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# **Diverging Paths: Occupational Sex Segregation, Australia, and the OECD**

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## **Abstract**

In the mid-1980s, “Australia held the title for the most sex segregated labour force in the OECD area” (OECD, 1984 in Pocock 1998: 590). Does this still hold true? In this paper, series analysis is employed to explore what has happened to occupational sex segregation in Australia since 1984. I do this by measuring changes in the Index of Association. The level, and change in trend, of occupational sex segregation in Australia is also compared to that of selected other groups of OECD nations between 2000 and 2010, including the Pacific Rim OECD nations and those nations which are included in both the OECD and G20 groups of nations.

Overall, no single pattern of changing levels of sex segregation is visible for all OECD countries. While some countries have shown a decrease in the levels of sex segregation (whether significant or not), others have shown an increase. What has emerged is a tendency for those countries with already low levels of sex segregation to have displayed decreasing sex segregation since 2000, while those with high levels of sex segregation have generally shown an increasing trend. What is clear from this analysis is that Australia is no longer the most sex-segregated country in the OECD, or even among Pacific Rim nations; that dubious honour now belongs to the United States of America. (221 words)

**Keywords:** OECD, Australia, occupational sex segregation, Index of Association, time series

## **Introduction**

In the mid-1980s, “Australia held the title for the most sex segregated labour force in the OECD area” (OECD, 1984 in Pocock 1998: 590). Since the 1980s, the number of women in the labour force in Australia has increased considerably (from 2.2 million employed women in 1982 to 4.9 million in 2010 [Australian Bureau of Statistics, 2012]). However, women have not increased their share of employment in all occupations equally, and as such, occupational sex segregation continues in Australia. The analysis presented here argues that this segregation has increased between 1982 and 2010.

Has there been a similar increase in sex segregation in other OECD nations? Or has Australia lost its crown as having the most highly sex-segregated workforce among industrialised nations? In the second half of this paper I show the level of occupational sex segregation across all OECD nations in 2010, before exploring the changing trends for selected groups of OECD nations between 2000 and 2010, using time series analysis. In general, those countries with a low level of occupational sex segregation in 2010, have displayed decreasing levels since 2000, while those with high levels in 2010 have shown an increasing trend.

## The Australian Labour Force

Discrimination, inequalities and segregation persist within the Australian labour force. In terms of occupations, some are more feminised than others: women accounted for 75% of those employed in clerical or administrative positions in 2010, but only 9% of machinery operators, as shown below.

**Table 1. Female Participation in Australian Occupations, 2010**

| 2010                     | % Female   |
|--------------------------|------------|
| <b>Total</b>             | <b>45%</b> |
| Clerical/Administration  | 75%        |
| Service Workers          | 69%        |
| Sales Workers            | 63%        |
| Professionals            | 53%        |
| Labourers                | 35%        |
| Managers                 | 34%        |
| Technical/Trades Workers | 14%        |
| Machinery Operators      | 9%         |

Source: Australian Bureau of Statistics, 6291.0.55.003 *Labour Force, Australia, Detailed, Quarterly*

As **Error! Reference source not found.** indicates, no single occupational group in Australia has the same gender balance as that of the total labour force, drawing on 2010 data. When the gender balance in individual occupations does not match that of the overall labour force, occupational sex segregation is present (Organisation for Economic Co-operation and Development 1984: 40). There are numerous methods utilised to measure sex segregation – here, I use the Index of Association, as developed by Charles and Grusky (2004).

## The Index of Association

The Index of Association ( $A$ ), is a measure of segregation that is independent of variability both in total participation rates and within specific categories (Bradley 2000: 6). This Index expresses “the extent to which occupation-specific sex ratios deviate from the mean of such ratios calculated across all occupations” (Charles and Grusky 2004: 42). The value of  $A$  “may be interpreted as the multiplicative factor by which males or females are, on average, overrepresented in the occupational categories being analysed” (Charles and Grusky 2004: 42). The values of  $A$  range from 1 (perfect integration) to infinity (perfect segregation) (Bradley 2000: 6; Charles and Grusky 2004: 323).  $A$  is found by the following equation:

$$A = \exp \left( \frac{1}{J} \times \sum_{j=1}^J \left\{ \ln \left( \frac{F_j}{M_j} \right) - \left[ \frac{1}{J} \times \sum_{j=1}^J \ln \left( \frac{F_j}{M_j} \right) \right] \right\}^2 \right)^{1/2}$$

In this equation,  $j$  represents the category of examination;  $F$  and  $M$  refer to the total number of women and men in the examined population; and  $F_j$  and  $M_j$  are the number of women and men in the  $j^{\text{th}}$  category.

All of the countries in this study displayed a mix of gender ratios across all occupations each year, so  $A$  was calculable in each case. I use regression analysis to examine whether the values of the Index of Association have increased or decreased in Australia between 1982 and 2010. I also calculate this for each country within the OECD between 2000 and 2010, so as to provide a picture of more recent changes in occupational sex segregation.

### Sex Segregation in Australia since 1982

The 1984 OECD report on *The Integration of Women into the Economy* uses two summary indices to measure sex segregation in the then-21 OECD countries: the “WE index, named after the report *Women and Employment* in which it appears, and the DI or ‘dissimilarity’ index” (Organisation for Economic Co-operation and Development 1984: 41). Using data which corresponded to the International Standard Classification of Occupations, ISCO, Australia was seen to have a high level of occupational sex segregation in 1982, compared to selected other OECD nations (**Error! Reference source not found.**):

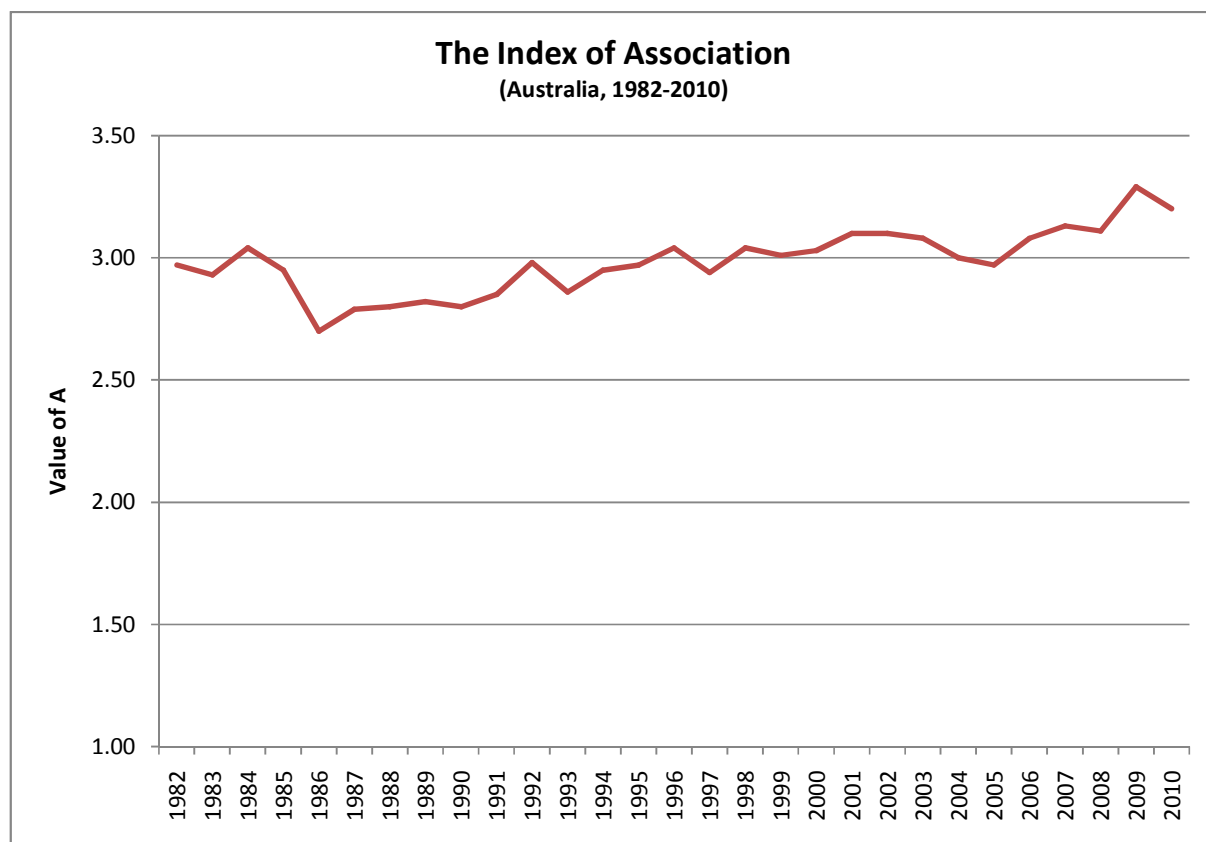
**Table 2. Aggregate Levels of Segregation in 1982**

|               | <b>WE Index (%)</b> | <b>DI Index (%)</b> |
|---------------|---------------------|---------------------|
| Australia     | 60.7                | 47.9                |
| Canada        | 44.6                | 37.9                |
| Germany       | 44.2                | 35.9                |
| Japan         | 27.5                | 22.5                |
| Norway        | 55.8                | 48.3                |
| Sweden        | 44.2                | 41.1                |
| United States | 46.5                | 40.6                |

Source: Organisation for Economic Co-operation and Development, 1984: 42.

Of these seven countries, Australia has the highest level of occupational sex segregation under the WE Index, and the second highest level under the DI Index. The value of the Index of Association for Australia in 1982 was 2.97, which is relatively high.

Since 1982, the values of the Index of Association have remained at this level, as demonstrated by **Error! Reference source not found.** Although there was an initial dip during the mid-1980s, the Index of Association for Australia has generally increased over this time ( $A_{\text{Australia}} = 2.81 + 0.01(\text{time})$ ).

**Figure 1. The Index of Association (Australia, 1982-2010)**

Sources: Australia Bureau of Statistics, *Statistical Yearbook of Australia 1983* and *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*

This increase (Figure 1) indicates that occupational sex segregation has not declined in Australia since the early 1980s. Occupations which had high levels of female participation in the 1980s now have even more female workers, while those that were masculinised have become more so (Table 3).

**Table 3. Female Participation in Australian Occupations, 1982 and 2010**

| <b>1982</b>                     | <b>% Female</b> | <b>2010</b>             | <b>% Female</b> |
|---------------------------------|-----------------|-------------------------|-----------------|
| <b>Total</b>                    | <b>37%</b>      | <b>Total</b>            | <b>45%</b>      |
| Clerical Workers                | 70%             | Clerical/Administration | 75%             |
| Service Workers                 | 64%             | Service Workers         | 69%             |
| Sales Workers                   | 54%             | Sales Workers           | 63%             |
| Professionals                   | 45%             | Professionals           | 53%             |
| Managers/Administration Workers | 14%             | Managers                | 34%             |
| Labourers                       | 12%             | Labourers               | 35%             |
| Transport/Communication Workers | 14%             | Machinery Operators     | 9%              |

|                      |     |                          |     |
|----------------------|-----|--------------------------|-----|
| Agricultural Workers | 20% | Technical/Trades Workers | 14% |
|----------------------|-----|--------------------------|-----|

Sources: Australia Bureau of Statistics, *Statistical Yearbook of Australia 1983* and *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*

While the categories through which occupational data is reported have altered between 1982 and 2010, making it hard to draw direct comparisons between the years, in neither year did any occupations have a gender balance which matched that of the overall labour force. The value of the Index of Association for Australia in 2010 was 3.20, indicating that the rate of overrepresentation across all occupations is 3.2 to 1 in favour of the dominant gender, on average.

Although women account for a larger share of the Australian labour force now than they did in the mid-1980s – in 2010 there were 5 million female workers in Australia, which represents a female labour force participation rate of 45.2% – they are not entering all occupations at the same rate. Occupations with an already high level of female participation are becoming more feminised, while occupations with a large number of male workers are becoming more masculinised. This is not unusual; as women increase their labour force participation, they often seek employment within already feminised occupations (Chang 2004: 131) and the gender balance between occupations may not shift to match the gender balance of the total labour force. This is often a matter of how the labour market is constructed (for example, in which occupations there are shortages), or the social construction of certain occupations as ‘feminine’ or ‘masculine’ (which is often supported by the social construction of various training courses and programmes as similarly gendered). These constructions can differ wildly between countries, and these are reflected in the values of the Index of Association for each country.

### OECD Comparisons

In terms of the Index of Association, Australia ranked 11th among all OECD nations<sup>1</sup> in terms of occupational sex segregation in 2010 (**Error! Reference source not found.**):

**Table 4. Values of the Index of Association for OECD Nations, 2010 (or nearby year) and rank (most to least segregated)**

|                  | A Value     | Rank      |
|------------------|-------------|-----------|
| United States    | 4.31        | 1         |
| United Kingdom   | 3.64        | 2         |
| Denmark          | 3.49        | 3         |
| Norway           | 3.47        | 4         |
| Ireland          | 3.39        | 5         |
| Canada           | 3.37        | 6         |
| Belgium          | 3.36        | 7=        |
| Italy            | 3.36        | 7=        |
| Czech Republic   | 3.25        | 9         |
| Netherlands      | 3.21        | 10        |
| <i>Australia</i> | <i>3.20</i> | <i>11</i> |

|                    |      |     |
|--------------------|------|-----|
| Spain              | 3.19 | 12  |
| Sweden             | 3.18 | 13  |
| Estonia            | 3.11 | 14  |
| Austria            | 3.08 | 15  |
| France             | 3.07 | 16= |
| Iceland            | 3.07 | 16= |
| Finland            | 3.01 | 18  |
| Greece             | 2.89 | 19  |
| Israel (2009)      | 2.82 | 20  |
| Japan              | 2.78 | 21  |
| Germany            | 2.75 | 22  |
| South Korea        | 2.72 | 23  |
| Chile (2008)       | 2.66 | 24  |
| Poland             | 2.61 | 25  |
| New Zealand (2009) | 2.55 | 26  |
| Hungary            | 2.51 | 27  |
| Slovak Republic    | 2.49 | 28= |
| Switzerland        | 2.49 | 28= |
| Slovenia           | 2.43 | 30  |
| Portugal           | 2.17 | 31= |
| Turkey             | 2.17 | 31= |

Sources: Australian Bureau of Statistics, *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*; LABORSTA *Labour Statistics Database (Chile, 2000–2008; US 2000–2002; Table: 2C Total employment, by occupation (Thousands))*; Statistical Bureau of Japan, *Statistical Yearbook of Japan, 2002–2012*; Statistics Canada, *Labour force survey estimates (LFS)*; Statistics Korea, *Statistical Yearbook of Korea, 2001–2009*; Statistics New Zealand, *Statistical Yearbook of New Zealand, 2002–2010*; UNECE *Statistical Division Database (Employment by Measurement, Country, Occupation, Sex and Year 2000–2010)*; United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

Such a large number of countries makes drawing comparisons difficult, and this is where using smaller data sets becomes more manageable. Therefore, I compare changes in Australia's occupational sex segregation against three groups – the seven countries from the OECD's 1984 report, Pacific Rim nations, and those nations that are included in both the OECD and the G20 group of nations.

#### *Seven Countries Comparison*

**Table 5. Values of the Index of Association for selected OECD Nations, 2000, 2010, increase or decrease over decade, and rank (most to least segregated) for 2000 and 2010**

|           | A (2000) | A (2010) | Change     | Rank (2000) | Rank (2010) |
|-----------|----------|----------|------------|-------------|-------------|
| Australia | 3.03     | 3.20     | + (sig)    | 5           | 4           |
| Canada    | 3.30     | 3.37     | + (n. sig) | 3=          | 3           |
| Germany   | 2.70     | 2.75     | - (n. sig) | 7           | 7           |
| Japan     | 2.94     | 2.78     | - (n. sig) | 6           | 6           |
| Norway    | 3.30     | 3.47     | + (n. sig) | 3=          | 2           |
| Sweden    | 3.61     | 3.18     | - (n. sig) | 2           | 5           |

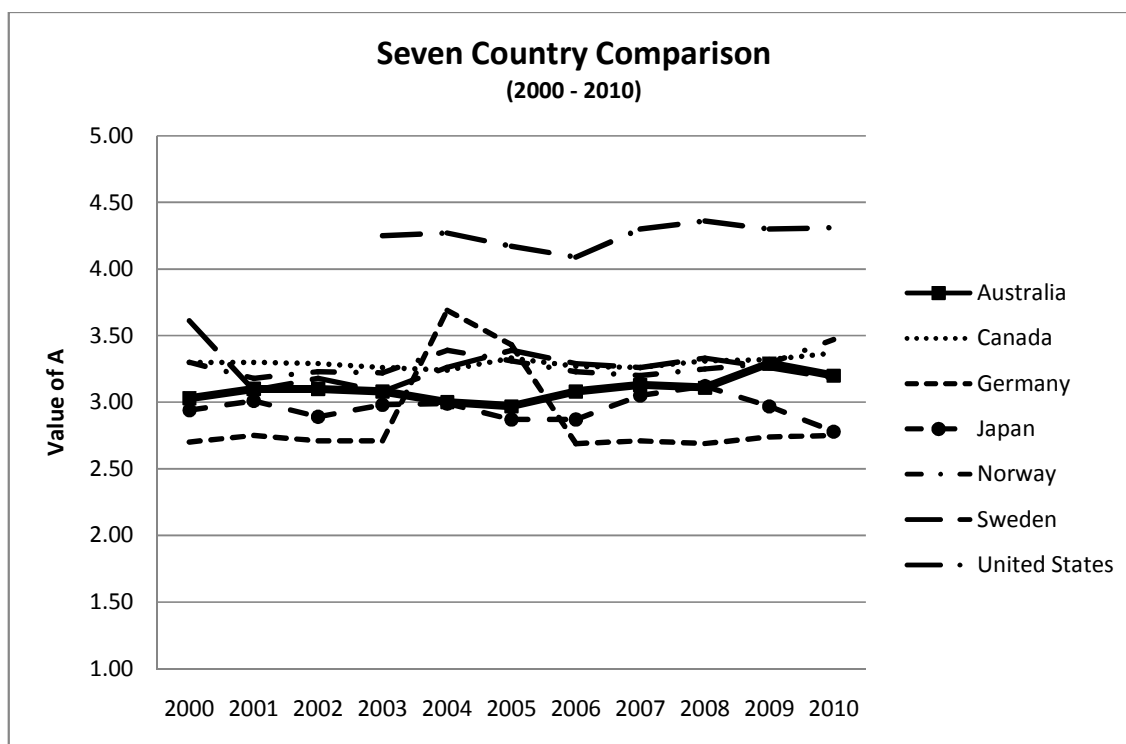
|                      |      |      |            |   |   |
|----------------------|------|------|------------|---|---|
| United States (2003) | 4.25 | 4.31 | + (n. sig) | 1 | 1 |
|----------------------|------|------|------------|---|---|

Note: significance at  $p=0.05$ .

Sources: Australian Bureau of Statistics, *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*; Statistics Canada, *Labour force survey estimates (LFS)*; Statistics Bureau of Japan, *Statistical Yearbook of Japan, 2002–2012*; UNECE *Statistical Division Database (Employment by Measurement, Country, Occupation, Sex and Year 2000–2010)*; United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

Australia now ranks fourth out of these seven countries in terms of occupational sex segregation (Table 5). Those countries with a high value of  $A$  in 2000 generally still have a high value, and those with a low value in 2000 tended to show a decrease over this time, with the exception of Sweden (which has fallen considerably in rank).

**Figure 2. Time Series of Values of  $A$  for Selected OECD Nations, 2000–2010**



Sources: Australian Bureau of Statistics, *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*; Statistics Canada, *Labour force survey estimates (LFS)*; Statistics Bureau of Japan, *Statistical Yearbook of Japan, 2002–2012*; UNECE *Statistical Division Database (Employment by Measurement, Country, Occupation, Sex and Year 2000–2010)*; United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

The jump in values for the United States reflects a change in the data source (from ISCO 1968 to ISCO 88) rather than a change in occupational sex segregation itself, and the spike between 2004 and 2005 for Germany reflects the two years in which the number of women in the Armed Forces was reported (Figure 2). In terms of overall trends, four of these countries have displayed increasing values of  $A$  (Australia, Canada, Norway and the United States<sup>2</sup>) and three have displayed decreasing values (Germany, Japan and Sweden). However, only



Australia has shown a statistically significant change over this period ( $p$ -value < 0.05). In terms of the seven countries highlighted in the 1984 report, only Australia has shown any significant change in occupational sex segregation.

*Pacific Rim OECD Nations*

**Table 6. Values of the Index of Association for Pacific Rim OECD Nations, 2000, 2010, increase or decrease over decade, and rank (most to least segregated) for 2000 and 2010**

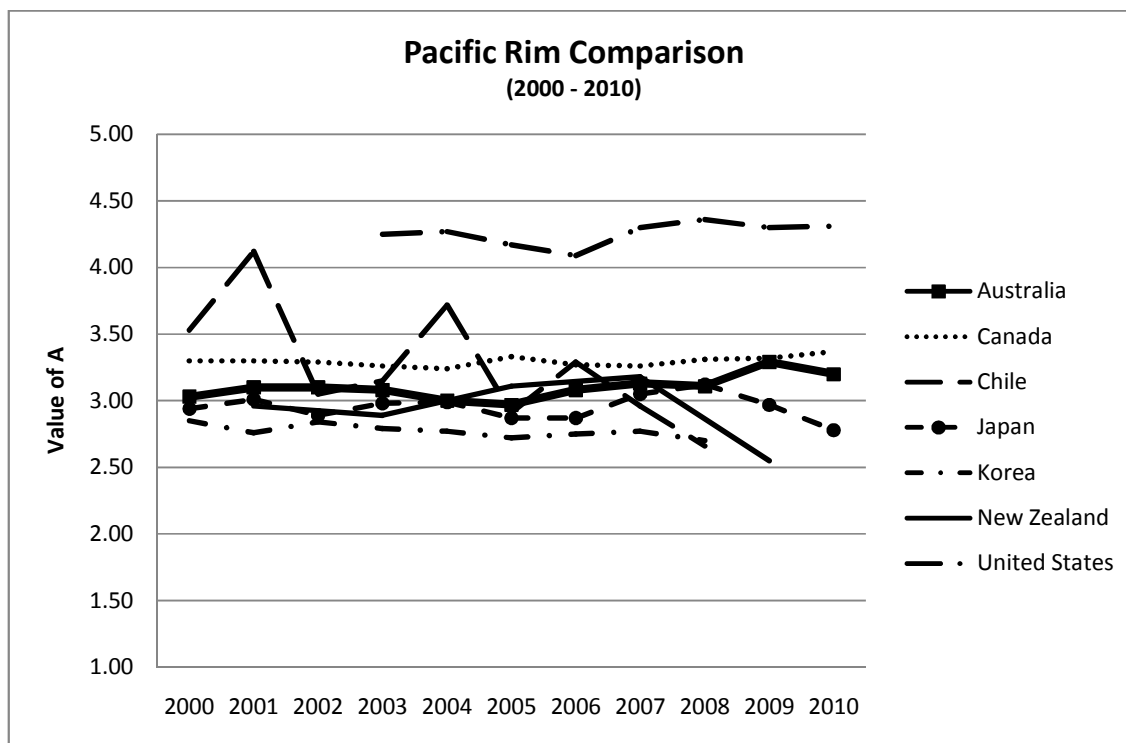
|                            | A (2000) | A (2010) | Change     | Rank (2000) | Rank (2010) |
|----------------------------|----------|----------|------------|-------------|-------------|
| Australia                  | 3.03     | 3.20     | + (sig)    | 4           | 3           |
| Canada                     | 3.30     | 3.37     | + (n. sig) | 3           | 2           |
| Chile (2008)               | 3.53     | 2.66     | - (sig)    | 2           | 6           |
| Japan                      | 2.94     | 2.78     | - (n. sig) | 6           | 4           |
| New Zealand<br>(2001/2009) | 2.96     | 2.55     | - (n. sig) | 5           | 7           |
| South Korea                | 2.85     | 2.72     | - (sig)    | 7           | 5           |
| United States (2003)       | 4.25     | 4.31     | + (n. sig) | 1           | 1           |

Note: significance at  $p=0.05$ .

Sources: Australian Bureau of Statistics, *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*; LABORSTA *Labour Statistics Database (Chile, 2000–2008; US 2000–2002; Table: 2C Total employment, by occupation (Thousands))*; Statistical Bureau of Japan, *Statistical Yearbook of Japan, 2002–2012*; Statistics Canada, *Labour force survey estimates (LFS)*; Statistics Korea, *Statistical Yearbook of Korea, 2001–2009*; Statistics New Zealand, *Statistical Yearbook of New Zealand, 2002–2010*; United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

While the United States and Canada continue to display a higher level of occupational sex segregation than Australia, the other four countries – Chile, Japan, South Korea and New Zealand – all have lower levels of occupational sex segregation (Table 6).

**Figure 3. Time Series of Values of A for Pacific Rim OECD Nations, 2000–2010**



Sources: Australian Bureau of Statistics, *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*; LABORSTA *Labour Statistics Database (Chile, 2000–2008; US 2000–2002; Table: 2C Total employment, by occupation (Thousands))*; Statistical Bureau of Japan, *Statistical Yearbook of Japan, 2002–2012*; Statistics Canada, *Labour force survey estimates (LFS)*; Statistics Korea, *Statistical Yearbook of Korea, 2001–2009*; Statistics New Zealand, *Statistical Yearbook of New Zealand, 2002–2010*; United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

In terms of the changing trend of occupational sex segregation, four of these nations have displayed decreasing levels of sex segregation while three displayed increasing levels (Figure 3). The three countries which have displayed increasing levels of sex segregation between the years of 2000 and 2010 are those with the highest levels of sex segregation – the United States, Canada and Australia. The countries with the highest levels of gender inequity within the occupations are becoming more sex segregated, rather than less.

#### OECD-G20 Nations

**Table 7. Values of the Index of Association for OECD-G20 Nations, 2000, 2010, increase or decrease over decade, and rank (most to least segregated) for 2000 and 2010**

|           | A (2000) | A (2010) | Change     | Rank (2000) | Rank (2010) |
|-----------|----------|----------|------------|-------------|-------------|
| Australia | 3.03     | 3.20     | + (sig)    | 5           | 5           |
| Canada    | 3.30     | 3.37     | + (n. sig) | 2=          | 3           |
| France    | 3.30     | 3.07     | - (n. sig) | 2=          | 6           |
| Germany   | 2.70     | 2.75     | + (n. sig) | 8           | 8           |
| Italy     | 2.06     | 3.36     | + (n. sig) | 10          | 4           |
| Japan     | 2.94     | 2.78     | - (n. sig) | 6           | 7           |

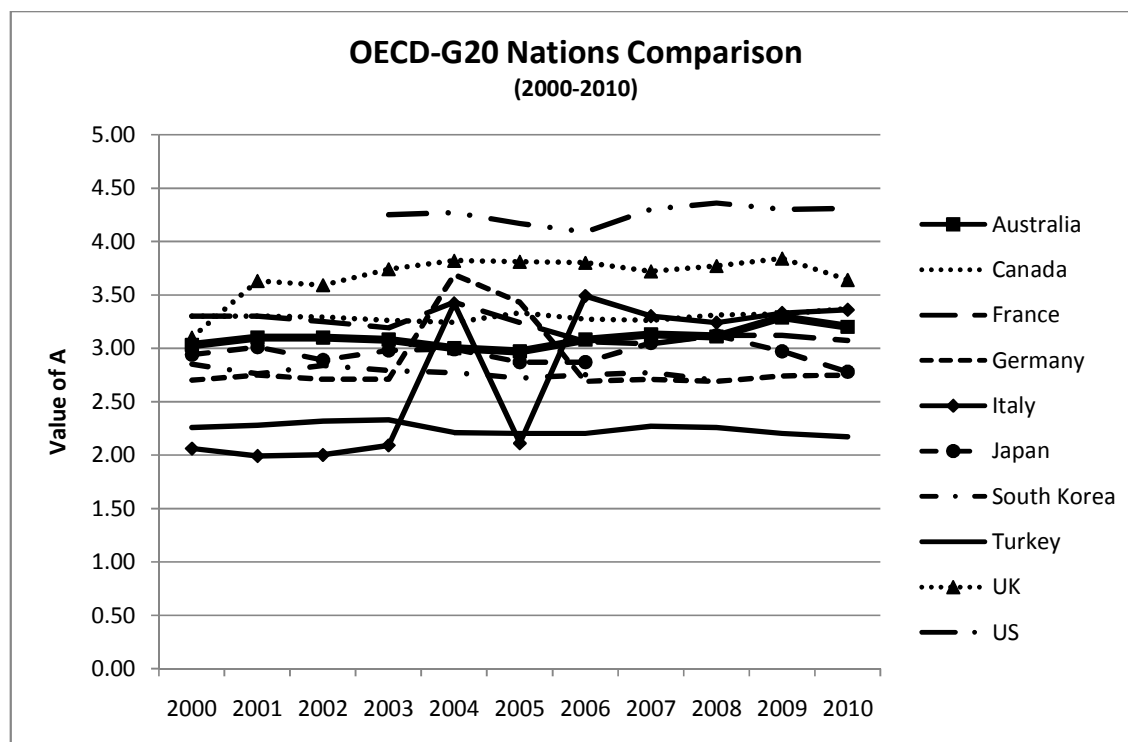
|                      |      |      |            |   |    |
|----------------------|------|------|------------|---|----|
| South Korea          | 2.85 | 2.72 | - (sig)    | 7 | 9  |
| Turkey               | 2.26 | 2.17 | - (n. sig) | 9 | 10 |
| United Kingdom       | 3.10 | 3.64 | + (sig)    | 4 | 2  |
| United States (2003) | 4.25 | 4.31 | + (n. sig) | 1 | 1  |

Note: significance at  $p=0.05$ .

Sources: Australian Bureau of Statistics, *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*; Statistics Canada, *Labour force survey estimates (LFS)*; Statistical Bureau of Japan, *Statistical Yearbook of Japan, 2002–2012*; Statistics Korea, *Statistical Yearbook of Korea, 2001–2009*; UNECE Statistical Division Database (*Employment by Measurement, Country, Occupation, Sex and Year 2000–2010*); United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

Among those nations who are included in both the G20<sup>3</sup> and the OECD groups of nations, Australia is ranked 5<sup>th</sup> out of 10 nations in terms of occupational sex segregation in 2010 (Table 7). Like the United Kingdom, Australia has seen a statistically significant increase in the value of A between 2000 and 2010. Only four nations within this group have shown decreasing levels of sex segregation, and only South Korea has registered a statistically significant decrease in A (France, Japan and Turkey have shown decreases not statistically significant at the 5% level).

**Figure 4. Time Series of Values of A for OECD-G20 Nations, 2000–2010**



Sources: Australian Bureau of Statistics, *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly*; Statistics Canada, *Labour force survey estimates (LFS)*; Statistical Bureau of Japan, *Statistical Yearbook of Japan, 2002–2012*; Statistics Korea, *Statistical Yearbook of Korea, 2001–2009*; UNECE Statistical Division Database (*Employment by Measurement, Country, Occupation, Sex and Year 2000–2010*); United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

*Country, Occupation, Sex and Year 2000–2010*); United States Department of Labor, *Employed persons by occupation, sex, and age 2003–2010*.

The values of the Index of Association have changed considerably more for this group of countries than for the seven selected OECD nations, or those surrounding the Pacific Rim. The large amount of change for Italy reflects the difference between years when the Armed Forces was reported: the Armed Forces were not reported in 2000, men alone were reported in 2001–2003 and 2005, and men and women were reported in 2004 and from 2006 onwards.

In terms of overall trends, four of the countries with the lowest level of sex segregation are those which display decreasing values of the Index of Association, while those countries with higher levels of sex segregation, such as the United Kingdom and the United States, show increasing values. This suggests that groups of countries are following diverging paths of sex segregation: countries with already low levels of sex segregation look to continue to decrease segregation, while those countries with higher levels of sex segregation show a trend to increase it in future.

## **Conclusion**

Overall, no single pattern of changing levels of sex segregation is visible for all OECD countries. While some countries have shown a decrease in the levels of sex segregation (whether significant or not), others have shown an increase. What has emerged is a tendency for those countries with already low levels of sex segregation to have displayed decreasing sex segregation since 2000, with those with high levels of sex segregation have generally shown an increasing trend. What is clear from this analysis is that Australia is no longer the most sex segregated country in the OECD, or even among Pacific Rim nations; based on the data analysed in this paper, that dubious honour now belongs to the United States of America, with Portugal and Turkey together having the lowest level of sex segregation.

## **Footnotes**

1. Mexico has been excluded from this analysis due to highly inconsistent data.
2. Due to the change in classifications, this analysis has been run for the United States for the years 2003–2010 only.
3. The G20 group of nations consists of Argentina, Australia, Brazil, Canada, China (People's Republic), the European Union, France, Germany, India, Indonesia, Italy, Japan, Mexico, Saudi Arabia, South Africa, South Korea, Russia, Turkey, the United Kingdom and the United States.

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