MODELLING THE ECONOMIC IMPACTS OF MIGRATION AND POPULATION GROWTH

A Report to the Productivity Commission

by

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PART A: AN OVERVIEW

1 Introduction

In March 2005, the Productivity Commission released a report on the *Economic Implications of an Ageing Australia*. The report describes projections for a number of economic variables including population, labour force participation rates, labour supply, employment and hours worked per week. The present report describes two simulations with the MONASH model designed to extend the range of the Commission's earlier analysis. The first (Simulation A) is a base case forecast for the Australian economy for the twenty-year period 2004-05 to 2024-25. As far as possible, it is specified so as to maintain consistency with the Commission's projections. The second (Simulation B) is an alternative forecast for the same period in which the intake of skilled migrants is assumed to be higher.

The primary purpose of the report is to identify how the labour market might absorb the increase in the number of migrants. To that end, employment by skill group is treated as exogenous in the simulations and the model determines the distribution of employment across industries and occupations. This emphasis is timely given wide-spread current concerns about skill shortages in Australia and the concomitant proposals to alleviate the perceived shortages via immigration. The study represents a clear addition to the range of existing quantitative assessments of the economic impact of migration. However, it abstracts from a number of issues that have been canvassed in other places, including economies of scale, congestion and environmental externalaties, fiscal transfers between incumbents and new arrivals, the extent of foreign ownership of the capital stock and immigration induced changes in technology and consumer tastes.

2 Determination of the exogenous projections

Tables 1 to 9 show projections for a range of key variables and compares them with the corresponding values recorded during recent years. They indicate the range of variables over which the MONASH simulations can be considered to be consistent with the Commission's projections. For the first eight years of the forecasts, that is, for the period 2004-05 to 2012-13, the MONASH results are enhanced with a Labour Market Extension (LME) which generates detailed labour market information. This circumstance is reflected in the construction of the tables.

In more detail, Table 1 shows the projected growth rates of the adult population and compares them with the corresponding growth rates recorded in recent years. The average growth rate is projected to be slightly lower in the medium term (1.37 per cent per annum between 2004–05 to 2012-13) than it has been recently (1.44 per cent per annum between 1994-95 to 2003-04), and somewhat lower in the long term (1.19 per cent per annum between 2004-05 to 2024-25). The reduction in population growth is concentrated in the 40-59 year age group. For persons aged 60 and over, the growth rate is projected to increase, particularly in the medium term.

The population projections underlying the growth rates of Table 1 are converted into labour force projections using the labour force participation rates shown in Table 2. The average participation rate is projected to remain relatively constant in the medium tern (63.25 per cent in 2012-13 compared to 63.56 per cent in 2004-04 and 63.01 per cent in 1994-95), but to decline in the long term (60.06 per cent in 2024-25). The main reason for the latter result is the increase in the share of the population aged 65 years or over. For persons belonging to this age group, the participation rate is significantly lower than the average. Note, however, that the trend is offset to some extent by the quite rapid rise in the participation rates projected for this age group in both the medium and the long term. The average growth rate of the labour force (Table 3) is projected to decline steadily, from 1.54 per cent per annum in recent history to 1.30 per cent per annum in the medium term and 0.91 per cent per annum in the long term. In the medium term, the reductions are largest for persons aged 40-59. In the long term, persons aged 60 and over also suffer significant reductions.

The labour force projections underlying the growth rates of Table 3 are converted into employment projections using the unemployment rates shown in Table 4. Historically, unemployment rates have declined steadily with age for both males and females up to age 55. For persons aged between 55 and 64, the rate rose for males but remained relatively constant for females. For persons aged 60 and above, the rate fell rapidly with age. These characteristics of the unemployment pool are projected to continue in both the medium and the long term. The average unemployment rate is projected to decline only slightly over time for both males and females. Hence the pattern of employment growth by age and sex shown in Table 5 follows closely the pattern of labour force growth shown in Table 3.

The employment projections underlying the growth rates of Table 5 are converted from persons to hours using the projections of average weekly hours per person shown in Table 6. The average hours for females are smaller than those for males of the same age in both the historical estimates and the projections. Similarly, the average hours decline with age for persons aged 50 or above in both cases. But, from Table 5, the projected growth rates for employment measured in persons are generally higher for the groups with the smaller average hours. Hence the average employment growth rate is somewhat lower when measured in hours (Table 7) than when it is when measured in persons (Table 5) for all three of the identified time periods.

Tables 8 and 9 show labour force growth rates and unemployment rates measured in hours. These estimates and projections are not used in the MONASH simulations and are included for reference.

The next step in the construction of the exogenous labour market projections for the simulations is to disaggregate the employment growth rates of Table 7 by qualification. Using data from the Labour Force Survey (LFS) and Survey of Education and Work (SEW), a multi-dimensional employment matrix (measured in hours) is constructed for each year from 1994-95 to 2003-04. The dimensions of the matrix are:

qualification level	(8 levels of highest educational attainment),
qualification field	(13 main fields of highest educational attainment),
occupation	(81 minor occupational groups),
sex	(males and females) and
age	(12 groups).

The qualification categories belong to the Australian Standard Classification of Education (ASCED) and the occupations belong to the Australian Standard Classification of Occupations (ASCO). Trends in the distribution of qualifications are estimated for each sex and age group (i.e., for 24 groups in total). The number of qualifications involved was 104 (i.e., 8 qualification levels cross-classified with 13 qualification fields). The qualification shares are then projected into the future on the basis of trend extrapolation. In particular, the changes in the shares are assumed to decline steadily up to 2012-13 and to remain constant thereafter. Selected values of the qualification shares are shown in Table 10 (for the qualification levels) and Table 11 (for the qualification fields). Note that the decline in the share of the qualification *Year 12 and below* between 2012-13 and 2024-25 reflects the very high share of this qualification for persons aged 15 to 24. From Table 7, employment growth for persons in the age group is projected to grow significantly more slowly than the average over the period in question.

Using the employment projections by age and sex underlying Table 7, and the qualification share projections underlying Tables 10 and 11, projections of employment growth (measured in hours) are determined for the 67 qualification groups described in Table 12. The results are shown as Simulation A. The number of qualification categories was reduced from the previous 104 to 67 by combining some categories into the single category *No post-school qualification.*

Projections of the amount of employment (measured in hours) attributable to the migrant intake have been prepared by the Productivity Commission for each of the 67 qualification groups and for each of the two simulations. This information enables the

projections for Simulation A to be converted into the projections for Simulation B as shown in Table 12.

The employment growth rates in Table 12 are treated as exogenous variables in the MONASH model. The standard MONASH database must also be complemented with two wage bill matrices for 2004-05: a qualification x occupation matrix of dimension (67 x 81) and an occupation x industry matrix of dimension (81 x 107). These matrices are constructed using data from the Input-Output Tables, from the Employment Earnings and Hours survey and other sources mentioned previously.

3 The MONASH simulations

The MONASH model itself is reconfigured such that labour by qualification group can be converted into labour by occupation according to Constant Elasticity Transformation (CET) functions. Labour by occupation in its turn can be converted into effective units of industry-specific labour according to Constant Elasticity Substitution (CES) functions. As already indicated, this scheme incorporates 67 qualification groups, 81 occupations (the ASCO minor groups) and 107 industries (the input-output classification). The MONASH model specification and results are described in detail in Part B of this report.

The MONASH model computes (107 x 81) industry-by-occupation employment matrices (measured in hours) for each period from 2005-06 to 2024-25. In the Labour Market Extension, the corresponding employment growth rates are applied to 2004-05 employment levels obtained from the LFS and SEW surveys. As already mentioned, the LME covers only the medium term, i.e., the period to 2012-13. A number of operations are then performed on the employment projections. The industry classification is converted from the 107 input-output industries identified in MONASH to the 158 3-digit ANZSIC industries. The classification of occupations is converted from the 81 ASCO minor groups identified in MONASH to the 340 4-digit ASCO occupations (the so-called unit groups). The units in which employment is measured are converted from hours to persons. The classification of qualifications is converted from the 11 broad fields of study identified in MONASH to the 72 narrow

fields of the ACSED classification. These operations are based mainly on the extrapolation of trends in various employment shares established between 1994-95 and 2004-05. Whenever relevant, the extrapolations are conditioned to conform to the projections by age and sex described in Tables 1 to 9.

The MONASH results for national employment by industry are distributed between 54 regions using the MONASH Regional Equation System (MRES). As the labour supply constraints are imposed only at the national level, the projections of regional "employment" should strictly be interpreted to be projections of the regional demand for labour. They can be interpreted as employment only on the assumption that the national labour supply distributes itself between the regions in accordance with employment opportunities. The LME extends the regional projections in a manner analogous to the national projections.

4 Discussion of the LME results

The results obtained from the LME are very detailed and hence are provided separately on CDs (one for each simulation) together with suitable viewing software. Here a selection of results are analysed with a view to identifying the forces of demand (by industry) and supply (by qualification) operating on employment by occupation, or, more specifically, on the employment deviations between Simulations A and B. As the deviations are relatively small, results are recorded to three decimal places. For reasons of manageability, the number of industries considered in the analysis is restricted to 24.

Table 13 presents a summary of the effects of the increase in the migrant intake (hereafter referred to as the shock) on employment by industry and qualification. The table is to be interpreted as follows. In 2012-13, aggregate employment is projected to be 1.330 per cent higher than it would have been in the absence of the shock. That is, aggregate employment is 1.330 per cent higher in Simulation B than it is in Simulation A. The shock has the most effect on employment in the *Non-metallic mineral products* industry, increasing employment by 2.449 per cent. However, the industry accounts for only about 0.5 per cent of aggregate employment in Simulation

A, and hence it makes a relatively minor contribution (0.008 percentage points or 0.630 per cent) to the increase in aggregate employment. The industry which contributes most is *Construction*, which accounts for more than eight per cent of employment in Simulation A. For employment by qualification, the shock affects persons with a *Post-graduate degree* the most (an increase of 4.863 per cent), while persons with a *Bachelor degree* make the largest contribution (30.543 per cent) to the aggregate deviation.

Table 14 shows the corresponding results for the 81 ASCO minor groups. The largest employment increases resulting from the shock are enjoyed by

211 Natural and physical science professionals (3.424 per cent),
443 Plumbers (2.872 per cent),
441 Structural construction tradespersons (2.599 per cent),
442 Final finish construction tradespersons (2.486 per cent),
223 Computing professionals (2.373 per cent).
238 Miscellaneous health professionals (2.249 per cent).

The smallest increases are suffered by

421 Automotive tradespersons (0.812 per cent),
411 Mechanical engineering tradespersons (0.878 per cent),
251 Social welfare professionals (0.933 per cent), and
491 Printing tradespersons (0.945 per cent).

The deviations in employment by occupation can be better understood if they are first decomposed into a shift effect and a share effect. The shift effect shows the deviations that would have occurred if the distribution of employment across occupations in each industry were unaffected by the shock, i.e., if the distribution was the same in Simulations A and B. The share effect shows the deviations arising from changes in the distribution across occupations induced by changes in relative wage rates. The shift and share effects are shown in Table 15, while Table 16 ranks the occupations by

shift effect, share effect, deviation, and contribution to the change in aggregate employment. A positive share effect in Table 15 suggests a tendency towards insufficient demand for the occupation, a tendency that is offset by a fall in its relative wage. A negative share effect suggests a tendency towards excess demand that is offset by a rise in its relative wage. The nature of the demand for a particular occupation can be further illuminated by identifying separately the industry contributions to its shift and share effects. In Tables 17 to 23, this is done for seven of the occupations listed above.

Tables 24 to 30 show the same kind of information about the supply of labour by occupation. Table 24 identifies the shift and share effects. This time effect shows the deviations which would have occurred if the distribution of employment across occupations for each qualification were unaffected by the shock. The share effect again shows the deviations arising from changes in the distribution induced by changes in relative wage rates. A positive share effect in Table 24 suggests a tendency towards insufficient supply of the occupation which is offset by a rise in its relative wage. A negative share effect suggests a tendency towards excess supply that is offset by a fall in its relative wage. Because the wage rate of a particular occupation rises relative to some occupations but falls relative to others, these considerations are not decisive and constitute only an intuitive appreciation of the interplay of demand and supply. In particular, a negative share effect in Table 15 (suggestive of a tendency towards excess demand) can be associated with a negative share effect in Table 24 (suggestive of a tendency towards excess supply).

A number of observations can be made from the information presented. The employment deviation is largest for the occupation *211 Natural and physical science professionals*. The exogenously determined increase in the employment of persons with the qualification field *Natural and physical sciences* is quite large (3.252 per cent compared with the average of 1.330 per cent). In Simulation A, about 20 percent of persons with this qualification field found employment in the occupation *Natural and physical science professionals*. This relatively strong concentration inhibits the capacity of the economy to redeploy persons with this qualification to other

occupations, and results in the relatively low share effect for the occupation shown in Tables 25 and 27. On the other hand, the economy has some difficulty employing so many persons in this occupation, and can only do so via a large reduction in its wage rate. This leads to the relatively large share effect shown in Tables 15 and 17. Evidently, large share effects on the demand side are likely to arise when the employment of a qualification that is relatively specific to a particular occupation is set exogenously.

Number of occupations, including *443 Plumbers*, *441 Structural construction tradespersons* and *442 Final finish construction tradespersons* owe their large deviations to the *Construction* industry. All have large shift effects and small share effects on the demand side (Table 15), with the former being dominated by *Construction* (Table 18). Similar considerations apply to the health related occupations *238 Miscellaneous health professionals*, *232 Nursing professionals* and *231 Medical practitioners* (Table 15) except that, in this case, the important industry is *Health and community services* (Table 24). The significant positive share effects on the demand side for these occupations suggest a tendency towards over supply. For Medical practitioners, the observation is enhanced by a significant negative share effect on the supply side (Table 25). More broadly, the forces driving the employment outcomes tend to be occupation specific and not susceptible to easy generalisation.

In conclusion, it is useful to compare the adjustments to employment by occupation required to employ the increased migrant intake with the actual adjustments that have occurred in the economy in recent years. Table 31 shows the average annual shift and share effects for the period 1994-95 to 2003-04. The effects are defined relative to changes in industry employment and hence should be compared with Table 14. It is clear that the economy should be easily able to accommodate the size of shock considered in the present analysis.

Table 1 Population Growth Rates, Persons, Australia, Per Cent Per Annum

Age and sex	1994-95 to 2003-04	2004-05 to 2012-13	2004-05 to 2024-05
Males			
15-19	0.79	0.54	0.21
20-24	-0.44	0.58	0.20
25-29	0.07	1.36	0.69
30-34	0.31	-0.08	0.44
35-39	0.54	0.44	0.62
40-44	1.63	0.39	0.39
45-49	1.34	0.79	0.43
50-54	3.57	1.75	1.05
55-59	4.36	1.41	1.09
60-64	2.53	4.11	2.55
65-69	0.74	4.30	3.08
70 and above	3.32	2.90	3.54
All age groups	1.42	1.40	1.21
Females			
15-19	0.87	0.46	0.17
20-24	-0.50	0.70	0.23
25-29	0.01	1.34	0.67
30-34	0.45	-0.40	0.33
35-39	0.60	0.33	0.54
40-44	1.76	0.37	0.26
45-49	1.87	0.72	0.31
50-54	4.19	1.77	1.03
55-59	4.40	1.88	1.23
60-64	2.24	4.62	2.77
65-69	0.33	4.09	3.18
70 and above	2.45	2.09	2.89
All age groups	1.46	1.35	1.18
Persons			
15-19	0.83	0.50	0.19
20-24	-0.47	0.64	0.22
25-29	0.04	1.35	0.68
30-34	0.38	-0.24	0.39
35-39	0.57	0.38	0.58
40-44	1.69	0.38	0.33
45-49	1.61	0.76	0.37
50-54	3.88	1.76	1.04
55-59	4.38	1.65	1.16
60-64	2.38	4.36	2.66
65-69	0.53	4.20	3.13
70 and above	2.81	2.44	3.18
All age groups	1.44	1.37	1.19

Table 2 Labour Force Participation Rates, Australia, Per Cent

Age and sex	1994-95	2004-05	2012-13	2024-25
Males				
15-19	56.98	58.62	59.88	60.42
20-24	87.33	85.09	83.58	83.97
25-29	93.00	90.72	88.41	87.98
30-34	93.17	92.09	89.87	87.87
35-39	92.86	91.28	89.52	86.02
40-44	92.56	90.20	88.57	85.18
45-49	91.02	89.47	87.82	85.21
50-54	85.81	85.74	85.46	83.88
55-59	72.99	73.76	74.28	73.81
60-64	48.33	50.20	51.97	52.76
65-69	16.17	20.40	25.69	29.64
70 and above	5.33	5.50	6.10	7.80
All age groups	73.67	71.65	69.20	64.38
Females				
15-19	57.50	60.99	63.61	64.00
20-24	77.34	77.37	77.84	78.64
25-29	69.81	74.02	76.85	78.51
30-34	64.12	68.12	71.33	73.83
35-39	68.13	69.52	71.50	74.78
40-44	73.01	74.62	75.51	78.78
45-49	70.51	77.58	80.43	82.49
50-54	60.19	69.40	76.95	79.07
55-59	38.34	51.24	62.05	66.89
60-64	15.88	27.10	35.70	42.96
65-69	5.69	8.48	12.41	17.35
70 and above	1.18	1.40	1.74	2.89
All age groups	52.69	55.74	57.49	55.85
Persons				
15-19	57.23	59.78	61.71	62.17
20-24	82.38	81.28	80.73	81.33
25-29	81.35	82.35	82.64	83.26
30-34	78.54	79.95	80.60	80.84
35-39	80.40	80.29	80.44	80.38
40-44	82.77	82.36	82.00	82.00
45-49	80.92	83.47	84.10	83.86
50-54	73.30	77.54	81.17	81.47
55-59	55.88	62.62	68.10	70.32
60-64	32.06	38.76	43.78	47.81
65-69	10.76	14.36	19.04	23.36
70 and above	2.88	3.15	3.67	5.15
All age groups	63.01	63.56	63.25	60.06

Table 3 Labour Force Growth Rates, Persons, Australia, Per Cent Per Annum

Age and sex	1994-95 to 2003-04	2004-05 to 2012-13	2004-05 to 2024-05
Males			
15-19	1.11	0.74	0.33
20-24	-0.73	0.39	0.15
25-29	-0.21	1.01	0.55
30-34	0.18	-0.40	0.21
35-39	0.35	0.16	0.32
40-44	1.34	0.15	0.11
45-49	1.15	0.62	0.21
50-54	3.56	1.74	0.95
55-59	4.49	1.54	1.10
60-64	2.96	4.55	2.78
65-69	3.38	7.20	4.85
70 and above	3.68	4.63	5.38
All age groups	1.11	0.94	0.69
Females			
15-19	1.53	0.93	0.38
20-24	-0.49	0.81	0.32
25-29	0.66	1.78	0.94
30-34	1.13	0.18	0.72
35-39	0.83	0.80	0.93
40-44	2.00	0.61	0.56
45-49	2.96	1.15	0.60
50-54	5.86	3.05	1.64
55-59	7.82	4.21	2.46
60-64	8.49	8.29	5.02
65-69	4.88	9.46	6.83
70 and above	4.39	4.94	6.43
All age groups	2.10	1.73	1.18
Persons			
15-19	1.32	0.84	0.36
20-24	-0.62	0.59	0.23
25-29	0.18	1.36	0.73
30-34	0.58	-0.14	0.44
35-39	0.56	0.45	0.60
40-44	1.64	0.36	0.32
45-49	1.96	0.87	0.40
50-54	4.53	2.35	1.28
55-59	5.71	2.70	1.70
60-64	4.57	5.97	3.68
65-69	3.80	7.90	5.51
70 and above	3.85	4.71	5.68
All age groups	1.54	1.30	0.91

Table 4 Unemployment Rates, Persons, Australia, Per Cent

Age and sex	1994-95	2004-05	2012-13	2024-25
Males				
15-19	21.57	16.24	15.58	15.47
20-24	14.45	9.34	9.30	9.24
25-29	10.66	6.25	5.80	5.73
30-34	8.27	4.23	4.07	4.00
35-39	7.47	4.00	3.42	3.36
40-44	6.65	3.66	3.12	3.06
45-49	5.95	3.64	3.31	3.26
50-54	7.03	3.37	3.33	3.28
55-59	10.32	4.14	3.65	3.54
60-64	12.62	4.05	3.96	3.84
65-69	2.01	1.41	1.53	1.56
70 and above	0.64	0.52	0.81	0.83
All age groups	9.81	5.55	5.16	4.97
Females				
15-19	21.51	15.07	14.32	14.24
20-24	12.09	8.43	7.89	7.84
25-29	8.09	5.67	5.26	5.22
30-34	7.90	5.33	5.03	5.00
35-39	7.35	5.06	4.23	4.19
40-44	6.11	4.69	3.89	3.86
45-49	5.71	3.90	3.68	3.66
50-54	5.77	3.16	2.67	2.60
55-59	5.73	3.28	2.28	2.20
60-64	1.80	1.68	1.58	1.58
65-69	1.17	0.91	1.01	1.07
70 and above	0.61	0.35	0.51	0.53
All age groups	8.91	5.83	5.07	4.83
Persons				
15-19	21.54	15.65	14.94	14.85
20-24	13.35	8.91	8.63	8.57
25-29	9.55	5.99	5.55	5.49
30-34	8.12	4.70	4.49	4.46
35-39	7.42	4.46	3.79	3.75
40-44	6.41	4.13	3.48	3.44
45-49	5.85	3.76	3.48	3.46
50-54	6.53	3.27	3.02	2.95
55-59	8.76	3.79	3.01	2.90
60-64	9.93	3.22	2.96	2.81
65-69	1.78	1.27	1.36	1.37
70 and above	0.63	0.48	0.73	0.74
All age groups	9.43	5.68	5.12	4.90

Table 5 Employment Growth Rates, Persons, Australia, Per Cent Per Annum

Age and sex	1994-95 to 2003-04	2004-05 to 2012-13	2004-05 to 2024-05
Males			
15-19	1.75	0.84	0.38
20-24	-0.16	0.40	0.16
25-29	0.29	1.07	0.57
30-34	0.61	-0.38	0.23
35-39	0.73	0.24	0.36
40-44	1.63	0.22	0.14
45-49	1.37	0.66	0.23
50-54	3.97	1.74	0.96
55-59	5.23	1.61	1.13
60-64	4.04	4.56	2.80
65-69	3.48	7.18	4.84
70 and above	3.66	4.59	5.37
All age groups	1.58	0.99	0.72
Females			
15-19	2.41	1.04	0.43
20-24	-0.06	0.89	0.35
25-29	0.89	1.84	0.96
30-34	1.41	0.22	0.73
35-39	1.08	0.91	0.98
40-44	2.13	0.72	0.60
45-49	3.17	1.18	0.61
50-54	6.16	3.11	1.67
55-59	8.11	4.35	2.52
60-64	8.50	8.30	5.02
65-69	4.88	9.45	6.82
70 and above	4.43	4.92	6.42
All age groups	2.45	1.83	1.23
Persons			
15-19	2.08	0.94	0.40
20-24	-0.12	0.63	0.25
25-29	0.56	1.42	0.75
30-34	0.95	-0.12	0.45
35-39	0.88	0.53	0.64
40-44	1.86	0.45	0.35
45-49	2.18	0.91	0.42
50-54	4.90	2.38	1.29
55-59	6.31	2.81	1.75
60-64	5.40	6.01	3.70
65-69	3.88	7.89	5.51
70 and above	3.85	4.68	5.66
All age groups	1.96	1.37	0.95

Table 6 Average Weekly Hours Per Worker, Australia

Age and sex	1994-95	2004-05	2012-13	2024-25
Males				
15-19	25.28	22.88	22.37	22.40
20-24	35.89	33.89	32.61	32.39
25-29	40.42	39.25	38.51	38.09
30-34	40.71	39.81	39.29	38.79
35-39	41.68	40.93	40.62	40.40
40-44	41.79	40.86	40.42	39.96
45-49	42.32	40.72	40.11	39.88
50-54	41.97	40.67	40.15	39.91
55-59	39.80	39.66	39.60	39.58
60-64	37.78	36.58	36.14	35.58
65-69	34.52	31.22	30.37	29.69
70 and above	30.87	26.91	25.38	24.66
All age groups	39.38	38.11	37.41	36.96
Females				
15-19	19.20	17.90	17.93	17.94
20-24	30.97	29.02	28.22	28.25
25-29	31.14	31.55	31.77	31.76
30-34	27.77	28.86	29.77	29.84
35-39	27.21	27.27	27.18	27.11
40-44	28.42	27.89	27.53	27.50
45-49	29.70	29.31	29.41	29.50
50-54	29.36	29.40	29.76	29.87
55-59	27.34	27.88	28.19	28.21
60-64	24.57	24.11	24.36	24.47
65-69	23.32	20.53	20.77	20.74
70 and above	22.28	18.06	17.71	17.71
All age groups	28.19	27.78	27.77	27.68
Persons				
15-19	22.30	20.37	20.12	20.14
20-24	33.57	31.59	30.49	30.39
25-29	36.36	35.76	35.36	35.10
30-34	35.38	35.11	35.09	34.72
35-39	35.50	35.00	34.61	34.23
40-44	35.86	34.99	34.46	34.03
45-49	36.90	35.36	34.97	34.80
50-54	36.87	35.55	35.15	34.99
55-59	35.44	34.77	34.27	34.10
60-64	34.20	32.13	31.15	30.47
65-69	31.44	28.04	27.17	26.29
70 and above	28.79	24.57	23.32	22.55
All age groups	34.60	33.49	32.95	32.58

Table 7 Employment Growth Rates, Hours, Australia, Per Cent Per Annum

Age and sex	1994-95 to 2003-04	2004-05 to 2012-13	2004-05 to 2024-05
Males			
15-19	0.79	0.56	0.27
20-24	-0.75	-0.08	-0.07
25-29	0.00	0.84	0.42
30-34	0.42	-0.54	0.10
35-39	0.60	0.14	0.29
40-44	1.44	0.09	0.03
45-49	1.02	0.47	0.13
50-54	3.67	1.58	0.86
55-59	5.17	1.59	1.12
60-64	3.71	4.40	2.65
65-69	2.62	6.81	4.58
70 and above	2.37	3.83	4.91
All age groups	1.29	0.76	0.57
Females			
15-19	1.73	1.07	0.44
20-24	-0.68	0.53	0.21
25-29	1.02	1.93	1.00
30-34	1.84	0.61	0.90
35-39	1.15	0.87	0.95
40-44	1.97	0.56	0.53
45-49	3.06	1.23	0.65
50-54	6.20	3.27	1.75
55-59	8.35	4.49	2.58
60-64	8.36	8.45	5.10
65-69	3.45	9.60	6.88
70 and above	2.32	4.66	6.31
All age groups	2.32	1.83	1.21
Persons			
15-19	1.19	0.79	0.35
20-24	-0.72	0.19	0.06
25-29	0.40	1.28	0.66
30-34	0.90	-0.12	0.40
35-39	0.78	0.39	0.52
40-44	1.63	0.26	0.22
45-49	1.76	0.77	0.34
50-54	4.54	2.24	1.21
55-59	6.11	2.62	1.65
60-64	4.75	5.60	3.42
65-69	2.79	7.46	5.16
70 and above	2.36	4.00	5.21
All age groups	1.66	1.17	0.82

Table 8 Labour Force Growth Rates, Hours, Australia, Per Cent Per Annum

Age and sex	1994-95 to 2003-04	2004-05 to 2012-13	2004-05 to 2024-05
Males			
15-19	0.16	0.47	0.23
20-24	-1.31	-0.09	-0.07
25-29	-0.49	0.77	0.39
30-34	0.00	-0.56	0.08
35-39	0.22	0.07	0.26
40-44	1.14	0.02	0.00
45-49	0.80	0.43	0.11
50-54	3.27	1.57	0.86
55-59	4.43	1.52	1.09
60-64	2.63	4.39	2.64
65-69	2.52	6.83	4.59
70 and above	2.39	3.87	4.93
All age groups	0.82	0.71	0.54
Females			
15-19	0.88	0.96	0.39
20-24	-1.11	0.46	0.18
25-29	0.80	1.87	0.97
30-34	1.55	0.57	0.89
35-39	0.90	0.76	0.91
40-44	1.85	0.45	0.49
45-49	2.85	1.20	0.64
50-54	5.90	3.20	1.72
55-59	8.07	4.36	2.52
60-64	8.36	8.43	5.10
65-69	3.44	9.61	6.89
70 and above	2.27	4.68	6.32
All age groups	1.99	1.73	1.16
Persons			
15-19	0.47	0.68	0.30
20-24	-1.23	0.15	0.04
25-29	0.00	1.22	0.63
30-34	0.52	-0.15	0.38
35-39	0.45	0.31	0.49
40-44	1.39	0.18	0.18
45-49	1.54	0.73	0.32
50-54	4.17	2.21	1.20
55-59	5.48	2.52	1.61
60-64	3.85	5.56	3.40
65-69	2.71	7.48	5.17
70 and above	2.37	4.03	5.23
All age groups	1.24	1.10	0.78

Table 9 Unemployment Rates, Hours, Australia, Per Cent

Age and sex	1994-95	2004-05	2012-13	2024-25
Males				
15-19	21.50	16.26	15.60	15.50
20-24	14.44	9.35	9.32	9.26
25-29	10.65	6.25	5.79	5.73
30-34	8.26	4.23	4.07	4.00
35-39	7.45	3.99	3.42	3.36
40-44	6.65	3.66	3.12	3.06
45-49	5.95	3.64	3.31	3.26
50-54	7.03	3.36	3.33	3.28
55-59	10.31	4.14	3.65	3.54
60-64	12.63	4.05	3.96	3.85
65-69	1.99	1.41	1.54	1.57
70 and above	0.62	0.52	0.82	0.84
All age groups	9.37	5.15	4.76	4.61
Females				
15-19	21.44	15.08	14.36	14.27
20-24	12.07	8.42	7.88	7.84
25-29	8.08	5.67	5.25	5.21
30-34	7.92	5.33	5.02	4.99
35-39	7.35	5.05	4.23	4.18
40-44	6.11	4.69	3.89	3.86
45-49	5.70	3.90	3.68	3.66
50-54	5.75	3.16	2.67	2.61
55-59	5.70	3.28	2.28	2.20
60-64	1.79	1.70	1.59	1.59
65-69	1.16	0.91	1.01	1.07
70 and above	0.64	0.35	0.51	0.53
All age groups	8.55	5.54	4.81	4.61
Persons				
15-19	21.48	15.74	15.04	14.95
20-24	13.42	8.95	8.68	8.63
25-29	9.70	6.02	5.56	5.51
30-34	8.15	4.62	4.43	4.39
35-39	7.42	4.35	3.71	3.67
40-44	6.46	4.03	3.40	3.37
45-49	5.86	3.74	3.46	3.43
50-54	6.62	3.29	3.07	3.00
55-59	9.11	3.86	3.13	3.01
60-64	10.71	3.43	3.19	3.03
65-69	1.82	1.30	1.40	1.42
70 and above	0.63	0.48	0.76	0.77
All age groups	9.08	5.29	4.78	4.61

Table 10 Qualification Shares, Level of Highest Educational Attainment, Australia, Per Cent

Age and sex	1994-95	2004-05	2012-13	2024-25
Males				
Post-graduate degree	2.65	4.07	4.65	5.16
Graduate diploma or certificate	1.83	2.26	2.56	2.86
Bachelor degree	11.93	14.58	15.91	17.00
Advanced diploma or diploma	5.90	7.86	8.77	9.49
Certificate III or IV	25.98	25.47	25.71	26.36
Certificate I or II	0.62	0.77	0.88	1.00
Year 12 and below	50.97	44.95	41.47	38.07
No educational attainment	0.12	0.06	0.06	0.06
All qualification levels	100.00	100.00	100.00	100.00
Females				
Post-graduate degree	1.53	2.91	3.39	3.61
Graduate diploma or certificate	3.06	4.22	4.68	4.87
Bachelor degree	14.42	18.56	20.12	20.67
Advanced diploma or diploma	8.79	10.51	11.49	12.11
Certificate III or IV	6.08	11.04	12.72	13.45
Certificate I or II	1.11	1.19	1.34	1.43
Year 12 and below	64.95	51.50	46.16	43.73
No educational attainment	0.06	0.07	0.10	0.12
All qualification levels	100.00	100.00	100.00	100.00
Persons				
Post-graduate degree	2.26	3.64	4.16	4.54
Graduate diploma or certificate	2.26	2.98	3.39	3.67
Bachelor degree	12.80	16.05	17.55	18.47
Advanced diploma or diploma	6.91	8.84	9.83	10.54
Certificate III or IV	19.06	20.12	20.64	21.19
Certificate I or II	0.79	0.92	1.06	1.17
Year 12 and below	55.84	47.37	43.30	40.34
No educational attainment	0.10	0.07	0.07	0.09
All qualification levels	100.00	100.00	100.00	100.00

Table 11 Qualification Shares, Main Field of Highest Educational Attainment, Australia, Per Cent

Age and sex	1994-95	2004-05	2012-13	2024-25
Males				
Natural and physical sciences	1.93	2.27	2.49	2.70
Information technology	1.07	2.68	3.07	3.34
Engineering and related technologies	21.30	19.88	20.04	20.65
Architecture and building	6.78	6.85	6.83	6.86
Agriculture and environmental studies	1.36	1.91	2.15	2.36
Health	1.87	2.46	2.75	3.06
Education	2.07	2.37	2.67	3.01
Management and commerce	5.69	8.49	9.74	10.67
Society and culture	3.73	4.10	4.34	4.56
Creative arts	1.15	1.70	1.93	2.10
Food, hospitality, personal services	1.97	2.26	2.42	2.54
Mixed field programmes	50.97	44.97	41.49	38.09
No educational attainment	0.12	0.06	0.06	0.06
All qualification fields	100.00	100.00	100.00	100.00
Females				
Natural and physical sciences	1.40	1.78	2.02	2.16
Information technology	0.57	1.23	1.43	1.51
Engineering and related technologies	0.94	1.09	1.20	1.25
Architecture and building	0.29	0.57	0.64	0.68
Agriculture and environmental studies	0.45	0.65	0.71	0.74
Health	9.13	9.26	9.40	9.55
Education	6.60	6.92	7.51	7.86
Management and commerce	5.75	11.23	12.88	13.55
Society and culture	5.66	9.75	11.20	11.76
Creative arts	1.85	2.70	3.05	3.20
Food, hospitality, personal services	2.32	3.20	3.64	3.85
Mixed field programmes	64.97	51.54	46.21	43.78
No educational attainment	0.06	0.07	0.10	0.12
All qualification fields	100.00	100.00	100.00	100.00
Persons				
Natural and physical sciences	1.75	2.09	2.31	2.48
Information technology	0.90	2.14	2.43	2.61
Engineering and related technologies	14.21	12.92	12.69	12.88
Architecture and building	4.52	4.52	4.41	4.38
Agriculture and environmental studies	1.04	1.44	1.59	1.71
Health	4.39	4.98	5.35	5.66
Education	3.65	4.06	4.56	4.95
Management and commerce	5.71	9.51	10.97	11.82
Society and culture	4.40	6.19	7.02	7.45
Creative arts	1.39	2.07	2.37	2.54
Food, hospitality, personal services	2.09	2.61	2.90	3.06
Mixed field programmes	55.84	47.40	43.33	40.37
No educational attainment	0.10	0.07	0.07	0.09
All qualification fields	100.00	100.00	100.00	100.00

Table 12.1 Employment Growth Rates, 2004-05 to 2012-13, Hours, Australia, Per Cent Per Annum

ASCED Levels of Educational Attainment	ASCED Broad Fields of Study	Simulation	
		A	B
Post-graduate degree	Natural and physical sciences	2.95	3.62
	Information technology	2.74	3.44
	Engineering and related technologies	2.66	3.64
	Architecture and building	3.30	3.84
	Agriculture and environmental studies	2.17	2.89
	Health	2.32	2.89
	Education	3.80	4.07
	Management and commerce	3.08	3.82
	Society and culture	2.72	3.33
	Creative arts	2.31	2.76
	Food, hospitality, personal services	0.00	0.00
Graduate diploma or certificate	Natural and physical sciences	2.82	2.92
	Information technology	2.07	2.32
	Engineering and related technologies	2.68	2.86
	Architecture and building	3.39	3.68
	Agriculture and environmental studies	5.32	5.62
	Health	3.31	3.39
	Education	2.00	2.08
	Management and commerce	2.97	3.11
	Society and culture	3.45	3.52
	Creative arts	3.19	3.28
	Food, hospitality, personal services	0.00	0.00
Bachelor degree	Natural and physical sciences	2.09	2.44
	Information technology	2.79	3.16
	Engineering and related technologies	1.96	2.49
	Architecture and building	1.03	1.35
	Agriculture and environmental studies	1.74	2.01
	Health	1.43	1.77
	Education	3.22	3.35
	Management and commerce	2.88	3.26
	Society and culture	1.83	2.12
	Creative arts	2.74	2.90
	Food, hospitality, personal services	3.12	3.30
Advanced diploma or diploma	Natural and physical sciences	2.27	2.55
	Information technology	2.87	3.25
	Engineering and related technologies	1.50	1.91
	Architecture and building	2.52	2.73
	Agriculture and environmental studies	2.14	2.30
	Health	1.56	1.83
	Education	1.11	1.32
	Management and commerce	2.99	3.19
	Society and culture	3.84	3.96
	Creative arts	2.84	2.98
	Food, hospitality, personal services	3.60	3.78

…continued

Table 12.1 (continued) Employment Growth Rates, 2003-04 to 2013-14, Hours, Australia, Per Cent Per Annum

ASCED Levels of Educational Attainment	ASCED Broad Fields of Study	Simulation	
		A	B
Certificate III or IV	Natural and physical sciences	3.65	3.81
	Information technology	3.09	3.21
	Engineering and related technologies	0.53	0.66
	Architecture and building	0.64	0.73
	Agriculture and environmental studies	2.94	2.99
	Health	3.39	3.47
	Education	3.33	3.35
	Management and commerce	3.22	3.29
	Society and culture	3.97	4.00
	Creative arts	3.08	3.15
	Food, hospitality, personal services	2.25	2.38
Certificate I or II	Natural and physical sciences	7.94	8.93
	Information technology	3.30	4.22
	Engineering and related technologies	2.18	2.38
	Architecture and building	1.76	1.98
	Agriculture and environmental studies	1.84	1.88
	Health	4.85	5.05
	Education	0.00	0.00
	Management and commerce	2.44	2.91
	Society and culture	5.11	5.45
	Creative arts	5.23	5.54
	Food, hospitality, personal services	3.84	4.02
No post-school qualification		0.04	0.14
All qualifications		1.16	1.34

Table 12. 2 Employment Growth Rates, 2004-05 to 2024-25, Hours, Australia, Per Cent Per Annum

ASCED Levels of Educational Attainment	ASCED Broad Fields of Study	Simulation A	Simulation B
Post-graduate degree	Natural and physical sciences	1.99	2.66
	Information technology	1.87	2.48
	Engineering and related technologies	1.78	2.63
	Architecture and building	2.27	2.73
	Agriculture and environmental studies	1.47	2.20
	Health	1.78	2.33
	Education	2.37	2.74
	Management and commerce	2.07	2.74
	Society and culture	1.75	2.48
	Creative arts	1.92	2.34
	Food, hospitality, personal services	0.00	0.00
Graduate diploma or certificate	Natural and physical sciences	2.14	2.25
	Information technology	1.43	1.73
	Engineering and related technologies	1.90	2.07
	Architecture and building	2.37	2.59
	Agriculture and environmental studies	3.48	3.72
	Health	2.08	2.18
	Education	1.46	1.57
	Management and commerce	1.95	2.09
	Society and culture	2.16	2.24
	Creative arts	2.26	2.34
	Food, hospitality, personal services	0.00	0.00
Bachelor degree	Natural and physical sciences	1.46	1.81
	Information technology	1.82	2.10
	Engineering and related technologies	1.40	1.88
	Architecture and building	0.78	1.08
	Agriculture and environmental studies	1.25	1.50
	Health	1.06	1.46
	Education	2.06	2.22
	Management and commerce	1.84	2.18
	Society and culture	1.15	1.47
	Creative arts	1.75	1.90
	Food, hospitality, personal services	1.91	2.06
Advanced diploma or diploma	Natural and physical sciences	1.61	1.91
	Information technology	1.81	2.16
	Engineering and related technologies	1.11	1.54
	Architecture and building	1.79	2.00
	Agriculture and environmental studies	1.41	1.58
	Health	1.18	1.55
	Education	1.25	1.61
	Management and commerce	1.92	2.15
	Society and culture	2.45	2.58
	Creative arts	1.81	1.96
	Food, hospitality, personal services	2.30	2.49

…continued

Table 12.2 (continued). Employment Growth Rates, 2004-05 to 2024-25, Hours, Australia, Per Cent Per Annum

ASCED Levels of Educational Attainment	ASCED Broad Fields of Study	Simulation	
		A	B
Certificate III or IV	Natural and physical sciences	2.38	2.54
	Information technology	1.94	2.06
	Engineering and related technologies	0.56	0.71
	Architecture and building	0.50	0.59
	Agriculture and environmental studies	2.04	2.08
	Health	2.21	2.32
	Education	2.12	2.15
	Management and commerce	2.00	2.08
	Society and culture	2.41	2.46
	Creative arts	1.96	2.03
	Food, hospitality, personal services	1.47	1.62
Certificate I or II	Natural and physical sciences	4.67	5.52
	Information technology	2.30	3.30
	Engineering and related technologies	1.48	1.73
	Architecture and building	2.07	2.30
	Agriculture and environmental studies	1.57	1.60
	Health	2.94	3.17
	Education	0.00	0.00
	Management and commerce	1.78	2.30
	Society and culture	3.24	3.59
	Creative arts	3.44	3.71
	Food, hospitality, personal services	2.50	2.73
No post-school qualification		0.01	0.14
All qualifications		0.81	1.02

Table 13 Employment Deviations, Industries and Qualifications, 2012-13, Persons, Australia

Code	Industry / Qualification	Deviation (per cent)	Contribution (percentage points)	Contribution (per cent)
	Industries			
1	Agriculture forestry and fishing	1.513	0.055	4.107
2	Mining	0.764	0.009	0.649
3	Food processing	0.872	0.018	1.356
4	Textiles clothing and footware	1.033	0.006	0.434
5	Wood paper products printing	1.530	0.029	2.207
6	Petroleum coal chemical products	1.270	0.013	0.992
7	Non-metallic mineral products	2.449	0.008	0.630
8	Metal products	1.010	0.017	1.260
9	Machinery and equipment	1.156	0.032	2.394
10	Other manufacturing	1.528	0.012	0.901
11	Utilities	1.394	0.010	0.747
12	Construction	2.398	0.188	14.171
13	Wholesale trade	1.186	0.057	4.296
14	Retail trade	1.058	0.164	12.334
15	Accomodation cafes restaurants	1.094	0.052	3.948
16	Transport and storage	1.145	0.052	3.886
17	Communications	1.299	0.021	1.592
18	Finance and insurance	1.184	0.039	2.913
19	Property and business services	1.351	0.166	12.487
20	Public administration and defence	1.227	0.054	4.095
21	Education	1.226	0.095	7.162
22	Health and community services	1.496	0.157	11.817
23	Cultural and recreational services	1.324	0.029	2.176
24	Personal and other services	1.194	0.046	3.446
25	All industries	1.330	1.330	100.000
	Qualifications			
1	Post-graduate degree	4.863	0.194	14.597
2	Graduate diploma or certificate	0.685	0.023	1.727
3	Bachelor degree	2.346	0.406	30.543
4	Advanced diploma or diploma	1.642	0.161	12.073
5	Certificate III or IV	0.803	0.152	11.443
6	Certificate I or II	2.082	0.022	1.685
7	No post school qualification	0.816	0.372	27.931
8	All qualification levels	1.330	1.330	100.000

Table 14 Employment Deviations, Occupations, 2012-13, Persons, Australia

Code	Occupation	Deviation (per cent)	Contribution (percentage points)	Contribution (per cent)
111	General managers and administrators	1.380	0.013	0.947
119	Miscellaneous generalist managers	2.137	0.022	1.664
121	Resource managers	1.180	0.010	0.721
122	Engineering distribution and process managers	1.516	0.020	1.521
123	Sales and marketing managers	1.410	0.017	1.276
129	Miscellaneous specialist managers	1.421	0.016	1.173
131	Farmers and farm managers	1.270	0.026	1.935
211	Natural and physical science professionals	3.424	0.026	1.923
212	Building and engineering professionals	1.740	0.027	2.023
221	Accountants auditors and corporate treasurers	1.158	0.019	1.396
222	Sales marketing and advertising professionals	1.292	0.012	0.869
223	Computing professionals	2.373	0.039	2.960
229	Misc. business and information professionals	1.414	0.023	1.696
231	Medical practitioners	2.172	0.013	1.013
232	Nursing professionals	2.268	0.049	3.711
238	Miscellaneous health professionals	2.358	0.024	1.802
241	School teachers	1.472	0.052	3.881
242	University and vocational education teachers	1.875	0.014	1.040
249	Miscellaneous education professionals	1.685	0.009	0.690
251	Social welfare professionals	0.933	0.010	0.731
252	Miscellaneous social professionals	0.971	0.007	0.562
253	Artists and related professionals	1.543	0.019	1.456
254	Miscellaneous professionals	1.390	0.006	0.433
311	Medical and science technical officers	2.259	0.009	0.670
312	Building and engineering associate professionals	1.621	0.018	1.385
321	Finance associate professionals	1.153	0.012	0.925
329	Misc. business and admin. associate professionals	1.268	0.046	3.441
331	Shop managers	1.075	0.022	1.639
332	Hospitality and accommodation managers	1.295	0.020	1.506
339	Misc. managing supervisors (sales and service)	1.204	0.012	0.926
341	Enrolled nurses	1.811	0.006	0.417
342	Welfare associate professionals	1.039	0.002	0.179
349	Misc. health and welfare associate professionals	1.894	0.005	0.378
391	Police officers	1.057	0.006	0.416
399	Miscellaneous associate professionals	1.125	0.006	0.457
411	Mechanical engineering tradespersons	0.878	0.011	0.826
412	Fabrication engineering tradespersons	0.987	0.009	0.662
421	Automotive tradespersons	0.812	0.011	0.861
431	Electrical and electronics tradespersons	1.184	0.022	1.643
441	Structural construction tradespersons	2.599	0.053	3.975
442	Final finish construction tradespersons	2.486	0.015	1.158

…continued

Table 14 (continued)

Code	Occupation	Deviation (per cent)	Contribution (percentage points)	Contribution (per cent)
443	Plumbers	2.872	0.016	1.219
451	Food tradespersons	1.352	0.012	0.889
461	Skilled agricultural workers	1.119	0.001	0.096
462	Horticultural tradespersons	1.376	0.009	0.714
491	Printing tradespersons	0.945	0.003	0.199
492	Wood tradespersons	1.418	0.005	0.385
493	Hairdressers	1.712	0.010	0.767
494	Textile clothing and related tradespersons	1.040	0.002	0.159
498	Miscellaneous tradespersons and related workers	1.345	0.011	0.832
511	Secretaries and personal assistants	1.118	0.018	1.372
591	Advanced numerical clerks	1.195	0.017	1.282
599	Misc. advanced clerical and service workers	1.066	0.006	0.419
611	General clerks	1.114	0.020	1.470
612	Keyboard operators	1.066	0.008	0.592
613	Receptionists	0.971	0.015	1.143
614	Intermediate numerical clerks	1.086	0.022	1.663
615	Material recording and despatch clerks	1.098	0.011	0.816
619	Miscellaneous intermediate clerical workers	1.153	0.018	1.326
621	Intermediate sales and related workers	1.151	0.018	1.388
631	Carers and aides	0.953	0.028	2.116
632	Hospitality workers	1.041	0.018	1.323
639	Miscellaneous intermediate service workers	1.255	0.017	1.252
711	Mobile plant operators	1.206	0.015	1.106
712	Intermediate stationary plant operators	1.049	0.006	0.452
721	Interm. textile and related machine operators	1.005	0.002	0.179
729	Miscellaneous intermediate machine operators	1.150	0.006	0.446
731	Road and rail transport drivers	1.100	0.034	2.527
791	Intermediate mining and construction workers	1.376	0.007	0.556
799	Misc. interm. production and transport workers	1.053	0.021	1.555
811	Elementary clerks	1.123	0.007	0.546
821	Sales assistants	1.030	0.062	4.626
829	Miscellaneous elementary sales workers	1.056	0.019	1.463
831	Elementary service workers	1.054	0.013	0.962
911	Cleaners	1.029	0.022	1.658
921	Process workers	1.090	0.016	1.219
922	Product packagers	0.969	0.008	0.615
991	Mining construction and related labourers	1.556	0.016	1.239
992	Agricultural and horticultural labourers	1.098	0.012	0.871
993	Elementary food preparation and related workers	0.945	0.012	0.916
999	Other miscellaneous labourers and related workers	1.251	0.010	0.755
	All occupations	1.330	1.330	100.000

Table 15 Employment Deviations, Occupations, 2012-13, Persons, Australia

Code	Occupation	Shift Effect (per cent)	Share Effect (per cent)	Deviation (per cent)
111	General managers and administrators	1.314	0.067	1.380
119	Miscellaneous generalist managers	1.797	0.340	2.137
121	Resource managers	1.268	-0.088	1.180
122	Engineering distribution and process managers	1.253	0.264	1.516
123	Sales and marketing managers	1.233	0.177	1.410
129	Miscellaneous specialist managers	1.293	0.128	1.421
131	Farmers and farm managers	1.489	-0.220	1.270
211	Natural and physical science professionals	1.295	2.129	3.424
212	Building and engineering professionals	1.337	0.403	1.740
221	Accountants auditors and corporate treasurers	1.297	-0.139	1.158
222	Sales marketing and advertising professionals	1.260	0.032	1.292
223	Computing professionals	1.292	1.082	2.373
229	Misc. business and information professionals	1.295	0.119	1.414
231	Medical practitioners	1.487	0.686	2.172
232	Nursing professionals	1.484	0.784	2.268
238	Miscellaneous health professionals	1.407	0.951	2.358
241	School teachers	1.230	0.242	1.472
242	University and vocational education teachers	1.230	0.645	1.875
249	Miscellaneous education professionals	1.241	0.444	1.685
251	Social welfare professionals	1.358	-0.425	0.933
252	Miscellaneous social professionals	1.318	-0.347	0.971
253	Artists and related professionals	1.350	0.193	1.543
254	Miscellaneous professionals	1.251	0.139	1.390
311	Medical and science technical officers	1.340	0.920	2.259
312	Building and engineering associate professionals	1.544	0.076	1.621
321	Finance associate professionals	1.210	-0.057	1.153
329	Misc. business and admin. associate professionals	1.344	-0.076	1.268
331	Shop managers	1.096	-0.021	1.075
332	Hospitality and accommodation managers	1.124	0.171	1.295
339	Misc. managing supervisors (sales and service)	1.265	-0.060	1.204
341	Enrolled nurses	1.485	0.325	1.811
342	Welfare associate professionals	1.398	-0.359	1.039
349	Misc. health and welfare associate professionals	1.433	0.461	1.894
391	Police officers	1.195	-0.138	1.057
399	Miscellaneous associate professionals	1.268	-0.143	1.125
411	Mechanical engineering tradespersons	1.200	-0.322	0.878
412	Fabrication engineering tradespersons	1.249	-0.263	0.987
421	Automotive tradespersons	1.108	-0.296	0.813
431	Electrical and electronics tradespersons	1.688	-0.504	1.184
441	Structural construction tradespersons	2.265	0.335	2.599
442	Final finish construction tradespersons	2.169	0.317	2.486

…continued

Table 15 (continued)

Code	Occupation	Shift Effect (per cent)	Share Effect (per cent)	Deviation (per cent)
443	Plumbers	2.218	0.655	2.872
451	Food tradespersons	1.090	0.263	1.352
461	Skilled agricultural workers	1.413	-0.293	1.119
462	Horticultural tradespersons	1.543	-0.167	1.376
491	Printing tradespersons	1.478	-0.533	0.945
492	Wood tradespersons	1.518	-0.100	1.418
493	Hairdressers	1.195	0.517	1.712
494	Textile clothing and related tradespersons	1.183	-0.143	1.040
498	Miscellaneous tradespersons and related workers	1.339	0.006	1.345
511	Secretaries and personal assistants	1.383	-0.265	1.118
591	Advanced numerical clerks	1.393	-0.198	1.195
599	Misc. advanced clerical and service workers	1.233	-0.166	1.067
611	General clerks	1.316	-0.202	1.114
612	Keyboard operators	1.298	-0.232	1.066
613	Receptionists	1.366	-0.394	0.971
614	Intermediate numerical clerks	1.265	-0.179	1.086
615	Material recording and despatch clerks	1.195	-0.097	1.098
619	Miscellaneous intermediate clerical workers	1.270	-0.117	1.153
621	Intermediate sales and related workers	1.166	-0.016	1.151
631	Carers and aides	1.414	-0.461	0.953
632	Hospitality workers	1.105	-0.065	1.041
639	Miscellaneous intermediate service workers	1.280	-0.025	1.255
711	Mobile plant operators	1.538	-0.332	1.206
712	Intermediate stationary plant operators	1.290	-0.241	1.049
721	Interm. textile and related machine operators	1.134	-0.129	1.005
729	Miscellaneous intermediate machine operators	1.384	-0.234	1.150
731	Road and rail transport drivers	1.219	-0.119	1.100
791	Intermediate mining and construction workers	1.592	-0.216	1.376
799	Misc. interm. production and transport workers	1.175	-0.123	1.053
811	Elementary clerks	1.296	-0.174	1.123
821	Sales assistants	1.091	-0.062	1.030
829	Miscellaneous elementary sales workers	1.120	-0.064	1.056
831	Elementary service workers	1.282	-0.228	1.054
911	Cleaners	1.300	-0.271	1.029
921	Process workers	1.190	-0.101	1.090
922	Product packagers	1.129	-0.160	0.969
991	Mining construction and related labourers	2.077	-0.522	1.556
992	Agricultural and horticultural labourers	1.406	-0.308	1.098
993	Elementary food preparation and related workers	1.159	-0.214	0.945
999	Other miscellaneous labourers and related workers	1.430	-0.180	1.251
	All occupations	1.330	0.000	1.330

Table 16 Employment Rankings, Occupations, 2012-13, Persons, Australia

Code	Occupation	Shift Effect	Share Effect	Deviation	Contri-bution
111	General managers and administrators	36	27	27	44
119	Miscellaneous generalist managers	5	13	10	14
121	Resource managers	50	39	42	58
122	Engineering distribution and process managers	54	17	20	20
123	Sales and marketing managers	59	21	25	32
129	Miscellaneous specialist managers	43	24	22	37
131	Farmers and farm managers	12	61	34	10
211	Natural and physical science professionals	42	1	1	11
212	Building and engineering professionals	33	12	14	9
221	Accountants auditors and corporate treasurers	39	48	43	25
222	Sales marketing and advertising professionals	53	28	33	50
223	Computing professionals	44	2	5	6
229	Misc. business and information professionals	41	25	24	13
231	Medical practitioners	13	6	9	42
232	Nursing professionals	15	5	7	4
238	Miscellaneous health professionals	21	3	6	12
241	School teachers	61	19	21	3
242	University and vocational education teachers	60	8	12	41
249	Miscellaneous education professionals	57	11	16	60
251	Social welfare professionals	28	77	79	57
252	Miscellaneous social professionals	34	74	74	65
253	Artists and related professionals	29	20	19	24
254	Miscellaneous professionals	55	23	26	71
311	Medical and science technical officers	31	4	8	61
312	Building and engineering assoc. professionals	8	26	17	27
321	Finance associate professionals	63	33	45	46
329	Misc. business and admin. assoc. professionals	30	38	35	5
331	Shop managers	79	31	58	18
332	Hospitality and accommodation managers	75	22	32	21
339	Misc. managing supervisors (sales and service)	52	34	39	45
341	Enrolled nurses	14	15	13	73
342	Welfare associate professionals	23	75	68	79
349	Misc. health and welfare assoc. professionals	17	10	11	76
391	Police officers	67	47	61	74
399	Miscellaneous associate professionals	49	50	48	68
411	Mechanical engineering tradespersons	64	72	80	53
412	Fabrication engineering tradespersons	56	66	72	62
421	Automotive tradespersons	77	70	81	51
431	Electrical and electronics tradespersons	6	79	41	17
441	Structural construction tradespersons	1	14	3	2
442	Final finish construction tradespersons	3	16	4	38

…continued

Table 16 (continued)

Code	Occupation	Shift Effect	Share Effect	Deviation	Contri-bution
443	Plumbers	2	7	2	36
451	Food tradespersons	81	18	30	48
461	Skilled agricultural workers	20	69	50	81
462	Horticultural tradespersons	9	53	29	59
491	Printing tradespersons	16	81	78	77
492	Wood tradespersons	11	41	23	75
493	Hairdressers	66	9	15	55
494	Textile clothing and related tradespersons	69	49	67	80
498	Misc. tradespersons and related workers	32	29	31	52
511	Secretaries and personal assistants	26	67	51	28
591	Advanced numerical clerks	24	57	40	31
599	Misc. advanced clerical and service workers	58	52	59	72
611	General clerks	35	58	52	22
612	Keyboard operators	38	63	60	64
613	Receptionists	27	76	73	39
614	Intermediate numerical clerks	51	55	57	15
615	Material recording and despatch clerks	65	40	55	54
619	Miscellaneous intermediate clerical workers	48	43	44	29
621	Intermediate sales and related workers	71	30	46	26
631	Carers and aides	19	78	76	8
632	Hospitality workers	78	37	66	30
639	Miscellaneous intermediate service workers	47	32	36	33
711	Mobile plant operators	10	73	38	40
712	Intermediate stationary plant operators	45	65	65	69
721	Interm. textile and related machine operators	73	46	71	78
729	Miscellaneous intermediate machine operators	25	64	47	70
731	Road and rail transport drivers	62	44	53	7
791	Intermediate mining and construction workers	7	60	28	66
799	Misc. interm. production and transport workers	70	45	64	19
811	Elementary clerks	40	54	49	67
821	Sales assistants	80	35	69	1
829	Miscellaneous elementary sales workers	76	36	62	23
831	Elementary service workers	46	62	63	43
911	Cleaners	37	68	70	16
921	Process workers	68	42	56	35
922	Product packagers	74	51	75	63
991	Mining construction and related labourers	4	80	18	34
992	Agricultural and horticultural labourers	22	71	54	49
993	Elementary food prep. and related workers	72	59	77	47
999	Other misc. labourers and related workers	18	56	37	56

Table 17 Employment Deviations, 211 Natural and Physical Science Professionals, 2012-13, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
19	Property and business services	0.269	1.351	0.363	2.010	0.541	0.904
22	Health and community services	0.175	1.496	0.262	2.038	0.357	0.619
20	Public administration and defence	0.109	1.227	0.134	2.357	0.257	0.391
21	Education	0.108	1.226	0.133	1.831	0.198	0.331
1	Agriculture forestry and fishing	0.077	1.513	0.116	2.338	0.179	0.295
2	Mining	0.075	0.764	0.057	2.099	0.156	0.213
23	Cultural and recreational services	0.040	1.324	0.053	2.140	0.085	0.138
6	Petroleum coal chemical products	0.036	1.270	0.046	2.360	0.085	0.131
3	Food processing	0.021	0.872	0.018	2.516	0.052	0.071
13	Wholesale trade	0.017	1.186	0.020	2.473	0.043	0.063
11	Utilities	0.014	1.394	0.020	2.585	0.036	0.056
14	Retail trade	0.012	1.058	0.013	2.393	0.030	0.043
8	Metal products	0.012	1.010	0.012	2.112	0.026	0.038
24	Personal and other services	0.010	1.194	0.012	2.291	0.024	0.036
9	Machinery and equipment	0.009	1.156	0.010	2.257	0.019	0.029
12	Construction	0.004	2.398	0.009	2.608	0.010	0.018
16	Transport and storage	0.004	1.145	0.005	2.523	0.010	0.015
5	Wood paper products printing	0.003	1.530	0.005	2.830	0.009	0.013
18	Finance and insurance	0.002	1.184	0.002	2.488	0.004	0.006
7	Non-metallic mineral products	0.001	2.449	0.002	2.845	0.002	0.005
15	Accomodation cafes restaurants	0.001	1.094	0.001	2.451	0.002	0.004
17	Communications	0.000	1.299	0.001	2.272	0.001	0.002
10	Other manufacturing	0.001	1.528	0.001	1.924	0.001	0.002
4	Textiles clothing and footware	0.000	1.033	0.000	2.374	0.001	0.001
25	Total	1.000		1.295		2.129	3.424

Table 18 Employment Deviations, 443 Plumbers, 2012-13, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
12	Construction	0.845	2.398	2.026	0.706	0.597	2.623
11	Utilities	0.021	1.394	0.030	0.533	0.011	0.041
19	Property and business services	0.018	1.351	0.024	0.290	0.005	0.029
20	Public administration and defence	0.017	1.227	0.020	0.292	0.005	0.025
14	Retail trade	0.015	1.058	0.016	0.509	0.008	0.023
13	Wholesale trade	0.014	1.186	0.016	0.409	0.006	0.022
9	Machinery and equipment	0.013	1.156	0.015	0.528	0.007	0.022
8	Metal products	0.012	1.010	0.012	0.748	0.009	0.021
24	Personal and other services	0.009	1.194	0.010	0.340	0.003	0.013
22	Health and community services	0.009	1.496	0.013	-0.205	-0.002	0.011
1	Agriculture forestry and fishing	0.005	1.513	0.008	0.422	0.002	0.010
6	Petroleum coal chemical products	0.003	1.270	0.004	0.389	0.001	0.006
16	Transport and storage	0.003	1.145	0.004	0.264	0.001	0.005
3	Food processing	0.004	0.872	0.003	0.409	0.002	0.005
21	Education	0.004	1.226	0.005	-0.322	-0.001	0.004
5	Wood paper products printing	0.001	1.530	0.002	0.534	0.001	0.003
23	Cultural and recreational services	0.002	1.324	0.002	0.218	0.000	0.002
15	Accomodation cafes restaurants	0.002	1.094	0.002	0.370	0.001	0.002
7	Non-metallic mineral products	0.001	2.449	0.001	0.499	0.000	0.002
2	Mining	0.003	0.764	0.002	-0.167	0.000	0.002
18	Finance and insurance	0.001	1.184	0.001	0.326	0.000	0.001
17	Communications	0.000	1.299	0.001	0.417	0.000	0.001
10	Other manufacturing	0.000	1.528	0.001	0.320	0.000	0.001
4	Textiles clothing and footware	0.000	1.033	0.000	0.426	0.000	0.000
25	Total	1.000		2.218		0.655	2.872

Table 19 Employment Deviations, 223 Computing Professionals, 2012-13, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
19	Property and business services	0.507	1.351	0.684	0.992	0.503	1.187
18	Finance and insurance	0.082	1.184	0.097	1.255	0.103	0.200
20	Public administration and defence	0.071	1.227	0.087	1.231	0.087	0.174
17	Communications	0.053	1.299	0.068	1.166	0.061	0.130
13	Wholesale trade	0.044	1.186	0.052	1.295	0.057	0.110
21	Education	0.052	1.226	0.063	0.589	0.030	0.094
14	Retail trade	0.035	1.058	0.037	1.386	0.049	0.086
9	Machinery and equipment	0.028	1.156	0.032	1.320	0.037	0.069
16	Transport and storage	0.023	1.145	0.026	1.373	0.032	0.058
22	Health and community services	0.018	1.496	0.026	0.755	0.013	0.040
11	Utilities	0.013	1.394	0.018	1.250	0.016	0.034
5	Wood paper products printing	0.012	1.530	0.018	1.077	0.013	0.031
23	Cultural and recreational services	0.011	1.324	0.014	1.188	0.013	0.027
12	Construction	0.007	2.398	0.017	1.486	0.010	0.027
24	Personal and other services	0.011	1.194	0.013	1.260	0.013	0.026
3	Food processing	0.009	0.872	0.007	1.336	0.011	0.019
6	Petroleum coal chemical products	0.006	1.270	0.008	1.350	0.009	0.017
8	Metal products	0.006	1.010	0.006	1.262	0.007	0.013
2	Mining	0.008	0.764	0.006	0.875	0.007	0.013
1	Agriculture forestry and fishing	0.002	1.513	0.004	1.788	0.004	0.008
15	Accomodation cafes restaurants	0.002	1.094	0.002	1.303	0.002	0.004
7	Non-metallic mineral products	0.001	2.449	0.002	1.357	0.001	0.003
10	Other manufacturing	0.001	1.528	0.001	1.349	0.001	0.002
4	Textiles clothing and footware	0.001	1.033	0.001	1.410	0.001	0.002
25	Total	1.000		1.292		1.082	2.373

Table 20 Employment Deviations, 421 Automotive Tradespersons, 2012-13, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
14	Retail trade	0.758	1.058	0.802	-0.245	-0.186	0.616
9	Machinery and equipment	0.067	1.156	0.078	-0.431	-0.029	0.049
13	Wholesale trade	0.045	1.186	0.054	-0.487	-0.022	0.032
12	Construction	0.016	2.398	0.038	-0.363	-0.006	0.032
16	Transport and storage	0.039	1.145	0.045	-0.400	-0.016	0.029
19	Property and business services	0.013	1.351	0.018	-0.462	-0.006	0.012
20	Public administration and defence	0.014	1.227	0.017	-0.599	-0.008	0.009
24	Personal and other services	0.012	1.194	0.014	-0.606	-0.007	0.007
1	Agriculture forestry and fishing	0.005	1.513	0.007	-0.062	0.000	0.007
10	Other manufacturing	0.003	1.528	0.005	-0.197	-0.001	0.004
23	Cultural and recreational services	0.002	1.324	0.003	-0.626	-0.002	0.002
8	Metal products	0.003	1.010	0.003	-0.392	-0.001	0.002
7	Non-metallic mineral products	0.001	2.449	0.002	-0.161	0.000	0.002
5	Wood paper products printing	0.002	1.530	0.003	-0.235	0.000	0.002
22	Health and community services	0.002	1.496	0.002	-1.074	-0.002	0.001
18	Finance and insurance	0.002	1.184	0.002	-0.426	-0.001	0.001
17	Communications	0.001	1.299	0.001	-0.365	0.000	0.001
15	Accomodation cafes restaurants	0.001	1.094	0.001	-0.517	-0.001	0.001
11	Utilities	0.002	1.394	0.002	-0.598	-0.001	0.001
6	Petroleum coal chemical products	0.002	1.270	0.002	-0.534	-0.001	0.001
4	Textiles clothing and footware	0.002	1.033	0.002	-0.390	-0.001	0.001
3	Food processing	0.002	0.872	0.002	-0.488	-0.001	0.001
2	Mining	0.007	0.764	0.005	-0.568	-0.004	0.001
21	Education	0.001	1.226	0.001	-1.168	-0.001	0.000
25	Total	1.000		1.108		-0.296	0.813

Table 21 Employment Deviations, 411 Mechanical Engineering Tradespersons, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
9	Machinery and equipment	0.242	1.156	0.280	-0.232	-0.056	0.224
12	Construction	0.047	2.398	0.113	-0.045	-0.002	0.111
13	Wholesale trade	0.093	1.186	0.110	-0.362	-0.034	0.076
14	Retail trade	0.078	1.058	0.083	-0.129	-0.010	0.073
8	Metal products	0.102	1.010	0.104	-0.362	-0.037	0.066
16	Transport and storage	0.073	1.145	0.084	-0.362	-0.026	0.057
19	Property and business services	0.051	1.351	0.069	-0.387	-0.020	0.049
6	Petroleum coal chemical products	0.041	1.270	0.052	-0.368	-0.015	0.037
5	Wood paper products printing	0.027	1.530	0.042	-0.151	-0.004	0.037
3	Food processing	0.051	0.872	0.044	-0.294	-0.015	0.029
20	Public administration and defence	0.027	1.227	0.034	-0.383	-0.010	0.023
7	Non-metallic mineral products	0.009	2.449	0.022	-0.096	-0.001	0.022
1	Agriculture forestry and fishing	0.013	1.513	0.020	0.054	0.001	0.021
11	Utilities	0.018	1.394	0.026	-0.342	-0.006	0.019
10	Other manufacturing	0.008	1.528	0.012	-0.598	-0.005	0.008
4	Textiles clothing and footware	0.007	1.033	0.007	-0.199	-0.001	0.006
22	Health and community services	0.009	1.496	0.013	-0.931	-0.008	0.005
24	Personal and other services	0.005	1.194	0.006	-0.397	-0.002	0.004
2	Mining	0.086	0.764	0.066	-0.715	-0.062	0.004
23	Cultural and recreational services	0.003	1.324	0.004	-0.448	-0.001	0.003
21	Education	0.005	1.226	0.006	-1.051	-0.005	0.001
17	Communications	0.001	1.299	0.002	-0.263	0.000	0.001
15	Accomodation cafes restaurants	0.002	1.094	0.002	-0.336	-0.001	0.001
18	Finance and insurance	0.001	1.184	0.001	-0.378	0.000	0.000
25	Total	1.000	1.330	1.200	-0.452	-0.322	0.878

Table 22 Employment Deviations, 251 Social Welfare Professionals, 2012-13, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
22	Health and community services	0.486	1.496	0.727	-0.540	-0.263	0.464
24	Personal and other services	0.204	1.194	0.243	-0.208	-0.042	0.201
20	Public administration and defence	0.128	1.227	0.157	-0.222	-0.028	0.129
19	Property and business services	0.055	1.351	0.075	-0.228	-0.013	0.062
21	Education	0.103	1.226	0.126	-0.735	-0.075	0.050
23	Cultural and recreational services	0.004	1.324	0.005	-0.283	-0.001	0.004
18	Finance and insurance	0.004	1.184	0.004	-0.107	0.000	0.004
15	Accomodation cafes restaurants	0.004	1.094	0.004	-0.165	-0.001	0.004
14	Retail trade	0.003	1.058	0.003	-0.079	0.000	0.003
12	Construction	0.001	2.398	0.003	-0.134	0.000	0.003
16	Transport and storage	0.002	1.145	0.003	-0.070	0.000	0.002
1	Agriculture forestry and fishing	0.001	1.513	0.002	0.176	0.000	0.002
17	Communications	0.001	1.299	0.001	-0.077	0.000	0.001
13	Wholesale trade	0.001	1.186	0.001	-0.157	0.000	0.001
11	Utilities	0.001	1.394	0.001	-0.049	0.000	0.001
10	Other manufacturing	0.000	1.528	0.000	0.058	0.000	0.000
9	Machinery and equipment	0.000	1.156	0.001	-0.143	0.000	0.000
8	Metal products	0.000	1.010	0.000	-0.494	0.000	0.000
7	Non-metallic mineral products	0.000	2.449	0.000	0.000	0.000	0.000
6	Petroleum coal chemical products	0.000	1.270	0.000	-0.391	0.000	0.000
5	Wood paper products printing	0.000	1.530	0.001	-0.199	0.000	0.000
4	Textiles clothing and footware	0.000	1.033	0.000	-0.032	0.000	0.000
3	Food processing	0.000	0.872	0.000	0.046	0.000	0.000
2	Mining	0.000	0.764	0.000	-0.923	0.000	0.000
25	Total	1.000	1.330	1.358	-0.396	-0.425	0.933

Table 23 Employment Deviations, 491 Printing Tradespersons, 2012-13, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
5	Wood paper products printing	0.804	1.530	1.230	-0.552	-0.444	0.786
19	Property and business services	0.041	1.351	0.055	-0.589	-0.024	0.031
6	Petroleum coal chemical products	0.024	1.270	0.031	-0.393	-0.010	0.021
9	Machinery and equipment	0.016	1.156	0.019	-0.210	-0.003	0.015
4	Textiles clothing and footware	0.017	1.033	0.018	-0.238	-0.004	0.014
14	Retail trade	0.016	1.058	0.016	-0.243	-0.004	0.013
12	Construction	0.006	2.398	0.014	-0.378	-0.002	0.012
13	Wholesale trade	0.013	1.186	0.015	-0.335	-0.004	0.011
24	Personal and other services	0.011	1.194	0.013	-0.380	-0.004	0.009
20	Public administration and defence	0.008	1.227	0.009	-0.402	-0.003	0.006
23	Cultural and recreational services	0.005	1.324	0.007	-0.423	-0.002	0.005
8	Metal products	0.005	1.010	0.005	-0.176	-0.001	0.004
18	Finance and insurance	0.003	1.184	0.004	-0.385	-0.001	0.003
10	Other manufacturing	0.006	1.528	0.010	-1.036	-0.006	0.003
7	Non-metallic mineral products	0.002	2.449	0.004	-0.625	-0.001	0.003
22	Health and community services	0.003	1.496	0.004	-0.824	-0.002	0.002
21	Education	0.014	1.226	0.017	-1.055	-0.015	0.002
16	Transport and storage	0.002	1.145	0.002	-0.195	0.000	0.002
3	Food processing	0.004	0.872	0.003	-0.300	-0.001	0.002
17	Communications	0.001	1.299	0.001	-0.197	0.000	0.001
15	Accomodation cafes restaurants	0.000	1.094	0.000	-0.334	0.000	0.000
11	Utilities	0.000	1.394	0.000	-0.177	0.000	0.000
2	Mining	0.000	0.764	0.000	-1.172	0.000	0.000
1	Agriculture forestry and fishing	0.000	1.513	0.000	2.526	0.000	0.000
25	Total	1.000	1.330	1.478	-0.384	-0.533	0.945

Table 24 Employment Deviations, 238 Miscellaneous Health Professionals, 2012-13, Persons, Australia

Code	Contributing Industry	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
22	Health and community services	0.762	1.496	1.141	0.852	0.650	1.790
14	Retail trade	0.158	1.058	0.168	1.323	0.210	0.377
21	Education	0.020	1.226	0.024	0.786	0.015	0.040
20	Public administration and defence	0.013	1.227	0.016	1.357	0.017	0.033
19	Property and business services	0.013	1.351	0.017	1.079	0.014	0.031
6	Petroleum coal chemical products	0.008	1.270	0.010	1.175	0.010	0.020
13	Wholesale trade	0.006	1.186	0.008	1.427	0.009	0.017
24	Personal and other services	0.005	1.194	0.006	1.348	0.007	0.013
9	Machinery and equipment	0.004	1.156	0.004	0.923	0.004	0.008
23	Cultural and recreational services	0.003	1.324	0.004	1.318	0.004	0.007
1	Agriculture forestry and fishing	0.002	1.513	0.003	1.955	0.004	0.007
18	Finance and insurance	0.002	1.184	0.002	1.505	0.003	0.005
15	Accomodation cafes restaurants	0.001	1.094	0.001	1.470	0.002	0.003
3	Food processing	0.001	0.872	0.001	1.499	0.001	0.002
17	Communications	0.000	1.299	0.000	1.455	0.000	0.001
16	Transport and storage	0.001	1.145	0.001	1.464	0.001	0.001
12	Construction	0.000	2.398	0.001	1.993	0.001	0.001
8	Metal products	0.000	1.010	0.000	0.840	0.000	0.001
11	Utilities	0.000	1.394	0.000	1.283	0.000	0.000
10	Other manufacturing	0.000	1.528	0.000	0.673	0.000	0.000
7	Non-metallic mineral products	0.000	2.449	0.000	0.000	0.000	0.000
5	Wood paper products printing	0.000	1.530	0.000	1.132	0.000	0.000
4	Textiles clothing and footware	0.000	1.033	0.000	1.638	0.000	0.000
2	Mining	0.000	0.764	0.000	0.689	0.000	0.000
25	Total	1.000		1.407		0.951	2.358

Table 25 Employment Deviations, Occupations, 2012-13, Persons, Australia

Code	Occupation	Shift Effect (per cent)	Share Effect (per cent)	Deviation (per cent)
111	General managers and administrators	1.794	-0.413	1.380
119	Miscellaneous generalist managers	1.279	0.858	2.137
121	Resource managers	1.663	-0.483	1.180
122	Engineering distribution and process managers	1.595	-0.078	1.517
123	Sales and marketing managers	1.727	-0.317	1.410
129	Miscellaneous specialist managers	1.993	-0.571	1.422
131	Farmers and farm managers	1.042	0.228	1.270
211	Natural and physical science professionals	3.163	0.264	3.426
212	Building and engineering professionals	2.224	-0.483	1.741
221	Accountants auditors and corporate treasurers	2.078	-0.920	1.159
222	Sales marketing and advertising professionals	1.662	-0.370	1.292
223	Computing professionals	2.034	0.339	2.373
229	Misc. business and information professionals	1.757	-0.342	1.415
231	Medical practitioners	3.026	-0.854	2.172
232	Nursing professionals	1.848	0.419	2.268
238	Miscellaneous health professionals	2.249	0.110	2.359
241	School teachers	2.124	-0.651	1.473
242	University and vocational education teachers	2.757	-0.877	1.880
249	Miscellaneous education professionals	2.051	-0.365	1.687
251	Social welfare professionals	2.259	-1.325	0.934
252	Miscellaneous social professionals	2.306	-1.334	0.972
253	Artists and related professionals	1.723	-0.180	1.543
254	Miscellaneous professionals	1.906	-0.516	1.391
311	Medical and science technical officers	1.979	0.280	2.260
312	Building and engineering assoc. professionals	1.303	0.318	1.621
321	Finance associate professionals	1.967	-0.813	1.153
329	Misc. business and admin. assoc. professionals	1.417	-0.149	1.268
331	Shop managers	1.084	-0.009	1.075
332	Hospitality and accommodation managers	1.025	0.270	1.295
339	Misc. managing supervisors (sales and service)	1.385	-0.180	1.204
341	Enrolled nurses	1.241	0.570	1.811
342	Welfare associate professionals	1.269	-0.230	1.039
349	Misc. health and welfare assoc. professionals	1.616	0.278	1.894
391	Police officers	1.569	-0.512	1.057
399	Miscellaneous associate professionals	1.341	-0.216	1.125
411	Mechanical engineering tradespersons	0.972	-0.093	0.879
412	Fabrication engineering tradespersons	0.912	0.075	0.987
421	Automotive tradespersons	0.870	-0.057	0.813
431	Electrical and electronics tradespersons	0.953	0.231	1.184
441	Structural construction tradespersons	0.885	1.715	2.599
442	Final finish construction tradespersons	0.870	1.617	2.486

…continued

Table 25 (continued)

Code	Occupation	Shift Effect (per cent)	Share Effect (per cent)	Deviation (per cent)
443	Plumbers	0.905	1.968	2.872
451	Food tradespersons	0.882	0.470	1.352
461	Skilled agricultural workers	0.971	0.149	1.119
462	Horticultural tradespersons	1.047	0.329	1.376
491	Printing tradespersons	0.999	-0.053	0.945
492	Wood tradespersons	0.919	0.499	1.418
493	Hairdressers	0.865	0.847	1.712
494	Textile clothing and related tradespersons	1.078	-0.038	1.040
498	Misc. tradespersons and related workers	1.108	0.236	1.345
511	Secretaries and personal assistants	1.091	0.027	1.118
591	Advanced numerical clerks	1.282	-0.087	1.195
599	Misc. advanced clerical and service workers	1.196	-0.130	1.066
611	General clerks	1.241	-0.127	1.115
612	Keyboard operators	1.180	-0.114	1.066
613	Receptionists	1.013	-0.042	0.971
614	Intermediate numerical clerks	1.162	-0.076	1.086
615	Material recording and despatch clerks	1.106	-0.008	1.098
619	Miscellaneous intermediate clerical workers	1.267	-0.114	1.153
621	Intermediate sales and related workers	1.087	0.064	1.151
631	Carers and aides	1.098	-0.145	0.953
632	Hospitality workers	1.025	0.016	1.041
639	Miscellaneous intermediate service workers	1.271	-0.016	1.255
711	Mobile plant operators	0.918	0.288	1.206
712	Intermediate stationary plant operators	0.934	0.114	1.049
721	Interm. textile and related machine operators	0.971	0.034	1.005
729	Miscellaneous intermediate machine operators	1.149	0.001	1.150
731	Road and rail transport drivers	0.970	0.130	1.100
791	Intermediate mining and construction workers	0.913	0.463	1.376
799	Misc. interm. production and transport workers	1.004	0.048	1.053
811	Elementary clerks	1.091	0.032	1.122
821	Sales assistants	0.941	0.088	1.030
829	Miscellaneous elementary sales workers	1.074	-0.018	1.056
831	Elementary service workers	1.054	0.000	1.054
911	Cleaners	0.991	0.039	1.029
921	Process workers	0.979	0.111	1.090
922	Product packagers	0.977	-0.007	0.970
991	Mining construction and related labourers	0.954	0.602	1.556
992	Agricultural and horticultural labourers	0.920	0.178	1.098
993	Elementary food prep. and related workers	0.915	0.030	0.945
999	Other misc. labourers and related workers	0.953	0.298	1.251
	All occupations	1.330	0.000	1.330

Table 26 Employment Rankings, Occupations, 2012-13, Persons, Australia

Code	Occupation	Shift Effect	Share Effect	Deviation	Contri-bution
111	General managers and administrators	17	71	27	44
119	Miscellaneous generalist managers	31	6	10	14
121	Resource managers	21	73	42	58
122	Engineering distribution and process managers	24	54	20	20
123	Sales and marketing managers	19	67	25	32
129	Miscellaneous specialist managers	12	76	22	37
131	Farmers and farm managers	52	25	34	10
211	Natural and physical science professionals	1	22	1	11
212	Building and engineering professionals	7	72	14	9
221	Accountants auditors and corporate treasurers	9	81	43	25
222	Sales marketing and advertising professionals	22	70	33	50
223	Computing professionals	11	14	5	6
229	Misc. business and information professionals	18	68	24	13
231	Medical practitioners	2	79	9	42
232	Nursing professionals	16	13	7	4
238	Miscellaneous health professionals	6	31	6	12
241	School teachers	8	77	21	3
242	University and vocational education teachers	3	80	12	41
249	Miscellaneous education professionals	10	69	16	60
251	Social welfare professionals	5	2	79	57
252	Miscellaneous social professionals	4	1	73	65
253	Artists and related professionals	20	64	19	24
254	Miscellaneous professionals	15	75	26	71
311	Medical and science technical officers	13	19	8	61
312	Building and engineering assoc. professionals	29	16	17	27
321	Finance associate professionals	14	78	45	46
329	Misc. business and admin. assoc. professionals	26	62	35	5
331	Shop managers	47	46	58	18
332	Hospitality and accommodation managers	54	21	32	21
339	Misc. managing supervisors (sales and service)	27	63	39	45
341	Enrolled nurses	36	9	13	73
342	Welfare associate professionals	33	66	68	79
349	Misc. health and welfare assoc. professionals	23	20	11	76
391	Police officers	25	74	61	74
399	Miscellaneous associate professionals	28	65	48	68
411	Mechanical engineering tradespersons	61	56	80	53
412	Fabrication engineering tradespersons	75	33	72	62
421	Automotive tradespersons	80	52	81	51
431	Electrical and electronics tradespersons	67	24	41	17
441	Structural construction tradespersons	77	4	3	2
442	Final finish construction tradespersons	79	5	4	38

…continued

Table 26 (continued)

Code	Occupation	Shift Effect	Share Effect	Deviation	Contri-bution
443	Plumbers	76	3	2	36
451	Food tradespersons	78	11	30	48
461	Skilled agricultural workers	63	27	50	81
462	Horticultural tradespersons	51	15	29	59
491	Printing tradespersons	57	51	78	77
492	Wood tradespersons	71	10	23	75
493	Hairdressers	81	7	15	55
494	Textile clothing and related tradespersons	48	49	67	80
498	Misc. tradespersons and related workers	41	23	31	52
511	Secretaries and personal assistants	45	40	51	28
591	Advanced numerical clerks	30	55	40	31
599	Misc. advanced clerical and service workers	37	60	60	72
611	General clerks	35	59	52	22
612	Keyboard operators	38	58	59	64
613	Receptionists	55	50	74	39
614	Intermediate numerical clerks	39	53	57	15
615	Material recording and despatch clerks	42	45	55	54
619	Miscellaneous intermediate clerical workers	34	57	44	29
621	Intermediate sales and related workers	46	34	46	26
631	Carers and aides	43	61	76	8
632	Hospitality workers	53	41	66	30
639	Miscellaneous intermediate service workers	32	47	36	33
711	Mobile plant operators	72	18	38	40
712	Intermediate stationary plant operators	69	29	65	69
721	Interm. textile and related machine operators	62	37	71	78
729	Miscellaneous intermediate machine operators	40	42	47	70
731	Road and rail transport drivers	64	28	53	7
791	Intermediate mining and construction workers	74	12	28	66
799	Misc. interm. production and transport workers	56	35	64	19
811	Elementary clerks	44	38	49	67
821	Sales assistants	68	32	69	1
829	Miscellaneous elementary sales workers	49	48	62	23
831	Elementary service workers	50	43	63	43
911	Cleaners	58	36	70	16
921	Process workers	59	30	56	35
922	Product packagers	60	44	75	63
991	Mining construction and related labourers	65	8	18	34
992	Agricultural and horticultural labourers	70	26	54	49
993	Elementary food prep. and related workers	73	39	77	47
999	Other misc. labourers and related workers	66	17	37	56

Table 27 Employment Deviations, Selected Occupations, 2012-13, Persons, Australia

Code	Occupation / Contributing Qualification	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
211	**Natural and Physical Science Professionals**						
1	Post-graduate degree	0.410	4.863	1.993	0.468	0.192	2.185
2	Graduate diploma	0.013	0.685	0.009	0.359	0.005	0.014
3	Bachelor degree	0.426	2.346	1.000	0.251	0.107	1.107
4	Diploma	0.046	1.642	0.075	-0.017	-0.001	0.075
5	Certificate III or IV	0.053	0.803	0.043	-0.444	-0.024	0.019
6	Certificate I or II	0.000	2.082	0.001	-0.344	0.000	0.001
7	No post school qualification	0.051	0.816	0.042	-0.301	-0.015	0.026
8	Total	1.000		3.163		0.264	3.426
443	**Plumbers**						
1	Post-graduate degree	0.008	4.863	0.040	2.914	0.024	0.064
2	Graduate diploma	0.019	0.685	0.013	2.697	0.052	0.065
3	Bachelor degree	0.002	2.346	0.006	2.619	0.006	0.012
4	Diploma	0.025	1.642	0.041	2.330	0.058	0.098
5	Certificate III or IV	0.489	0.803	0.393	1.866	0.912	1.305
6	Certificate I or II	0.032	2.082	0.066	2.005	0.063	0.129
7	No post school qualification	0.425	0.816	0.347	2.007	0.853	1.200
8	Total	1.000		0.905		1.968	2.872

Table 28 Employment Deviations, Selected Occupations, 2012-13, Persons, Australia

Code	Occupation / Contributing Qualification	(1) Empolyment Share	(2) Shift Effect	(3) = (1) x (2) Contribution	(4) Share Effect	(5) = (1) x (4) Contribution	(6) = (3) + (5) Total Contribution
		Simulation A	(per cent)	(percentage points)	(per cent)	(percentage points)	(percentage points)
223	**Computing Professionals**						
1	Post-graduate degree	0.117	4.863	0.568	0.742	0.087	0.655
2	Graduate diploma	0.052	0.685	0.035	0.618	0.032	0.067
3	Bachelor degree	0.414	2.346	0.972	0.510	0.211	1.183
4	Diploma	0.136	1.642	0.223	0.239	0.032	0.255
5	Certificate III or IV	0.037	0.803	0.030	-0.200	-0.007	0.023
6	Certificate I or II	0.005	2.082	0.011	-0.087	0.000	0.010
7	No post school qualification	0.239	0.816	0.195	-0.062	-0.015	0.180
8	Total	1.000		2.034		0.339	2.373
421	**Automotive Tradespersons**						
1	Post-graduate degree	0.001	4.863	0.007	0.822	0.001	0.008
2	Graduate diploma	0.000	0.685	0.000	0.696	0.000	0.001
3	Bachelor degree	0.026	2.346	0.061	0.576	0.015	0.076
4	Diploma	0.017	1.642	0.028	0.317	0.005	0.033
5	Certificate III or IV	0.668	0.803	0.537	-0.126	-0.084	0.453
6	Certificate I or II	0.003	2.082	0.005	-0.008	0.000	0.005
7	No post school qualification	0.284	0.816	0.232	0.017	0.005	0.237
8	Total	1.000		0.870		-0.057	0.813

Table 29 Employment Deviations, Selected Occupations, 2012-13, Persons, Australia

Code	Occupation / Contributing Qualification	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
411	**Mechanical Engineering Tradespersons**						
1	Post-graduate degree	0.007	4.863	0.032	0.742	0.005	0.037
2	Graduate diploma	0.007	0.685	0.005	0.618	0.004	0.009
3	Bachelor degree	0.047	2.346	0.110	0.512	0.024	0.134
4	Diploma	0.068	1.642	0.112	0.242	0.017	0.128
5	Certificate III or IV	0.672	0.803	0.540	-0.193	-0.130	0.410
6	Certificate I or II	0.008	2.082	0.017	-0.084	-0.001	0.017
7	No post school qualification	0.191	0.816	0.156	-0.065	-0.012	0.144
8	Total	1.000	1.330	0.972	-0.451	-0.093	0.879
251	**Social Welfare Professionals**						
1	Post-graduate degree	0.189	4.863	0.918	-1.100	-0.208	0.711
2	Graduate diploma	0.167	0.685	0.115	-1.126	-0.189	-0.074
3	Bachelor degree	0.385	2.346	0.902	-1.270	-0.488	0.414
4	Diploma	0.136	1.642	0.223	-1.543	-0.210	0.014
5	Certificate III or IV	0.063	0.803	0.051	-1.945	-0.123	-0.072
6	Certificate I or II	0.001	2.082	0.002	-1.847	-0.001	0.000
7	No post school qualification	0.059	0.816	0.048	-1.790	-0.106	-0.058
8	Total	1.000	1.330	2.259	-0.396	-1.325	0.934

Table 30 Employment Deviations, Selected Occupations, 2012-13, Persons, Australia

Code	Occupation / Contributing Qualification	(1) Empolyment Share Simulation A	(2) Shift Effect (per cent)	(3) = (1) x (2) Contribution (percentage points)	(4) Share Effect (per cent)	(5) = (1) x (4) Contribution (percentage points)	(6) = (3) + (5) Total Contribution (percentage points)
491	**Printing Tradespersons**						
1	Post-graduate degree	0.000	4.863	0.002	0.762	0.000	0.002
2	Graduate diploma	0.000	0.685	0.000	0.628	0.000	0.000
3	Bachelor degree	0.050	2.346	0.116	0.513	0.025	0.142
4	Diploma	0.103	1.642	0.169	0.249	0.026	0.194
5	Certificate III or IV	0.447	0.803	0.359	-0.191	-0.085	0.274
6	Certificate I or II	0.021	2.082	0.044	-0.073	-0.002	0.042
7	No post school qualification	0.379	0.816	0.309	-0.047	-0.018	0.291
8	Total	1.000		0.999		-0.053	0.945
238	**Miscellaneous Health Professionals**						
1	Post-graduate degree	0.128	4.863	0.623	0.382	0.049	0.672
2	Graduate diploma	0.108	0.685	0.074	0.311	0.034	0.107
3	Bachelor degree	0.559	2.346	1.312	0.162	0.091	1.402
4	Diploma	0.082	1.642	0.135	-0.088	-0.007	0.128
5	Certificate III or IV	0.058	0.803	0.047	-0.532	-0.031	0.016
6	Certificate I or II	0.005	2.082	0.010	-0.425	-0.002	0.008
7	No post school qualification	0.060	0.816	0.049	-0.382	-0.023	0.026
8	Total	1.000		2.249		0.110	2.359

Table 31 Average Employment Growth Rates, 1996-97 to 2004-05, Occupations, Persons, Australia

Code	Occupation	Shift Effect (per cent per annum)	Share Effect (per cent per annum)	Growt Rate (per cent per annum)
111	General managers and administrators	1.992	9.095	11.087
119	Miscellaneous generalist managers	1.955	2.101	4.056
121	Resource managers	2.177	2.093	4.270
122	Engineering distribution and process managers	0.964	8.382	9.346
123	Sales and marketing managers	1.401	7.927	9.329
129	Miscellaneous specialist managers	2.687	4.818	7.504
131	Farmers and farm managers	-1.639	-0.263	-1.902
211	Natural and physical science professionals	2.829	1.300	4.130
212	Building and engineering professionals	2.665	0.395	3.060
221	Accountants auditors and corporate treasurers	2.862	2.206	5.068
222	Sales marketing and advertising professionals	1.575	5.484	7.059
223	Computing professionals	2.738	3.243	5.981
229	Misc. business and information professionals	2.968	3.132	6.100
231	Medical practitioners	3.592	-2.686	0.907
232	Nursing professionals	3.607	-0.869	2.738
238	Miscellaneous health professionals	3.313	1.897	5.209
241	School teachers	2.063	0.679	2.742
242	University and vocational education teachers	2.077	-2.825	-0.748
249	Miscellaneous education professionals	2.349	0.559	2.908
251	Social welfare professionals	3.152	3.934	7.086
252	Miscellaneous social professionals	3.839	-0.279	3.560
253	Artists and related professionals	2.633	0.505	3.138
254	Miscellaneous professionals	2.157	-0.504	1.653
311	Medical and science technical officers	2.373	-3.413	-1.040
312	Building and engineering assoc. professionals	2.966	-0.569	2.397
321	Finance associate professionals	1.784	6.161	7.945
329	Misc. business and admin. assoc. professionals	3.042	9.374	12.416
331	Shop managers	2.231	-2.228	0.002
332	Hospitality and accommodation managers	3.176	2.453	5.629
339	Misc. managing supervisors (sales and service)	2.500	2.153	4.653
341	Enrolled nurses	3.618	-3.933	-0.315
342	Welfare associate professionals	3.378	8.361	11.738
349	Misc. health and welfare assoc. professionals	3.138	4.787	7.924
391	Police officers	2.822	-1.228	1.593
399	Miscellaneous associate professionals	3.140	1.334	4.475
411	Mechanical engineering tradespersons	0.549	-1.602	-1.054
412	Fabrication engineering tradespersons	-0.318	2.347	2.030
421	Automotive tradespersons	2.083	-2.307	-0.224
431	Electrical and electronics tradespersons	2.827	-2.694	0.134
441	Structural construction tradespersons	4.520	-0.634	3.886
442	Final finish construction tradespersons	4.674	-1.417	3.257

…continued

Table 31 (continued)

Code	Occupation	Shift Effect (per cent per annum)	Share Effect (per cent per annum)	Growt Rate (per cent per annum)
443	Plumbers	4.635	-3.632	1.003
451	Food tradespersons	2.515	-3.672	-1.157
461	Skilled agricultural workers	-0.533	-1.828	-2.361
462	Horticultural tradespersons	2.797	0.862	3.659
491	Printing tradespersons	0.846	-4.316	-3.470
492	Wood tradespersons	0.654	-1.157	-0.503
493	Hairdressers	2.791	1.029	3.820
494	Textile clothing and related tradespersons	-2.106	-0.444	-2.550
498	Misc. tradespersons and related workers	1.956	2.315	4.270
511	Secretaries and personal assistants	2.691	-6.228	-3.537
591	Advanced numerical clerks	2.451	1.864	4.315
599	Misc. advanced clerical and service workers	2.484	-1.946	0.538
611	General clerks	2.402	16.838	19.239
612	Keyboard operators	2.387	-6.540	-4.154
613	Receptionists	2.960	-0.135	2.825
614	Intermediate numerical clerks	1.887	-5.716	-3.828
615	Material recording and despatch clerks	0.952	-0.068	0.884
619	Miscellaneous intermediate clerical workers	2.443	1.993	4.436
621	Intermediate sales and related workers	0.845	2.060	2.905
631	Carers and aides	3.198	1.526	4.724
632	Hospitality workers	3.241	-0.765	2.476
639	Miscellaneous intermediate service workers	2.931	2.416	5.347
711	Mobile plant operators	1.982	1.462	3.443
712	Intermediate stationary plant operators	0.210	-4.090	-3.881
721	Interm. textile and related machine operators	-3.442	-2.770	-6.212
729	Miscellaneous intermediate machine operators	0.204	-1.521	-1.317
731	Road and rail transport drivers	1.653	0.097	1.750
791	Intermediate mining and construction workers	2.685	1.896	4.581
799	Misc. interm. production and transport workers	0.785	0.104	0.889
811	Elementary clerks	2.386	-5.463	-3.076
821	Sales assistants	2.317	0.229	2.546
829	Miscellaneous elementary sales workers	2.393	-1.505	0.889
831	Elementary service workers	3.201	-0.804	2.397
911	Cleaners	3.365	-2.810	0.555
921	Process workers	0.130	-0.818	-0.689
922	Product packagers	0.832	2.425	3.257
991	Mining construction and related labourers	3.775	-0.927	2.848
992	Agricultural and horticultural labourers	-0.375	-2.513	-2.889
993	Elementary food prep. and related workers	2.985	-1.843	1.142
999	Other misc. labourers and related workers	2.538	3.268	5.806
	All occupations	2.148	0.000	2.148

MODELLING THE ECONOMIC IMPACTS OF MIGRATION AND POPULATION GROWTH

PART B: THE MONASH SOLUTIONS

1 Introduction and Summary

This report investigates the impact on the Australian economy of an increase in immigration over the period 2005 – 2025. The composition of the increased migrant intake is weighted towards skilled migrants.

The Productivity Commission provided us with estimates of the employment effects of the increase in skilled migration. We input the Productivity Commission's estimates to our model as shocks to employment of labour differentiated by skill.

Employment rises steadily relative to basecase throughout the simulation period. By 2025, employment (hours) is 4.6 per cent above its no-policy-change basecase level. Employment of labour with post-school qualifications is 5.8 per cent above basecase by 2025. Employment of labour without post-school qualifications is 2.8 per cent above basecase by 2025. Since the increase in employment is weighted towards more qualified labour, who on the whole earn above average wages, the economy-wide wagebill weighted employment deviation (4.9 per cent) exceeds the economy-wide deviation in total hours employed (4.6 per cent).

The positive deviation in employment relative to basecase causes a positive deviation in rates of return. This causes investment to rise relative to basecase. We assume that investors are forward-looking but also cautious about the possibility of a reversal of the immigration policy. Hence we a adopt a middle position on the speed of investor reaction to the policy. We assume investors install additional capital at a rate faster than they would if they all shared expectations that were purely adaptive, but slower than they would if they all shared an expectation that there was no possibility of a future reversal of the immigration policy. The positive deviation in the economy-wide

rate of return index peaks in year 5 of the simulation at 0.8 per cent. Thereafter the deviation in the rate of return declines steadily.

With the capital stock and employment rising relative to basecase throughout the simulation, so too does real GDP. The deviation in real GNE is larger than the deviation in real GDP because of the strong growth in investment relative to basecase. This causes a negative deviation in the balance of trade and a rise in net foreign liabilities relative to basecase.

Broadly, aggregate import volumes tend to move in proportion with aggregate activity. Hence, as the positive deviation in real GDP rises over the simulation period, so too does the positive deviation in import volumes. Over time, this requires the deviation in export volumes to become positive. From 2015 onwards, this reduces the terms of trade relative to basecase.

All sectors tend to expand. Relative prospects for individual sectors are largely governed by macroeconomic factors. In general, changes in skill supply exert only a small effect on sectoral output deviations. The five broad sectors with the smallest 2025 output deviations are Agriculture, Mining, Food processing, Basic Metal Products and Dwellings ownership. All five sectors are relatively capital intensive, and the first four are trade exposed. The last sector sells entirely to private consumption. Throughout the simulation the deviation in export volumes is less than the deviation in real GDP. Also, the strong positive deviation in real investment causes a positive deviation in the cost of capital. Both factors act to damp the output deviations of trade exposed and / or capital intensive sectors. In the case of Dwellings ownership, which sells all of its output to households, the rise in the relative cost of capital eventually passes through to dwellings capital rental rates, causing the price of dwellings services to rise relative to other items in the household consumption basket.

The sectors experiencing the largest deviations in output are Construction, Other manufacturing, Transport equipment, Fabricated metal products, and Health and welfare. Construction experiences the largest deviation in output. This reflects the large positive deviation in aggregate investment. Aggregated within the Transport equipment, Fabricated metal products and Other manufacturing sectors are a number

of industries that sell relatively large proportions of their output to industries in the Construction sector. Hence these sectors experience large positive deviations in their output via their inter-industry linkages with Construction. However the output deviation of the Transport equipment sector is initially quite damped. Transport equipment is subject to relatively strong import competition. The rapid rise in the investment deviation in the first five years of the simulation period causes the real exchange rate to appreciate, causing a negative deviation in Transport equipment's domestic market share. The Health and welfare sector is among the top five sectors ranked by output deviation because of the effects of skill supply. Health and welfare production is intensive in the use of medical occupations. These occupations experience a negative deviation in wages because the immigration policy promotes the supply of labour with medical skills. This reduces the relative price of Health and welfare, augmenting the positive deviation in private consumption of these services.

For the first four years of the policy there is a small (but growing) positive deviation (averaging $25.1 per capita) in real (consumption price deflated) GNP. The positive deviation in real GNP per capita then grows steadily from 2009 onwards. The deviation in real GNP per capita is the net result of a number of countervailing effects. Inputs provided by the Productivity Commission to the Centre of Policy Studies suggest that the new arrivals will have higher skills, participation rates, and working hours per worker than the incumbent population. These labour market characteristics of the new arrivals act to increase real GNP per capita relative to basecase. However the declining terms of trade, rising labour / capital ratio, and rising foreign interest payments act to reduce real GNP per capita. In the first four years of the simulation period, the negative influences on real GNP per capita and the positive influences on real GNP per capita are approximately equal. After 2009 the positive deviation in real GNP per capita rises steadily, driven largely by a rising participation rate relative to basecase.

The real GNP per capita measure provides little insight into the welfare effects of the proposed policy. In the policy case, the measure is an average of the real incomes of the basecase (incumbent) population and the real incomes of the additional (skilled migrant) population. In the basecase, the measure is an average of the real incomes of the incumbent population only. The appropriate measure for assessing the welfare

effects of the policy is the deviation in the real income of the basecase (incumbent) population. A detailed assessment of the welfare effects of the policy was not a primary focus of our study. Nevertheless, MONASH results can be used to calculate an estimate of the change in the per-capita real income of the incumbent population. This estimate includes the effects on incumbent incomes of changes in factor prices but excludes the effects of net fiscal transfers. The deviation in our estimate of net incumbent real income is positive for the first sixteen years of the simulation period and negative thereafter. For the first sixteen years of the policy (2005-2020) there are approximately matched gains and losses in incumbent capital and wage income respectively, leaving a small net gain (averaging approximately $61 per annum) in per capita incumbent real income over this period. However the negative deviation in real wages grows throughout the simulation, while ongoing growth in capital supply damps the positive deviation in capital rental rates. From 2020 onwards the loss in wage income comes to dominate the net income calculation, leading to a growing negative deviation in incumbent real per capita income. The year 2025 deviation in incumbent real per capita income is -$77. At a 5 per cent discount rate, the net present value of the deviation in real per capita incumbent income over the period 2005-2025 is +$596 per capita, or an annual average per capita income gain of approximately $30. The size and sign of this net present value is likely to be sensitive to the choice of end point for the simulation period. Since the positive deviation in rates of return is transient, but the negative deviation in real wages grows, an extension of the simulation period by perhaps around 10 years might be sufficient to generate a zero or negative value for the deviation in the net present value of incumbent real income.

Underlying the deviation in average incumbent income are large and important distributional effects. Broadly, incumbent workers lose from the policy, while incumbent capital owners gain. At a 5 per cent discount rate, the net present value of per capita incumbent wage income losses over the period 2005 – 2025 is $1,775. The net present value of per capita incumbent capital income gains is $1,953 per capita. There are likely to be large within-group differences in income deviations for members of each of these two groups. Incumbent holders of advanced diplomas, bachelor degrees, graduate diplomas and postgraduate degrees experience greater than average negative deviations in their real wages. Incumbent workers with C12 and C34 qualifications, and those with no post school qualifications, experience small positive

deviations in their real wages. Owners of capital in the sectors experiencing the largest output gains will, in general, experience the largest gains in capital income. Also, the distribution of capital income is quite concentrated: the capital owned by the wealthiest 10 per cent of the Australian population represents approximately 45 per cent of all household net wealth. The age distribution of household wealth is also highly skewed, peaking in the pre-retirement years of 55-64. While MONASH itself does not model income distribution, we would expect the incumbent capital income gain calculated by MONASH to be distributed among the incumbent population in a manner broadly consistent with the aforementioned capital ownership patterns.

The increase in labour supply causes the labour / capita ratio to rise and the terms of trade to fall. This generates a negative deviation in the average real wage. By 2025 the deviation in the real wage is –1.7 per cent. Relative wage prospects for individual occupations depend in part on the extent to which the supply of skills required for each occupation are increased by the immigration policy, and in part on the changes in demand conditions induced by the increase in migration. For example, wages of *natural and physical science professionals*, *building engineering professionals*, *medical practitioners*, *university and vocational teachers*, *miscellaneous social professionals*, *computing professionals*, *miscellaneous health professionals*, *accountants and auditors*, and *nursing professionals*, all fall substantially relative to basecase. In large part this reflects the positive impact of the policy on the supply of skills that are required for these occupations. Falls in wages of medical, teaching and social occupations are also due in part to the relatively inelastic demand for the output of the *Health services*, *Education*, *Public administration* and *Community services* industries, which are the predominant employers of these occupations. However industry prospects also exert an influence on occupational wage rates. In particular, a narrow range of occupations employed heavily by the construction sector (*final finish construction tradespersons*, *plumbers*, *structural tradespersons*, *wood tradespersons* and *mining construction labourers*) experience substantial positive deviations in their real wages.

2 The Model

2.1 Overview of MONASH

This section provides a brief overview of MONASH. The reader is referred to Dixon and Rimmer (2002) for a detailed exposition of the full model.

MONASH is a dynamic CGE model of the Australian economy. It features detailed sectoral disaggregation, with the version employed in this paper covering 106 industries and commodities. Familiar neoclassical assumptions govern the behaviour of the model's economic agents. Decision-making by firms and households is governed by maximising behaviour. Each representative industry is assumed to minimise costs subject to constant returns to scale production technologies and given input prices. Household commodity demands are modelled via a representative utility-maximising household. Units of new industry-specific capital are assumed to be cost minimising combinations of commodities sourced from Australia and overseas. Imperfect substitutability between imported and domestic varieties of each commodity are modelled using the CES assumption of Armington. The export demand for any given Australian commodity is assumed to be inversely related to its foreign-currency export price. The model recognises both the consumption of commodities by government, and a variety of direct and indirect taxation instruments. In general, markets are assumed to clear and to be competitive. Purchasers' prices differ from producer prices by the value of indirect taxes and margin services. Dynamic equations describe stock-flow relationships, such as those between capital and investment, and debt and savings. The model contains many relationships that facilitate the use of extraneous data from official statistical publications and forecasting organisations during simulations designed to either track history or forecast the future. The model is solved with the GEMPACK economic modelling software (Harrison and Pearson, 1996).

2.2 Generating the MONASH basecase

We model the skilled migration program as an additional shock against a detailed explicit basecase forecast of prospects for the Australian economy over the period 2005 – 2025. We report annual results for selected variables in Section 3 as deviations

in the their values away from their basecase forecast values. We provide an overview of our basecase forecasting methodology in the remainder of Section 2.2.

2.2.1 The historical simulation

Generation of the basecase forecast begins with the MONASH model of the Australian economy parameterised on a database relating to the 1996/97 economy (box 1 of Diagram 1). This database forms the starting point for the historical simulation (procedure A in Diagram 1). Details of the historical simulation methodology can be found in Dixon and Rimmer (2002). Broadly, the historical simulation serves two purposes. Firstly, it updates the MONASH database, in this case from 1996/97 to 2001/02 (box 3), using highly disaggregated ABS data as input (box 2). Secondly, it uncovers recent trends in technologies and tastes (box 4). In the forecasting simulations, these trends are extrapolated into the future. The historical trends in taste and technology changes are uncovered in the historical simulation by forcing MONASH to track the detail of industry and commodity outcomes over a period of recent history, as observed from ABS data. This allows the model to calculate the movements in sectoral variables describing features of the economy's structure – such as industry production technologies and household tastes – variables that would be otherwise unobservable. A detailed discussion of the 1996/97 – 2001/02 historical simulation is provided in Giesecke (2004).

2.2.2 Updating the database to a recent year

The historical simulation is difficult and time consuming, and the necessary detailed data is updated infrequently by the ABS. Hence the updated database provided by the historical simulation (box 3) will never be current. In the second step (procedure B in Diagram 1) the database produced by the historical simulation (box 3) is rescaled to the most recent year possible, using a MONASH model version of Horridge's ADJUSTER program (Horridge 2004). This procedure produces a MONASH database for 2003/04 (box 6). This database reflects the latest ABS national accounts macroeconomic and sectoral data.

2.2.3 MONASH forecast simulation

Details of the MONASH forecasting methodology are discussed in Dixon and Rimmer (2002). Broadly, the MONASH forecast simulation relies on inputs from

both the historical simulation and from agencies that specialise in different areas of the Australian economy. The historical simulation generates insights into trends in tastes and technologies at a highly disaggregated level (approximately 100 sectors). In generating plausible forecasts for individual industries, such detail matters. Hence the output of the historical simulation is used to form judgements about the forecast values for industry/commodity taste and technology variables in the basecase forecast simulation (box 4). We also use independent forecasts for macroeconomic variables and sectoral variables relating to primary producers. In particular, we impose the following exogenous forecasts on the model:

1. Macroeconomic forecasts from Access Economics Pty Ltd. (box 10);
2. Forecasts of foreign tourism numbers from the Federal Government's Tourism Forecasting Council (box 9);
3. Forecasts for the quantities and prices of agricultural and mineral exports from the Australian Bureau of Agricultural and Resource Economics (box 7); and
4. Forecasts for changes in tariff rates from the Productivity Commission (box 11).

These four sets of extraneous forecasts, in addition to assumptions about changes in industry production technologies and household tastes, are fed into the model as exogenous shocks over the period 2004/05 to 2024/25 (procedure C). In imposing the fours sets of extraneous forecasts on the model as exogenous shocks, many variables that would normally be exogenous in a standard policy closure must instead be endogenous. For example, for MONASH to accommodate Access Economics' forecast for real consumption spending, the average propensity to consume must initially be determined endogenously. However structural variables such as the average propensity to consume must be exogenous in a policy simulation. Hence we undertake a second forecast simulation (the base rerun) in which all structural variables are returned to their exogenous status and shocked with their base forecast values. The base rerun reproduces the forecast. It also provides the standard model closure (in which policy and structural variables are exogenous) necessary for the evaluation of the effects of imposing additional policy shocks.

2.3 Amendments to MONASH for the present simulation

The standard version of MONASH distinguishes labour by occupation. Industries face limited substitution possibilities between labour of different occupational types. This limited ability to substitute between labour is implemented by assuming that industries employ a CES composite of labour of differing occupational types. For many implementations of MONASH, the occupational dimension of the model exerts no influence on the results: labour is assumed to be free to move between different occupations, meaning that wages by occupation move together. That is, the occupation dimension of the model is effectively turned off. This is not the case in the present simulations. In the simulations undertaken for this report, labour supply by occupation is determined by skill supply. This requires changes in occupation-specific wages to equate demand and supply of occupation-specific labour.

The supply of labour to each occupation is equal to the sum of labour supplied to that occupation by the holders of each type of skill. This is described by Diagram 2. Labour supply to skills 1 – *m* is determined exogenously. Holders of each skill face limited abilities to transform their skill to the supply of labour of particular occupational types. This limited ability is governed by CRETH functions. Holders of each skill are assumed to maximise their income from supplying labour to different occupations subject to these skill-specific CRETH transformation functions. Total labour supply to any one of the occupations 1 – *n* is the sum of labour supply to that occupation by holders of skills 1 – *m*. A formal description of these additions to the MONASH theory is provided in Appendix 1.

2.4 A back of the envelope representation of the MONASH model

Table 1 presents a version of Dixon and Rimmer's (2002) sketch model of MONASH. This model is used to describe the migration simulation results in Section 3.

Equation (1) describes the GDP (Y) identity in constant price terms. Equation (2) describes an economy-wide constant returns to scale production function, relating Y to inputs of labour and capital (L and K respectively). A describes technical change. Equation (3) links total real consumption (C+G) to real (consumption price deflated) GNP via a given propensity to consume out of GNP (APC). GNP is equal to GDP multiplied by a positive function of the terms of trade (TOT) less interest payments on net foreign liabilities (NFL * R, where NFL is real net foreign liabilities and R is the

interest rate). Equation (4) defines Γ, the ratio of private (C) to public (G) consumption spending. Equation (5) summarises the determination of import volumes (M). Import volumes are positively related to GDP (Y) and the ratio of domestic to imported prices (represented here by TOT). Commodity exports in MONASH are inversely related to their foreign currency prices via constant elasticity demand functions. This is summarised by equation (6), which relates the terms of trade to the volume of exports (X) and the positions of foreign demand schedules (V). Like MONASH the BOTE model assumes constant returns to scale. Hence marginal product functions are homogeneous of degree 0 and so can be expressed as functions of K / L and A. This accounts for equations (7) and (8). Equation (7) relates the profit maximising capital / labour ratio to the post tax rate of return on capital (ROR), the real (consumption price deflated) price of investment relative to the price of consumption (PI), technological change (A) and the terms of trade (TOT). Similarly, equation (8) relates the movement in the real consumer wage (W) to changes in the capital / labour ratio, technology, and the terms of trade. Equation (9) governs investment determination in the short-run, describing a positive relationship between investment (I) and rates of return (ROR). Equation (10) defines the investment / capital ratio (Ψ).

The BOTE model can now be used to describe the main features of the MONASH model as it operates in the immigration policy simulations in the short-run and long-run. In the short run L, K, A, Λ, Γ, APC, NFL, PI, V and R are determined exogenously[1]. Most equations can be readily associated with the determination of a specific endogenous variable. Hence, under the short-run closure, with L, K and A exogenous, equation (2) determines Y. With Y thus determined, and Γ, APC, NFL and R exogenous, C and G are determined by equations (4) and (5). Leaving the possibility of movements in TOT aside for one moment, with K, L, PI and A exogenous, equation (7) determines ROR. This determines I via equation (9). With Y fixed by equation (2), M is determined by equation (5). With movements in Y, C, G, I

[1] For simplicity, BOTE contains no equations describing the determination of PI and NFL. Hence they are treated as exogenous in BOTE. However they are endogenous in MONASH. The MONASH value for NFL at any point in time is related to the accumulated value of previous period's current account deficits. The value of PI is determined by relative demand / supply prospects in markets for goods and services used intensively in consumption and investment.

and M given by equations (2), (3), (4), (9) and (5), equation (1) determines X. Finally, TOT is determined by equation (6).

In the long-run, rates of return (ROR) are exogenous and K is endogenous. Equation (9) no longer operates to determine I. Rather, the shift variable Λ is endogenous (thus effectively removing (9) from the model) and Ψ is exogenous. The operation of the model is the same as that outlined for the short-run in all respects other than that equation (7) now determines K, and equation (10) now determines (I).

In terms of the BOTE model, the skilled migration simulation can be represented as an increase in effective employment, L. We do not shock A (to reflect any changes in the productivity of primary factors caused by the implementation of the skilled migration policy) or V (to capture the possibility that skilled migrants might identify hitherto unknown foreign markets for new Australian products).

2.5 Disaggregation in MONASH

Unlike the BOTE model discussed in Section 2.4, MONASH is highly disaggregated. The version employed in this project features 106 industries and commodities, 64 skills, 81 occupations and 56 regions. Relative to using a more aggregated model, this disaggregation adds to the complexity of the modelling task. However, for modelling a policy change such as a program of skilled migration, the use of a highly disaggregated model is important both to the correct modelling of the shocks, and to ensuring that the model provides useful insights into the likely effects of the policy. In particular:

- the size of any "skill effect" arising from the program is calculated endogenously within the model during both the basecase and policy case, rather than imposed exogenously by the model user;
- in a disaggregated model the interdependence of skill supply and skill demand is explicitly modelled, hence, an increase in the supply of specific skill types (by differing amounts) will not have the same impact as an (otherwise equivalent) uniform increase in the economy-wide supply of effective labour;
- the model produces results for deviations in occupation and skill-specific wages;

- disaggregation allows insights into which agents are likely to gain from the policy, and which agents are likely to lose.

We discuss these features of our disaggregated modelling of the skilled migration policy in more detail below.

Disaggregation of the supply of labour by skill within MONASH allows for the year-on-year endogenous evaluation of any contribution to real GDP arising from the program of skilled migration stimulating wagebill weighted employment more than hours weighted employment. In particular, this "skill effect" is the difference between the (wagebill) weighted sum of the percentage changes in employment by skill type and the (hours) weighted sum of the percentage changes in employment by skill type. In an aggregated model, one option for evaluating the size of the skill effect is to use base year wage and hours weights. However this approach risks over- or under-estimating the size of the skill effect in years that are distant from the initial year of the simulation. Firstly, a risk of over-estimation arises because the policy is one of increasing employment of skilled labour. This reduces the wage premia of skilled workers, thus reducing differences between hourly wage rates throughout the policy case. However the policy also affects the demand for labour. For example, the demand for skilled labour might rise in the policy case, leading to an under-estimate of the skill effect if base year wage rates are used instead of the skill-specific wage rates prevailing in each of the years in which skill supply is augmented by the immigration of skilled labour. Indeed, in our simulations (see Section 3.9) we find the opposite effect at work: migration stimulates investment, which is relatively intensive in the use of unskilled labour. This causes a small positive deviation in the wages of unskilled workers. We calculated the extent of overestimation of the year 2025 skill effect that would arise from using basecase wage rates via the formula:

$$\text{Diff} = \sum_{s \in \text{skill}} \frac{H_s^{(P)}}{H_{\text{Tot}}^{(P)}} \left[\frac{W_s^{(B)}}{W_{\text{Ave}}^{(B)}} - \frac{W_s^{(P)}}{W_{\text{Ave}}^{(P)}} \right] \times l_s^{(Dev)}$$

where

Diff is the percentage-point overestimation of the year 2025 deviation in wagebill weighted hours that arises from the use of basecase wage rates;

$H_s^{(P)}$ is the level of hours supplied by skill type (s) in year 2025 of the policy case;

$H_{Tot}^{(P)}$ is the total level of hours supplied in year 2025 of the policy case;

$W_s^{(B)}$ is the wage rate of skill type (s) in year 2025 of the basecase;

$W_{Ave}^{(B)}$ is the average basecase wage in year 2025;

$W_s^{(P)}$ is the wage rate of skill type (s) in the policy case in 2025;

$W_{Ave}^{(P)}$ is the average policy case wage in year 2025; and

$l_s^{(Dev)}$ is the percentage deviation in employment of skill type (s) in year 2025.

The year 2025 value for Diff is +0.09. This compares with the year 2025 "skill effect" of 0.28 percentage points (being the difference between the year 2025 deviation in wagebill weighted hours of 4.87 per cent and the year 2025 deviation in total hours of 4.59).

In introducing heterogeneous labour, distinguished by skill type, we place some limit on the economy's ability to shift labour resources between alternative uses. Hence the model explicitly captures any implications of the skilled migration policy for supply / demand balances of labour distinguished by skill. Shifts in skill and occupation specific supply and demand balances will influence both sectoral results and macroeconomic outcomes. For example, as we discuss in Sections 3.9 and 3.3, immigration causes a strong positive deviation in investment, and with it, activity in the construction sector. This in turn causes construction costs to rise, via a rise in the wage rates of construction workers. Not only does this constrain the size of the positive deviation in construction output, but it has implications for macroeconomic outcomes. The policy also stimulates supplies of workers with skills used intensively in medical occupations. As we discuss in Sections 3.9 and 3.10, this contributes to a strong positive deviation in output of the *Health services* sector.

Disaggregation facilitates the identification of winners and losers from the policy. While not a primary focus of our brief, our results nevertheless provide insights into the question of who gains and who losers from the policy. Calculation of the impact

of the program on incumbents (see Section 3.8) requires as input information about the skill supply of incumbents in the base and policy cases. For the model to provide insights into the relative income prospects of incumbents with different skills it is necessary that those skills be identified in the model. It also requires detailed industrial disaggregation. For example, we find the largest negative wage deviations are likely to be felt by incumbents holding skills used intensively in medical and teaching occupations. This is due in part to the policy promoting skill supply by immigrants into these occupations, and in part to the nature of the industries that employ these skills intensively. In particular, government demands for education and health services are price inelastic. While government demands for these services rise in line with the expansion in real consumption spending in general, this expansion is not sufficient to absorb the additional skills supplied to occupations used intensively in these industries without a relatively large negative deviation in their wage rates (See Section 3.9).

3 RESULTS

3.1 The policy shocks

Three sets of shocks (in addition to those implementing the basecase forecast) are administered to the model. Firstly, the policy increases labour supply differentiated by skill type. This accounts for the positive and growing deviation in employment (hours) in Chart 1. The increase in labour supply is weighted towards skilled labour. Hence the deviation in wagebill-weighted labour supply exceeds the deviation in total hours. On its own, the increase in labour supply exerts long-run pressure for an increase in capital supply of approximately the same magnitude. This is apparent from BOTE equation (7): in the absence of movements in the terms of trade and the relative cost of capital[2], with ROR and A exogenous in the long-run, an *n*% increase in L will cause an *n*% increase in K. The short-run mechanism that delivers this long-run result is higher investment. Recall from the discussion in Section 2.4 that in the short-run K is sticky and ROR is endogenous. Hence in the short-run, equation (7) translates rises in L into increases in ROR. Via (9), this causes I to rise. The rise in I will, over time, gradually translate into a higher capital stock. The speed at which this occurs depends on investor expectations. At one extreme, investors might behave extremely cautiously, attaching a very high likelihood to a current or future government abandoning the policy. Under this scenario, investors would tend to react only to each year's higher immigration, without taking account of the prospect of higher future immigration. Under this assumption, the capital supply response to higher immigration is incremental and gradual. Since investors are reacting cautiously, taking account of only each year's higher labour supply, the economy will not reach its long-run equilibrium (in terms of the BOTE model, ROR returned to basecase) by 2025, leaving the deviation in rates of return on capital above basecase by the end of the simulation period. At the other extreme, investors might react instantaneously to the announcement of ongoing higher immigration, and supply capital at a rate that allows for little or no transitory deviation in rates of return. The immigration scenario provided to CoPS by the PC implies a rise in the annual average rate of growth in (wagebill weighted) labour supply over 2005 – 2025 of approximately 0.2 per cent per

[2] As we discuss in Sections 3.3 and 3.5, TOT declines and PI rises, causing a long-run increase in the labour / capital ratio. Also, in a disaggregated model, BOTE equation (7) can hold at the industry level

annum relative to basecase. Ceteris paribus, in the long-run, this requires the rate of growth of the capital stock to be approximately 0.2 per cent per annum higher. If all investors: believe that the immigration policy is permanent; that the (wagebill weighted) immigration policy targets will be met in each year; and that the reaction (via participation, skill acquisition and propensity to emigrate) of effective labour supply by incumbents can be fully anticipated, then more of the adjustment to capital supply will occur early in the simulation period. We do not believe that either extreme of potential investor behaviour outlined above is a plausible description of likely behaviour. For our simulation we adopt a position midway between these alternatives. This is described in Diagram 3 and discussed below.

Diagram 3 describes the MONASH theory linking changes in the rate of growth in industry *j*'s capital stock ($\dot{K}$) to changes in industry *j*'s rate of return (ROR). The theory underlying Diagram 3 is described in detail in Dixon and Rimmer (2002). Broadly, growth rates in industry capital stocks (and hence, investment by industry) are positively related to expected rates of return. Realised capital growth rates are constrained to fall within a certain range ($\dot{K}_{MIN}$ and $\dot{K}_{MAX}$ in Diagram 3). The initial (pre policy) capital supply function (AA) passes through point C, at which capital growth is equal to trend capital growth ($\hat{K}_0$) and the rate of return is equal to the normal rate of return (ROR_{Norm}). As described in Dixon and Rimmer, the position of AA is defined by database values for $\dot{K}_{MIN}$, $\dot{K}_{MAX}$, $\hat{K}_0$, ROR_{Norm} and a parameter defining the slope of AA in the vicinity of point C. In the immigration simulation, we assume that investors gradually adjust upwards their expectation of the long-run trend growth rate in labour supply. As discussed above, over the period 2005 – 2025, the rate of growth in the labour force increases by approximately 0.2 per cent relative to basecase. In our MONASH policy simulation, investors adjust upwards the trend rate of growth in capital for each industry. We assume that investors take time to become aware of the details of the policy and to become convinced that the policy is permanent. As such, we phase-in the shifts in trend capital growth rates. Diagram 4 plots the accumulated change in the level of the trend rate of capital growth in each year of the simulation. As Diagram 4 makes clear, we assume that trend capital

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but not the national level. For example, a policy that stimulates long-run activity in labour-intensive

growth rates rise by 0.2 percentage points by 2013. In terms of Diagram 3, this is equivalent to shifting the capital supply function from AA to BB.

The third set of policy shocks relates to the net assets of the skilled migrants at the time they enter the country. The Productivity Commission supplied us with the LSIA2 estimate of net assets per immigrant in 2001 ($A 25,400). However, since the first year of our simulation is 2005, we require a value for net assets per skilled immigrant for 2005. Between 2001 and 2005, nominal growth in world GDP was approximately 20 per cent. We assumed that the foreign currency value of net assets per skilled immigrant would increase by the same amount. However, over the same period, the TWI exchange rate appreciated by approximately 20 per cent. On this basis we assume an initial 2005 value for net assets per skilled immigrant of $A 25,000. We assume that this grows by 3.5 per cent per annum throughout the simulation period. Multiplying by the number of new arrivals in each period, we calculate the shock to net foreign assets each period reflecting the net asset position of the new arrivals.

3.2 Employment rises, generating positive deviations in investment and capital

The level of immigration is above basecase throughout the simulation period. Hence the employment (hours) deviation is positive and increasing (Chart 1). The policy encourages the immigration of workers with post graduate degrees, bachelor degrees and advanced diplomas relative to workers with C34, graduate diploma, and no post school qualifications (Chart 15). On average, the former group of workers receive higher wage rates than the latter group, hence the deviation in wagebill weighted employment exceeds the deviation in total hours (Chart 1). In the initial years of the simulation period, capital stocks are slow to adjust. This contributes to a positive deviation in the labour / capital ratio (Chart 2). Via BOTE equation (7), with the labour / capital ratio rising, so too must the rate of return on capital. An indicator of the economy-wide average rate of return is the ratio of the average capital rental rate to the investment price deflator. This ratio is described as “rate of return index” in Charts 2 and 5. Consistent with the anticipated outcome from equation 7, the deviation in the rate of return index is positive, peaking in 2009. Thereafter, ongoing growth in capital supply causes the deviation in the rate of return index to decline. Via

sectors can cause the economy-wide labour / capital ratio to rise.

BOTE equation (9), the positive deviation in the rate of return induces a positive deviation in investment (Chart 3). In part (see section 3.3 below) this accounts for shape of the deviation path for the labour / capital ratio. At first, the deviation in the labour / capital ratio rises. However it rises at a decreasing rate as investment, and hence capital supply, respond to the positive deviation in rates of return. The deviation in the labour / capital ratio peaks in 2012. Thereafter, the growth in the capital deviation is slightly faster than the growth in the employment deviation, causing the deviation in the labour / capital ratio to fall. However it is clear from Chart 2 that, despite the rise in capital supply, the labour / capital ratio is permanently higher by approximately 0.6 per cent. The simulation causes the price of capital to rise relative to the price of consumption (PI in the BOTE model, and "relative price of investment" in Chart 2). As discussed in Section 3.3, this is caused by two features of the model: firstly, labour supply can only imperfectly transform itself towards occupations used intensively in investment activities, and secondly, the immigration policy promotes the supply of occupations used intensively in price-inelastic public consumption spending. Via BOTE equation 7, the rising positive deviation in the long run relative price of investment, in addition to the long run negative deviation in the terms of trade (see 3.5 below) causes a positive deviation in the long run labour / capital ratio. The negative deviation in the terms of trade, and the positive deviation in the labour / capital ratio, cause a negative deviation in the real consumer wage (Chart 2).

3.3 The cost of capital increases and labour-intensive sectors expand, causing the long-run L/K ratio to rise

In the short-run, via BOTE equation 7, the increase in employment lifts the labour capital ratio, and with it, the rate of return on capital (see section 3.2 above). In the long-run, via BOTE equations (9) and (7) capital accumulation reduces the rate of return deviation, damping the labour / capital deviation. However in Chart 2 it is clear that part of the rise in the labour / capital ratio is permanent. The persistence of the positive deviation in the labour / capital ratio is due to two broad sets of factors. These relate to features of a disaggregated model such as MONASH that are not present in the simple single sector model represented by BOTE. Firstly, sectoral labour / capital ratios are determined by the real producer price of capital. As we discuss below, the skilled migration simulation permanently increases the real producer price of capital

relative to basecase, even as long-run rates of return return towards basecase. Secondly, the economy-wide labour / capital ratio depends on compositional effects. In particular, the skilled migration policy generates sectoral output deviations that are positively correlated with sectoral labour / capital ratios. We discuss each point in turn below.

The percentage change in the labour / capital ratio of any non-agricultural industry in the model can be described by:

$$(12) \quad (x_L^j - x_K^j) = [\sigma / S_L^j]\left(p_K^j - p_{VA}^j \right)$$

where σ is the elasticity of substitution between labour and capital, S_L^j is the share of payments to labour in industry j's primary factor costs, and x_L^j, x_K^j, p_K^j and p_{VA}^j are industry-specific percentage change variables describing, respectively, employment, capital usage, the rental price of capital, and the average price of primary factors. The term (x_L^j - x_K^j) is the percentage change in industry j's labour / capital ratio, and the term (p_K^j - p_{VA}^j) can be interpreted as the real producer price of capital in industry j. Generalising to the economy-wide level by ignoring compositional effects, equation (12) suggests that an understanding of the movements in the ratio of the economy wide average capital rental rate (P_K) to the economy-wide average price of primary factors (P_{VA}) is a necessary part to understanding the movement in the economy-wide labour / capital ratio. To this end, it is useful to expand the economy-wide rental / value added price ratio (P_K / P_{VA}) according to the following identity:

$$(13) \quad \frac{P_K}{P_{VA}} = \frac{P_K}{P_2}\frac{P_2}{P_{GNE}}\frac{P_{GNE}}{P_{GNE}^*}\frac{P_M^{S_M}}{P_X^{S_X}}\frac{P_{GDP}}{P_{VA}}$$

where

P_2 is the investment deflator

P_{GNE} is the GNE deflator

P^*_{GNE} is a price index of the components of GNE calculated using GDP weights[3].

P_M is the import deflator

P_X is the export deflator

P_{GDP} is the GDP deflator

S_M is the import share in GDP

S_X is the export share in GDP

Chart 3 uses equation (13) to decompose movements in the economy-wide average real producer price of capital (P_K / P_{VA}) into the individual percentage point contributions of movements in:

- an index of the economy-wide average rate of return (P_K / P_2);
- an index of the real price of investment (P_2 / P_{GNE}) ;
- a residual term equal to the ratio of the prices of the components of GNE weighted with GNE and GDP weights respectively (P_{GNE} / P^*_{GNE})
- an index of movements in the terms of trade ($P_M^{S_M} / P_X^{S_X}$)
- the ratio of the GDP at market prices deflator to the GDP at factor cost deflator (P_{GDP} / P_{VA}), labelled "indirect tax" in Chart 3.

The deviation in the real producer price of capital rises steadily in the first nine years of the simulation period, and then stays permanently above basecase by between 1.2 and 1.3 per cent thereafter. Initially, the positive deviation in the real producer price of capital is due to the positive deviation in the rate of return index. The contribution of the deviation in the rate of return index (P_K / P_2) to the deviation in the real producer price of capital (P_K / P_{VA}) peaks in the first year of the simulation period at 87.4 per cent. Its share then declines steadily throughout the simulation period. In 2025 the deviation in the ratio P_K / P_2 accounts for 1.8 per cent of the deviation in P_K / P_{VA}. Much of the remainder (39 per cent) is explained by the negative deviation in the terms of trade (see section 3.5 below) and the rise in the relative price of

[3] With the balance of trade approximately balanced, the GNE and GDP weights on C, I and G will be very similar, hence values for the two GNE price indices will be very similar, and their ratio close to 1.

investment (59 per cent). As discussed in section 2.3 and appendix 1, labour in this model is heterogeneous, being distinguished by skill types that each face a constrained ability to transfer the application of their skills across different occupations. At the same time, firms face limited substitution possibilities between labour of differing occupational types. The strong increase in investment demand (see section 3.4 below) increases demand for occupations used intensively in investment (see Section 3.9 below). This causes relatively strong positive deviations in the wages of construction-related occupations, which, in turn, causes the investment price index to rise (rows 23 and 25 of table 2).

Together equations (12) and (13) show that much of the positive deviation in the labour / capital ratio (chart 2) is attributable to the decline in the terms of trade and the rise in the real cost of capital. However an important additional contributor to the rise in the labour capital ratio is the correlation of industry deviations in output growth with industry labour / capital ratios. To evaluate the size of this effect, we begin with equation (14), which measures the percentage change in the aggregate labour / capital ratio of non-agricultural industries:

(14) $\psi = \sum_j SH_j^L \; x_j^L \; - \; \sum_j SH_j^K \; x_j^K$

where ψ is the percentage change in the average labour / capital ratio of non-agricultural sectors, x_j^L and x_j^K are the percentage changes in labour and capital usage in non agricultural industry j, and SH_j^L and SH_j^K are the shares of industry j in the total of non-agricultural industry wagebills and capital rentals respectively. The percentage change expressions for the cost minimising labour and capital demand equations of non-agricultural industry j are:

(15) $x_j^L = x_j + \sigma \frac{S_j^K}{S_j^L}(p_K^j - p_{VA}^j)$

(16) $x_j^K = x_j - \sigma(p_K^j - p_{VA}^j)$

where x_j is the percentage change in industry j's output, σ is the elasticity of substitution between labour and capital, S_j^K is the share of capital rentals in industry j's factor payments, and S_j^L is the share of wages in industry j's factor payments. Substituting (15) and (16) into (14) provides:

$$(17) \quad \psi = \sum_j [SH_j^L - SH_j^K]\, x_j^L + \sum_j \sigma [SH_j^L (S_j^K / S_j^L) + SH_j^K]\, (p_K^j - p_{VA}^j)$$

Using (17), chart 4 shows the contributions of the share effect ($\sum_j [SH_j^L - SH_j^K]\, x_j^L$) and the real producer price of capital effect ($\sum_j \sigma [SH_j^L (S_j^K / S_j^L) + SH_j^K]\, (p_K^j - p_{VA}^j)$) to the deviation in the economy-wide non-agricultural labour / capital ratio. Chart 4 makes clear that the share effect (that is, relatively strong positive deviations in activity of industries in which $SH_j^L > SH_j^K$) contributes to the positive deviation in the labour / capital ratio throughout the simulation period.

3.4 Real GDP rises, but not by as much as real GNE

With rising positive deviations in labour and capital, via BOTE equation (2) it is clear that the deviation in real GDP must also be positive and growing throughout the simulation period (Chart 1). Leaving aside for the moment the effects of changes in the terms of trade and changes in foreign financing requirements, via BOTE equation (3), with real GDP higher so too must be real consumption spending. This accounts for why the deviation in real consumption spending is very close to the deviation in real GDP (Chart 7). Initially, the deviation in real consumption spending is slightly above the deviation in real GDP. This is due to the initial small positive deviation in the terms of trade (see Chart 6 and Section 3.5 below). However two factors eventually damp the real consumption deviation relative to the real GDP deviation. Firstly, the deviation in the terms of trade is negative from 2011. Secondly, the strong positive deviation in investment – and attendant negative deviation in the balance of trade (see 3.5 below) – causes net foreign liabilities to rise (Chart 7). Via BOTE equation (3) declining terms of trade and rising net foreign liabilities reduce the extent of the real consumption deviation relative to the real GDP deviation. This accounts for why the deviation in real consumption is less than the deviation in real GDP from

2014 onwards (Chart 7). Nevertheless, the deviation in real GNE is greater than the deviation in real GDP throughout the simulation period (Chart 7). This is due to the strong positive deviation in real investment spending (see 3.2 above). The rate of growth in the investment deviation is strongest in the first decade of the simulation period, as investors adjust upwards the trend rate of capital growth. Accordingly, the gap between the real GNE and real GDP deviations widens rapidly during this period, and with it, the balance of trade deficit. This causes the real exchange rate to appreciate, and export volumes to contract, relative to basecase.

3.5 The balance of trade moves towards deficit, the terms of trade decline

Since the deviation in real GNE exceeds the deviation in real GDP (Chart 7), the balance of trade must move towards deficit (Chart 6). In the first decade of the simulation period, the strong growth in the investment deviation causes a negative deviation in the volume of exports. This accounts for the small positive deviation in the terms of trade over this period. Via BOTE equation (5), the deviation in import volumes tracks the deviation in real GDP (Chart 6). However the deviation path for import volumes is above the deviation in real GDP because investment (the deviation in which is greater than the deviation in real GDP – see Chart 7) is relatively import intensive. This accounts for the why the rate of growth in the import deviation is fastest in the first half of the simulation period. As already discussed, since the deviation in real GNE is greater than the deviation in real GDP, BOTE equation 1 requires a negative deviation in net exports. Initially, this is achieved through both a rise in import volumes and a contraction in export volumes, relative to basecase (Chart 6). Over time, since the deviation in import volumes continues to grow, the deviation in export volumes must eventually become positive. This accounts for the negative deviation in the terms of trade from 2015 (Chart 6).

3.6 With the labour / capital ratio higher, and the terms of trade lower, the real wage falls

BOTE equation (8) links the real wage to changes in the capital / labour ratio, changes in primary factor technical change, and changes in the terms of trade. The labour / capital ratio is above basecase throughout the simulation period (Chart 2). There is a small positive deviation in the terms of trade for the first ten years of the simulation period, but the terms of trade deviation is negative and growing thereafter (Chart 6)

reflecting the ongoing growth in the size of the economy caused by the increase in labour supply. The rise in the labour / capital ratio and the decline in the terms of trade relative to basecase account for the negative deviation in the real wage (Chart 2).

3.7 Average real GNP per capita rises

Chart 8 plots the percentage deviation in real (consumption price deflated) GNP per capita. It also plots the percentage deviations in the factors that contribute to the deviation in real GNP per capita. Chart 9 translates the information in Chart 8 into dollar (2005) deviations. We caution against the use of real GNP per capita as an indicator of the policy's effect on economic welfare. The measure subtracts from the policy scenario value of average per capita GNP (an average of the incomes of both the basecase population and the new arrivals) the basecase scenario value of average per capita GNP (the income of the basecase population only), thus comparing the average incomes of two different populations. Section 3.8 discusses a more appropriate measure of the welfare effects of the policy, namely, the deviation in incumbent real income. Nevertheless, an examination of the determinants of the change in average GNP per capita (plotted in Charts 8 and 9) provides insights into the likely effects of the policy on incumbent incomes, since the individual determinants of the deviation in average GNP per capita affect the incomes of incumbents and new arrivals differently. The determinants of real GNP per capita plotted in Charts 8 and 9 are defined according to the following decomposition equation:

$$(11)\ \frac{GNP}{POP} = f\left(\frac{P_I}{P_C}\right) g\left(\frac{P_X}{P_M}\right)\left(\frac{GDP_R}{EH}\right)\left(\frac{EH}{H}\right)\left(\frac{H}{L}\right)\left(\frac{L}{L_S}\right)\left(\frac{L_S}{POP_{WA}}\right)\left(\frac{POP_{WA}}{POP}\right) - \left(\frac{NFL \times R}{POP}\right)$$

where

GNP is real (consumption price deflated) GNP;

POP is the population ;

P_I is the investment price deflator;

P_C is the consumption price deflator;

P_X is the export price deflator;

P_M is the import price deflator;

GDP_R is real GDP;

EH is employment measured in efficiency units;

H is employment measured in hours;

L is employment measured in persons;

L_S is labour supply in persons;

POP_{WA} is the population of working age;

NFL is real (consumption price deflated) net foreign liabilities;

R is the rate of interest on net foreign liabilities;

and where *f* and *g* are positive functions of the relative price of investment and the terms of trade respectively.

Chart 8 plots the movements in the RHS terms of equation (11), distinguishing movements in the relative price of investment term, $f(P_I/P_C)$, the terms of trade term, $f(P_X/P_M)$, labour productivity (GDP_R/EH), the skill effect (EH/H), hours worked per worker (H/L), the employment rate (L/L_S), the participation rate (L_S/POP_{WA}), and the working age effect (POP_{WA}/POP). Chart 9 plots the dollar contributions of each of these terms to the total deviation in real GNP per capita. The deviations in these determinants of real GNP per capita provide pointers to the likely impact of the policy on incumbents: assuming the wages earned by new arrivals are in accordance with their contribution to the labour market, they can be expected to capture most of the gains from positive deviations in the skill effect, hours worked per worker, the employment rate, the participation rate, and the working age effect. Movements in the terms of trade and labour productivity will affect the incomes of incumbents, relative to basecase.

For the first four years of the policy there is a small positive deviation (averaging $25.1 per capita) in real (consumption price deflated) GNP. Over this period, factors acting to reduce real GNP relative to basecase (declining labour productivity, a rise in the unemployment rate, and a fall in the working age share) are slightly more than offset by factors acting to increase real GNP relative to basecase (a positive deviation in the terms of trade, a fall in the relative price of consumption, a positive skill effect,

a positive deviation in hours worked per worker, and a positive deviation in the participation rate). After 2008 the deviation in average real GNP per capita rises steadily. It is clear from Chart 8 that the positive deviation in real GNP per capita is the net result of a number of countervailing effects. Inputs provided by the Productivity Commission to the Centre of Policy Studies suggest that the new arrivals will have a higher participation rate, higher working hours per worker, and (from 2018) a lower unemployment rate, than the incumbent population. These characteristics act to increase real GNP per capita relative to basecase. However the declining terms of trade, the rise in the labour / capital ratio, and rising foreign interest payments act to reduce real GNP per capita. In the first four years of the simulation period, the negative and positive influences on real GNP per capita are approximately matched. From 2009 onwards, real GNP per capita rises steadily. It is clear from Chart 9 that much of the positive deviation in real GNP per capita is driven by the positive deviation in the participation rate[4].

3.8 In the short to medium run, incumbent wage losses and capital gains are approximately matched, but in the long run incumbent real income falls

The investigation of the impact of the skilled migration policy on incumbent welfare was not a primary focus of this study. However, on the basis of some assumptions about incumbent capital ownership and savings behaviour, we can use MONASH results for wages and rental rates to calculate an estimate of the deviation in incumbent income. The deviation in this estimate is driven primarily by changes in factor market conditions, that is, we do not take account of such things as net fiscal transfers, or the costs of administering the skilled migration policy. Our results suggest that the policy will have a negligible impact on per capita incumbent real income in the short to medium run, and a small (but growing) negative impact on incumbent real per capita income in the long run. We conjecture that these small impacts on average income are likely to obscure important distributional effects. These distributional effects may be quite large, and hence are worthy of further research. We conclude section 3.8 by speculating on the possible signs and magnitudes of some potential distributional effects.

[4] Of the total value of the contributions to real GNP made by factors acting only to *increase* real GNP per capita, the participation rate accounts for 24 per cent of the total in 2005 and 54% of the total in 2025.

We track the average real per capita income of the incumbent population in the policy and basecase by tracking movements in five components of aggregate gross income: wages, capital rents, land rents, indirect tax revenue, and net foreign interest payments. In the basecase, the entire population is the incumbent population. In the policy case, the basecase population is the incumbent population. We assume that the supply of agricultural land is unaffected by the policy and that the basecase population (and hence the incumbent population in the policy case) owns all agricultural land. Hence the deviation in incumbent agricultural land rental income is driven by deviations in agricultural land rental rates only. In the basecase, all wage income accrues to incumbents. In calculating incumbent wage income in the policy case, we assume that the policy shock has no adverse effects on the number of hours of incumbent employment by skill type. Hence the deviation in incumbent per capita wage income is determined by the deviation in wage rates by skill type. This approach may lead to a slight overstatement of incumbent wage income in the policy case, since the policy may cause a small positive deviation in incumbent unemployment rates in the short-run, reduce incumbent participation rates relative to basecase in the long-run, and reduce incumbent acquisition of post graduate, graduate diploma, bachelor and advanced diploma qualifications relative to basecase. We assume that 28 per cent of the pre-tax capital income deviation arising from deviations in the capital rental rate on the basecase capital stock accrues to foreigners, but that the domestic incumbent population taxes this at the rate of 30 per cent. In the policy case, we keep track of year-on-year changes in the share of the capital stock owned by the incumbent population by relating it to the savings of the incumbent population in each year. In the policy case, we assume that incumbents' share in net foreign interest payments (net of income on the foreign assets of the skilled migrants) is the same as incumbents' share in the capital stock. In the policy case, incumbents receive a per-capita share of indirect tax revenue.

Chart 10 plots the deviation in real ($2005) average per capita incumbent income. It also plots the deviations in the components of per capita incumbent income: wages, net capital rentals (comprising the sum of capital and land rentals less net foreign interest payments) and the incumbent's share of changes in real indirect tax revenues. As discussed in Section 3.6, the deviation in the real wage is negative and growing

throughout the simulation period. Hence so too is the deviation in real per capita wage income (Chart 10). However the deviation in the rate of return is positive, and, for the first five years of the simulation, growing. The deviation in per capita rental income begins to peak slightly later than the peak in the rate of return deviation, for two reasons. Firstly, the deviation in land rents grows throughout the simulation. Secondly, the deviation in net incumbent income is positive for the first sixteen years of the simulation period. This allows an initial positive deviation in net incumbent savings, which, in turn, adds to incumbent capital accumulation in the policy case relative to the basecase. However from 2015 onwards the decline in the deviation in the rate of return on capital exerts a larger negative impact on the net capital rental deviation than does the growing land rental deviation. Finally, the policy stimulates imports relative to real GDP (section 3.5). This stimulates indirect tax revenue. We assume that in the policy case incumbents receive a share of indirect tax revenue in proportion to their share in the policy-case population.

For the first sixteen years of the policy (2005-2020) the gain in incumbent capital and indirect tax income exceeds the loss of wage income by an average of $61 per annum (Chart 10). However the negative deviation in real wages grows throughout the simulation, while ongoing growth in capital supply damps the positive deviation in capital rental rates. From 2021 the loss in wage income dominates the net income calculation, leading to a growing negative deviation in incumbent real per capita income. The year 2025 deviation in incumbent real per capita income is -$77. At a 5 per cent discount rate, the net present value of the deviation in real per capita incumbent income over the period 2005-2025 is +$596 per capita. It should be noted that the sign of the net present value of the income deviation is likely to be sensitive to the choice of time horizon. Since the positive deviation in rates of return is transient, but the negative deviation in real wages grows, an extension of the simulation period by perhaps around 10 years might be sufficient to generate a zero or negative value for the deviation in the net present value of incumbent real income.

The deviation in average incumbent per capita income obscures potentially large distributional effects. Broadly, incumbent workers lose from the policy, while incumbent capital owners gain. At a 5 per cent discount rate, the net present value of per capita incumbent wage income losses over the period 2005 – 2025 is $1,775. The

net present value of per capita incumbent capital income gains is $1,953 per capita. In addition, there are likely to be large within-group variations in income deviations. The negative wage deviations are highest for workers with post graduate, graduate diploma, bachelor and advanced diploma qualifications. Incumbent workers with C34, C12 or no post school qualifications experience small positive deviations in real wages (Chart 16). Owners of capital in the sectors experiencing the largest output gains will, in general, experience the largest gains in capital income. Furthermore, the distribution of capital income in Australia is quite concentrated. The capital owned by the wealthiest 10 per cent of the Australian population represents approximately 45 per cent of all household net wealth (Heady, Marks and Wooden, 2004). Income distribution is not explicitly modelled in the version of MONASH employed for this project. However it would be reasonable to conjecture that a likely distribution of the gain in (pre tax) aggregate incumbent capital income would follow the Heady, Marks and Wooden data: that is, in line with their capital ownership share, approximately 45 per cent would be received by the wealthiest 10 per cent of the population. If so, this would represent a gain in the net present value of per capita capital income for members of these households of $8,788, implying a per-capita capital income gain for the remaining 90 per cent of households of $1,193. The distribution of net gains and losses from the policy are also likely to be quite unevenly distributed across the population ranked in terms of age. Heady, Marks and Wooden note that household net wealth, associated as it is with past savings behaviour, peaks in the pre-retirement years of 55-64 and declines thereafter. Hence it possible that incumbents in this age group stand to gain the most from the policy. With few years left in the labour force, the net present value of wage income losses is likely to be relatively low. At the same time, with high capital ownership, they stand to gain from rises in rental rates. The reverse would likely be true for young incumbents: they begin with modest stakes in the domestic capital stock (and thus receive relatively little direct benefit from the rise in rental rates) while facing many years of participation in the workforce (thus suffering a comparatively larger decline in the net present value of future wage income).

3.9 Wage rates

As discussed in Section 2.3, each industry in MONASH faces CES substitution possibilities between labour of different occupational types. Furthermore, each

industry in MONASH faces downward sloping demand schedules for its output. These two features of MONASH suggest that an increase in immigration of skilled labour should cause relatively larger negative deviations in the wages of occupations that are intensive in the use of skilled labour. This is because an increase in the supply of skilled labour must be matched by an increase in the demand for skilled labour. This can occur either through substitution on the part of all industries towards occupations that are intensive in the use of skilled labour, or through expansion in the activity of industries that employ occupations that are intensive in the use of skilled labour. Ceteris paribus, both routes are facilitated by a reduction in the relative wages of skill-intensive occupations. Chart 11 provides a preliminary test of this simple intuition. The results underpinning Chart 11 are reproduced in Table 3. Along the x axis of Chart 11 are ranked occupations in terms of the deviation in an index of occupational labour supply, x_o^*. The index x_o^* measures the percentage change in the supply of occupation type *o* implied by changes in skill supply alone. That is, the index x_o^* is defined as:

$$(18) \quad x_o^* = \sum_s (H_{o,s}/H_o)\, x_s$$

On the y axis of Chart 11 is plotted both the actual wage deviation for each occupation in 2025, and the predicted wage deviation from the regression of the actual wage deviation on the labour supply index deviation. Both the scatter diagram and the simple regression support our preliminary intuition: the deviation in the wage for any given occupation tends to be inversely related to the deviation in the supply of that occupation. The regression equation (wage(o) = 10.77 – 2.46 * x(o)) explains about 85 per cent of the variation in the 2025 wage deviations. As discussed below, prospects for some of the outlying occupations (such as plumbers, structural construction tradespeople, final finishes construction tradespersons, mining construction and related labourers, wood tradespersons, electrical tradespersons, fabricated engineering tradespersons, miscellaneous health professionals, nursing professionals, medical practitioners, enrolled nurses, miscellaneous educational professionals, welfare and associated professionals, carers and aides, and school teachers) are determined by features of the MONASH model that are not captured by the naïve regression equation.

$$(19)\quad p_o = \left[\frac{1}{\sigma^{Occ} + \phi}\right]\left[\sum_j \left(\frac{\mathrm{H_{o,j}}}{\mathrm{H_o}}\right) z_j - \sum_s \left(\frac{\mathrm{H_{o,s}}}{\mathrm{H_o}}\right) x_s - \left[\sigma^{\mathrm{Prim}} S^K - \sigma^{Occ} - \phi\right] p^L\right]$$

Appendix 2 uses the theory of MONASH to derive equation 19, a back-of-the-envelope estimate of the relationship between occupational wage rates and changes in labour supply by skill type, industry activity levels, and the economy-wide average wage. From equation 19 it is clear that an increase in the supply of those skill types that supply heavily to occupation type *o* will depress the wage of occupation type *o* relative to the average wage rate. Similarly, an increase in the activity levels of industries that are intensive in the use of labour of occupation type *o* will cause the wage of occupation *o* to rise relative to the average wage rate. Chart 12 plots the 2025 occupational wage deviations against the predicted occupational wage deviations from equation 19. The data underlying Chart 12 are reproduced in Table 4. It is clear from Chart 12 that equation 19 does a good job at anticipating the wage rankings (the BOTE equation explains about 90 per cent of the variation in the 2025 wage deviation). Compared with the results of the naïve regression equation, equation 19 is able to account for some or all of the deviations of earlier outliers such as plumbers, final finishes tradespersons, structural construction tradespeople, mining construction and related labourers, wood tradespersons, electrical tradespersons, fabricated engineering tradespersons. This is because equation 19 takes account of changes in industry activity (z_j). These occupations are used relatively intensively in construction activity, which, as discussed in section 3.10, experiences a relatively large positive output deviation. However occupations used intensively in health and education continue to be outliers in Chart 12, and the new equation underestimates the wage deviations for occupations such as farmers and farm managers, agricultural and horticultural labourers, and intermediate mining workers. This is due to features of MONASH not captured by BOTE equation 19. In particular, while equation 19 allows for the effect of changes in industry activity on occupational wage rates, industry activity is treated as exogenous: that is, the equation does not take account of the fact that industry activity is in part dependent on changes in occupational wage rates. For example, the medical occupations are used predominantly in the industry Health services. Output of this sector is sold in approximately equal proportions to

households and government. In MONASH, government demands for commodities are not modelled as being sensitive to price. Hence larger falls in the wages of medical occupations than those anticipated by BOTE equation 19 are required in order to reduce the price of Health services by an amount sufficient to induce households to increase Health services consumption and thus facilitate the absorption of the increase in the supply of medical occupations. Similarly, BOTE equation 19 overestimates the negative wage deviations for occupations such as farmers and farm managers, agricultural and horticultural labourers, and intermediate mining workers. In part this is due to these occupations being used relatively intensively in export-oriented industries. Since mining and agriculture face relatively price elastic demands, absorption of occupations used intensively in these industries is facilitated by comparatively smaller relative wage reductions. The wage outcomes of occupations used intensively in agriculture are also supported by rising land rentals, which induces substitution towards labour on the part of agricultural industries.

3.10 Sectoral results

Table 5 reports output deviations for 25 broad industry sectors. Charts 13 and 14 report output deviations for the five bottom and top ranked sectors by 2025 output deviation. The strong positive deviation in investment spending in the first years of the simulation causes a positive deviation in the real exchange rate. This causes negative deviations in the output of trade exposed sectors such as Mining and Basic Metal Products for the first eight years of the simulation period. Thereafter, all sectors expand, reflecting the (broadly) uniform expansions in all elements of domestic absorption and (from 2015 onwards) exports. As discussed in section 3.5 above, the requirement that the balance of trade move towards deficit leads to the export deviation lying below the real GDP deviation. This accounts for why Mining, Agriculture and Food processing (sectors 1 - 3 in Table 5) are among the five sectors with the smallest output deviations (Chart 13). The deviation in the output of the Food processing sector is damped by the relatively small deviation in output of wine and spirits, which is highly export-oriented. The strong positive deviation in investment spending causes a positive deviation in the cost of capital (section 3.3 above). This raises long run costs for the capital intensive export sectors such as Mining, Food processing and Basic metal products. It also causes dwelling construction costs, and hence long-run dwellings rentals, to rise relative to the average of consumer prices.

This induces substitution on the part of households away from dwellings services and towards other commodities.

Chart 14 plots output deviations for the five sectors with the largest 2025 output deviation. Construction experiences the biggest output deviation, reflecting the large deviation in aggregate investment relative to the deviation in real GDP (see Chart 7 and section 3.4 above). This also accounts for the strong growth, relative to basecase, in the output of Transport equipment, Fabricated metal products, and Other manufacturing. Activity in these sectors are also buoyed by the increase in aggregate investment, since the industries of which they are comprised either contribute to capital formation directly, or indirectly via intermediate sales to the Construction sector. However Transport equipment's output deviation is relatively low in the first five years of the simulation period. Transport equipment is subject to relatively strong import competition. The rapid rise in the investment deviation in the first five years of the simulation period causes the real exchange rate to appreciate, causing a negative deviation in Transport equipment's domestic market share. Output of Health and welfare rises faster than real consumption spending, placing it within the top five ranked sectors. This is due to this sector being relatively intensive in the use of medical occupations, the supplies of which are stimulated by the policy of skilled immigration. This causes the relative price of health services to fall, inducing substitution on the part of households towards the consumption of more of this commodity.

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Appendix 1: CRETH labour supply

As discussed in Section 2.2, we assume that supplies of labour by skill type are determined exogenously. Persons with particular skill types are assumed to face a limited ability to turn their skill to the supply of labour of particular occupational types. We implement these limited transformation possibilities via skill-specific CRETH transformation functions. The economy-wide supply of a particular type of occupation is calculated as the sum of the supplies of that type of occupation by holders of each skill type. This theory is set out formally below. The equations are expressed in percentage change form. The underlying levels equations and details of the optimising behavioural assumptions on which the CRETH equations are based are set out in Dixon et al (1992).

The percentage change in the supply of occupation type o by skill type s is governed by the following CRETH supply functions:

$$\text{(A1.1)}\quad x_{(o,s)} = x_{(\square,s)} + \theta_{(o,s)}\left(w_{(o,\square)} - \sum_{t\in \mathrm{OCC}} \mathrm{S}^{*}_{(\mathrm{t,s})} w_{(t,s)} \right)$$

where

$x_{(o,s)}$ is the percentage change in the supply of occupation type *o* by skill type *s*;

$x_{(\square,s)}$ is the percentage change in the supply of labour of skill type *s*;

$\theta_{(o,s)}$ CRETH skill transformation elasticity;

$w_{(o,\square)}$ is the percentage change in the wage rate for occupation type *o*;

$\mathrm{S}^{*}_{(\mathrm{t,s})}$ CRETH modified share of earnings from occupation type *t* in total earnings by skill type *s*;

$w_{(t,s)}$ is the percentage change in the wage rate for occupation type *o* supplied by skill *s*;

The percentage change in the average wage received by skill type *s* is the CRETH modified wagebill share weighted sum of the percentage changes in the wage rates received by skill type *s* from supplying labour to each occupation, *o*:

(A1.2) $w_{(\square,s)} = \sum_{t \in OCC} S^{*}_{(t,s)} w_{(t,s)}$

where

$w_{(\square,s)}$ is the percentage change in the average wage received by skill type s.

The percentage change in the total supply of labour of occupation type *o* is the share weighted sum of the percentage changes in the supply of labour of occupation type *o* by each skill type, *s*:

(A1.3) $L_{(o,\square)}\ x_{(o,\square)} = \sum_{s \in SKILL} L_{(o,s)}\ x_{(o,s)}$

where

$x_{(o,\square)}$ is the percentage change in the supply of labour of occupation type *o*;

$L_{(o,\square)}$ is the level of employment in hours of labour of occupation type *o*; and

$L_{(o,s)}$ is the number of hours supplied by skill type *s* to occupation type *o*.

The average wage rate for occupation type o is the wagebill share weighted sum of the percentage changes in the skill-specific occupational wage rates of which it is comprised, as follows:

(A1.4) $W_{(o,\square)}\ w_{(o,\square)} = \sum_{s \in SKILL} W_{(o,s)}\ w_{(o,s)}$

where

$W_{(o,\square)}$ is the economy-wide wagebill for occupation type *o*; and

$W_{(o,s)}$ is the value of total wage payments received by skill type *s* from occupation type *o*.

The wage rate received by skill type s from the supply of labour to occupation type *o* is determined by equation (A1.5).

(A1.5) $w_{(o,s)} - \xi^{(3)} = f^{W}_{(o)}$

where

$\xi^{(3)}$ is the percentage change in the consumer price index; and

$f^{W}_{(o)}$ is an endogenous shift variable determined by the condition that the demand and supply of labour of occupation type o be equal.

Appendix 2: Back-of-the-envelope relationship between labour supply by skill and occupational wage relativities

Equation (19) is the back-of-the-envelope relationship between the wage of occupation type *o* and the supply of skill type *s*. Derivation of equation (19) begins with equations (A2.1) to (A2.6). Equation (A2.1) defines the percentage change in aggregate demand for labour of occupational type *o* as the share weighted sum of the percentage changes in demand for labour type *o* by each industry, *j*. Equation (A2.2) is the cost minimising CES demand for labour of occupation type *o* by industry *j*. Equation (A2.3) is the cost minimising CES demand for labour by industry j. Equation (A2.4) calculates the change in the price of the primary factor composite to industry *j*, on the basis of the simplifying assumption that input prices for other primary factors are unchanged. Equation (A2.5) is the CET transformation function, relating the supply of occupation-specific labour by holders of each skill type to changes in relative occupational wage rates. Equation (A2.5) is expressed on the basis of the simplifying assumption that the measure of the relative occupational wage is computed with respect to the average economy-wide wage (p^L), rather than the average returns to skill type *s* (as in the true CET transformation equation – see equation A1.1 in appendix A). Equation (A2.6) defines the percentage change in aggregate supply of labour of occupational type *o* as the share weighted sum of the percentage changes in supply of labour type *o* by holders of each skill type.

(A2.1) $\mathrm{H_o}\ x_o = \sum_j \mathrm{H_{o,j}}\ x_{o,j}$

(A2.2) $x_{o,j} = x_j^L - \sigma^{Occ}(p_o - p_j^L)$

(A2.3) $x_j^L = z_j - \sigma^{\mathrm{Prim}}(p_j^L - p_j^{\mathrm{Prim}})$

(A2.4) $p_j^{\mathrm{Prim}} = S_j^L p_j^L$

(A2.5) $x_{o,s} = x_s + \phi(p_o - p^L)$

(A2.6) $\mathrm{H_o}\ x_o = \sum_s \mathrm{H_{o,s}}\ x_{o,s}$

Substituting equation (A2.4) into (A2.3) provides:

(A2.7) $x_j^L = z_j - \sigma^{\mathrm{Prim}} S_{\mathrm{j}}^K\, p_j^L$

Substituting (A2.7) into (A2.2) provides:

(A2.8) $x_{o,j} = z_j - \sigma^{\mathrm{Prim}} S_{\mathrm{j}}^K\, p_j^L + \sigma^{Occ} p_j^L - \sigma^{Occ} p_o$

Substituting (A2.8) into (A2.1), and simplifying by replacing $S_{\mathrm{j}}^{\mathrm{K}}$ with S^{K} (the economy wide average share of non-labour inputs in total primary factor inputs) and p_j^L with p^L (the economy wide price of labour), provides our BOTE estimate of economy-wide demand for labour of occupation type *o*:

(A2.8) $x_o = \sum_j \left[\frac{\mathrm{H_{o,j}}}{\mathrm{H_o}} \right] z_j - \left[\sigma^{\mathrm{Prim}} S^K - \sigma^{Occ} \right] p^L - \sigma^{Occ} p_o$

Substituting (A2.5) into (A2.6) provides our BOTE estimate of economy-wide labour supply of occupation type *o*:

(A2.9) $x_o = \sum_s \left[\frac{\mathrm{H_{o,s}}}{\mathrm{H_o}} \right] x_s + \phi[p_o - p^L]$

Equating (A2.8) and (A2.9) and solving for p_o provides equation (A2.10):

(A2.10)

$$p_o = \left[\frac{1}{\sigma^{Occ} + \phi}\right]\left[\sum_j \left(\frac{\mathrm{H_{o,j}}}{\mathrm{H_o}}\right) z_j - \sum_s \left(\frac{\mathrm{H_{o,s}}}{\mathrm{H_o}}\right) x_s - \left[\sigma^{\mathrm{Prim}} S^K - \sigma^{Occ} - \phi\right] p^L\right]$$

which is equation (19) .

Variables of the BOTE wage model:

x_o percentage change in demand for occupation type *o*.

$x_{o,j}$ percentage change in demand for labour of occupation type *o* by industry *j*.

x_j^L demand for labour, undifferentiated by type, by industry *j*.

p_o price of labour of occupation type o.

p_j^L price of labour, undifferentiated by type, faced by industry j.

z_j percentage change in output of industry *j*.

p_j^{Prim} percentage change in price of primary factor inputs to industry *j*.

p^L percentage change in economy-wide price of labour.

$x_{o,s}$ percentage change in supply of hours of occupation type *o* by skill type *s*.

Coefficients of the BOTE wage model:

$\mathrm{H_o}$ total economy-wide employed hours of labour of occupation type *o*;

$\mathrm{H_{o,j}}$ employment (hours) of occupation type *o* by industry *j*.

σ^{Occ} is the elasticity of substitution between labour of different occupation types (equal to 0.35)

σ^{Prim} elasticity of substitution between primary factors (equal to 0.5)

S_j^K share of non-labour inputs in industry *j*'s primary factor costs.

S^K economy-wide share of payments to land and capital in total primary factor costs.

$H_{o,s}$ employed hours of occupation type *o* provided by skill type *s*.

ϕ CET skill / occupation transformation elasticity (equal to 0.2).

Diagram 1 Overview of the methodology used to generate the basecase

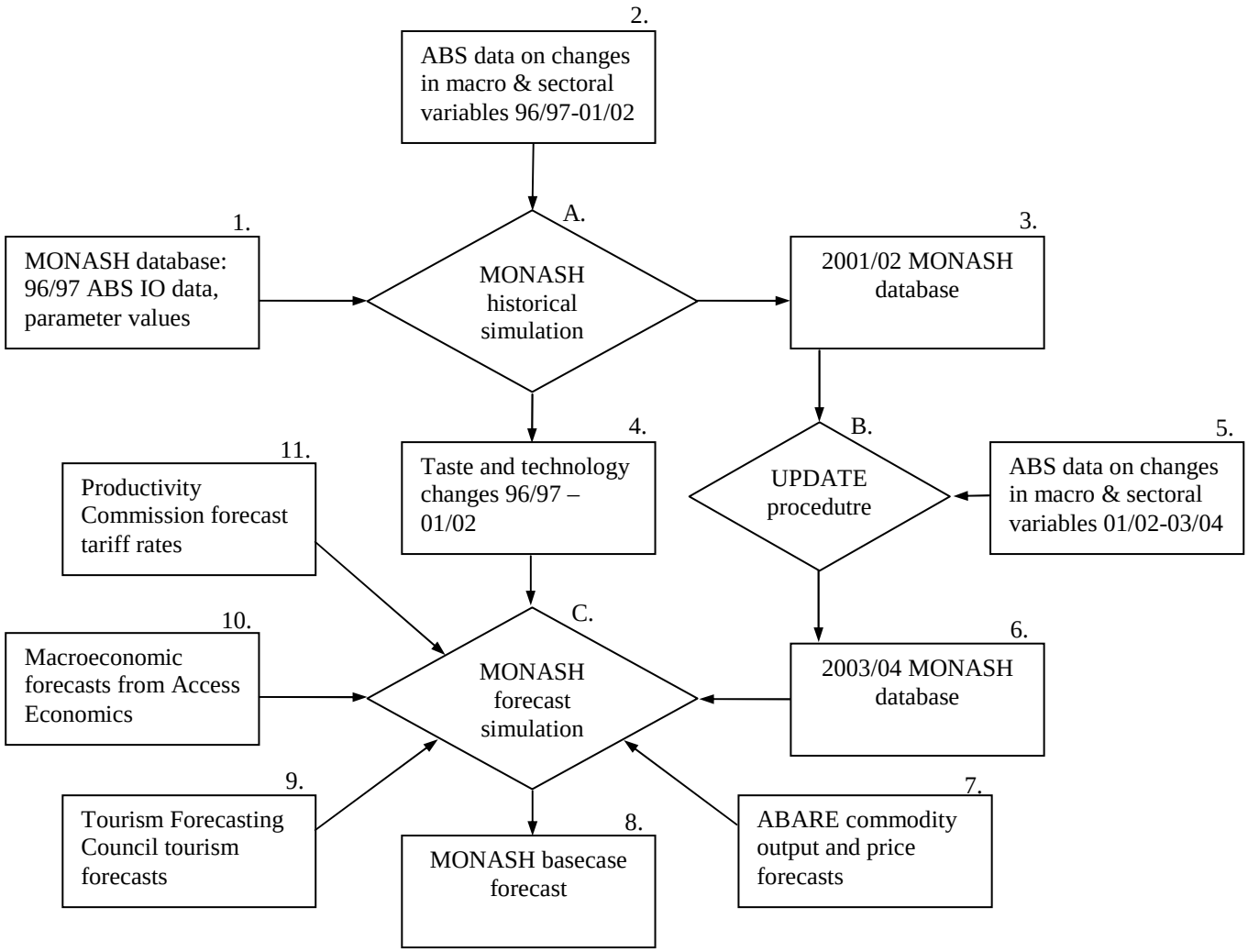

Diagram 2 labour supply by occupation

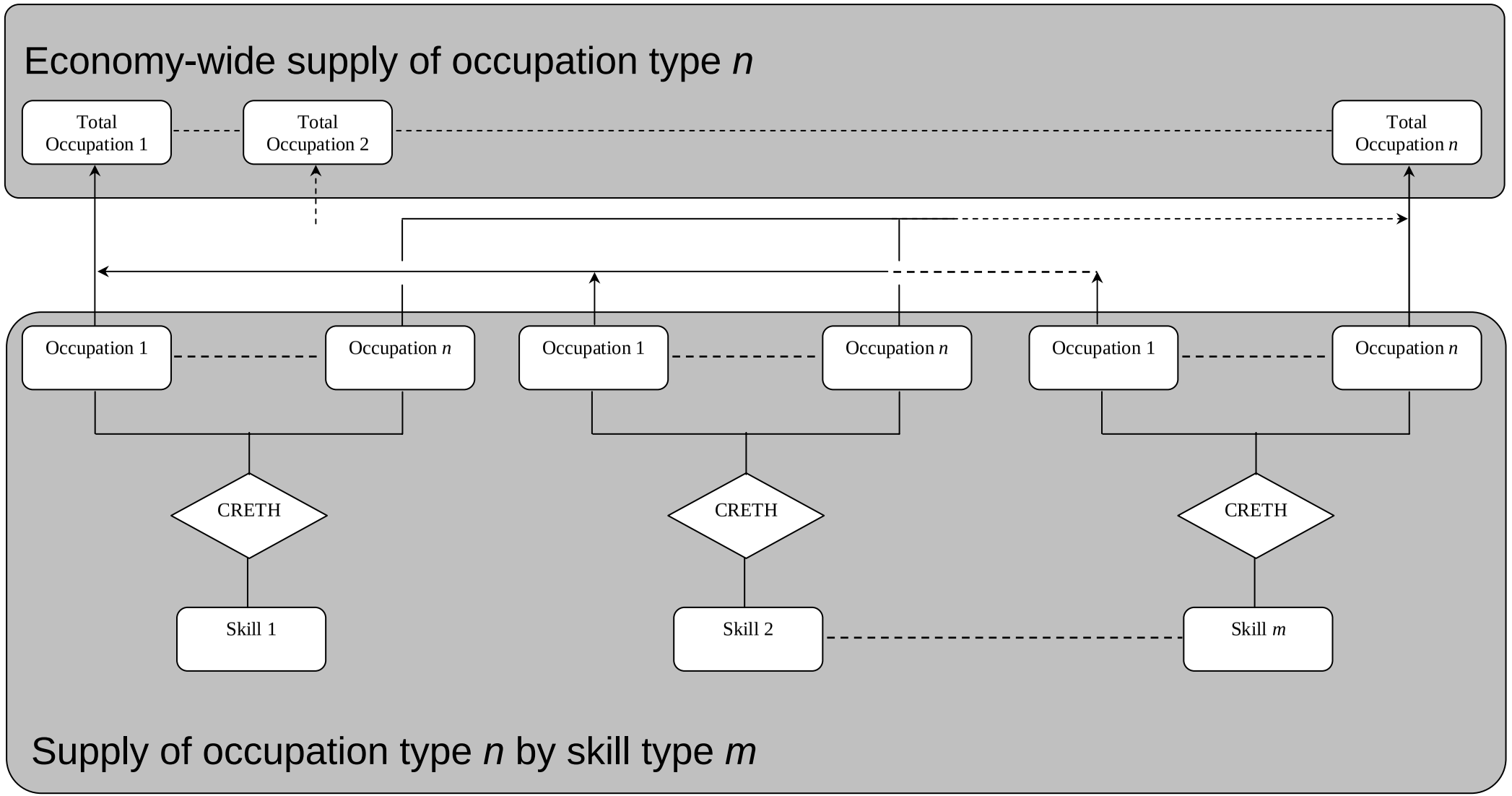

Table 1 Back-of-the-envelope (BOTE) model

(1) $Y=C + I + G + X – M$

(2) $Y = A\ F(K, L)$

(3) $C + G = APC\ [Y \cdot q(TOT) – NFL \cdot R]$

(4) $C / G = \Gamma$

(5) $M = H(Y, TOT)$

(6) $TOT = J(X,V)$

(7) $K / L = N(ROR, PI, A, TOT)$

(8) $W = Z(K / L, A, TOT)$

(9) $I=D(ROR, \Lambda)$

(10) $\Psi = I / K$

Diagram 3 Adjustment to trend rate of capital growth

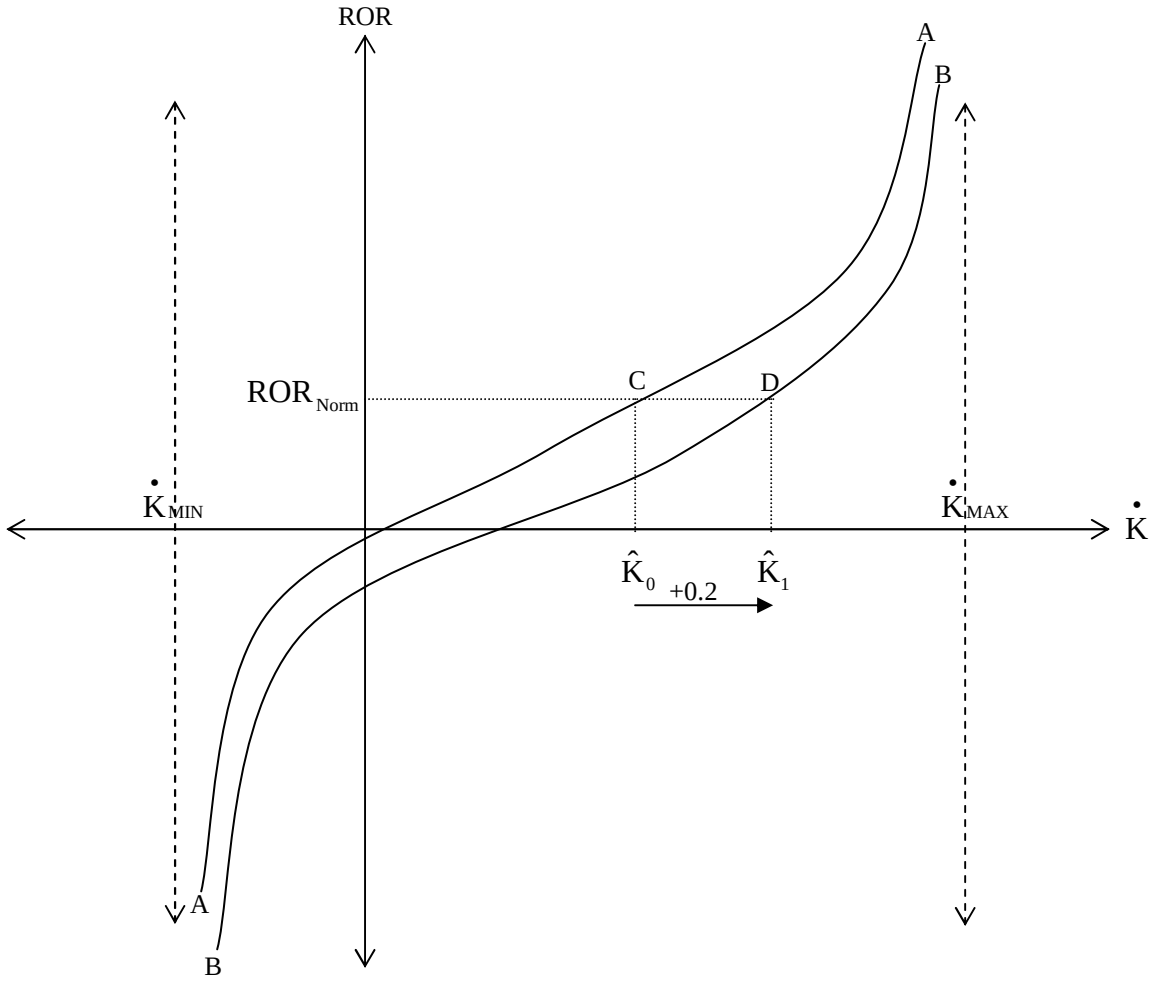

Figure 4: Trend rate of capital growth

change in level relative to basecase

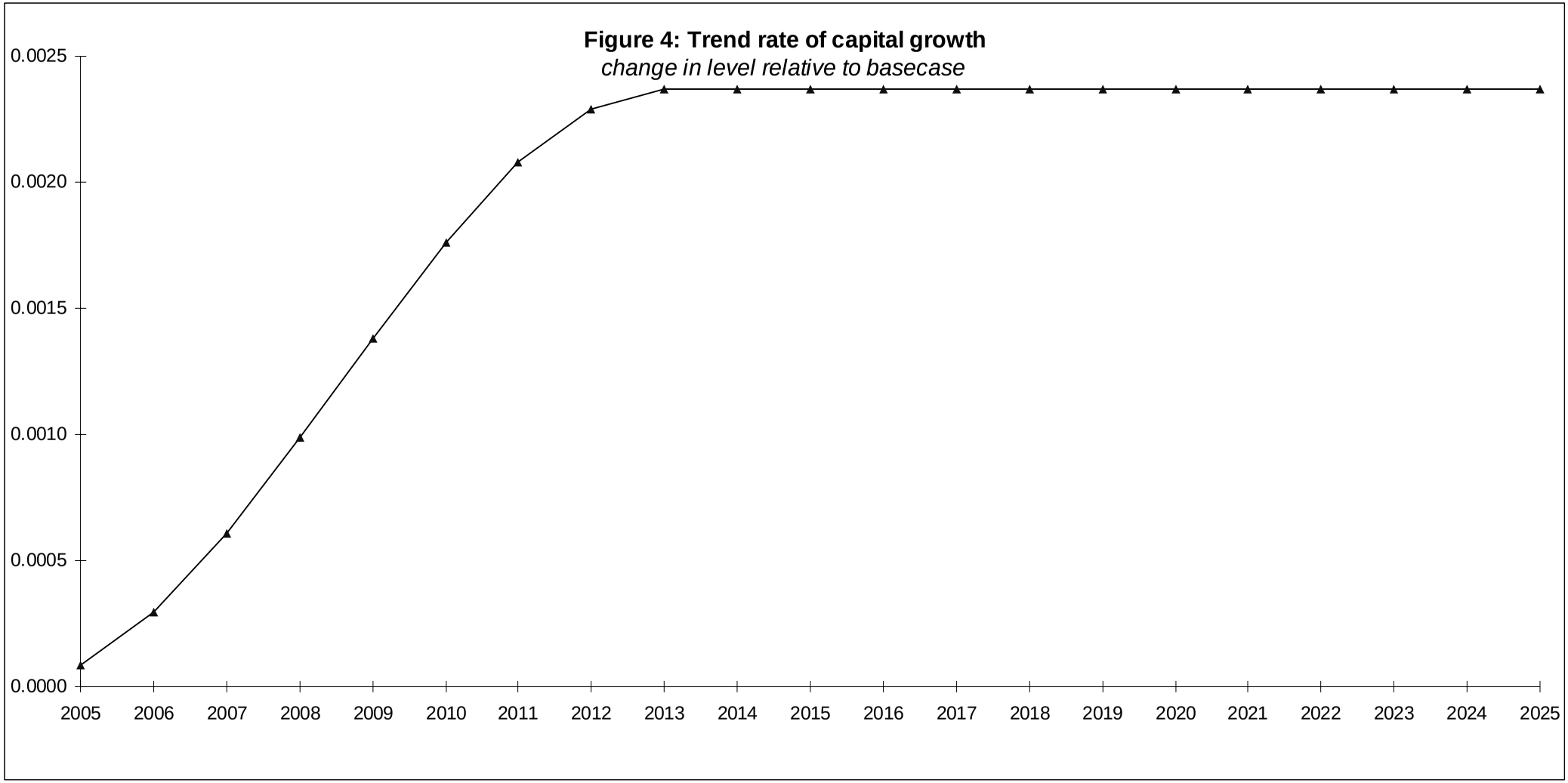

Table 2 Macroeconomic outcomes (percentage deviation from basecase)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1. Real GDP	0.1	0.3	0.4	0.6	0.8	1.0	1.3	1.5	1.7	2.0	2.2	2.4	2.7	2.9	3.2	3.4	3.6	3.9	4.1	4.4	4.6
2. Real (CPI deflated) GNP	0.1	0.3	0.5	0.8	1.0	1.2	1.4	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.5	3.7	3.9	4.1
3. Real GNE	0.1	0.4	0.7	1.0	1.4	1.7	2.0	2.3	2.5	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5	4.7	4.9
4. Real private consumption	0.1	0.3	0.5	0.8	1.0	1.2	1.4	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.5	3.7	3.9	4.1
5. Real investment	0.2	0.7	1.2	1.8	2.5	3.2	3.8	4.3	4.7	5.1	5.4	5.7	6.0	6.3	6.5	6.8	7.0	7.3	7.5	7.7	8.0
6. Real public consumption	0.1	0.3	0.5	0.8	1.0	1.2	1.4	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.5	3.7	3.9	4.1
7. Export volumes	-0.1	-0.3	-0.5	-0.7	-1.0	-1.0	-0.9	-0.9	-0.6	-0.3	0.0	0.4	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.2	3.5
8. Import volumes	0.1	0.5	0.8	1.1	1.5	1.8	2.1	2.4	2.6	2.8	3.0	3.2	3.4	3.5	3.7	3.9	4.1	4.2	4.4	4.6	4.8
9. Employment (hours)	0.1	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.7	3.0	3.2	3.4	3.7	3.9	4.1	4.4	4.6
10. Employment (wage weights)	0.1	0.4	0.6	0.8	1.1	1.3	1.5	1.8	2.0	2.2	2.5	2.7	2.9	3.2	3.4	3.6	3.9	4.1	4.4	4.6	4.9
11. Capital stock	0.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.0	3.2	3.5	3.7	4.0	4.2
12. Labour / capital ratio	0.1	0.3	0.5	0.7	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6
13. Real consumer wage	-0.1	-0.2	-0.3	-0.4	-0.4	-0.5	-0.5	-0.6	-0.6	-0.7	-0.8	-0.9	-1.0	-1.0	-1.1	-1.2	-1.3	-1.4	-1.5	-1.6	-1.7
14. Real exchange rate (a)	0.1	0.3	0.4	0.6	0.9	0.9	0.8	0.8	0.6	0.4	0.2	0.1	-0.1	-0.3	-0.5	-0.7	-0.9	-1.1	-1.2	-1.4	-1.6
15. Nominal exchange rate (b)	0.1	0.3	0.4	0.5	0.8	0.8	0.8	0.8	0.6	0.5	0.4	0.2	0.1	-0.1	-0.2	-0.3	-0.5	-0.6	-0.8	-0.9	-1.0
16. Traditional export volume	-0.1	-0.2	-0.3	-0.5	-0.7	-0.7	-0.8	-0.8	-0.8	-0.7	-0.6	-0.4	-0.3	-0.1	0.1	0.3	0.5	0.8	1.0	1.3	1.5
17. Non-traditional export vol.	-0.1	-0.4	-0.6	-0.8	-1.3	-1.2	-1.0	-0.9	-0.5	-0.1	0.4	0.8	1.3	1.7	2.2	2.6	3.1	3.5	4.0	4.5	4.9
18. Tourism volume	-0.2	-0.6	-1.0	-1.3	-2.0	-2.0	-1.8	-1.8	-1.4	-1.0	-0.5	-0.1	0.3	0.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2
19. GDP deflator	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.3	-0.4	-0.4	-0.5	-0.5	-0.6
20. CPI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21. Government deflator	-0.1	-0.2	-0.4	-0.5	-0.6	-0.7	-0.9	-1.0	-1.2	-1.3	-1.4	-1.6	-1.7	-1.8	-1.9	-2.1	-2.2	-2.3	-2.4	-2.6	-2.7
22. Consumption deflator	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-0.6	-0.6	-0.6
23. Investment deflator	0.0	0.1	0.2	0.2	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
24. Rate of return index	0.2	0.5	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.1
25. Relative price of investment	0.1	0.1	0.2	0.4	0.5	0.6	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1
26. Terms of trade	0.0	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.0	-0.1	-0.2	-0.3	-0.4	-0.4	-0.5	-0.6	-0.7	-0.8	-0.9
27. % pt. ch. in BOT/GDP ratio	0.0	-0.1	-0.2	-0.3	-0.5	-0.6	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
28. 100 x Ch. in NFL/GDP ratio	0.0	-0.1	-0.2	-0.2	0.0	0.4	0.8	1.4	2.0	2.7	3.4	4.1	4.8	5.6	6.4	7.1	8.0	8.8	9.6	10.4	11.3

Table 3 Occupations ranked by deviation in 2025 labour supply index

Occupation	2025 wage deviation	wage regression*	labour supply index
Natural & Physical Science Professionals	-13.9	-16.7	11.2
Building & Engineering Professionals	-10.6	-14.0	10.1
Medical Practitioners	-13.1	-12.1	9.3
University & Vocational Education Teachers	-10.2	-10.0	8.4
Miscellaneous Social Professionals	-8.7	-8.7	7.9
Computing Professionals	-7.6	-8.7	7.9
Miscellaneous Health Professionals	-10.1	-8.6	7.9
Accountants, Auditors & Corporate Treasurers	-6.9	-7.5	7.4
Nursing Professionals	-8.8	-6.3	7.0
Medical & Science Technical Officers	-6.3	-5.8	6.8
Social Welfare Professionals	-6.7	-5.8	6.7
Miscellaneous Professionals	-5.6	-5.5	6.6
General Managers & Administrators	-4.3	-5.1	6.5
Finance Associate Professionals	-4.8	-4.9	6.4
Miscellaneous Specialist Managers	-5.8	-4.8	6.3
Miscellaneous Business & Information Professionals	-4.9	-4.5	6.2
Engineering, Distribution & Process Managers	-3.3	-4.5	6.2
Resource Managers	-4.1	-4.2	6.1
Sales & Marketing Managers	-3.0	-3.8	5.9
Miscellaneous Education Professionals	-5.3	-3.5	5.8
Miscellaneous Health & Welfare Associate Professionals	-5.4	-3.2	5.7
Sales, Marketing & Advertising Professionals	-2.5	-2.8	5.5
Building & Engineering Associate Professionals	-0.6	-1.8	5.1
Misc. Business & Admin. Associate Professionals	-1.7	-1.5	5.0
School Teachers	-4.2	-1.0	4.8
Miscellaneous Managing Supervisors (Sales & Service)	-0.5	-0.1	4.4
Artists & Related Professionals	-0.8	0.1	4.4
Advanced Numerical Clerks	-0.2	0.1	4.3
Miscellaneous Generalist Managers	3.3	0.2	4.3
Miscellaneous Associate Professionals	-1.1	0.4	4.2
General Clerks	-0.6	0.4	4.2
Miscellaneous Intermediate Clerical Workers	-0.9	0.5	4.2
Enrolled Nurses	-3.3	0.5	4.2
Miscellaneous Intermediate Service Workers	-0.5	0.8	4.1
Intermediate Numerical Clerks	0.1	0.8	4.0
Police Officers	-0.7	1.0	4.0
Intermediate Sales & Related Workers	1.3	1.0	4.0
Mechanical Engineering Tradespersons	1.8	1.1	3.9
Shop Managers	0.6	1.1	3.9
Material Recording & Despatch Clerks	1.2	1.2	3.9
Keyboard Operators	0.2	1.3	3.8
Electrical & Electronics Tradespersons	3.1	1.4	3.8
Miscellaneous Advanced Clerical & Service Workers	0.3	1.4	3.8
Miscellaneous Intermediate Machine Operators	3.1	1.5	3.8
Printing Tradespersons	1.7	1.6	3.8
Secretaries & Personal Assistants	0.8	1.6	3.7
Elementary Service Workers	0.8	1.7	3.7
Textile, Clothing & Related Tradespersons	3.4	1.8	3.7
Misc. Intermediate Production & Transport Workers	1.9	1.8	3.6
Miscellaneous Elementary Sales Workers	1.1	1.8	3.6
Hospitality & Accommodation Managers	0.6	1.9	3.6
Miscellaneous Tradespersons & Related Workers	1.9	1.9	3.6

Table 3 (cont) Occupations ranked by deviation in 2025 labour supply index

Occupation	2025 wage deviation	wage regression*	labour supply index
Hospitality Workers	0.8	2.0	3.6
Elementary Clerks	0.7	2.1	3.5
Receptionists	0.5	2.2	3.5
Farmers & Farm Managers	4.0	2.3	3.5
Road & Rail Transport Drivers	2.3	2.3	3.5
Welfare Associate Professionals	-0.1	2.3	3.4
Process Workers	3.1	2.3	3.4
Cleaners	1.4	2.4	3.4
Fabrication Engineering Tradespersons	4.5	2.4	3.4
Intermediate Stationary Plant Operators	3.1	2.5	3.4
Automotive Tradespersons	2.3	2.5	3.4
Intermed. Textile, Cloth'g & Related Machine Operators	2.9	2.5	3.4
Sales Assistants	1.7	2.7	3.3
Wood Tradespersons	6.5	2.7	3.3
Product Packagers	2.0	2.7	3.3
Hairdressers	1.8	2.8	3.2
Mining, Construction & Related Labourers	6.1	2.8	3.2
Other Miscellaneous Labourers & Related Workers	3.0	2.9	3.2
Mobile Plant Operators	3.9	3.1	3.1
Food Tradespersons	1.6	3.1	3.1
Elementary Food Preparation & Related Workers	1.4	3.1	3.1
Agricultural & Horticultural Labourers	3.9	3.2	3.1
Intermediate Mining & Construction Workers	3.9	3.3	3.1
Carers & Aides	0.3	3.3	3.0
Horticultural Tradespersons	3.8	3.7	2.9
Skilled Agricultural Workers	3.2	4.0	2.7
Structural Construction Tradespersons	10.0	4.1	2.7
Plumbers	9.7	4.3	2.6
Final Finish Construction Tradespersons	8.9	4.4	2.6

** wage(o) = 10.77 - 2.46 * x(o)*

Table 4 2025 Occupational wage deviations: actual v BOTE

Occupation	2025 wage deviation	BOTE equation 13
Natural & Physical Science Professionals	-13.9	-11.3
Building & Engineering Professionals	-10.6	-9.1
Medical Practitioners	-13.1	-7.7
University & Vocational Education Teachers	-10.2	-7.4
Miscellaneous Social Professionals	-8.7	-6.5
Computing Professionals	-7.6	-5.7
Miscellaneous Health Professionals	-10.1	-5.7
Accountants, Auditors & Corporate Treasurers	-6.9	-5.7
Miscellaneous Professionals	-5.6	-4.9
Social Welfare Professionals	-6.7	-4.8
Medical & Science Technical Officers	-6.3	-4.2
Miscellaneous Specialist Managers	-5.8	-4.1
Finance Associate Professionals	-4.8	-4.1
General Managers & Administrators	-4.3	-4.0
Nursing Professionals	-8.8	-3.9
Miscellaneous Business & Information Professionals	-4.9	-3.9
Resource Managers	-4.1	-3.6
Engineering, Distribution & Process Managers	-3.3	-3.5
Miscellaneous Education Professionals	-5.3	-3.2
Sales & Marketing Managers	-3.0	-3.2
Sales, Marketing & Advertising Professionals	-2.5	-2.3
Farmers & Farm Managers	4.0	-2.2
Miscellaneous Health & Welfare Associate Professionals	-5.4	-1.9
Misc. Business & Admin. Associate Professionals	-1.7	-1.5
School Teachers	-4.2	-1.4
Building & Engineering Associate Professionals	-0.6	-1.2
Miscellaneous Managing Supervisors (Sales & Service)	-0.5	-1.0
Miscellaneous Associate Professionals	-1.1	-1.0
Shop Managers	0.6	-0.9
Miscellaneous Intermediate Clerical Workers	-0.9	-0.7
General Clerks	-0.6	-0.5
Hospitality Workers	0.8	-0.5
Police Officers	-0.7	-0.5
Hospitality & Accommodation Managers	0.6	-0.4
Artists & Related Professionals	-0.8	-0.4
Advanced Numerical Clerks	-0.2	-0.4
Miscellaneous Intermediate Service Workers	-0.5	-0.3
Agricultural & Horticultural Labourers	3.9	-0.2
Intermediate Numerical Clerks	0.1	-0.1
Miscellaneous Elementary Sales Workers	1.1	-0.1
Intermediate Sales & Related Workers	1.3	0.0
Mechanical Engineering Tradespersons	1.8	0.1
Material Recording & Despatch Clerks	1.2	0.1
Sales Assistants	1.7	0.2
Food Tradespersons	1.6	0.2
Product Packagers	2.0	0.2
Hairdressers	1.8	0.2
Elementary Service Workers	0.8	0.3
Keyboard Operators	0.2	0.3
Automotive Tradespersons	2.3	0.3
Misc. Intermediate Production & Transport Workers	1.9	0.4
Miscellaneous Advanced Clerical & Service Workers	0.3	0.4

Table 4 (cont) 2025 Occupational wage deviations: actual v BOTE

Occupation	2025 wage deviation	BOTE equation 13
Printing Tradespersons	1.7	0.4
Elementary Clerks	0.7	0.5
Road & Rail Transport Drivers	2.3	0.5
Welfare Associate Professionals	-0.1	0.6
Miscellaneous Tradespersons & Related Workers	1.9	0.6
Enrolled Nurses	-3.3	0.7
Secretaries & Personal Assistants	0.8	0.8
Intermediate Mining & Construction Workers	3.9	0.8
Intermediate Stationary Plant Operators	3.1	0.8
Cleaners	1.4	0.9
Elementary Food Preparation & Related Workers	1.4	0.9
Intermed. Textile, Cloth'g & Related Machine Operators	2.9	0.9
Process Workers	3.1	1.0
Textile, Clothing & Related Tradespersons	3.4	1.1
Skilled Agricultural Workers	3.2	1.1
Miscellaneous Generalist Managers	3.3	1.1
Miscellaneous Intermediate Machine Operators	3.1	1.2
Electrical & Electronics Tradespersons	3.1	1.2
Receptionists	0.5	1.3
Other Miscellaneous Labourers & Related Workers	3.0	1.5
Mobile Plant Operators	3.9	1.8
Carers & Aides	0.3	1.9
Fabrication Engineering Tradespersons	4.5	2.0
Horticultural Tradespersons	3.8	2.3
Wood Tradespersons	6.5	3.2
Mining, Construction & Related Labourers	6.1	3.5
Final Finish Construction Tradespersons	8.9	5.6
Plumbers	9.7	5.9
Structural Construction Tradespersons	10.0	6.2

Table 5 Sectoral output deviations (percentage deviation from basecase)

Sectoral output	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1. Agric., forestry & fishing	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.7	1.9	2.1	2.3	2.5	2.6
2. Mining	0.0	-0.1	-0.1	-0.2	-0.3	-0.3	-0.2	-0.2	0.0	0.1	0.3	0.5	0.8	1.0	1.3	1.6	1.9	2.2	2.5	2.8	3.2
3. Food processing	0.0	0.1	0.1	0.2	0.2	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0
4. Textiles, clothing, footwear	0.0	0.1	0.2	0.2	0.2	0.3	0.5	0.7	1.0	1.3	1.5	1.8	2.1	2.4	2.7	3.0	3.2	3.5	3.8	4.1	4.4
5. Paper, printing	0.1	0.2	0.4	0.6	0.7	0.9	1.2	1.4	1.6	1.9	2.2	2.4	2.7	2.9	3.2	3.4	3.7	3.9	4.2	4.4	4.7
6. Chemical, petroleum, coal	0.0	0.1	0.2	0.3	0.2	0.4	0.6	0.8	1.1	1.4	1.7	2.0	2.3	2.7	3.0	3.3	3.6	3.9	4.2	4.6	4.9
7. Basic metal products	0.0	-0.1	-0.2	-0.2	-0.4	-0.3	-0.2	-0.1	0.1	0.4	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.8	3.1	3.4	3.7
8. Transport equipment	0.0	0.1	0.1	0.2	0.1	0.3	0.5	0.7	1.1	1.5	1.9	2.3	2.8	3.2	3.7	4.1	4.5	5.0	5.4	5.8	6.3
9. Fabricated metal products	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.7	2.0	2.3	2.6	2.9	3.2	3.5	3.9	4.2	4.4	4.7	5.0	5.3	5.6
10. Other manufacturing	0.1	0.2	0.4	0.7	0.8	1.1	1.4	1.7	2.0	2.4	2.7	3.1	3.4	3.8	4.1	4.4	4.8	5.1	5.4	5.7	6.0
11. Electricity, gas, water	0.1	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.9	2.1	2.3	2.6	2.8	3.0	3.2	3.4	3.7	3.9	4.1	4.3
12. Construction	0.1	0.5	0.9	1.4	1.9	2.5	3.1	3.6	4.1	4.5	4.9	5.3	5.6	6.0	6.3	6.6	6.8	7.1	7.3	7.6	7.8
13. Wholesale trade	0.1	0.3	0.6	0.8	1.1	1.4	1.7	1.9	2.2	2.5	2.7	2.9	3.2	3.4	3.7	3.9	4.2	4.4	4.7	4.9	5.2
14. Retail trade, repairs	0.1	0.3	0.6	0.8	1.1	1.3	1.4	1.7	1.9	2.0	2.2	2.4	2.6	2.7	2.9	3.1	3.3	3.4	3.6	3.8	4.0
15. Transport, stor., communic.	0.1	0.2	0.4	0.6	0.7	0.9	1.2	1.4	1.6	1.9	2.1	2.4	2.6	2.8	3.0	3.3	3.5	3.7	4.0	4.2	4.4
16. Finance, insurance	0.1	0.3	0.5	0.7	0.9	1.2	1.4	1.7	1.9	2.2	2.4	2.7	2.9	3.1	3.4	3.6	3.8	4.1	4.3	4.5	4.8
17. Other business services	0.1	0.4	0.6	0.9	1.2	1.5	1.7	2.0	2.3	2.5	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5.0	5.3
18. Education	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.2	1.5	1.7	2.0	2.3	2.5	2.8	3.1	3.3	3.6	3.9	4.2	4.4	4.7
19. Health, welfare	0.1	0.4	0.6	0.9	1.2	1.4	1.7	2.0	2.2	2.5	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5.1	5.3
20. Entertainment	0.1	0.3	0.5	0.7	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.7	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6
21. Personal services	0.1	0.3	0.6	0.8	1.0	1.2	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.8	4.0	4.2	4.4
22. Restaurants, hotels	0.1	0.3	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0
23. Ownership of dwellings	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.2	1.4	1.7	1.9	2.2	2.4	2.7	3.0	3.2	3.5
24. Public administration	0.1	0.3	0.5	0.7	1.0	1.2	1.4	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	3.9	4.1
25. Defence	0.1	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.5	3.7	3.9	4.1

Chart 1: Employment, capital stock and real GDP

percentage deviation from basecase

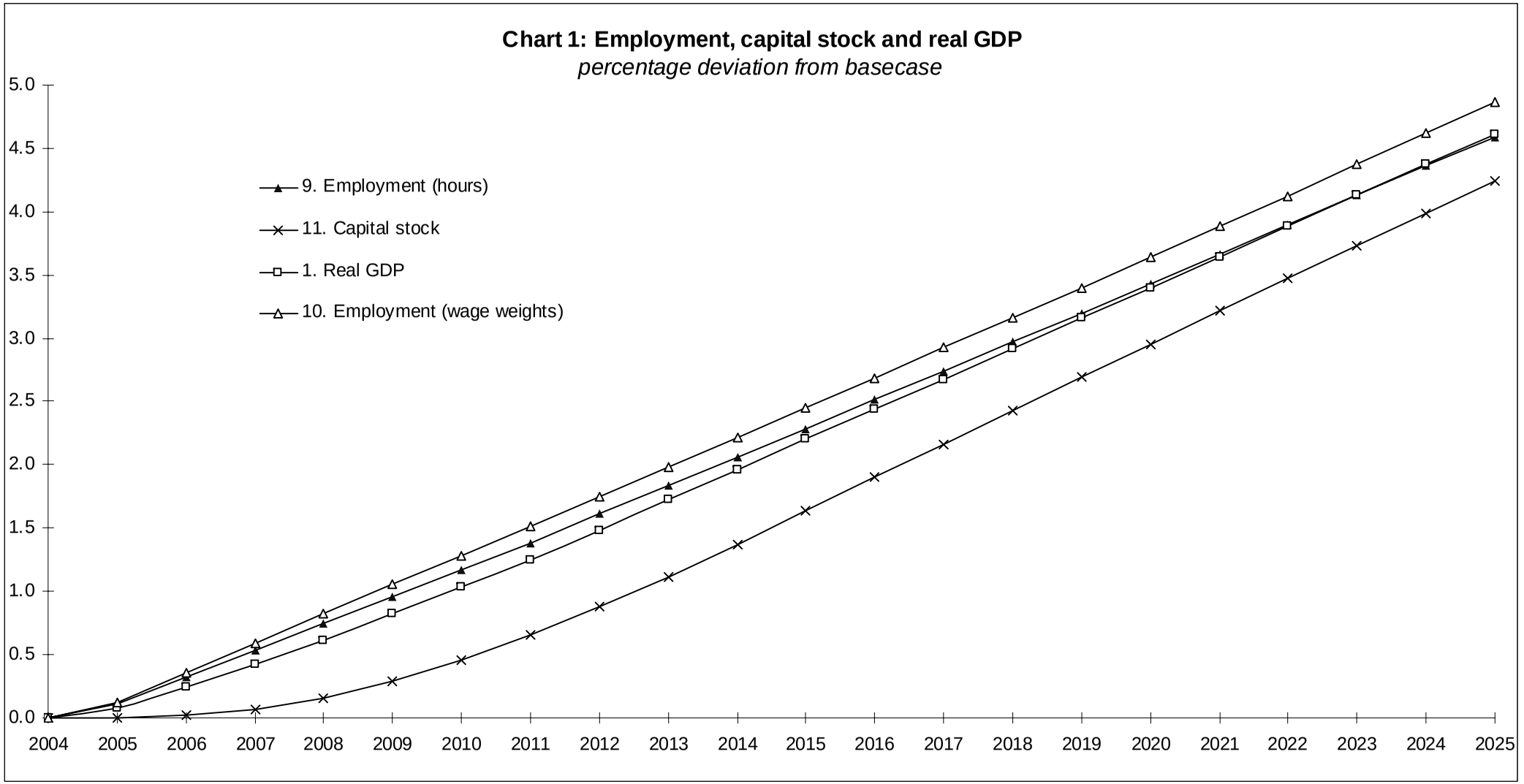

Chart 2: Labour / capital ratio, the terms of trade and relative factor prices

percentage deviation from basecase

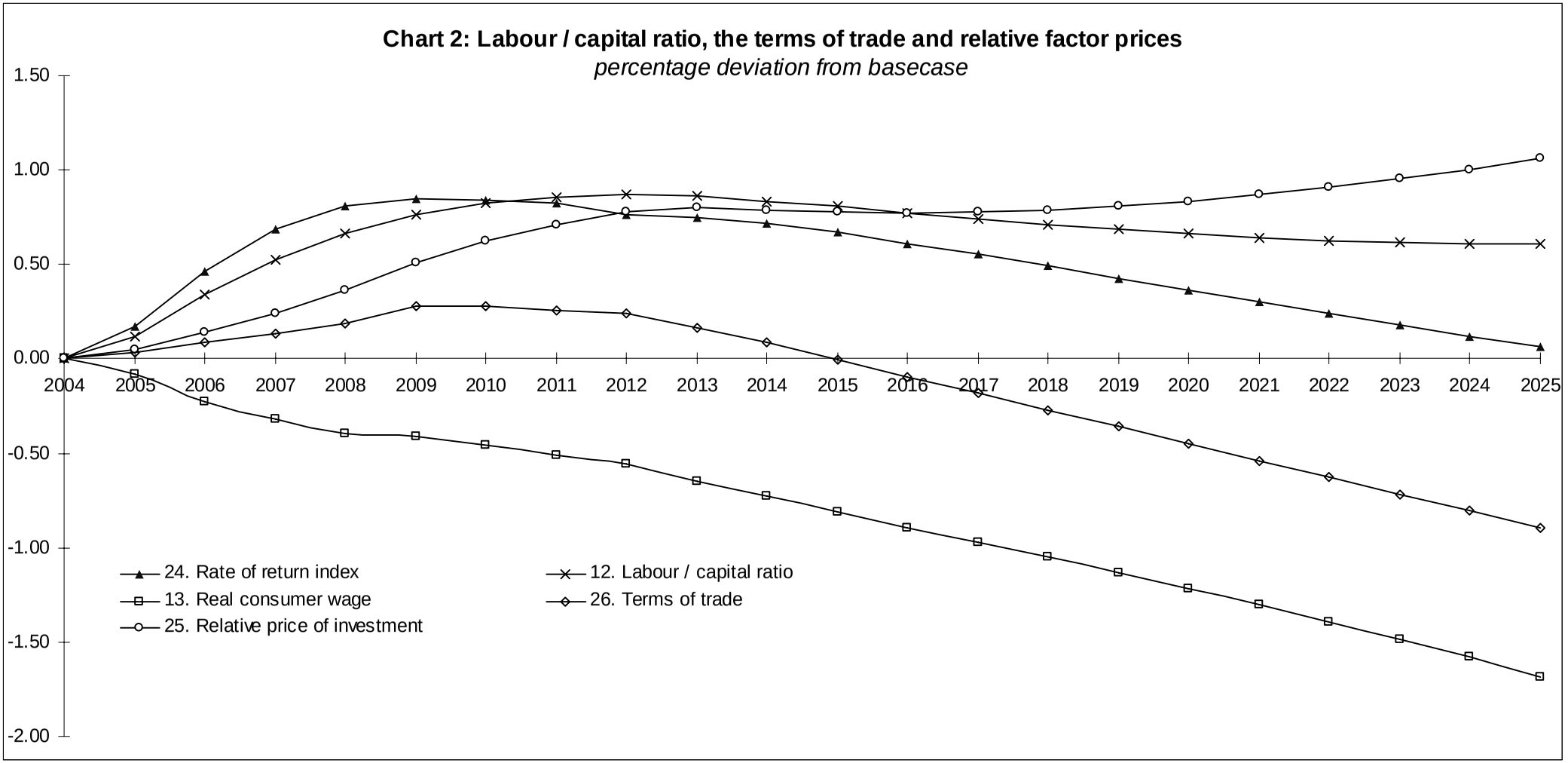

Chart 3: Contributions to the deviation in the real producer price of capital

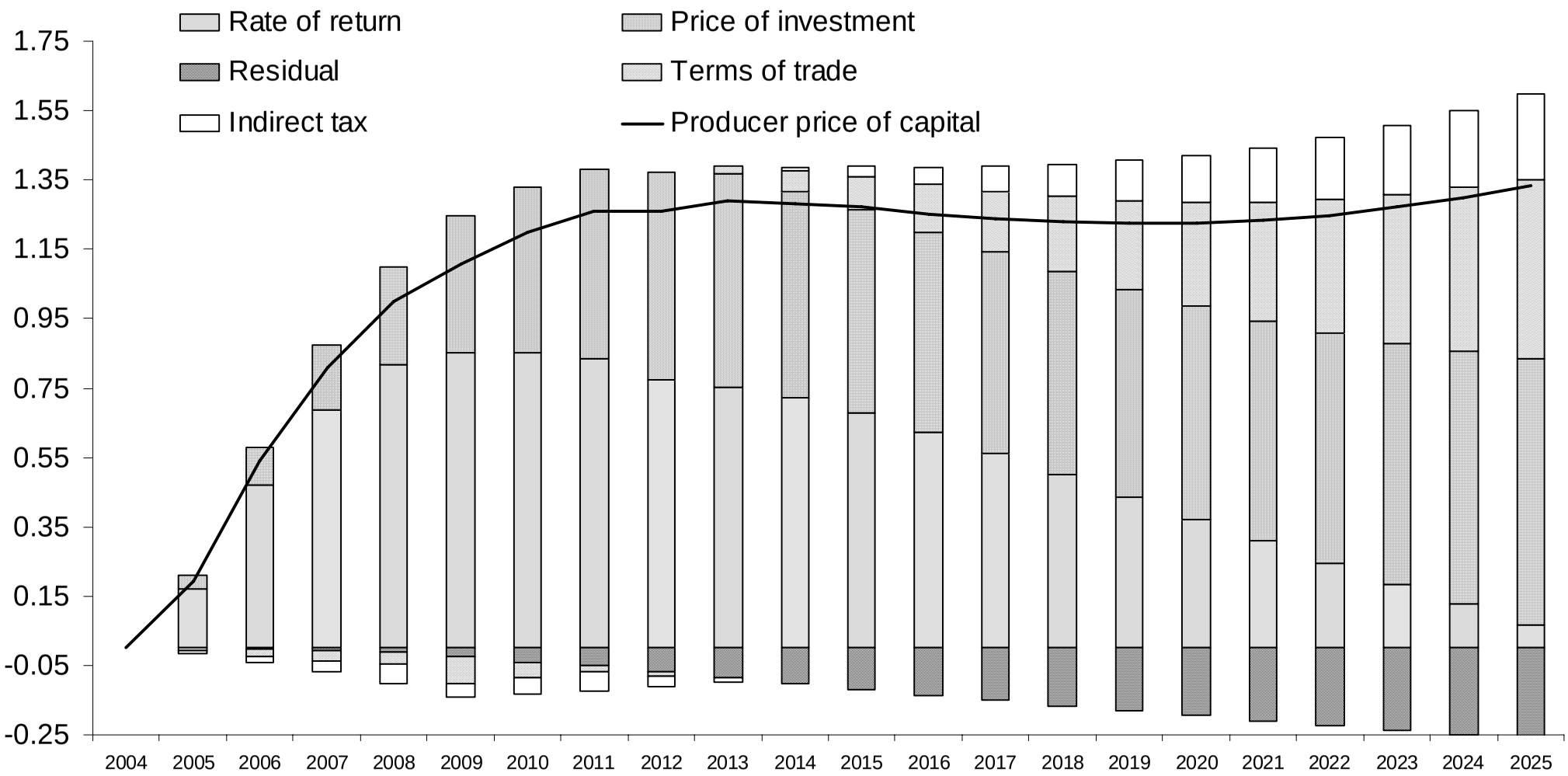

Chart 4: Contributions to deviation in economy-wide (non-agricultural) labour / capital ratio

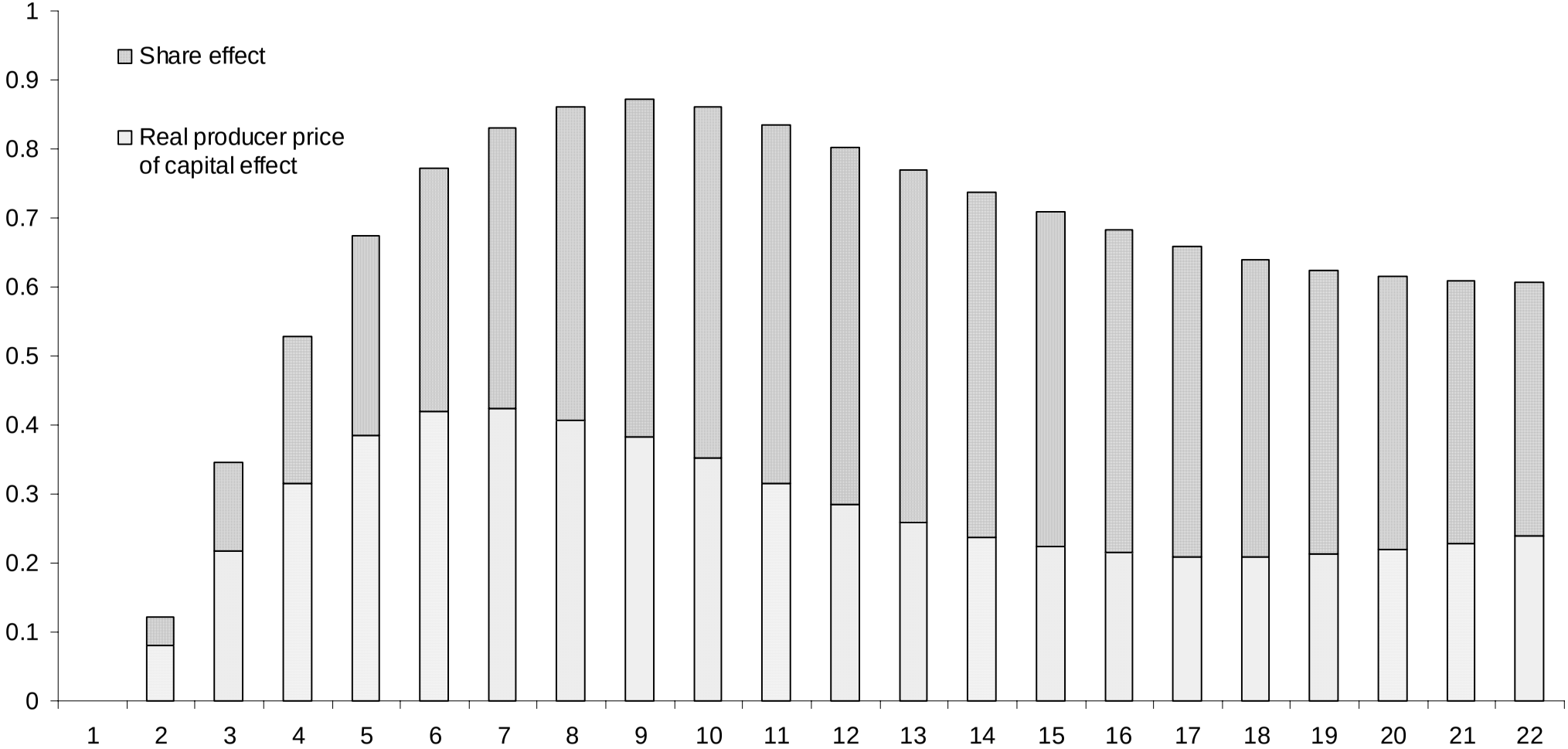

Chart 5: Rate of return on capital, investment and capital stock

percentage deviation from basecase

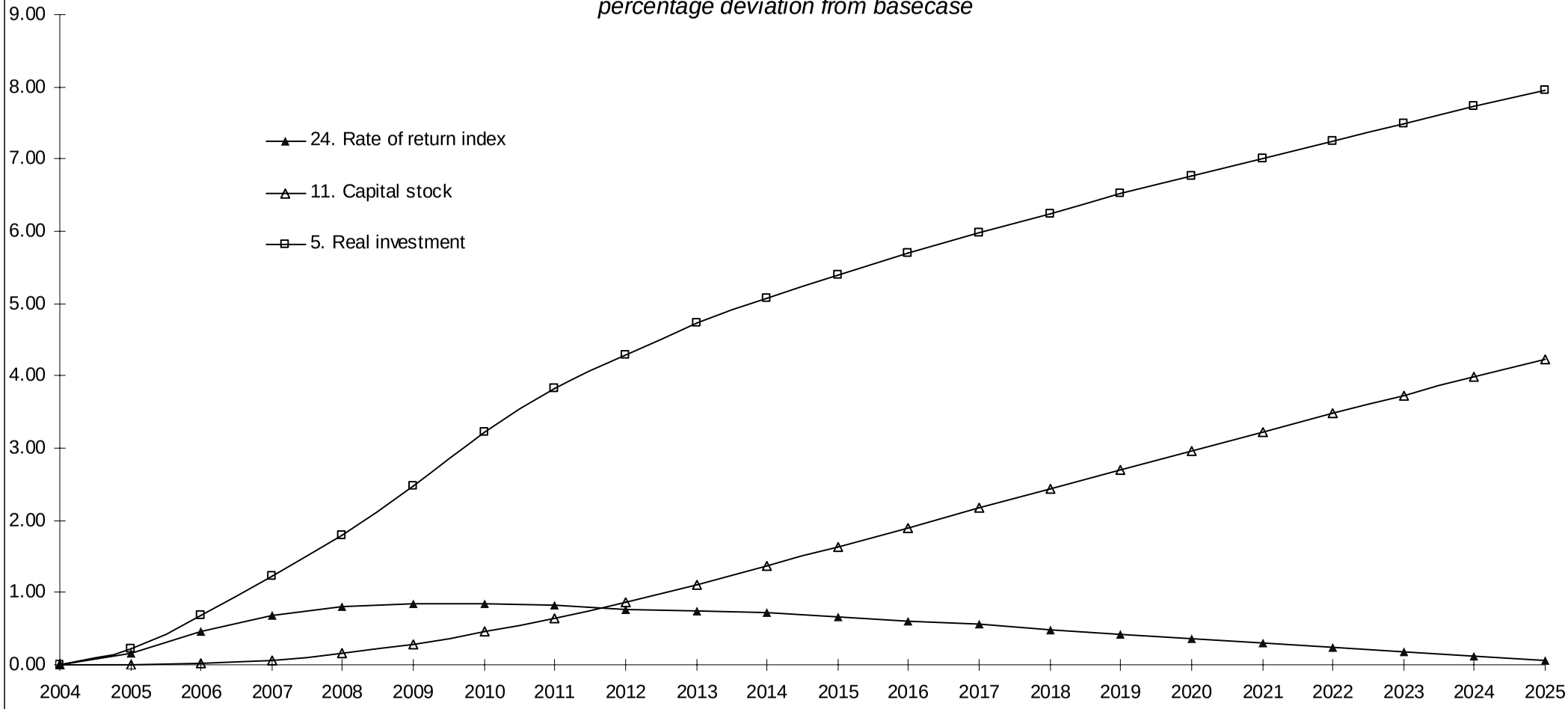

Chart 6: Real GDP, import volumes, export volumes and the terms of trade

percentage deviation from basecase

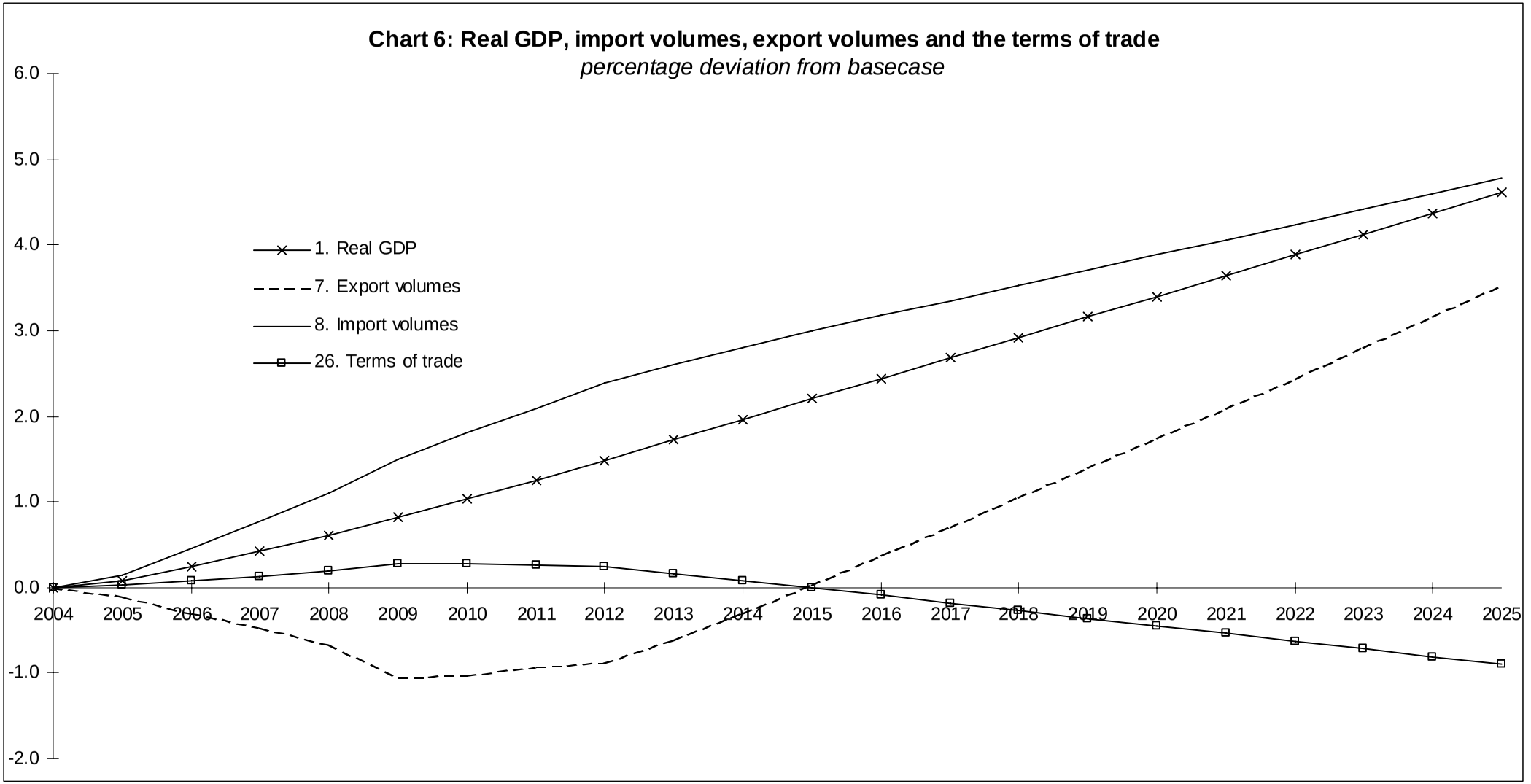

Chart 7: GDP, consumption, investment, and foreign liabilities

percentage deviation from basecase

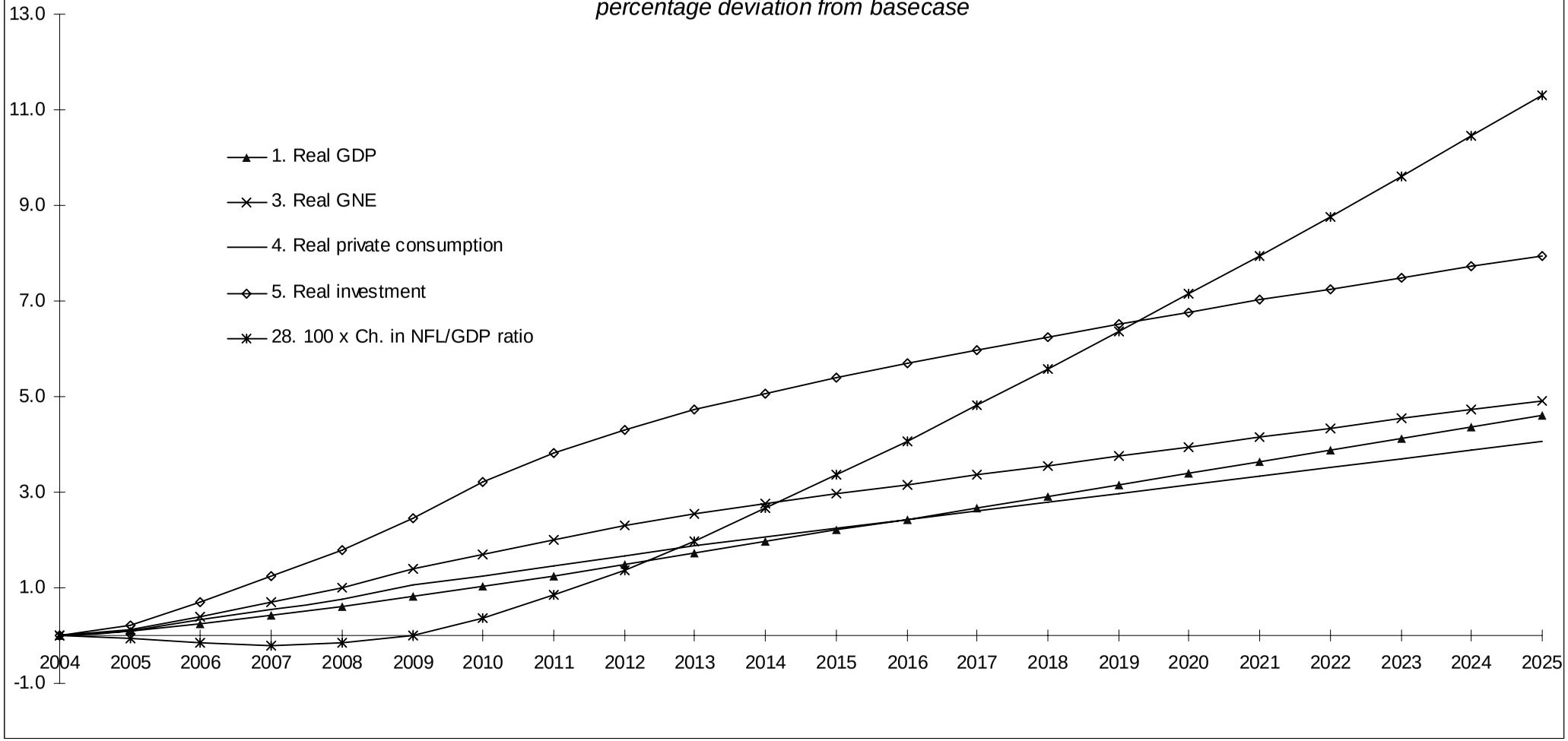

Chart 8: Real GNP per capita and its determinants

(percentage deviation from basecase)

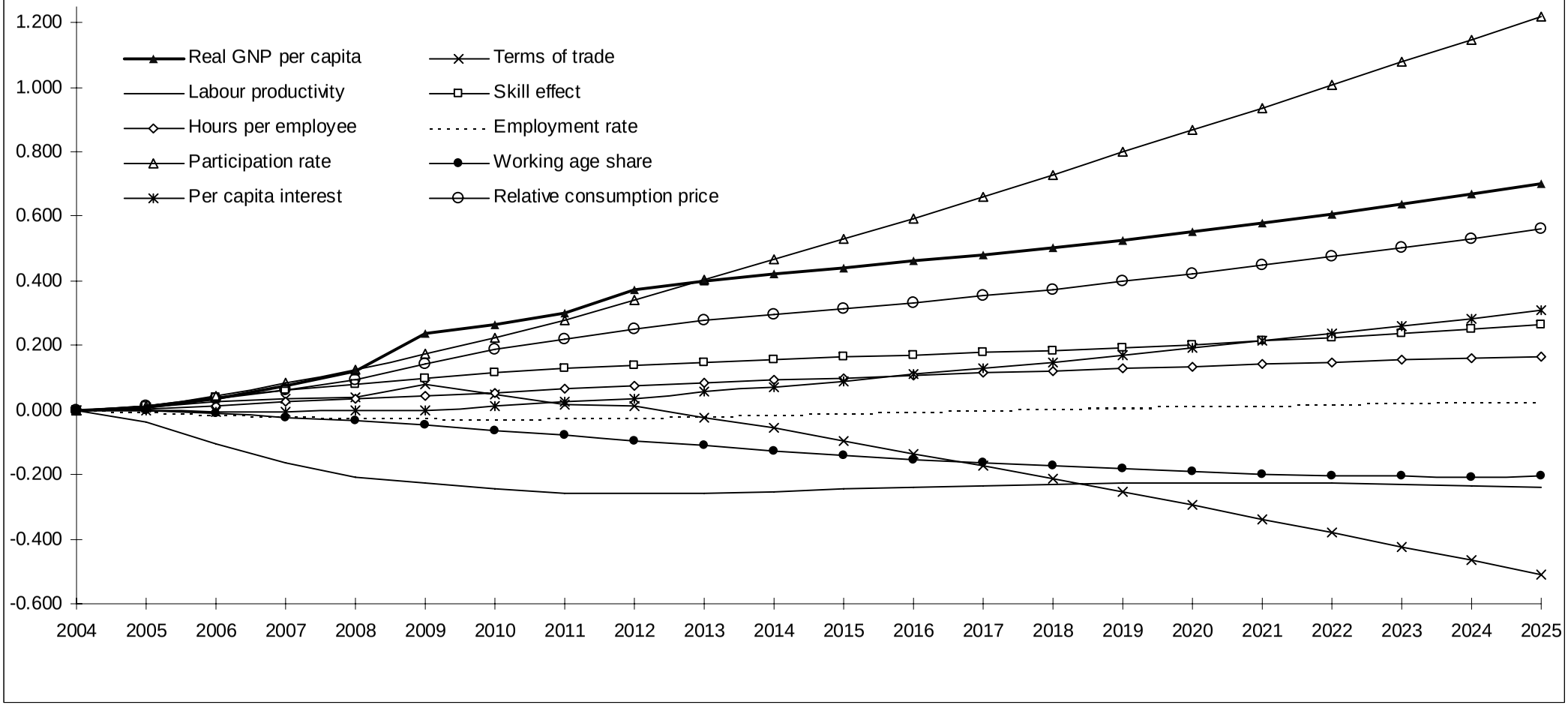

Chart 9: Contributions to deviation in real GNP per capita ($)

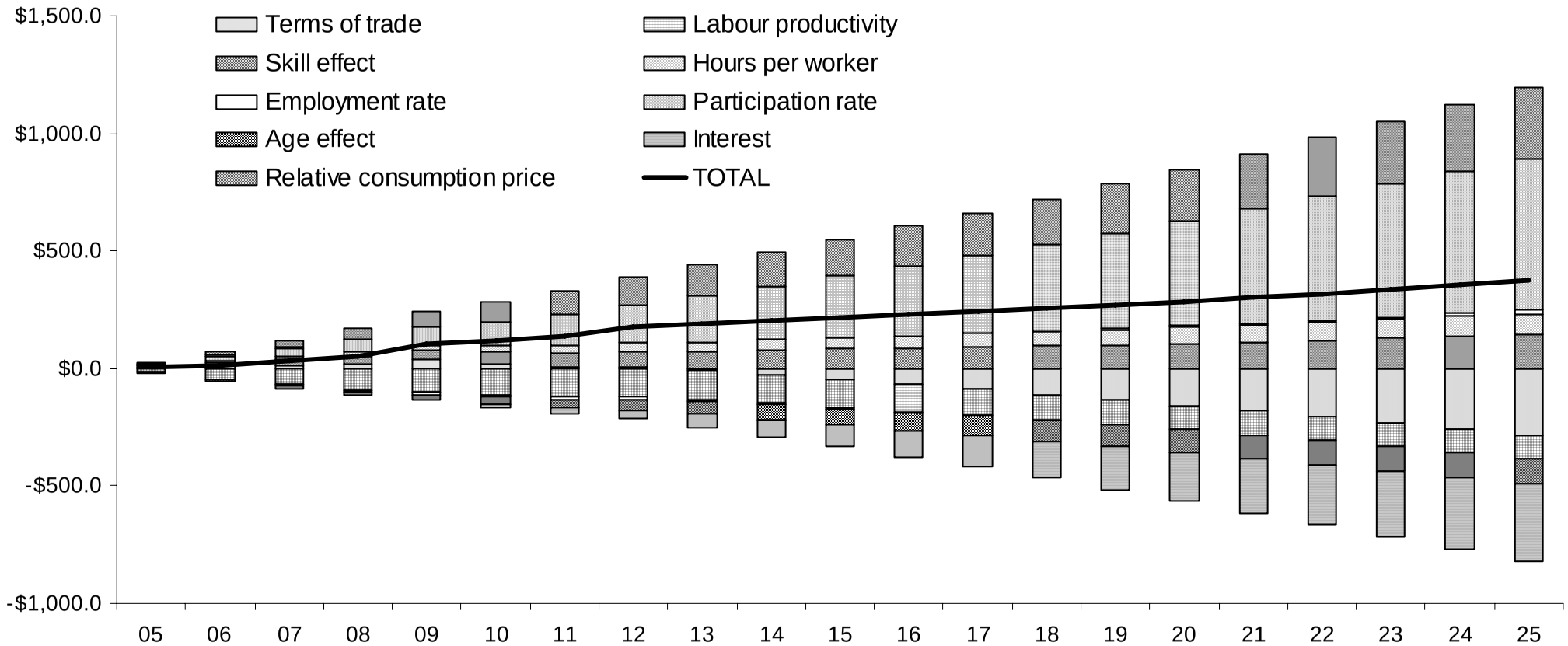

Chart 10: Deviation in real per capita incumbent income and its components

deviation ($2005) from basecase

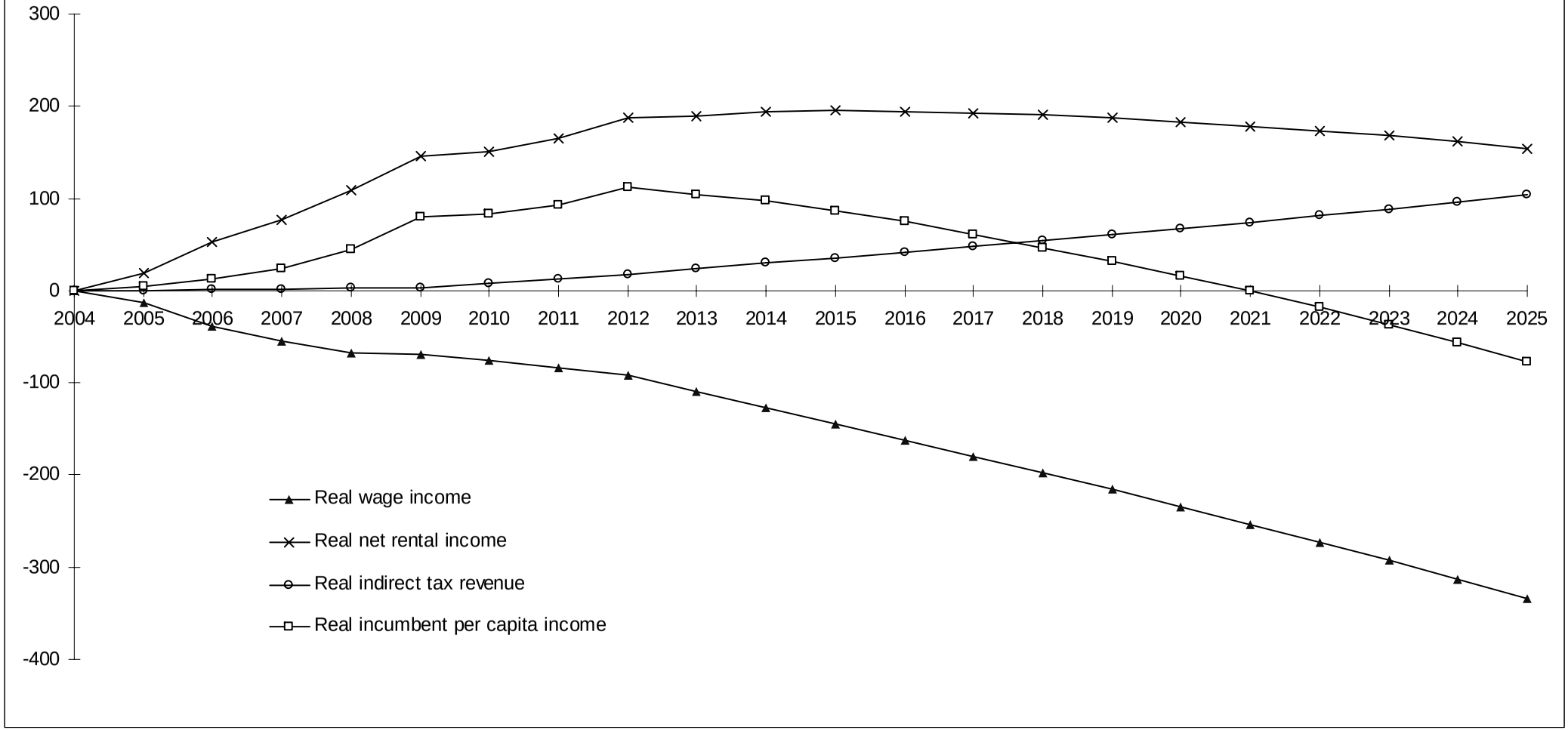

Chart 11: 2025 deviations in occupational wage rates ranked against labour supply index

(percentage deviation from basecase)

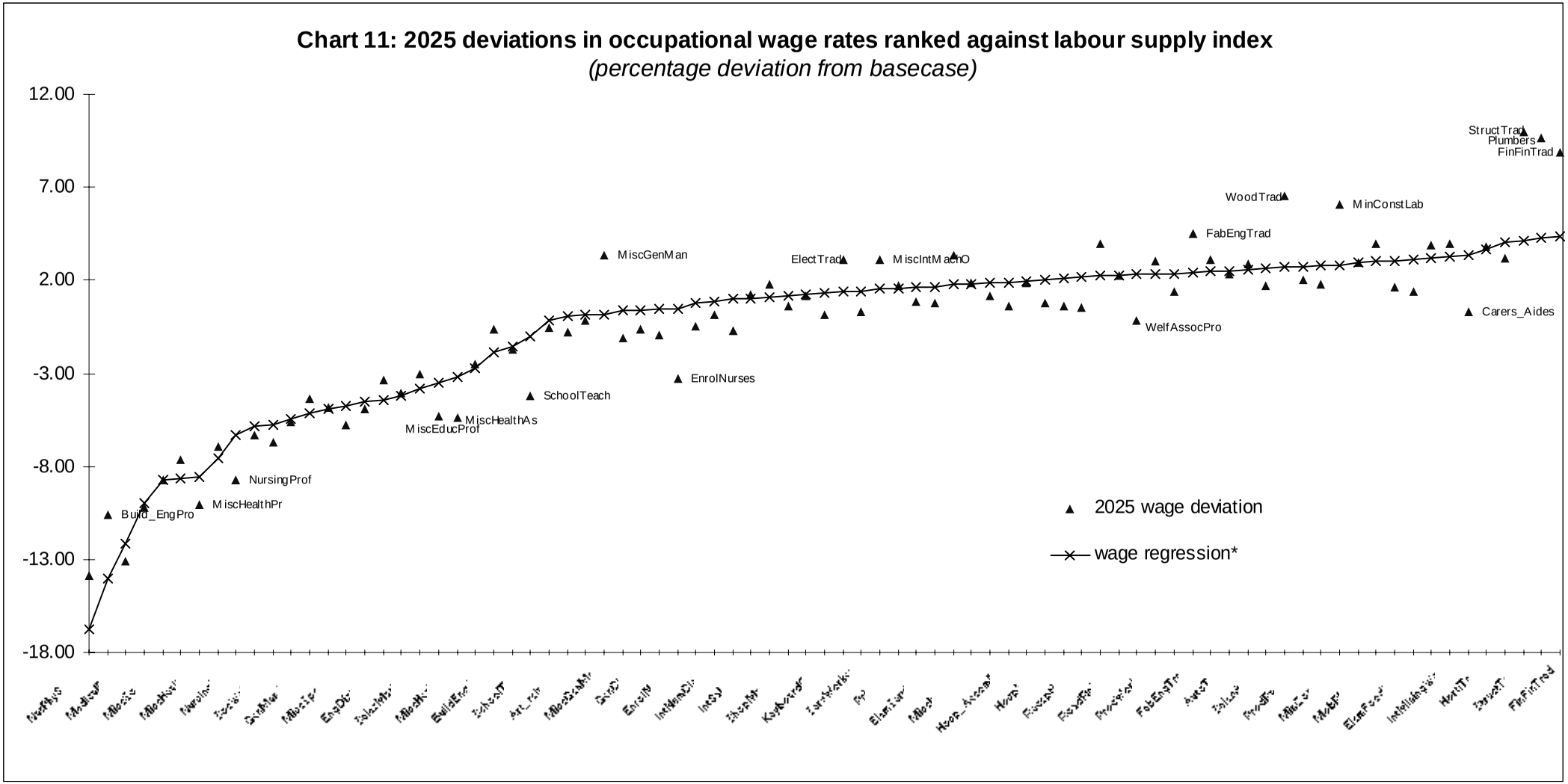

Chart 12: 2025 occupational wage rates: actual v BOTE

(percentage deviation from basecase)

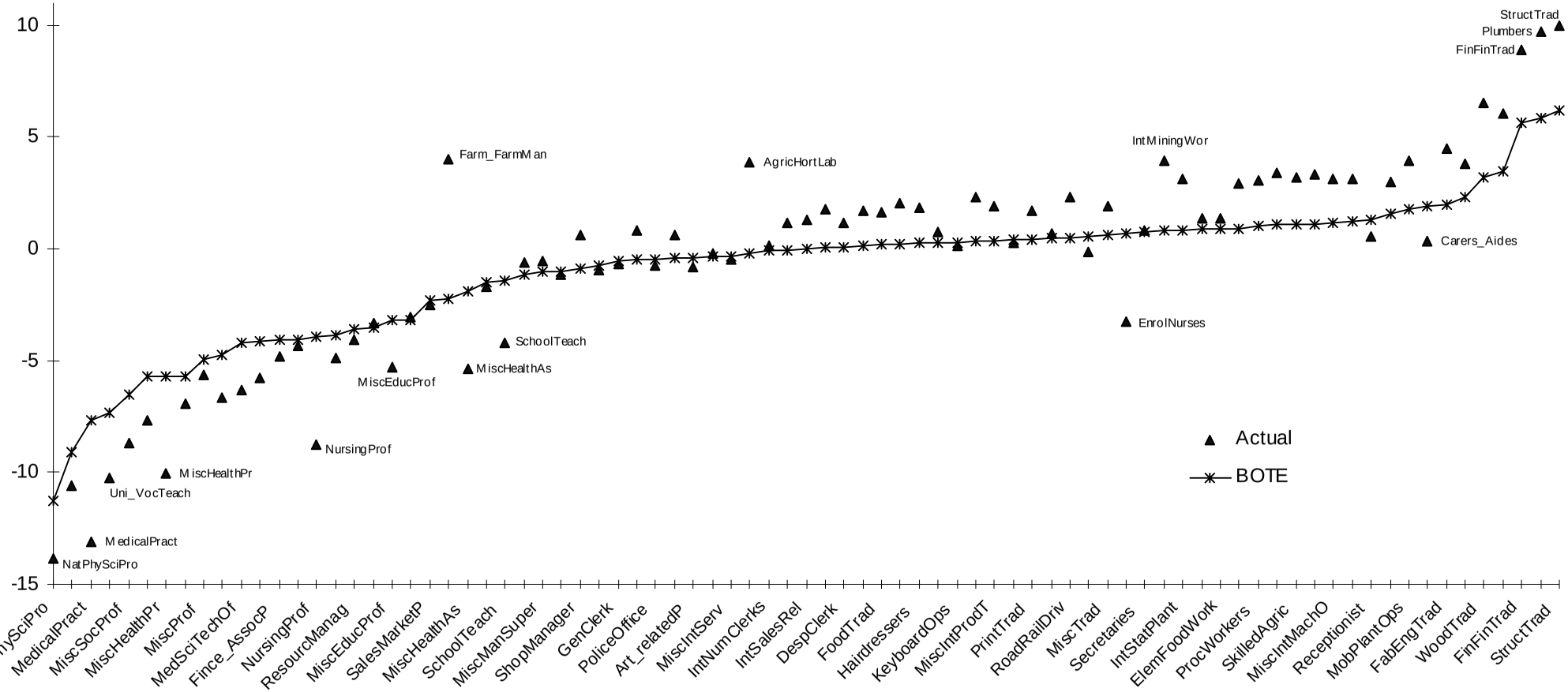

Chart 13: Bottom five sectors (ranked by output deviation)

percentage deviation from basecase

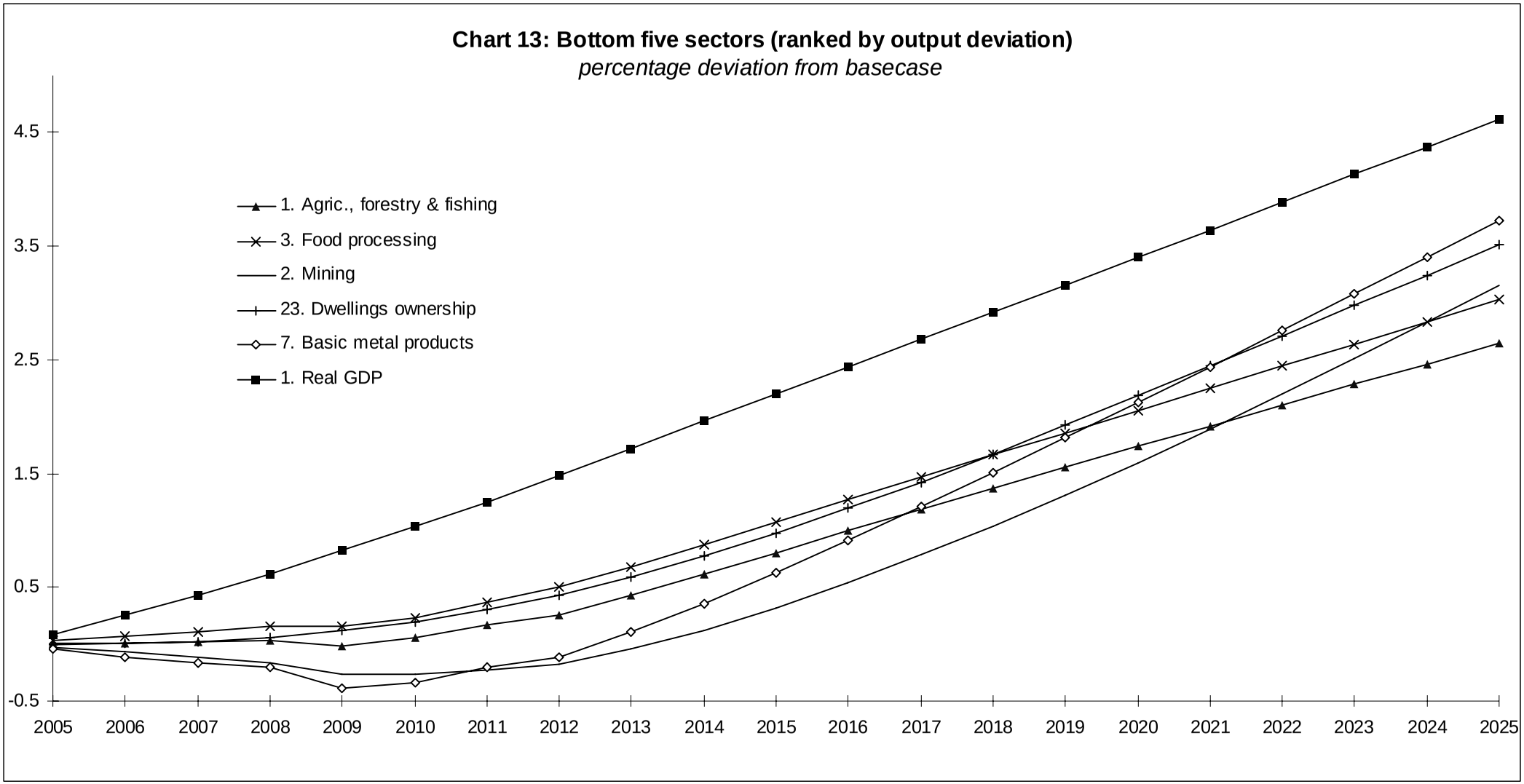

Chart 14: Top five sectors (ranked by output deviation)

percentage deviation from basecase

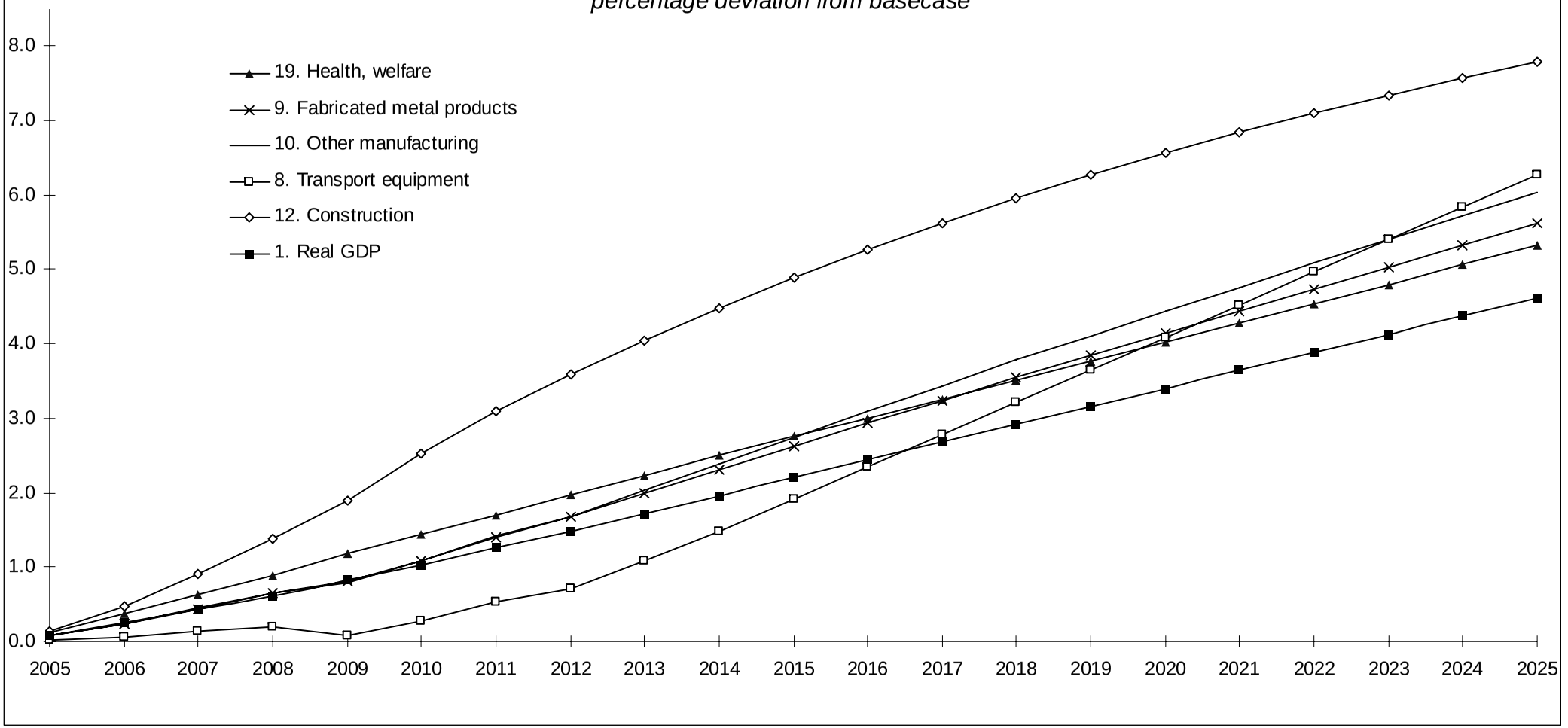

Chart 15: Employment deviations, by qualification

(percentage deviation from basecase)

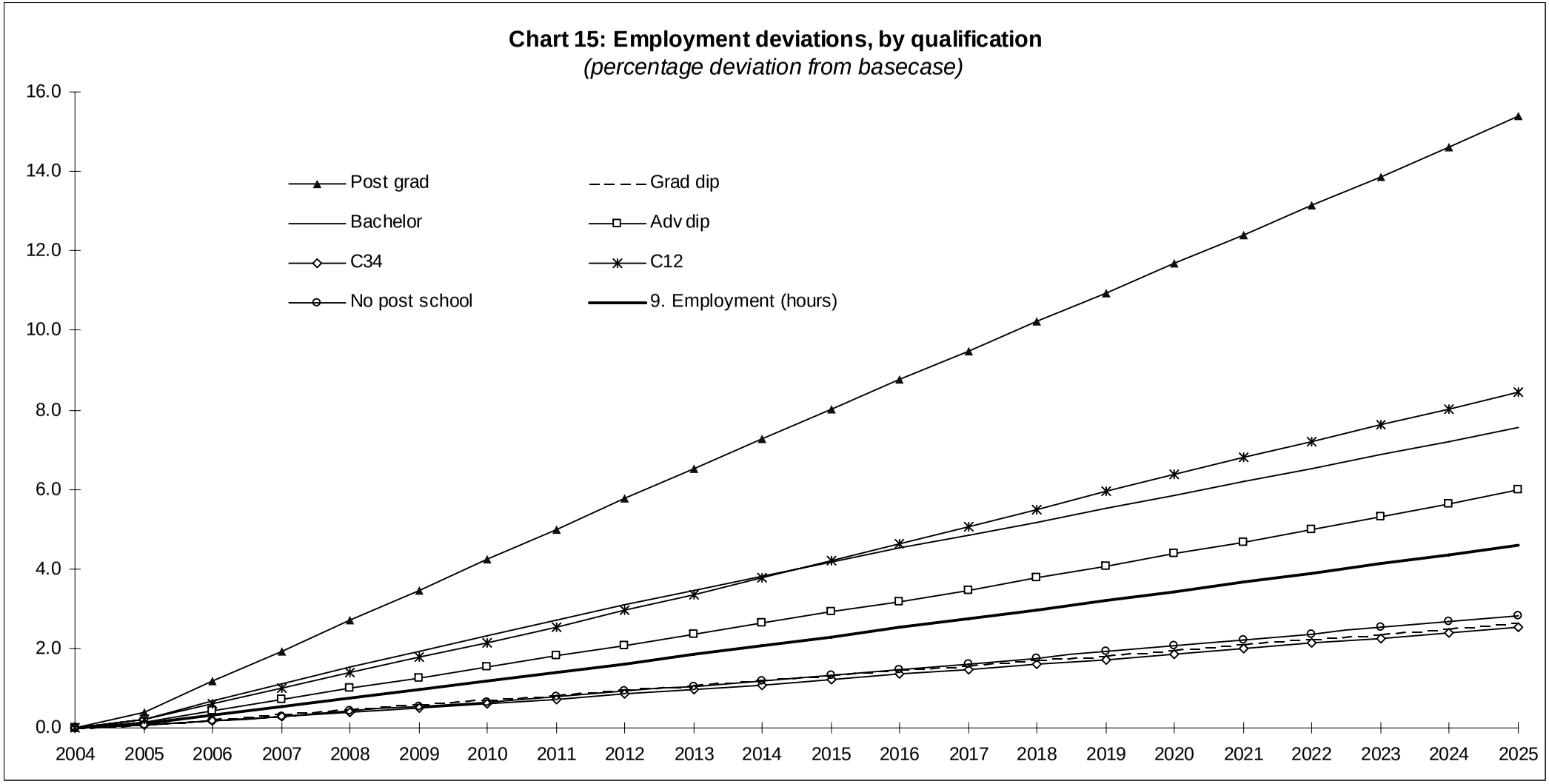

Chart 16: Real wage deviations, by qualification

(percentage deviation from basecase)