14] To conserve space, the redistribution of employment across occupations for the APEC simulation is not comprehensively reported The ASCO minor groups are listed in Tables 3 and 4.

4. Concluding Remarks

The necessity for a nation's workforce to keep pace with the demands of a productive system faced with rapid technological and social change provides a compelling rationale for the notion of lifelong learning.[15] In this paper, the notion has been imbued with a quantitative dimension by analysing the effects of such changes, as represented by changes in the distribution of employment across occupations, on the demand for labour with different qualification levels and fields. That is, computations have been conducted with a view to determining which qualifications might usefully be targeted by the providers of lifelong learning programs. Using the Australian economy as a case study, three different redistributions have been analysed, one concerned with historical changes, one with prospective future changes and one with changes induced by trade liberalisation. The analysis suggests three conclusions about the relationship between structural change and the provision of training services.

Firstly, the economic forces driving structural change are numerous and diverse, and their net effect on the demand for labour is not transparent. Hence generalisations and "stylised facts" are likely to be of only limited usefulness in determining training priorities. For example, according to the analysis, there is no secular tendency for structural change to favour the employment of persons with higher level qualifications, at least over the time periods and range of qualifications considered here. Similarly, structural change does not systematically favour the qualifications of the young over those of the old. For Australia, trade liberalisation shifts employment away from "professional, technical, administrative and managerial occupations" and into agriculture, the opposite of the effect thought likely to pertain by the OECD. This is not to say that the stylised facts are inoperative, but only that their effects are diluted and scrambled by the presence of other important influences such as the business cycle, government policy and international comparative advantage.

Before proceeding, it is appropriate to remind the reader that the present results are conditional on the assumptions incorporated in the analysis. In particular, the analysis abstracts from

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[15] Although compelling, the utilitarian motivation is not the only one to have been advanced in the literature. Candy and Crebert (1991), for example, consider personal enrichment and the extension of knowledge to be more important objectives.

- changes over time in the distribution of qualifications within a particular occupation and
- changes over time in the distribution of skills within a particular qualification level.

These limitations are potentially important. For example, between 1989 and 1994 the number of students engaged in higher education in Australia increased by 32.7% whereas the number of persons in the labour force increased by only 7.6%. This suggests that the share of persons with higher level qualifications in an occupation has been tending to increase.[16] While the analytical framework can accommodate less restrictive theoretical specifications readily enough, data availability has precluded their empirical implementation in the present study. For that reason, some of our results should be regarded as indicative rather than definitive.

In addition to being numerous and diverse, the forces driving structural change are also interconnected. The demand for labour of a particular qualification depends on employment in the occupations that use the qualification relatively intensively. Employment in a particular occupation depends on employment in the industries that use the occupation relatively intensively, and on changes in the distribution of employment across occupations within those industries. Employment in a particular industry depends on the output of the industry, on its rate of capital formation and on various kinds of technical change. The output of an industry depends, *inter alia*, on the state of the macroeconomy, on government policy, on the terms of trade and on social change such as population ageing. To determine the effect of structural change on the demand for a qualification, therefore, one must not only specify the nature and magnitude of the economic forces operating at each level of this hierarchy but also how a change at one level affects the outcome at other levels. This kind of determination lies outside the range of qualitative analysis. In other words, if the concept of lifelong learning is to contribute to the efficient (from the utilitarian point of view) allocation of resources for training, it must be married with formal modelling techniques.

Finally, the formal modelling techniques should ideally be forward looking.

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[16] To complicate the matter further, the rapid increase in the number of students in higher education has coincided with a period of tight fiscal policy. Hence resources in the higher education sector have become stretched and it is unlikely that the skill level of the graduate population has risen as fast as the population itself.

For training purposes, it is mandatory that the future demand for labour of different types be forecast in one way or another. It takes time to conduct a training course and the skills that result are generally expected to retain their social usefulness for an extended period after the completion of the course. Formal labour market forecasting is an uncertain activity, but the uncertainty is not diminished by a reliance on qualitative methods for extrapolating historical experience into the future.

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