

**An Analysis of Scotland's Performance
in the Commonwealth Games
1950-2006**

Research Report no. 104

A study for
sportscotland

by

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1. INTRODUCTION

This report has been compiled by staff from the Sport Industry Research Centre (SIRC) at Sheffield Hallam University on behalf of **sportscotland**, the national agency for sport in Scotland. The research updates a previous study¹ examining Scotland's performance in the Commonwealth Games in two key respects. First, it includes the results of the Melbourne 2006 Commonwealth Games and thereby continues the time series analysis begun in the 2004 study. Second, and arguably more importantly, it makes a detailed comparison between Scotland's performance in 2006 compared with 2002. Of particular note in this regard are the comparisons made between:

- Scotland and other Commonwealth nations;
- Athletes representing Scotland in events for men, women, and men and women combined (mixed events); and
- Different sports or disciplines in which athletes representing Scotland competed in 2006 and 2002.

The significance of this research is that it looks at the third time that Scottish athletes have been supported by funding for elite athlete development programmes from the Sport Lottery Fund. It might be argued reasonably that rule changes to the use of Lottery funds in 1997 came too late to make a meaningful difference to Scotland's performance in Kuala Lumpur in 1998. However, for the first time it is possible to make comparisons between two editions of the Commonwealth Games in which Scotland's athletes have had the opportunity to benefit from elite athlete development programmes that have been in place for complete four year cycles. Thus in addition to updating an historical record of performance, this research also contributes to the forward planning of Scotland's performance in future editions of the Commonwealth Games. Furthermore, given that the City of Glasgow intends to bid for the rights to host the 2014 Commonwealth Games, some of the contextual material from this report may help stakeholders to appreciate the nature and scale of the event.

2. TERMS OF REFERENCE

The specific requirements of the research are detailed below and the results are presented in the same sequence.

- An overview of the Commonwealth Games held since 1950 covering the number of sports, the number of events, the number of athletes and the number of nations. Where data is available for Delhi 2010 it is included alongside the historical data.
- The number of nations winning a gold medal or any medal between 1950 and 2006 overall and by gender.
- Scotland's points through medals 1950 – 2006 where a gold medal equals three points, a silver two points and a bronze one point.

¹ **sportscotland** (2004) An analysis of Scotland's performance in the Commonwealth Games 1950 – 2002, **sportscotland**, Edinburgh.

- Scotland's overall market share 1950 – 2006 (where market share is defined as the percentage of points won expressed as a proportion of the total points available) and market share by gender.
- Detailed analysis of Scotland's performance in 2006 compared with 2002.
- Regression analysis to determine how Scotland performs relative to other medal winning nations on the basis of its macro level economic resources such as population and Gross Domestic Product.
- Time series performance analysis of Scotland compared with the other 'home nations' (England, Wales and Northern Ireland).
- Analysis of the sports Scotland has medalled in overall and by gender.
- Comparison of the sports Scotland has medalled in compared with selected other nations.
- Analysis of the medals won by Scotland in its three most successful sports.
- Breakdown of the number and proportion of medals won by gender for Scotland and the comparator nations.
- Breakdown of the number and proportion of medals won by type (gold, silver, bronze) for Scotland and the comparator nations.
- Breakdown of success for sports in which Scotland has won medals.
- Analysis of performance in events contested by Elite Athletes with a Disability (EAD events).

3. METHODOLOGY

The method used to compile this report was desk research whereby a programme of secondary analysis was conducted on the results' database of the Commonwealth Games from 1950 – 2006. The Commonwealth Games takes place every four years and thus the results are based on 15 editions of the event. The results for each edition were downloaded from either the official website of the Commonwealth Games (www.thecgf.com) or the official website of the 2006 Melbourne Games www.melbourne2006.com.au. Estimates for the Delhi 2010 Commonwealth Games have been accessed from www.cwgdelhi2010.com.

For each edition of the Commonwealth Games 1950 - 2006 we have disaggregated the overall final medal table into subsidiary tables such that it is also possible to view:

- overall performance by gender including mixed events;
- overall performance in specific sports or disciplines; and
- performance in specific sports or disciplines by gender where this is possible, for example athletics.

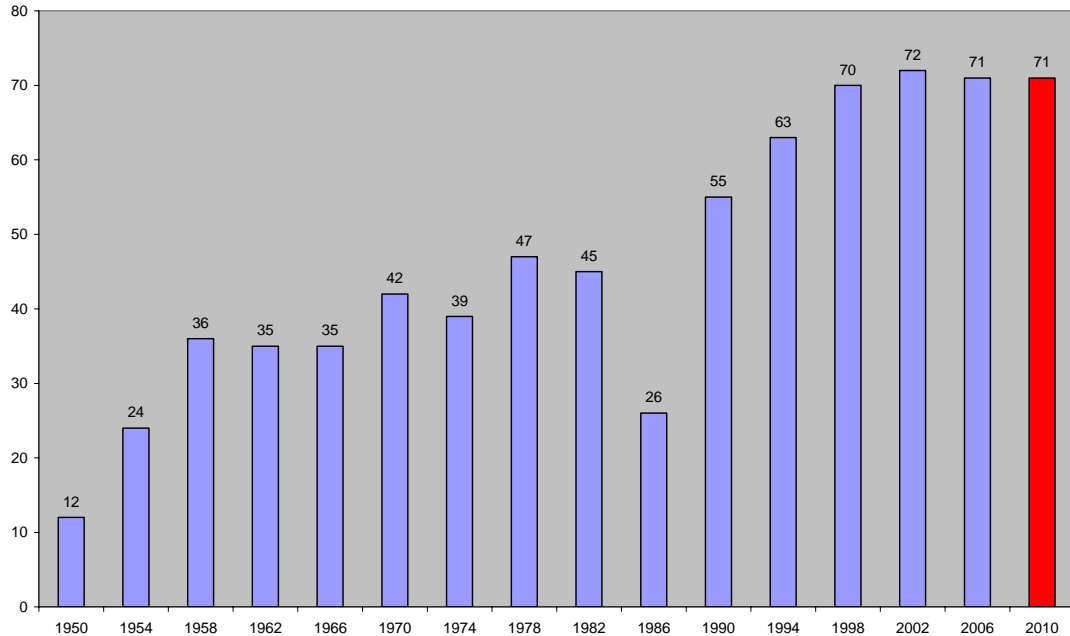
The disaggregated data by gender and sport has been fully reconciled back to the aggregate data and as such this report and the data it is based on supersedes all previous versions and derivatives.

4. RESULTS

4.1 The Commonwealth Games in context

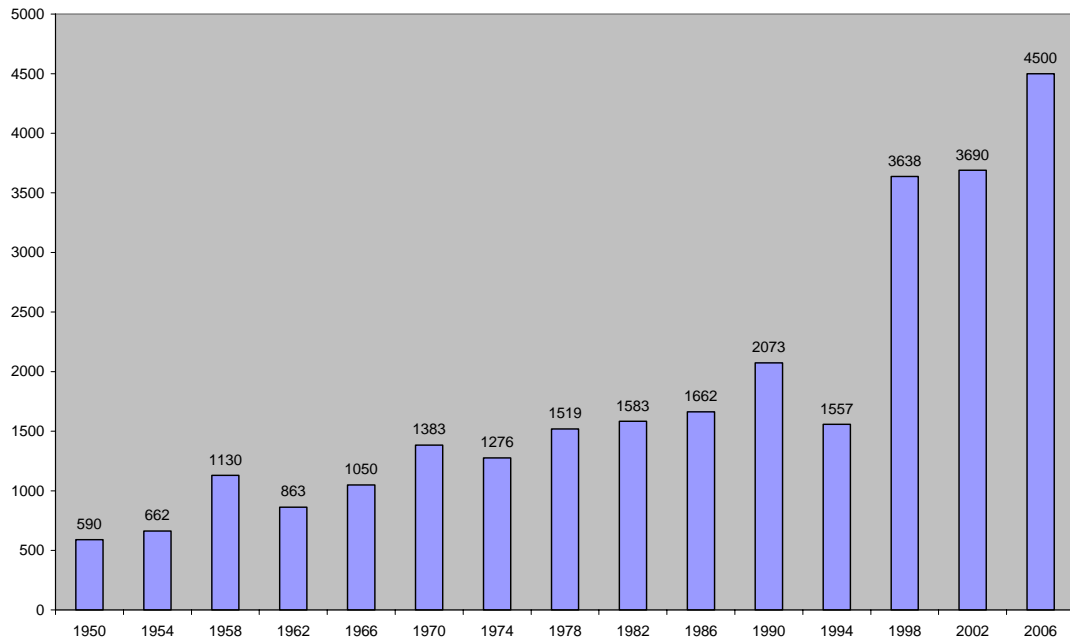
The substantive part of the context has been described in the 2004 report of which this current report is an update. Therefore only new data is included in this deliberately brief scene setting. In 2006 the Commonwealth was an alliance of 71 nations, crown dependencies and protectorates and one of the ways in which the alliance expresses itself is via a quadrennial Commonwealth Games. In 2006 all 71 nations took part in the event as shown in Graph 4.1 and Delhi is targeting full attendance in 2010.

Graph 4.1: The number of nations taking part in the Commonwealth Games



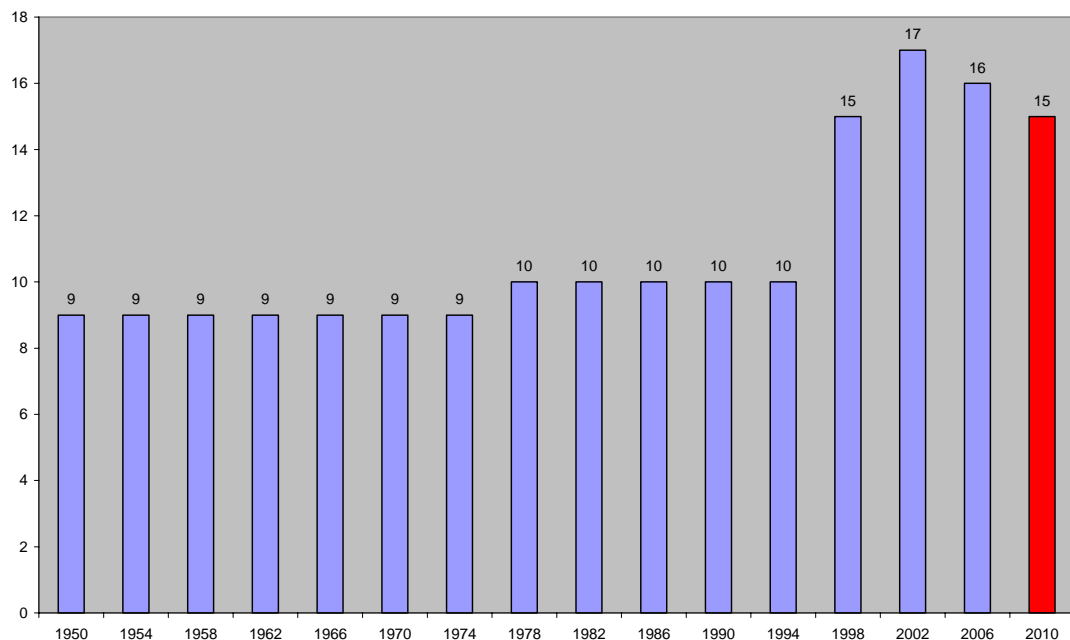
In the same way that the number of nations taking part in the Commonwealth Games has increased, so too has the number of athletes. In Melbourne 2006 4,500 athletes took part in the event which was by some margin the highest number of athletes ever to compete in the Commonwealth Games (see Graph 4.2). Organisers of Delhi 2010 are predicting that in 2010 there will also be around 4,500 athletes in attendance.

Graph 4.2: The number of athletes taking part in the Commonwealth Games



The number of sports contested at each edition of the Commonwealth Games since 1950 is shown in Graph 4.3 and shows considerable expansion from ten in 1994 to 16 in 2006 and an agreed 15 for 2010. Recent guidelines from the Commonwealth Games Federation post 2002 now state that there should be no more than fifteen sports on the overall programme, comprised of at least ten individual sports and no more than four team sports. This latter point was waived for Melbourne 2006 when the Australian authorities lobbied for the inclusion of basketball for the first time.

Graph 4.3: The number of sports contested at the Commonwealth Games

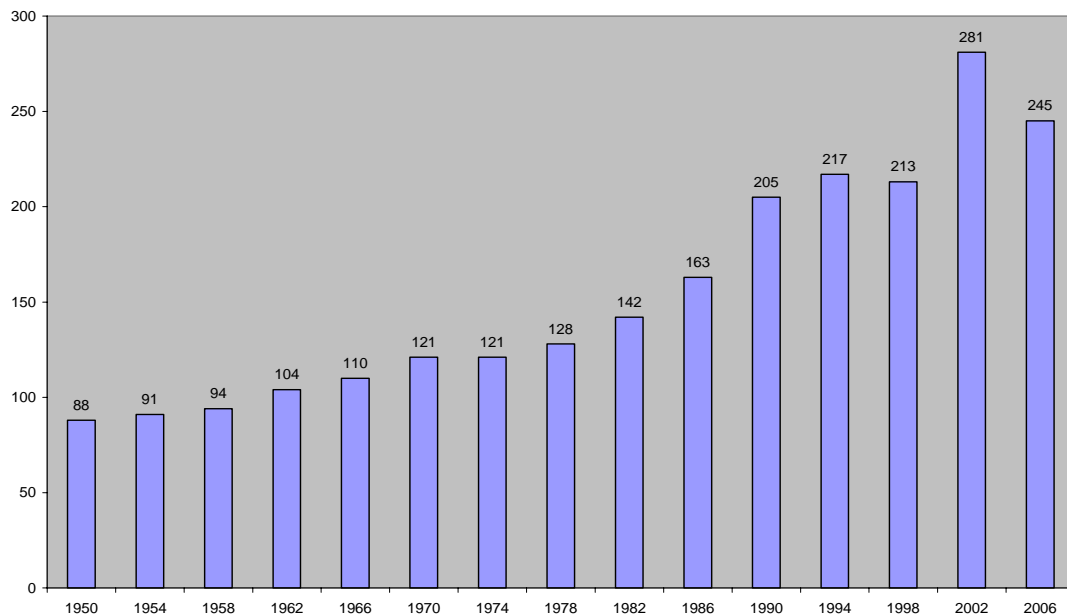


The choice of sports contested at each Commonwealth Games is set by the host city subject to a degree of constrained choice from a predetermined list of 'core' and 'approved' sports. The current core sports consist of athletics, aquatics (swimming, diving and synchronised swimming), lawn bowls, netball (for women) and rugby sevens (for men). These will all remain core sports until at least the 2014 Commonwealth Games.

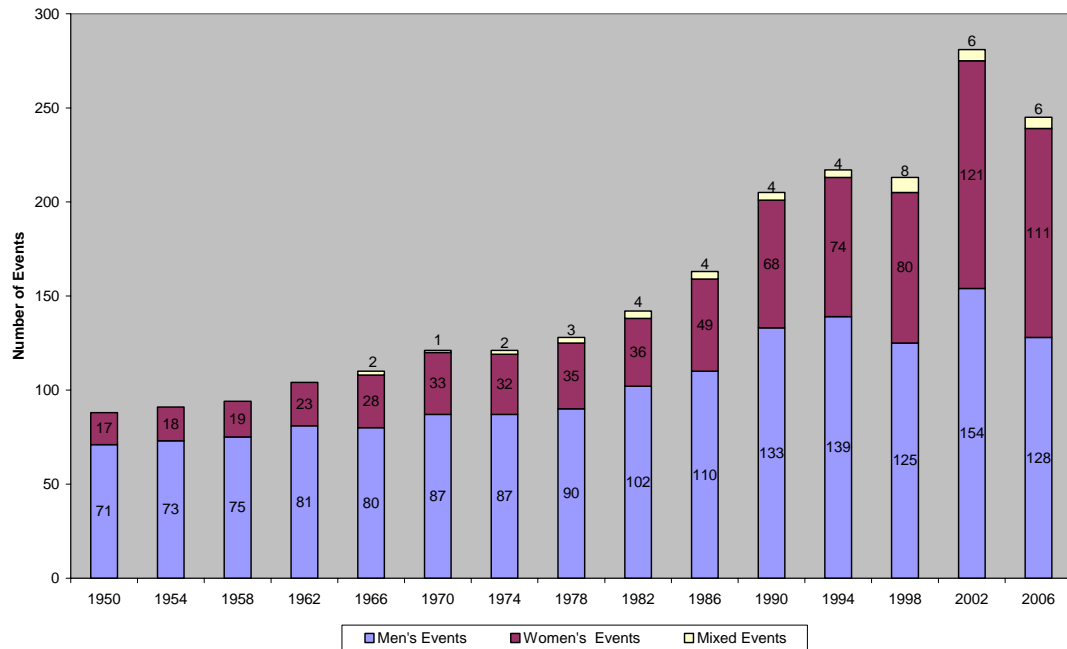
In addition to the core sports there is also an approved list of sports which can be contested subject to the parameters of at least ten individual sports and no more than four team sports being contested overall. The approved list of sports includes archery, badminton, billiards and snooker, boxing, canoeing, cycling, fencing, gymnastics, judo, rowing, sailing, shooting, squash, table tennis, tennis, tenpin bowling, triathlon, weightlifting and wrestling. Some of these approved sports are included frequently in the programme, for example boxing which has been contested at every Commonwealth Games, while others are technically permissible but have not yet featured in the event, for example sailing.

In addition to the increase in the number of sports contested at the Commonwealth Games there has also been an increase in the number of events which peaked at 281 in Manchester 2002 and subsequently fell to 245 in Melbourne 2006 (see Graph 4.4). The 245 events contested in Melbourne was the second highest number of events ever featured in a Commonwealth Games programme and is likely to be the benchmark total for 2010 and 2014.

Graph 4.4: The number of events contested at each Commonwealth Games



As was the case in the Olympic Games, early editions of the Commonwealth Games were dominated by events for men and only a minority of events were available for women. However, in recent times much of the expansion of the Commonwealth Games programme has been driven by an increase in the number of events contested by women. To illustrate this point Graph 4.5 analyses the number of events contested by men, women, and men and women (mixed events) between 1950 and 2006.

Graph 4.5: The number of events by gender

Although Graph 4.5 shows that the majority of events in the Commonwealth Games are still for men, much of the growth in the number of events contested overall has been driven by an increase in the number of events contested for women. In 1950, 81% of the 88 events were contested by men and 19% were contested by women. Over time the proportion of male events as a function of total events has steadily reduced such that in 2006 52% of events were contested by men, 45% were contested by women and 3% were contested by men and women on equal terms.

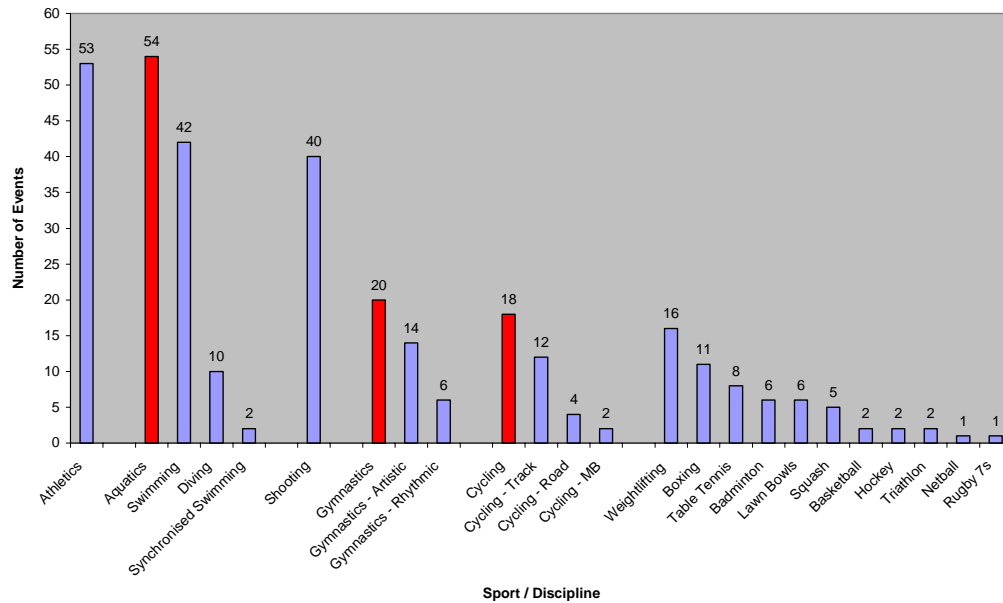
The number of events contested by women grew from 17 to 111 (553%) between 1950 and 2006 whereas during the same period the corresponding figures for men were an increase from 71 events to 128 (80%). As will be shown later in the report the most successful nations in the Commonwealth Games are those which have realised and capitalised on the growing importance of women's sport as a key driver of overall medal table success.

To complete the contextual analysis we examine the sports contested in Melbourne 2006 and the number of events contested in each sport. It is worth noting that the number of events in three sports (aquatics, cycling and gymnastics) are contested in disciplines as indicated below:

- Aquatics - swimming, diving and synchronised swimming;
- Cycling - track cycling, road cycling and cross country (mountain bike); and
- Gymnastics - artistic gymnastics and rhythmic gymnastics.

Graph 4.6 shows the sports and disciplines contested in 2006 along with the number of events in each sport or discipline. The red bars show the total number of medals available in sports which have sub disciplines. For example in aquatics the total of 54 events is explained by: 42 events in swimming, ten events in diving and two events in synchronised swimming.

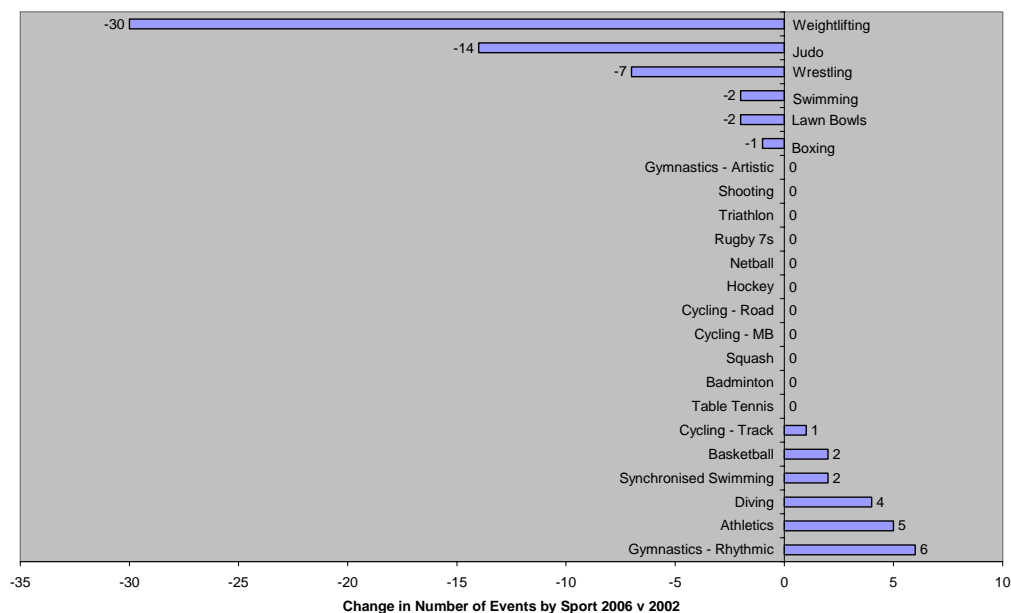
Graph 4.6: Sports, disciplines and the number of events contested in Melbourne 2006



The key point of note from Graph 4.6 is that the five sports of athletics, aquatics, shooting, gymnastics and cycling, including disciplines where appropriate, account for 76% of all events. Integrated within the number of events contested in athletics (6), swimming (4), weightlifting (1) and table tennis (1) are twelve events for Elite Athletes with a Disability.

Finally we examine in Graph 4.7 how the number of events contested in Melbourne 2006 differs from the total events contested in the previous edition of the Games, Manchester 2002.

Graph 4.7: The change in the number of events contested in 2006 compared with 2002



The key changes in the number of events can be explained by four key factors. First, variations to the number of events contested within sports or disciplines that were in both the 2002 and 2006 programmes. The most notable example of this point was rule changes to weightlifting whereby medals are awarded solely to the winners of an overall category (clean and jerk plus snatch combined) rather than to the winners of each component (clean and jerk, snatch, and clean and jerk plus snatch combined). This rule change has had the effect of reducing the number of events in weightlifting in 2006 by 30. Other, less extreme examples of reduced events for existing sports include: swimming (-2), lawn bowls (-2) and boxing (-1).

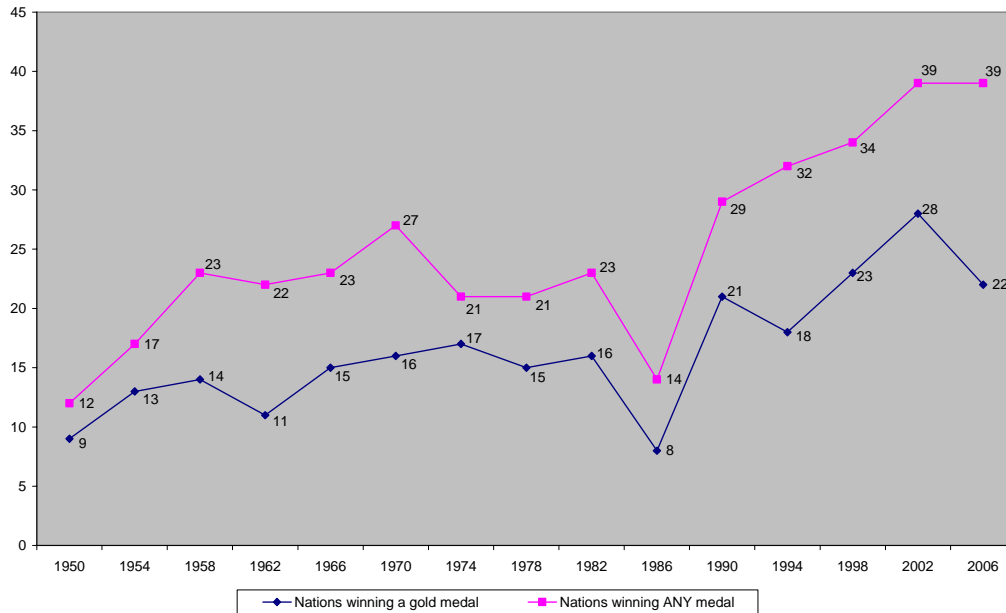
Second, the total elimination of events in particular sports arising as a result of those sports not being contested in 2006. Two sports are affected by this type of change, namely judo (-14 events) and wrestling (-7 events). Scotland performed particularly well in judo in 2002 winning ten of its 30 medals in this sport. Third, the extension of events in existing sports such as track cycling (1), diving (4) and athletics (5). The fourth and final key change is the inclusion of new sports (basketball, 2 events) and new disciplines such as synchronised swimming (2 events) and rhythmic gymnastics (6 events).

Key points

- The number of nations contesting the Commonwealth Games has increased from 12 in 1950 to full representation of all 71 nations in 2006.
- The number of athletes contesting the Commonwealth Games has increased from 590 in 1950 to 4,500 in 2006.
- The number of sports has increased from nine in 1950 to 16 in 2006. It is likely that future editions of the Commonwealth Games will have 15 sports.
- The number of events increased from 88 in 1950 to 245 in 2006. The 2006 total is likely to be the approximate number of events contested in 2010 and 2014.
- In 2006 five sports / disciplines (athletics, aquatics, shooting, cycling, and gymnastics) accounted for 76% of all events.
- The number of events contested by women increased from 17 (19%) in 1950 to 111 (45%) in 2006.
- Rule changes and alterations to the portfolio of sports and disciplines contested reduced the number of events in 2006 to 245 from 281 in 2002.

4.2 Evidence of increasing competition for medals?

The contextual material above suggests that competition for medals may have increased over time, by virtue of more nations and more athletes taking part in the Commonwealth Games. One way of quantifying evidence of increasing competition is to analyse the number of nations that have developed medal winning capability over time. Graph 4.8 presents a time series analysis of the number of nations winning a gold medal and a medal of any hue (i.e. gold, silver or bronze).

Graph 4.8: The number of nations winning a gold medal and any medal

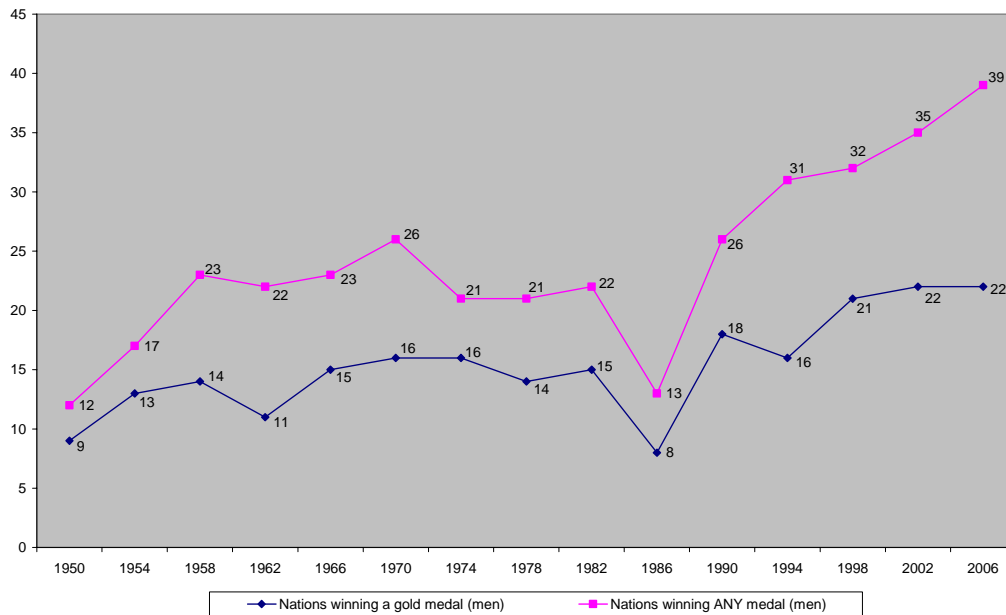
In 1950, nine nations won a gold medal and all 12 of the participating nations won a medal of any colour. In 2006 22 of the 71 nations taking part won at least one gold medal and 39 won at least one medal of any colour. The number of nations winning a gold medal has fallen to 22 from a peak of 28 in 2002 and this may in part be explained by the fact that in 2006 there were fewer events (36) than in 2002 and fewer medals contested (155). The number of nations winning any medal in 2006 remained static at the all time high of 39 originally set in 2002.

The reduction in the number of nations winning a gold medal in 2006 cannot be wholly explained by the reduction in the number of events. In 1998 213 events were contested and 23 nations won a gold medal which is more gold medal winning nations and fewer events than in 2006. An alternative interpretation of the data in Graph 4.8 is that a minority of nations have become increasingly dominant in the Commonwealth Games. These tend to be nations which take a state sponsored approach to elite sports development, notably Australia, the nations that comprise the United Kingdom of Great Britain and Northern Ireland, Canada and India.

As these nations invest escalating sums of money into elite sport development systems to fuel their demand for success whilst the supply of success (medals) falls or remains static, the net result is an increase in the price of success. Any increase in the price of success penalises smaller, less wealthy nations who are unable to match the investment of their wealthier peers. Thus it might be reasonable to expect a fall in the number of nations with genuine gold medal winning capability.

To identify potential trends of increasing competition at a disaggregated level, we have replicated the analysis shown in Graph 4.8 by gender to see if there are any differences from the overall picture.

Graph 4.9: The number of nations winning a gold medal and any medal: men

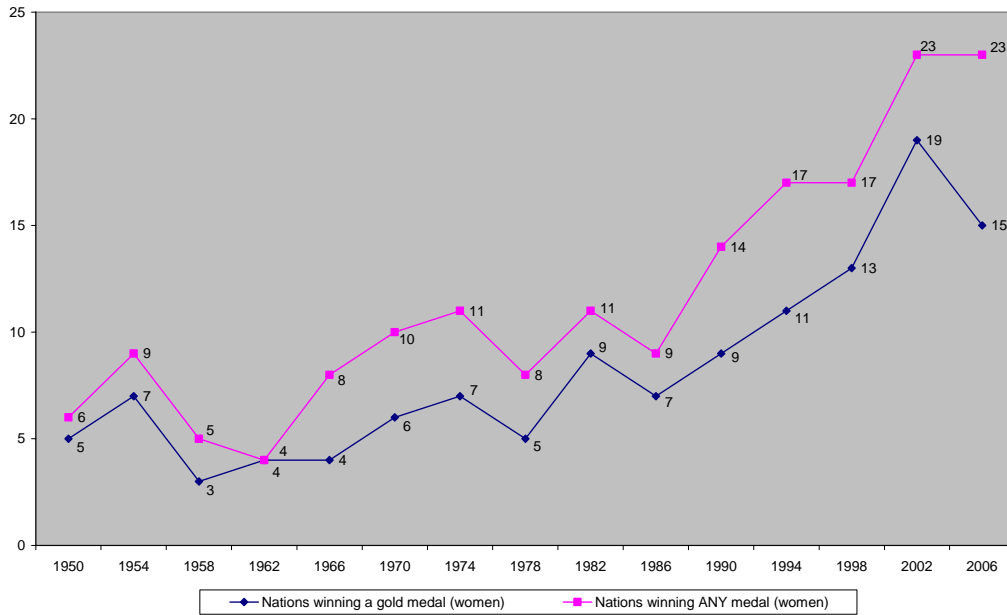


Graph 4.9 reveals that although the trend for nations winning medals in men's events is largely comparable to the overall trend, the findings for Melbourne 2006 are different. The number of nations winning a gold medal in 2006 is static at the peak score of 22 set in 2002. Furthermore, the number of nations winning a medal of any description has increased to a new record of 39 in 2006 from 35 in 2002. Thus as far as events for men are concerned, there is no evidence of a few nations becoming increasingly dominant and taking a greater share of the medals available.

The findings and interpretation of Graphs 4.8 and 4.9 suggests that the reduction in the number of nations winning a gold medal and the static nature of nations winning any medal must have driven developments in events for women. To test this view, Graph 4.10 illustrates the time series analysis for nations winning gold and any medals in women's events.

In 2006 15 nations won a gold medal in women's events, a reduction of four on the peak score of 19 in 2002. The number of nations winning any medal in 2006 in women's events remained the same as the 2002 peak of 23. It is now clear that the reduction in the number of nations winning a gold medal has been driven by developments in women's sport.

Graph 4.10: The number of nations winning a gold medal and any medal: women



Analysis of the medal tables for Melbourne 2006 and Manchester 2002 confirms that Australia's women athletes won more medals from fewer events in 2006 than 2002 as shown in Table 4.1.

Table 4.1: The performance of Australia's women athletes 2002 and 2006

| | Events | Gold | Silver | Bronze | Total | Points | Market Share % |
|----------------|--------|------|--------|--------|-------|--------|----------------|
| Australia 2002 | 121 | 36 | 33 | 34 | 103 | 208 | 28% |
| Australia 2006 | 111 | 47 | 40 | 30 | 117 | 251 | 38% |

In 2002 Australia achieved a market share of 28% and subsequently increased this to 38% in 2006. This level of dominance in a multi-sports event by one nation in women's sport has not been seen since East Germany dominated women's events in the Olympic Games from 1968 to 1980. Clearly the Australian sport agencies have realised the significance of women's sport and have put in place strategies to achieve competitive advantage in this area.

In short it is possible for competition to increase in two ways. First, if the number of nations developing medal winning capability increases it can be argued that competition is increasing. Second, if a nation is becoming increasingly dominant by producing increasing numbers of medal winners, competition can also be said to have increased because higher standards have resulted in medals becoming increasingly difficult to win.

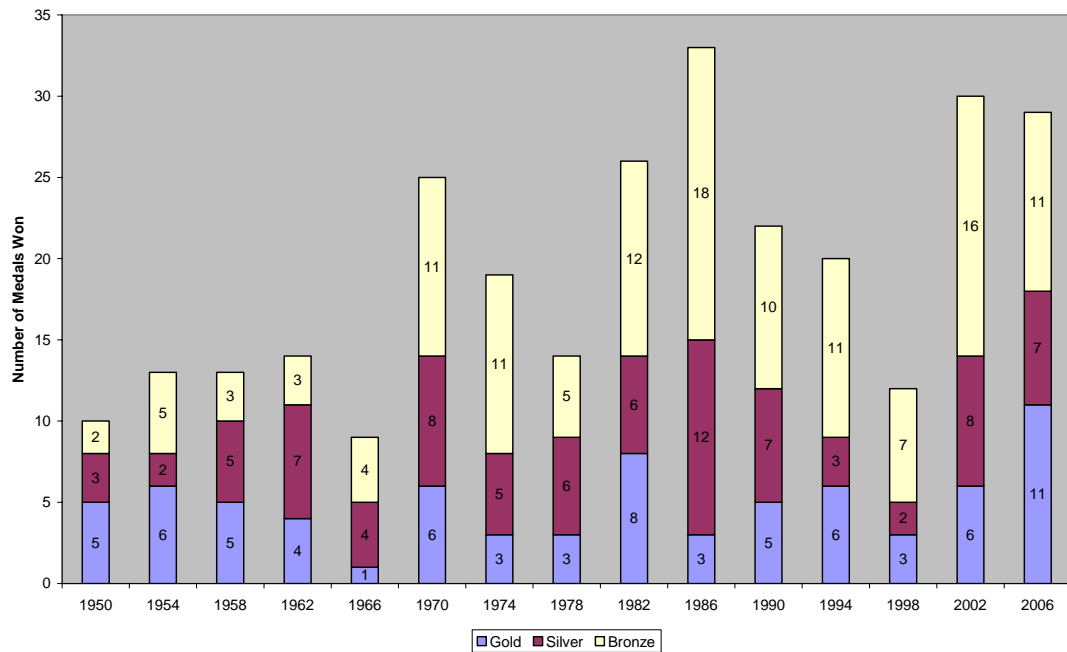
Key points

- Competition, defined by the number of nations capable of winning medals, has decreased for gold medals and remained static for any medals. However, there is a marked difference in the number of nations winning medals when analysed by gender.
- In men's events the number of nations winning a gold medal in 2006 is static but there has been an increase in the number of nations winning any medal.
- In women's events the number of nations winning a gold medal in 2006 has fallen by four and the number of nations winning any medal is static.
- Australia is identified as having become increasingly dominant in women's events in the Commonwealth Games between 2002 and 2006.

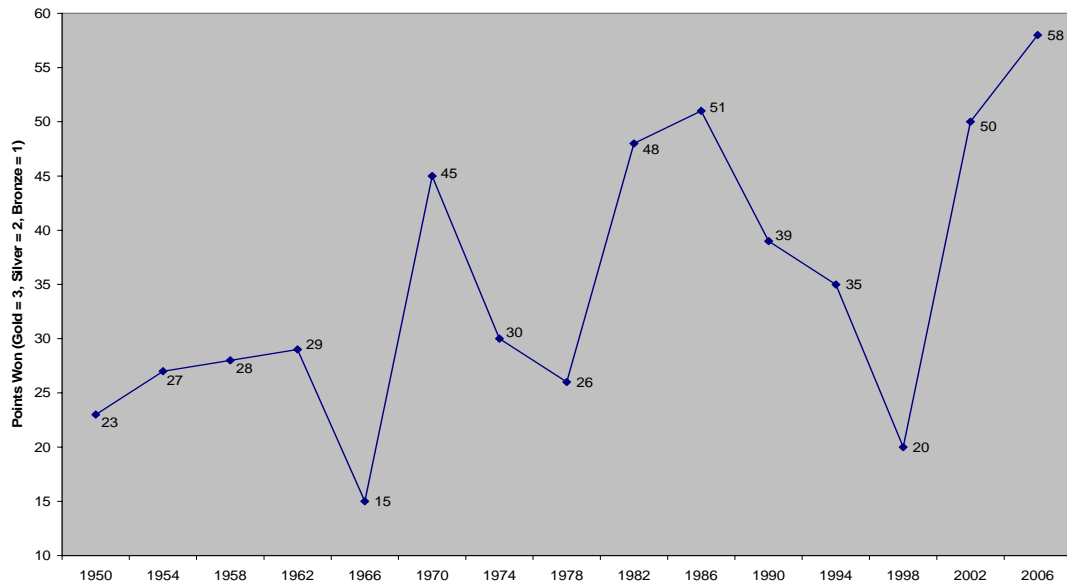
4.3 Scotland's performance in the Commonwealth Games

Scotland's overall performance by edition of the Commonwealth Games between 1950 and 2006 is shown in Graph 4.11

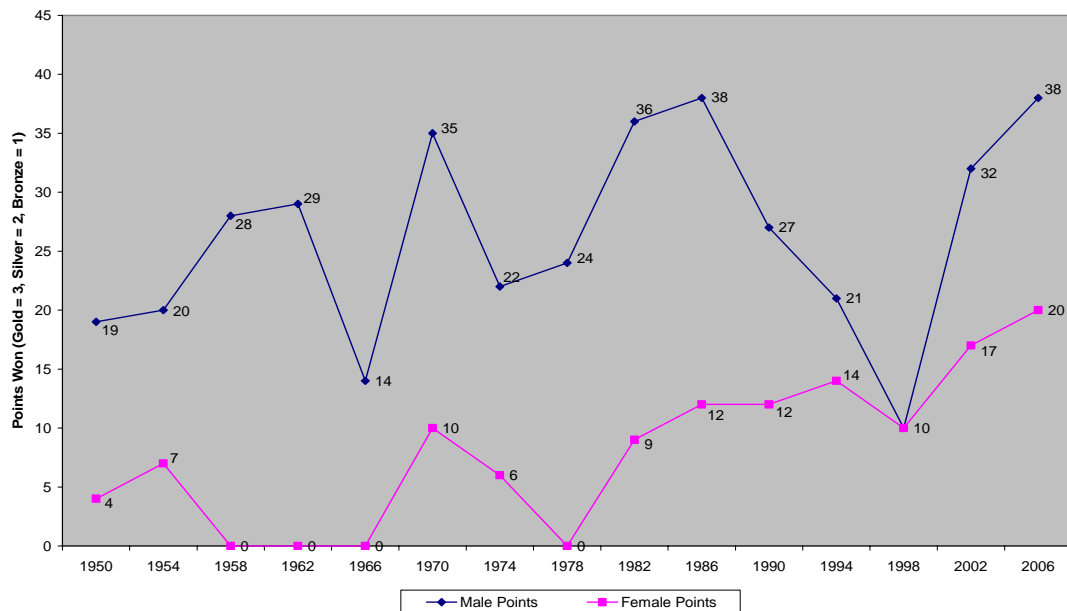
Graph 4.11: Scotland's medal winning performance by edition



Scotland is identified as having had a particularly successful Commonwealth Games in 2006 with 11 gold medals being its highest level of achievement to date. The total of 29 medals won was bettered only in 2002 (30 medals) when 155 more medals were contested and in 1986 (33 medals) where competition was reduced by a boycott and Scotland enjoyed home advantage. The key point of note about 2006 is the quality of medals won, particularly the proportion of gold medals (38%) relative to 1986 (9%) and 2002 (20%). This change in the quality of medals won in 2006 is illustrated to good effect when the medals won are converted into a 'points' score where gold = 3, silver = 2 and bronze = 1 as shown in Graph 4.12.

Graph 4.12: Scotland's points 1950 – 2006

Graph 4.12 confirms that when medals are converted to points, 2006 was indeed Scotland's best performance in the Commonwealth Games since 1950. In 2006 Scotland shows an increase in the number of points won on two consecutive occasions for the first time since 1962. This improvement coincides with the availability of Lottery funding to support elite athlete development programmes. Although in overall terms Scotland has shown continuous improvement in points won, sub analysis by gender reveals some interesting differences between the performance of Scotland's male and female athletes (see Graph 4.13).

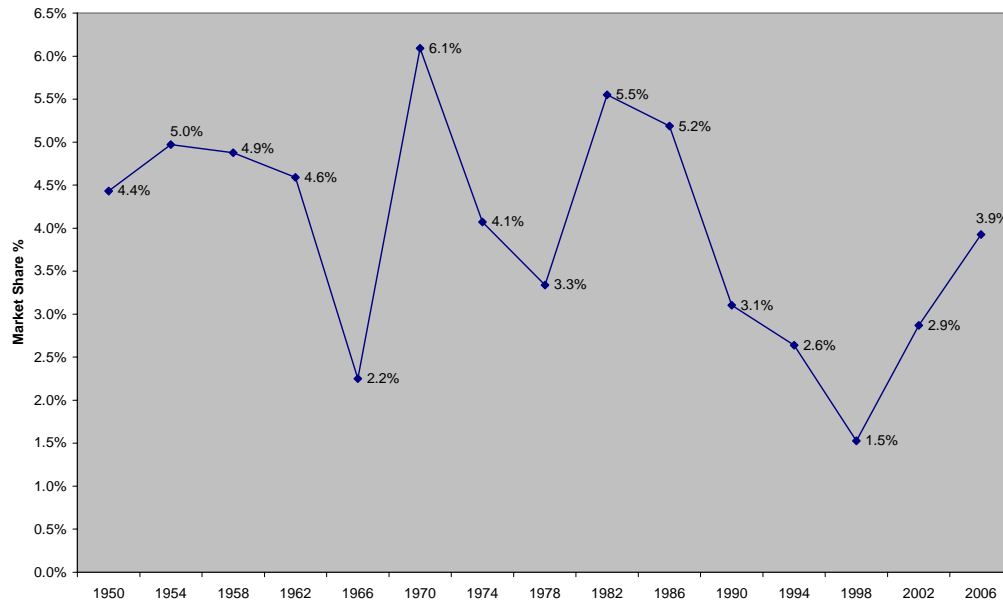
Graph 4.13: Scotland's points sub analysed by gender from 1950 - 2006

Much of the decline in Scotland's performance from 1986 to 1998 can be attributed to a reduction in success for male athletes whose points won fell from 38 in 1986 to ten in

1998. During the same period Scotland's women athletes were on a growth trend from 12 points (1986) to 14 points (1994) and suffered a reversal to ten points in 1998. In the two Commonwealth Games since 1998 Scotland's recovery has been led by male athletes whose rate of improvement has on both occasions been steeper than that for female athletes.

Examining points won in isolation is of limited value because the number of events has been different in 14 of the 15 editions since 1950. Thus it would be unwise to assume that the points won in one edition is a greater achievement than the points won in another edition without taking into account points available. The relationship between points won and points available is called 'market share' and is the only measure of performance which enables time series comparisons to be made on a standardised (or like for like) basis. Scotland's market share for the period 1950 to 2006 is shown in Graph 4.14.

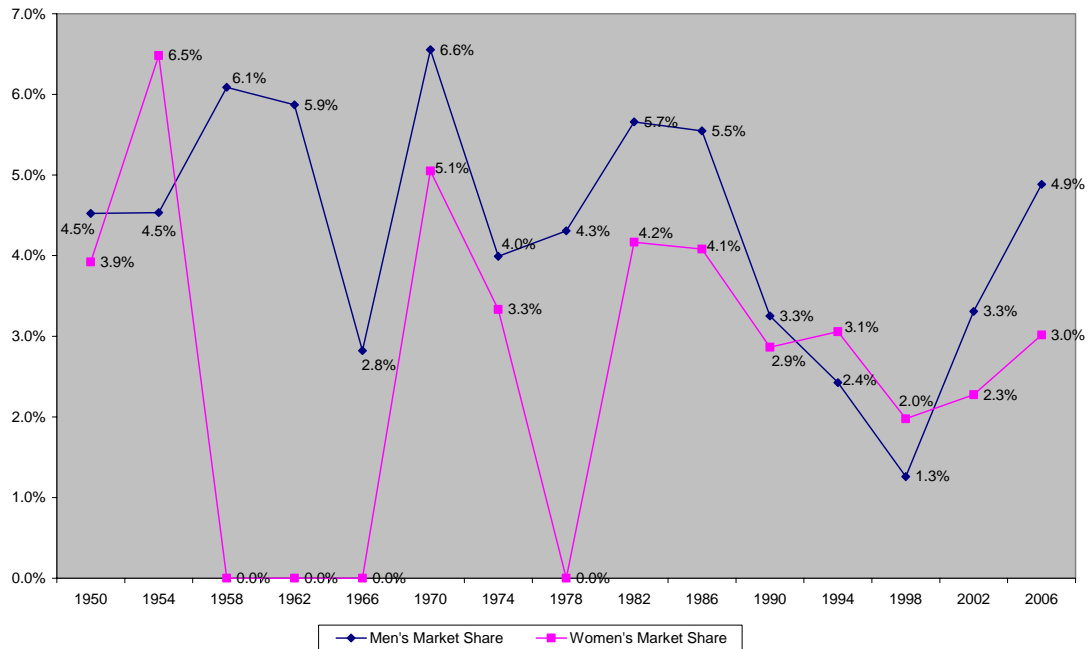
Graph 4.14: Scotland's market share 1950 - 2006



The market share trend line confirms the interpretation of Graph 4.11, notably Scotland's recovery to a market share of 3.9% in 2006 from an all time low of 1.5% in 1998. However, given that all of the points in Graph 4.14 are standardised, it can be argued reasonably that the improvements of 2002 and 2006 represent a recovery to levels that were attained on a regular basis in the past. Excluding 2006, Scotland has enjoyed a market share of 3.9% or more on 8/14 occasions and a market share of less than 3.9% on 6/14 occasions. However, the increase in nations taking part in the Commonwealth Games, particularly since 1986, has arguably increased competition and therefore resulted in medals being more difficult to win.

It is notable that the increases in market share between 1998 and 2006 are the only occasions when Scotland has increased market share over two consecutive editions of the Commonwealth Games.

At aggregate level, market share masks the difference in achievement between men and women. Graph 4.15 addresses this issue by showing time series analysis of market share sub-analysed by gender and edition.

Graph 4.15: Scotland's market share by gender

Graph 4.15 illustrates market share for Scotland's male and female athletes between 1950 and 2006. The main finding is men have out performed women on 12/15 times; women have out performed men on 3/15 times (1954, 1994 and 1998). As will be shown in greater depth later, Scotland is over reliant on male athletes for its success in the Commonwealth Games.

Scotland's recovery from 1998 is shown to have been driven primarily by success in men's events as the slope of the market share lines for men and women post 1998 is significantly steeper for men than women. This means that men's performance has improved at a greater rate than has been the case for women. For the most successful nations in the Commonwealth Games, notably Australia, the reverse is true.

Key points

- Scotland won more gold medals (11) in 2006 than at any previous edition of the Commonwealth Games since 1950.
- The 29 medals won by Scotland in 2006 convert into Scotland's highest ever 'points' total, which was primarily driven by the high proportion (38%) of gold medals won.
- When analysed on a standardised basis Scotland's market share for 2006 is 3.9% and is the highest score achieved since 1986.
- Male athletes representing Scotland consistently out perform their female counterparts and have led the recovery in performance since 1998.

4.4 Detailed analysis of Scotland's performance in 2006 compared with 2002

In this section we analyse in detail Scotland's performance over the period 2002 to 2006. A useful starting point is to consider how the top nations and selected others performed according to four separate measures of performance namely: final position in the overall medal table; total medals won; points value of medals; and market share percentage. Table 4.2 summarises these four measures and the direction of their change between 2006 and 2002.

Table 4.2: The top nations in 2006 using four different performance measures

| Nation | Medal Table (2006,2002) | Total Medals (2006,2002) | Points (2006,2002) | Market Share (2006,2002) |
|------------------|------------------------------------|-------------------------------------|-------------------------------|-------------------------------------|
| Australia | Same (1st, 1st) | Better (221, 207) | Better (458, 433) | Better (31%, 25%) |
| England | Same (2nd, 2nd) | Worse (110, 266) | Worse (222, 326) | Worse (15%, 19%) |
| Canada | Same (3rd, 3rd) | Worse (86, 118) | Worse (167, 221) | Worse (11%, 13%) |
| India | Same (4th, 4th) | Worse (50, 69) | Worse (111, 151) | Worse (9%, 8%) |
| South Africa | Better (5th, 6th) | Worse (38, 46) | Worse (75, 84) | Better (5.1%, 4.8%) |
| Scotland | Better (6th, 10th) | Worse (29, 30) | Better (58, 50) | Better (3.9%, 2.9%) |
| Jamaica | Better (7th, 13th) | Better (22, 17) | Better (46, 31) | Better (3.1%, 1.8%) |
| Malaysia | Same (8th, 8th) | Worse (29, 34) | Worse (55, 57) | Better (3.7%, 3.3%) |
| New Zealand | Worse (9th, 5th) | Worse (31, 45) | Worse (55, 80) | Worse (3.7%, 4.6%) |
| Kenya | Better (10th, 12th) | Better (18, 16) | Better (35, 31) | Better (2.4%, 1.8%) |
| Singapore | Better (11th, 14th) | Better (18, 13) | Better (34, 23) | Better (2.3%, 1.3%) |
| Wales | Worse (13th, 9th) | Worse (19, 31) | Worse (56, 30) | Worse (2.0%, 3.2%) |
| Northern Ireland | Worse (25th, 17th) | Worse (2, 5) | Worse (4, 11) | Worse (0.6%, 0.3%) |

Table 4.2 illustrates that in terms of medal table ranking there was no change in the performance of the top four nations despite Australia improving on all other measures and the other three nations all deteriorating. Clearly it is not possible for Australia to improve on first place in the medal table. Nonetheless, as its market share has increased and its top three rivals exhibit decreased market share it can be argued that Australia increased its dominance in the Commonwealth Games in 2006. To a certain extent this might be expected given home advantage and the degree of influence the host city has over the sport programme. However, the superiority of Australia's elite sport development systems should not be underestimated as they have been proven to be consistently capable of producing medal winners in a variety of sports at World and Olympic levels.

Jamaica is identified as the most improved nation in 2006 having climbed from 13th place in the medal table to 7th. Along with Kenya and Singapore, Jamaica is one of only a few nations to have improved on all four measures of performance shown in Table 4.2.

Scotland is identified as the second most improved nation having moved from 10th to 6th place in the medal table rankings. Despite winning one less medal in 2006 than 2002, Scotland scored more points and a higher market share in 2006 compared with 2002 for two key reasons. First, the quality of medals won by Scotland in 2006 was vastly superior (more gold and less bronze) than 2002. Second, the number of events was fewer in 2006 than 2002 resulting in the higher number of points converting into an even higher market share percentage.

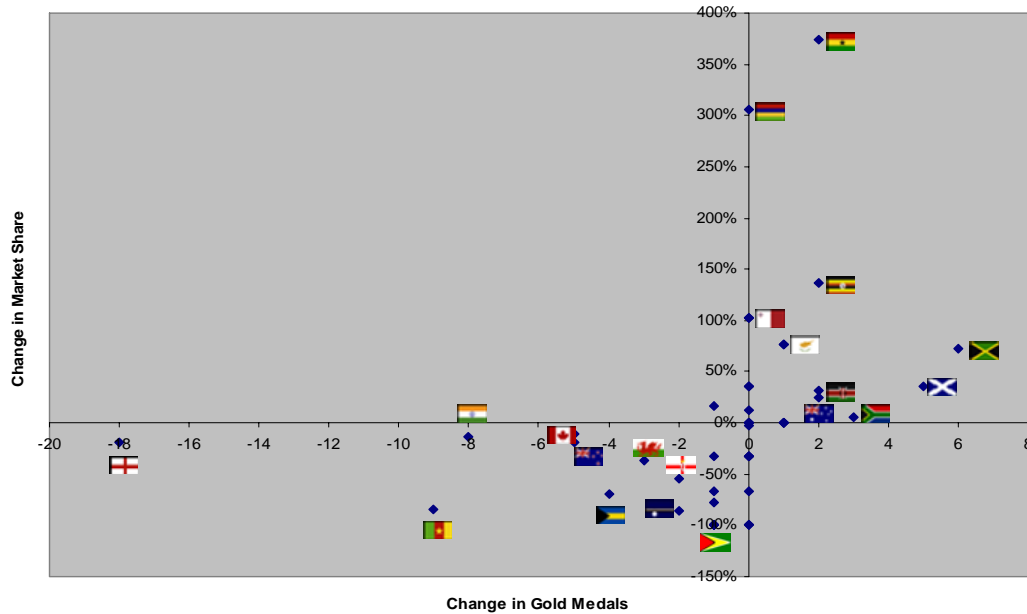
New Zealand is identified as the worst performing top nation having fallen four places in the medal table from 5th to 9th and showing a deterioration on all other measures. Other nations showing a similar trend to New Zealand include Wales and Northern Ireland.

An alternative way of looking for improving and deteriorating nations is to plot the change in medals won against change in market share. In Graph 4.16 we have plotted the change in the number of gold medals won against market share and this confirms Jamaica and Scotland as the two most improved nations with both experiencing an increase in gold medals won (six and five respectively) and an increase in market share (75% and 37% respectively).

Bearing in mind that there were 36 less gold medals awarded in 2006 compared with 2002, any nation showing an absolute increase in gold medals must have performed particularly well. In this regard the performance of Australia which won two more gold medals in 2006 than in 2002 is particularly noteworthy.

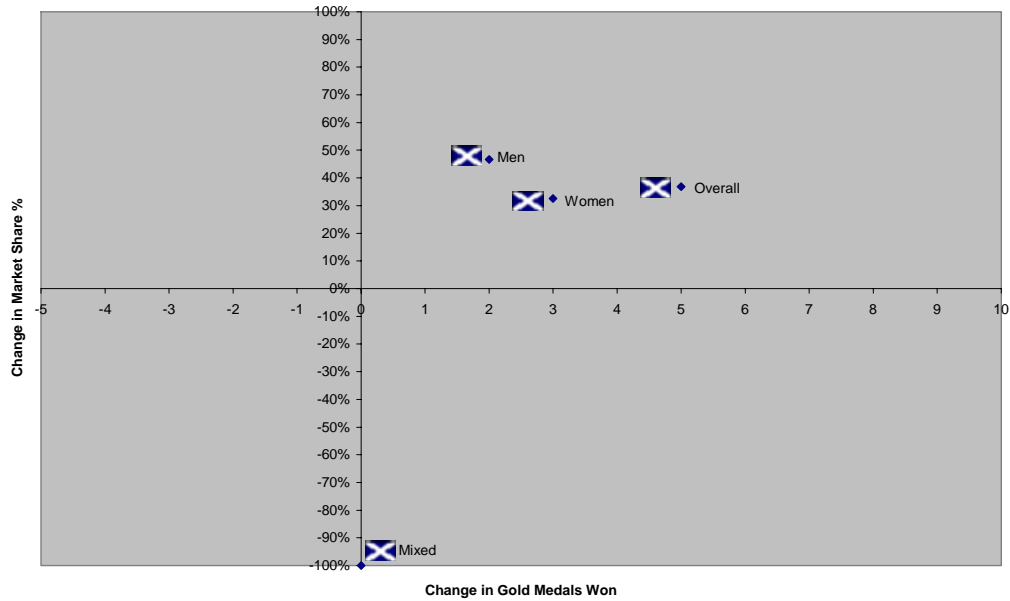
If some nations increase their share of gold medals, it follows that others must decrease their share. England (-18), Cameroon (-9), India (-8), Canada (-5) and New Zealand (-5) are all identified as nations that lost gold medals and market share in 2006. Amongst the other home nations, both Wales (-3) and Northern Ireland (-2) also lost gold medals and market share.

Graph 4.16: Change in gold medals won against change in market share 2002 - 2006



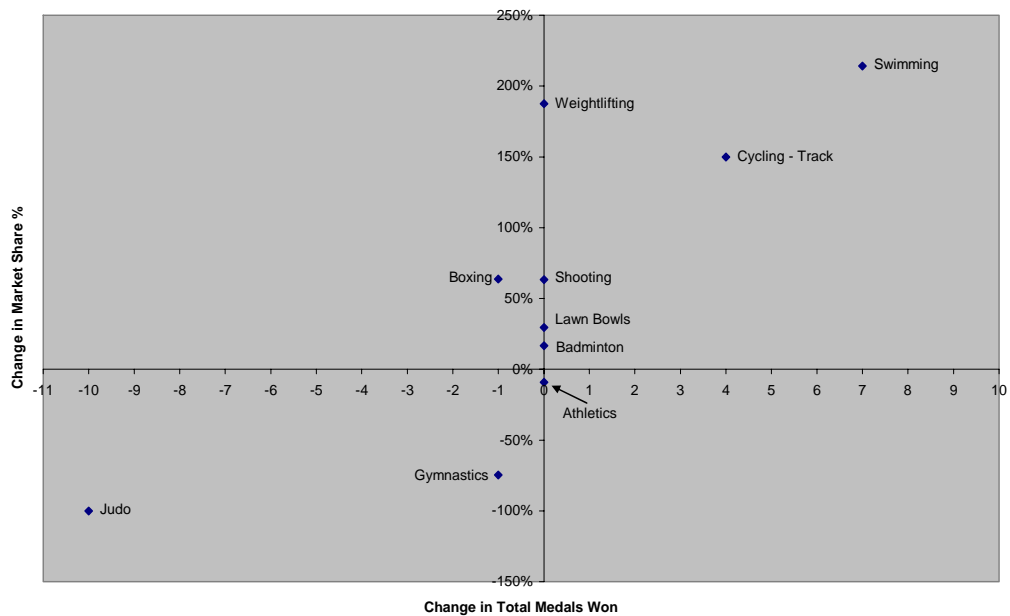
In the same way that the data in Graph 4.16 can be used to diagnose overall performance, it can also be used to identify relative performance by gender and by sport / discipline. In Graph 4.17 Scotland's performance in events for men, women and mixed / open categories is plotted as per Graph 4.16.

Graph 4.17: Scotland's change in gold medals won against change in market share by gender 2002 - 2006



In Graph 4.17 it can be seen that Scotland increased its number of gold medals won by five and its market share by 37%. Men won two more gold medals in 2006 compared with 2002 and increased their market share by 47%. By contrast women won three more gold medals and increased market share by 33%. These findings provide further evidence that Scotland's resurgence has been led by male athletes.

Graph 4.18 Scotland's change in total medals won against change in market share by sport 2002 - 2006



When analysing changes in performance by sport, as shown in Graph 4.18, it can be seen that there are various clusters of performance. Swimming and track cycling both increased

their number of medals won and their market share. Consequently they are identified as Scotland's two best performing sports in 2006 compared with 2002. Weightlifting, shooting, lawn bowls and badminton all won the same number of medals in 2006 as in 2002 but increased their market share. This means that the quality of medals won in these sports must have increased. Athletics won the same number of medals in 2006 as in 2002 but market share fell, which means that the quality of medals won must have fallen or the number of medals available must have increased. Boxing won one medal less in 2006 compared with 2002 but the medal won was a gold medal which is arguably better than the two bronze medals won in 2002 and hence market share increased. By contrast gymnastics experienced both a reduction in the quantity and quality of medals won. Finally, judo was not contested in 2006 and thus (mathematically) there is a loss of all ten medals and 100% of market share in 2006.

Key points

- Scotland is identified as the second most improved nation in the Commonwealth Games in 2006 compared with 2002. Jamaica was the most improved nation.
- Scotland's increase in market share is confirmed as having been led by male athletes despite female athletes increasing their number of gold medals by three compared with two by men.
- At a sport / discipline level swimming and track cycling are the two key drivers of Scotland's success with both recording an increase in medals won and market share.

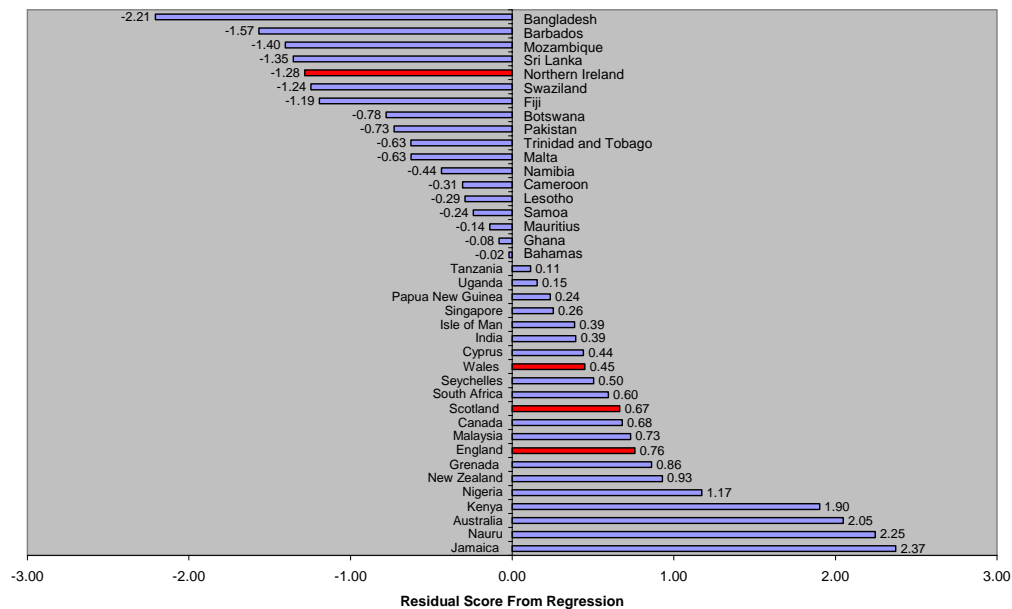
4.5 How does Scotland perform relative to how it might be expected to perform?

In section 4.4 it was shown that 2006 was a year of considerable improvement for Scotland. However, a key question to answer is how does Scotland perform relative to how it might be expected to perform? We have tackled this question in two ways.

First using regression analysis on macro economic indicators such as population, Gross Domestic Product (GDP) and GDP per capita for all nations which won a medal in Melbourne 2006, we have quantified the extent to which nations over or under perform relative to their economic resources. This type of analysis has been used many times on performance in the Olympic Games but we are unaware of its application previously to the Commonwealth Games.

Second, for the four home nations of England, Scotland, Wales and Northern Ireland we have computed the relationship between actual and expected market share on the basis of each nation's population. This analysis enables us to identify if any home nation is relatively more efficient than any other in terms of producing medal winning elite athletes.

In terms of the regression analysis we sourced the population and GDP data from the CIA World Fact Book where possible and where there was missing data it was found from official sources for the nations concerned. The basic finding from the regression analysis is that 57% of success as defined by market share can be predicted by the macro economic variables used in the regression analysis. This finding is highly comparable with the regression analyses conducted on the summer Olympic Games, where the same macro economic variables tend to account for around 54% of medal winning nations' success. Some nations perform better than their macro economic resources might predict and others perform worse. The difference between a nation's actual score and expected score is termed its 'residual' score. The residual scores for all 39 medal winning nations in Melbourne 2006 are shown in Graph 4.19.

Graph 4.19: The residual scores for medal winning nations in Melbourne 2006

Scotland is identified as having a positive residual score of 0.67 which means that its performance in 2006 was better than might have been expected on the basis of macro economic variables. Scotland performed relatively better than Wales (0.45) but less well than England (0.76) on this basis. England, Scotland and Wales all have positive residuals and Northern Ireland is the only home nation with a negative residual score (-1.28).

Northern Ireland is widely thought to have had a 'bad' Commonwealth Games winning only two medals and failing to win a gold medal for only the second time since 1954. This is reflected in the negative residual score which can be interpreted as Northern Ireland failing to punch its weight in terms of medal winning success given the resources at its disposal. In other words, in Melbourne 2006 Northern Ireland was an inefficient producer of medal winning elite athletes. By contrast, there has been something of a public outcry in New Zealand over perceived poor performance in Melbourne. The regression analysis in Graph 4.19 indicates that despite perceived failure, New Zealand performed better than its economic wealth might otherwise indicate.

Jamaica which has already been identified as the most improved nation in 2006 (Graph 4.16) has the highest residual score (2.37) and Australia, which was the most successful nation in terms of actual medals won and market share, has the third highest residual score (2.05).

From a policy perspective Graph 4.19 serves a useful purpose for those concerned with elite sport in Scotland. The reason why some nations have higher than predicted residual scores is arguably attributable to the quality of their elite sports development systems. In the short term Scotland will not increase its macro economic resources significantly and therefore the only way in which the success of 2006 can be built upon is for greater rates of improvement in its elite sports development systems than its near rivals.

This means that rather than being concerned about investment levels made in elite sport relative to what Scotland has done in the past, the concern should focus on what Scotland is investing now relative to its near rivals. To achieve improvement from 6th to 5th place in 2010, that is to win more gold medals than South Africa, will require not only maintenance of current performance but also further improvement.

As an alternative way of examining relative performance of nations we have compiled a time series analysis of the market share achieved by the four home nations over the period 1950 to 2006 relative to their respective populations. To illustrate how the calculation has been made, Table 4.3 shows the relevant data for 2006.

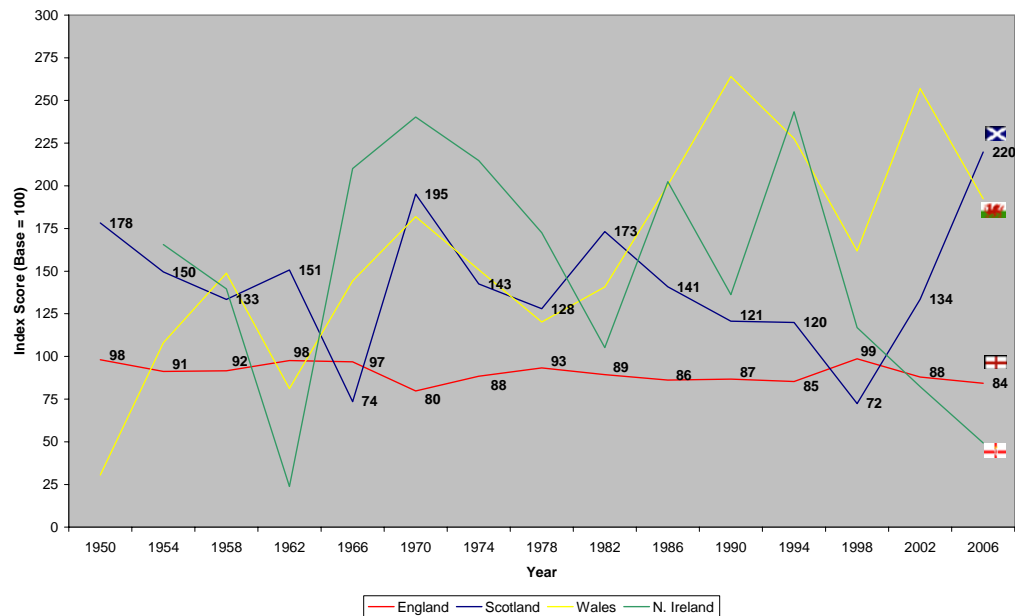
Table 4.3: Index of market share achieved relative to population

| 2006 | Population | % of Pop. | Market Share % | % of M/S | Market Share % to Population % Index |
|------------|------------|-----------|----------------|----------|--------------------------------------|
| England | 50.3m | 83.8% | 15.0% | 70.8% | 84 |
| Scotland | 5.0m | 8.4% | 3.9% | 18.4% | 220 |
| Wales | 2.9m | 4.9% | 2.0% | 9.4% | 192 |
| N. Ireland | 1.7m | 2.9% | 0.3% | 1.4% | 49 |
| Totals | 59.9m | 100% | 21.2% | 100% | 100 |

Population % to Market Share % Index for England = $((70.8/83.8)*100) = 84$

If the four home nations win market share in proportion to their populations, then each nation would receive an index score of 100. However, in Table 4.3 it can be seen that England and Northern Ireland under achieved in 2006 and that Scotland and Wales over achieved. A full time series analysis of this indicator is shown in Graph 4.20.

Graph 4.20: Time series analysis of market share relative to population



England has never quite punched its weight (a score of 100 or more) in the Commonwealth Games, with the best score achieved to date being 99 in 1998. This suggests that the other home nations must perform proportionately better than their population levels relative to England. There is a random pattern of how the smaller home nations perform relative to each other and to England. For example in 1998 Scotland was the only under performing nation; in 2002 Wales and Scotland over performed whilst Northern Ireland under performed; in 2006 Scotland over performed at an increasing rate, Wales over performed at a decreasing rate and Northern Ireland under performed at an increasing (i.e. worsening) rate.

Peaks in Northern Ireland's success around 1970 can be explained by the Mary Peters era. Recent over performance by Wales is in part explained by the Colin Jackson era. In the case of Scotland in 2006, three swimmers, Caitlin McClatchey, Gregor Tait and David

Carry, all won two gold medals each which is an unusual level of performance. When the performance of Scotland's swimmers is linked to successes in other sports and an all time record of 11 gold medals, the reason for an index score of 220 in 2006 can be understood. A salutary note to sport administrators in Scotland is that the 2006 level of performance is unprecedented and has created the first ever case of improvement in two consecutive Commonwealth Games. Improving on 2006 will be a tough act to follow in 2010.

Key points

- In 2006 Scotland over performed relative to how its macro economic resources predicted.
- Relative to the other home nations, Scotland was the best performing nation when linking market share to population.
- The key point arising from the regression analysis and the population to market share analysis is that 2006 will be difficult for Scotland to emulate in 2010.
- We hold this view because the resources and systems in place in 2006 performed at unprecedented levels. Unless there is investment in the systems at levels over and above existing provision, it is difficult to see how Scotland can squeeze any more out of a system that is already over performing.

4.6 Analysis of the sports in which Scotland has won medals

In this section we examine Scotland's performance in the Commonwealth Games by sport to identify the most successful sports and to provide benchmarks for comparison with other nations. The 29 medals won by Scotland in 2006 increases its total medals won to 289 as shown in Table 4.4.

Although athletics and boxing are historically Scotland's most successful sports no gold medals have been won in athletics since 1994 and only five of the 13 gold medals won in boxing have been won since 1966. These two sports are in relative decline compared with swimming in which seven of the 13 gold medals won have been won since 2002. Cycling, notably on the track, is also identified as a sport which is performing well in the present as both gold medals won to date have been won since 2002.

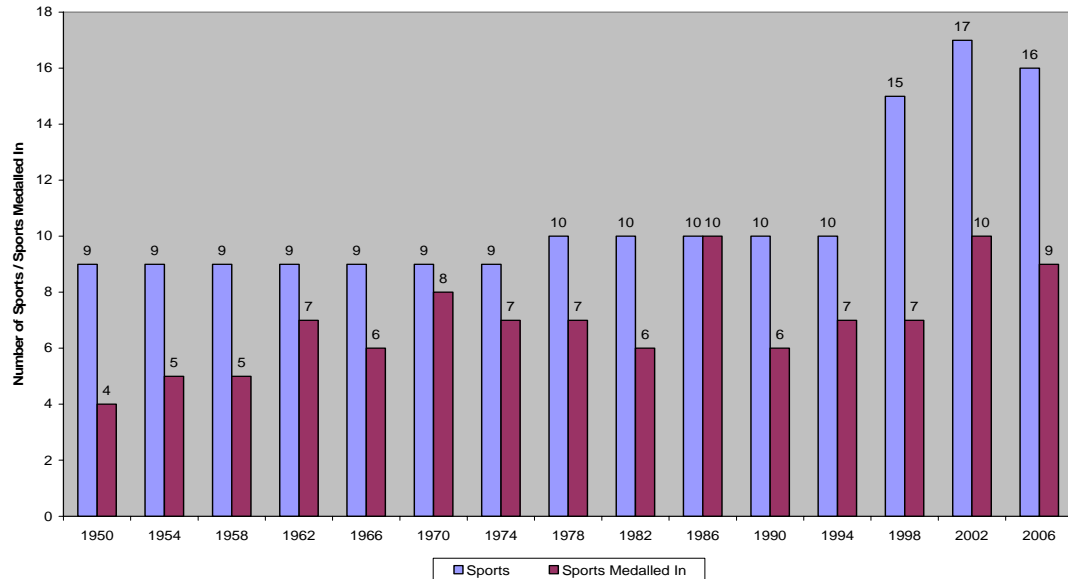
Table 4.4: Scotland's overall performance by sport 1950 - 2006

| Sport | Gold | Silver | Bronze | Total | % | Cumulative |
|---------------|-----------|-----------|------------|------------|-------------|------------|
| Athletics | 15 | 16 | 21 | 52 | 18% | 18% |
| Boxing | 13 | 12 | 23 | 48 | 17% | 35% |
| Swimming | 13 | 17 | 18 | 48 | 17% | 51% |
| Shooting | 8 | 10 | 14 | 32 | 11% | 62% |
| Lawn Bowls | 12 | 7 | 6 | 25 | 9% | 71% |
| Judo | 2 | 6 | 10 | 18 | 6% | 77% |
| Weightlifting | 2 | 4 | 9 | 15 | 5% | 82% |
| Wrestling | 0 | 5 | 9 | 14 | 5% | 87% |
| Cycling | 2 | 2 | 6 | 10 | 3% | 91% |
| Fencing | 2 | 4 | 2 | 8 | 3% | 93% |
| Badminton | 1 | 1 | 5 | 7 | 2% | 96% |
| Diving | 3 | 1 | 1 | 5 | 2% | 98% |
| Gymnastics | 1 | 0 | 3 | 4 | 1% | 99% |
| Squash | 1 | 0 | 1 | 2 | 1% | 100% |
| Rowing | 0 | 0 | 1 | 1 | 0% | 100% |
| Total | 75 | 85 | 129 | 289 | 100% | |

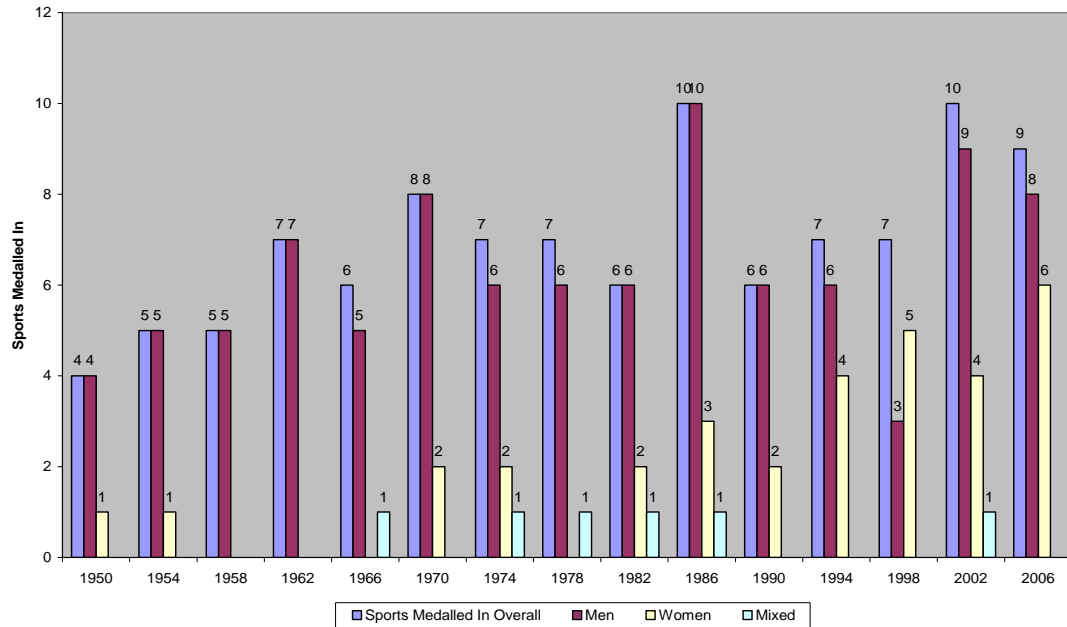
It is interesting to note that the medals listed in Table 4.4 have been won predominantly in individual sports. Whilst sports such as athletics and swimming (relays), lawn bowls (pairs and triples), shooting (pairs), cycling (team sprint) do have limited 'team' events, Scotland does not have a good track record in mainstream team sports such as hockey, rugby 7s, netball and the recently contested basketball.

In addition to analysing medals won by sport, a useful indicator of a nation's all round sporting prowess is the number of sports in which it wins medals in any given edition of the Commonwealth Games. In Graph 4.21 the number of sports in which Scotland won at least one medal is plotted against the total number of sports contested at each Commonwealth Games.

Graph 4.21: The number of sports Scotland has medalled in at each edition



As a general trend Scotland tends to medal in most of the sports contested at each Commonwealth Games. It could be argued that the availability of Lottery funding for full four year cycles in 2002 and 2006 has increased the diversity of sports Scotland has medalled in with scores of 10/17 and 9/16 respectively. The fall from ten to nine sports medalled in over the period 2002 to 2006 can be explained by the exclusion of judo from the programme in 2006, in which Scotland won ten medals in 2002, and the inclusion of basketball in which Scotland did not win a medal.

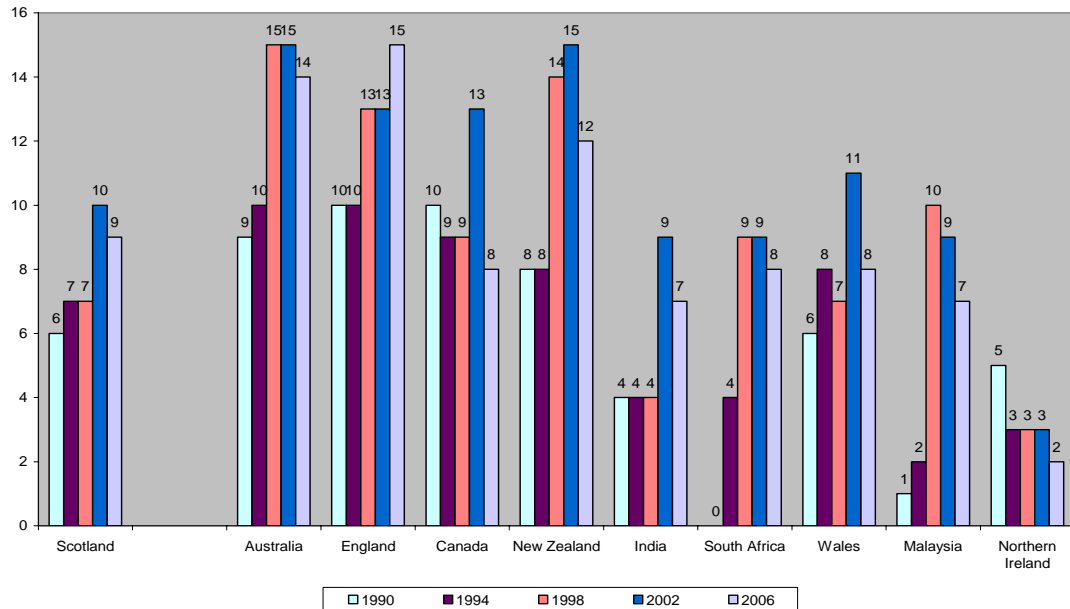
Graph 4.22: The number of sports Scotland has medalled in by gender

More detailed analysis of the breadth of sporting prowess can be seen when analysed by gender - as shown in Graph 4.22. Scotland's male athletes tend to win medals in more sports than Scotland's women athletes. This may well be because historically there have been more sports for men than women. On the one occasion that women won medals in more sports than men (1998), it is widely accepted that Scotland had a particularly poor Commonwealth Games.

2006 was a good year for Scotland's women athletes who won medals in six sports which was two less than for male athletes and equalled the narrowest gap between the genders in the time series. If this level of performance can be maintained it bodes well for the future as Scotland will become less reliant on a minority of sports for the majority of its success.

A final way to examine the number of sports medalled in is to make comparisons with other nations. Graph 4.23 shows the number of sports medalled in at the last five Commonwealth Games by Scotland and key comparator nations.

Graph 4.23: The number of sports medalled in by Scotland and the comparator nations



The nations most comparable to Scotland in 2006 are South Africa, New Zealand, and Wales. South Africa's recent performance is highly comparable to Scotland's and it is therefore perhaps no surprise that there was only one gold medal between them in fifth and sixth place respectively in the final medal table for Melbourne 2006. New Zealand won more medals (31) than Scotland (29) and won medals in more sports than Scotland (12 vs. 9) in Melbourne 2006. Nonetheless, Scotland finished three places higher in the Melbourne final medal table than New Zealand by virtue of winning 11 gold medals compared with New Zealand's six. The key point of note here is the importance of focusing on the quality rather than quantity of medals won. Scotland's gold medal percentage was 38%; New Zealand's by contrast was 19%.

Wales is widely regarded as having had a relatively poor Commonwealth Games compared with 2002 and this in part can be explained by the fact that the number of sports in which Wales won medals fell from 11 to eight.

Key points

- Scotland has won 289 medals in 15 different sports over the period 1950 to 2006.
- Success in athletics and boxing has been largely historical whereas contemporary success is being driven by swimming and cycling.
- A notable weakness in Scotland's medal winning profile is its performance in mainstream team sports such as hockey, netball, rugby 7s and basketball.
- Scotland tends to medal in the majority of sports contested and historically men have performed better in this regard than women. The evidence from 2006 is that the gap between men and women is narrowing and Scotland's success has in part been driven by women winning medals in more sports than ever before.
- Comparison with South Africa and New Zealand highlights the importance of strategies which prioritise quality rather than quantity of medals won.

4.7 Benchmarking against other nations

This section of the report is concerned with benchmarking the performance of Scotland against selected comparator nations for three key variables, namely, 'market concentration', distribution of medals won by gender, and quality of medals won by type. However, to put Scotland and the comparator nations into context, Table 4.5 shows the medal winning performance of the nations to be benchmarked.

Table 4.5: The performance of the comparator nations 1950 - 2006

| | Gold | Silver | Bronze | Total | % |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| Australia | 698 | 593 | 533 | 1824 | 25% |
| England | 509 | 498 | 520 | 1527 | 21% |
| Canada | 364 | 389 | 423 | 1176 | 16% |
| All Other Nations | 290 | 301 | 399 | 990 | 14% |
| New Zealand | 115 | 157 | 221 | 493 | 7% |
| India | 102 | 98 | 72 | 272 | 4% |
| Scotland | 75 | 85 | 129 | 289 | 4% |
| South Africa | 69 | 68 | 79 | 216 | 3% |
| Wales | 47 | 63 | 93 | 203 | 3% |
| Malaysia | 36 | 48 | 51 | 135 | 2% |
| Northern Ireland | 24 | 25 | 38 | 87 | 1% |
| Totals | 2330 | 2324 | 2557 | 7211 | 100% |

Historically, Scotland has won 4% of all medals contested at the Commonwealth Games between 1950 and 2006. Of the nations ranked above Scotland, in 2006 one of these (New Zealand) was ranked below Scotland in the final medal table. Of the nations ranked below Scotland, South Africa was placed higher than Scotland although it should be noted that South Africa's all time medal tally has been affected by apartheid sporting bans.

The first benchmark is 'market concentration', which in the context of elite sport is used to describe the extent to which nations are reliant on a limited number of sports for overall medal winning success. The top three sports and the extent to which Scotland and the sample nations are reliant on them are shown in Table 4.6.

Table 4.6: The market concentration for Scotland and the comparator nations

| | Most Successful | 2nd Most Successful | 3rd Most Successful | Total |
|------------------|----------------------|---------------------|---------------------|------------|
| India | 34% Weightlifting | 27% Shooting | 21% Wrestling | 82% |
| Northern Ireland | 43% Boxing | 20% Athletics | 18% Lawn Bowls | 81% |
| Malaysia | 38% Badminton | 20% Weightlifting | 13% Shooting | 71% |
| Australia | 30% Swimming | 21% Athletics | 9% Cycling | 60% |
| South Africa | 27% Athletics | 22% Swimming | 11% Shooting | 60% |
| Wales | 24% Weightlifting | 20% Athletics | 12% Boxing | 56% |
| England | 28% Athletics | 18% Swimming | 9% Shooting | 55% |
| Scotland | 18% Athletics | 17% Swimming | 17% Boxing | 52% |
| Canada | 25% Swimming | 18% Athletics | 9% Shooting | 52% |
| New Zealand | 21% Athletics | 14% Cycling | 14% Swimming | 49% |

In Table 4.6 it can be seen that India is reliant on weightlifting (34%), shooting (27%) and wrestling (21%) for 82% of all the medals it has won since 1950. Given the degree of influence that host nations have over the programme of events for the Commonwealth Games, it is perhaps no surprise that weightlifting, shooting and wrestling all feature in the

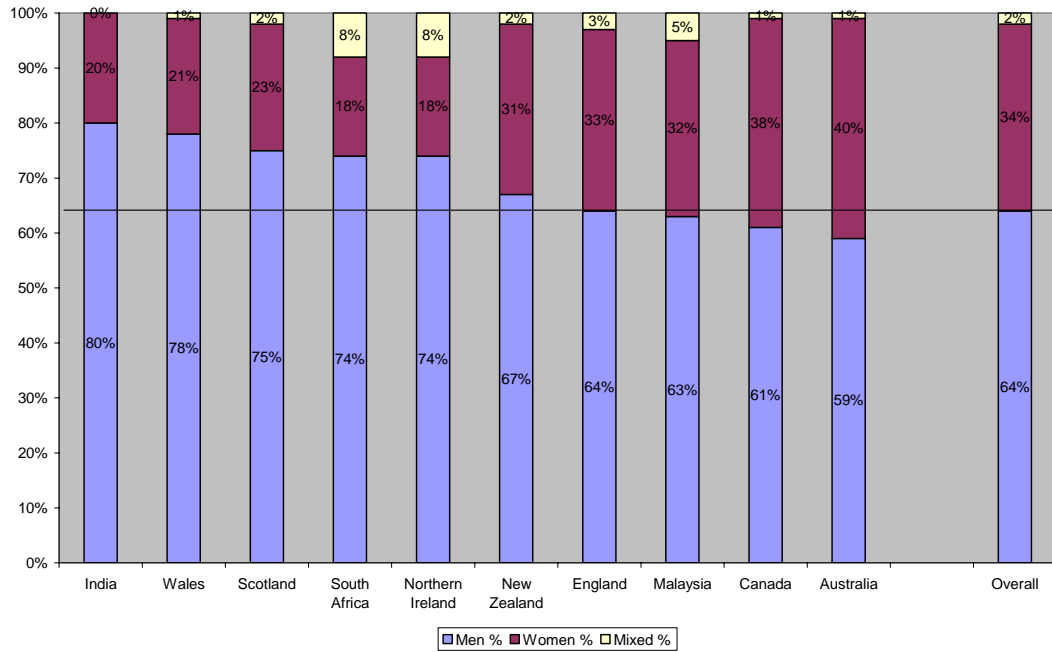
Delhi 2010 programme. It would also be reasonable to speculate that India will improve its performance in 2010 over 2006 as the programme is more in line with India's traditional strengths. Should Glasgow secure the rights to the 2014 Commonwealth Games, Scotland will have a potential advantage over other nations depending on the sports it chooses to include and indeed exclude.

Scotland has a three sport market concentration of 52% with athletics (18%), swimming (17%) and boxing (17%) being the main contributors to its success. Relative to the comparator nations, Scotland can be said to be following a strategy of sporting diversity rather than specialisation as it has a relatively low three sport market concentration. Scotland's reliance on athletics and boxing is in decline as the proportion of medals won in these sports was 19% and 18% respectively in the period 1950 to 2002. Furthermore, in the period 2002 to 2006 the proportion of Scotland's total medals won in swimming has increased from 14% to 17%.

A point of concern for Scotland as the proportion of its success derived from athletics declines is that athletics comprises more than 20% of the events in the Commonwealth Games. Any nation which has serious aspirations to be a significant force in the final medal table needs to develop medal winning capability in athletics and swimming. The only nation typically ranked above Scotland in the Commonwealth Games which does not have a higher reliance on athletics and swimming than Scotland is India. India has sought to differentiate itself in the other sports with a high number of events, namely shooting (40 events in 2006) and weightlifting (16).

The second benchmark we consider is the proportion of medals won by gender. Previous research (UK Sport 2003²) has indicated that examining the overall success of a nation can mask considerable differences in performance by gender. In Melbourne 2006 Australia's increased success over 2002 was driven primarily by women athletes. In the case of Scotland we have already shown that in standardised terms (market share) men perform better than women, but in Graph 4.24 we can see the performance of the comparator nations alongside Scotland in a standardised form.

² UK Sport (2003) European sporting success: A study of the development of medal winning elites in 5 European countries, UK Sport, London.

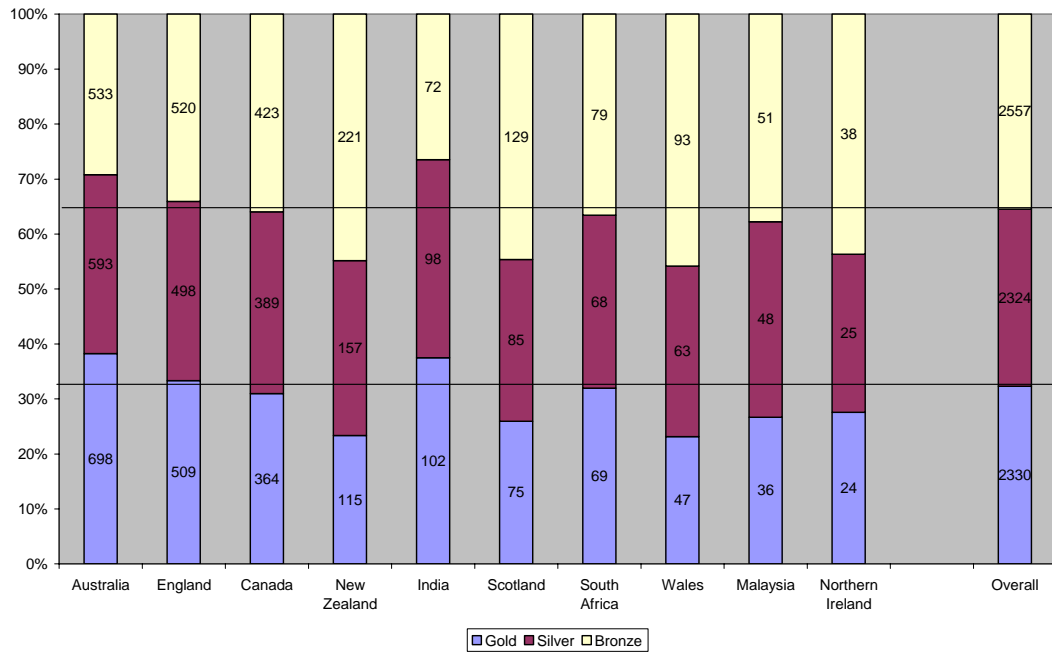
Graph 4.24: The number and proportion of medals won by gender 1950 - 2006

The reference line in Graph 4.24 is drawn at the break point between medals contested by men and women / open categories 1950 - 2006. During this time 64% of all medals have been contested by men, 34% by women and 2% by mixed teams. Any nation with blue above the reference line has been over reliant on men for its medals; and any nation with burgundy below the reference line is over reliant on women / mixed categories for its success. It can therefore be seen that India (80%), Wales (78%), Scotland (75%), South Africa (74%) Northern Ireland (74%) and New Zealand (67%) have a disproportionately high percentage of their medals won by men and consequently a relatively low percentage of their medals won by women.

The most dominant nation, Australia, wins a disproportionately high percentage of its medals in women's sport. Canada and Malaysia are also disproportionately reliant on women for their success. England's success over time is directly in line with what might be expected proportionately.

One obvious way in which Scotland could improve its overall performance in the Commonwealth Games would be to take advantage of the increased medal winning opportunities in events for women. Women's sport at elite level in Scotland is identified as an area for further research to establish if there are any systematic factors which are preventing women athletes from realising their full potential.

The third benchmark we consider is the quality of medals won by Scotland and the comparator nations. In the same way that it is possible to analyse the number and proportion of medals won by gender, so too it is possible and worthwhile to look at the number and proportion of medals won by type. The relevant data is shown in Graph 4.25.

Graph 4.25: The number and proportion of type of medals won

Since 1950, 7,211 medals have been contested of which 32.3% have been gold, 32.2% silver and 35.5% bronze. The reason why there are more bronze medals contested than gold and silver is because of the practice of awarding two bronze medals in combat sports such as boxing and judo. The two reference lines are drawn at the points which equal the proportion of medals awarded by type between 1950 and 2006 i.e. at 32.3% for gold, 32.2% for silver and 35.5% for bronze.

Australia and India both achieve a higher percentage of gold medals won relative to the percentage of gold medals awarded. Consequently they also win a lower proportion of silver and bronze medals. By contrast, Canada, Northern Ireland, Malaysia, Wales, Scotland and New Zealand all win a disproportionately low level of gold medals and consequently a disproportionately high level of silver and bronze medals.

Scotland has a below average gold medal percentage (26%) and one of the highest bronze medal percentages (45%) with New Zealand. Many of the bronze medals won by Scotland have been won in boxing in which two bronze medals are awarded in each event.

Key points

- Scotland has won 4% of all medals won at the Commonwealth Games between 1950 and 2006.
- Scotland's three sport market concentration is 52% (athletics 18%, swimming 17% and boxing 17%). Swimming is shown to be increasing its importance to Scotland's contemporary medal winning success while athletics and boxing are in relative decline.
- Scotland is consistently over reliant on men for its medal winning success. Longer term improvements in performance could be developed by greater emphasis on events for women.

- In terms of the quality of medals won, Scotland wins disproportionately more silver and bronze medals than gold. 2006 was an excellent counter to this trend with 38% of the 29 medals won being gold medals. Improving Scotland's future medal table ranking depends crucially on the quality of medals won rather than the quantity.

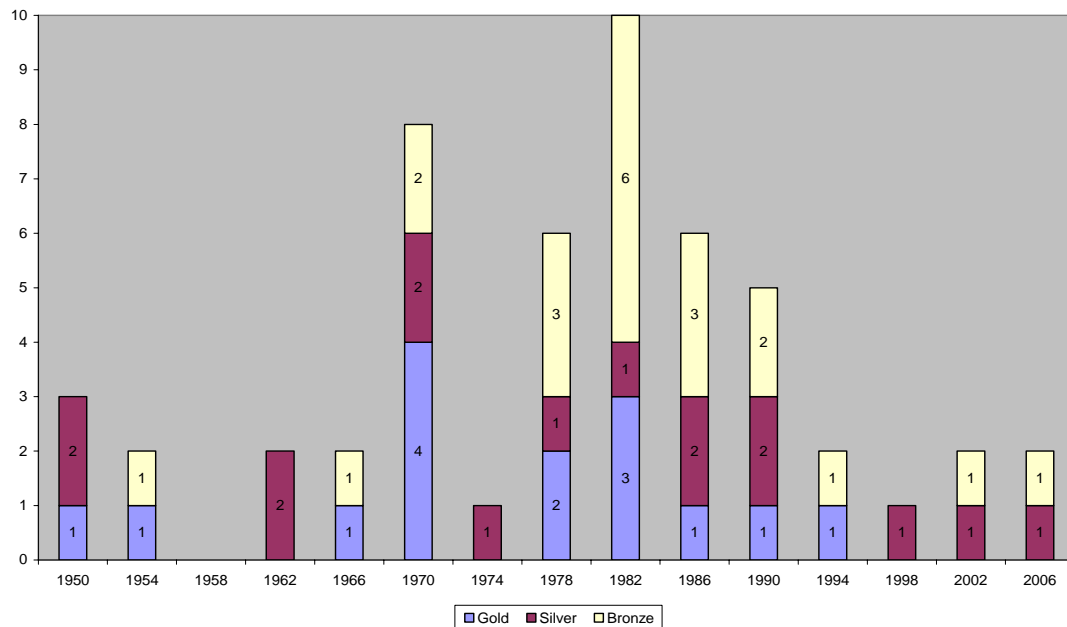
4.8 Breakdown of success by sport

As has been demonstrated in Table 4.6 Scotland has won 52% of all its Commonwealth Games medals in athletics, boxing and swimming. Given the importance of these sports to Scotland's overall success, we now examine performance and trends in these sports on a sport by sport basis.

4.8.1 Performance in athletics

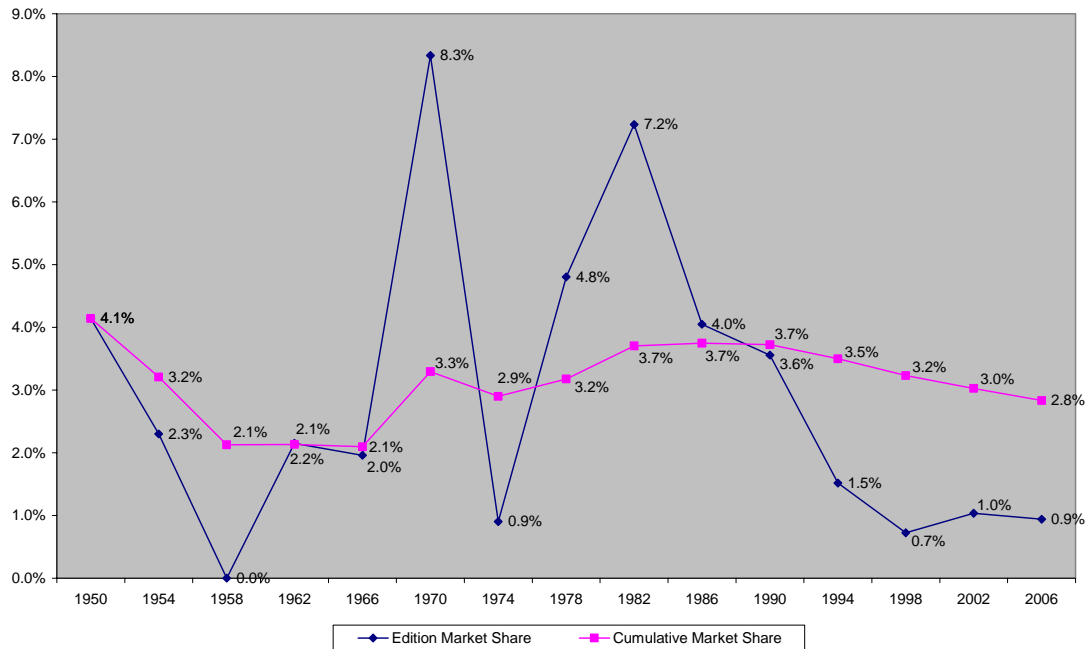
The total number and type of medals won in athletics by Scotland over the period 1950 to 2006 is shown in Graph 4.26.

Graph 4.26: Scotland's absolute achievement in athletics



Scotland enjoyed a particularly productive period in athletics from 1978 to 1994 winning at least one gold medal on five consecutive occasions and averaging almost six medals in athletics at each Commonwealth Games during this period. The last athlete to win a gold medal for Scotland in the Commonwealth Games was Yvonne Murray in 1994 who emulated Liz McColgan's achievements of 1990 and 1986. The last male athlete to win a gold medal for Scotland was Allan Wells in 1982 when he won the 100m and 200m in athletics.

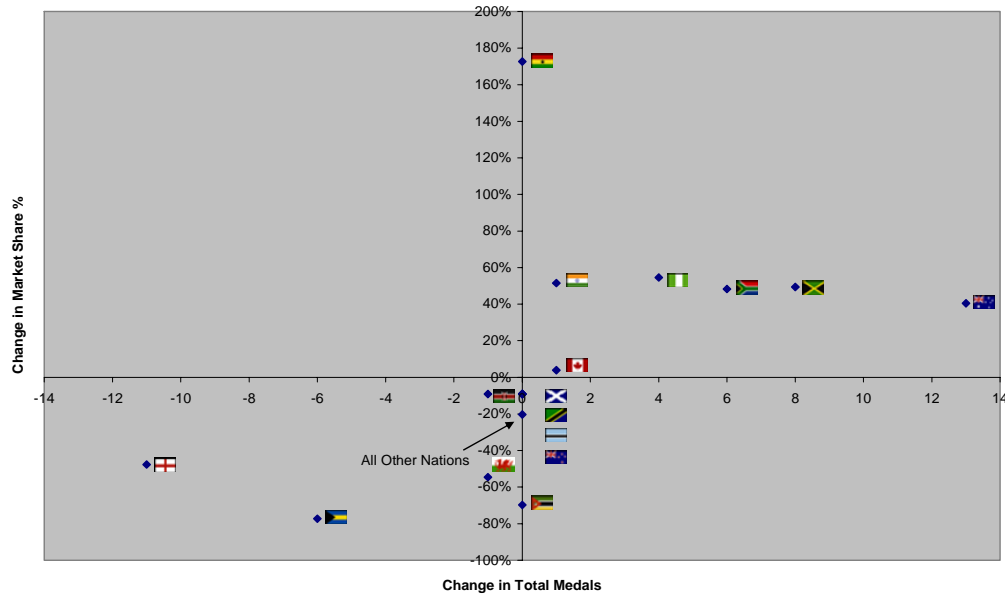
When examined on a standardised basis (market share) it would be expected that Scotland's market share in athletics would be in decline. The reasoning for this view is that the athletics programme in the Commonwealth Games has expanded to 53 events in 2006 and Scotland has failed to retain its historical share of success. In short Scotland is winning a declining share of an increasing number of medal winning opportunities. This point can be appreciated by looking at the trend lines in Graph 4.27.

Graph 4.27: Scotland's market share in athletics

Since the Allan Wells era of 1982, Scotland's market share in athletics has been in decline such that for the last three editions of the Commonwealth Games it has been 1% or less. The long term (cumulative) trend line has been in decline since 1990 and at 2.8% in 2006 is at its lowest since 1966 (2.1%). The effect of not winning a gold medal in the last three editions of the Commonwealth Games has reduced Scotland's market share to 1974 levels - the last time since 1994 that Scotland did not win a gold medal in athletics.

In order to put Scotland's performance in athletics into context and to identify the nations that are performing well currently, we have re-analysed the 2002 and 2006 medal tables for athletics and plotted the change in total medals won against change in market share as shown in Graph 4.28.

Graph 4.28: The change in total medals won against change in market share for athletics

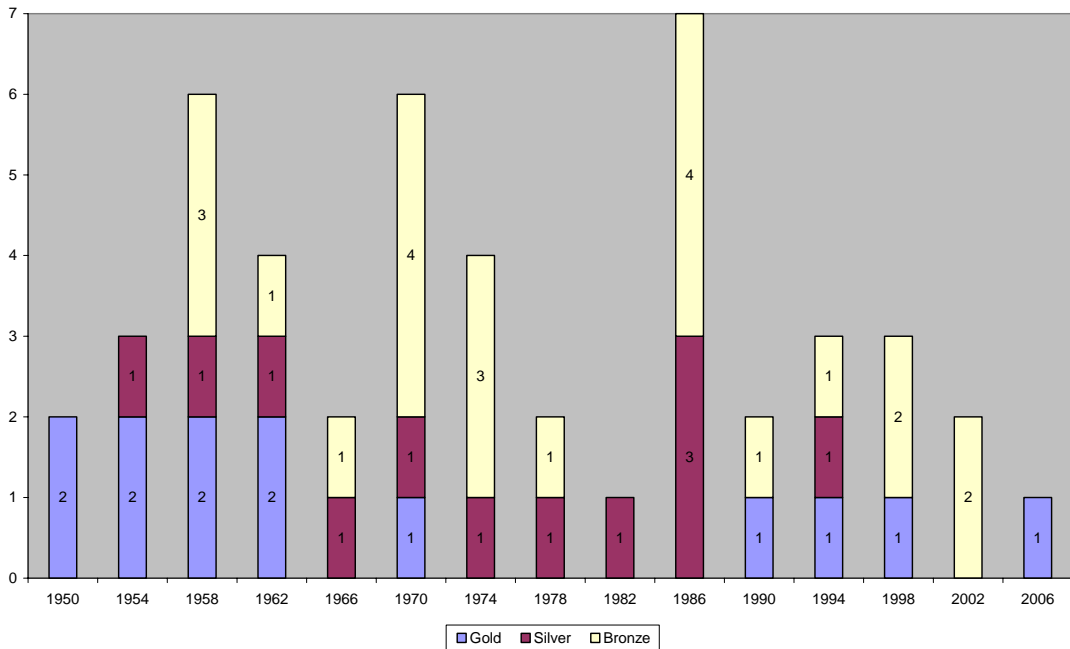


The nations increasing their total medals won and market share in athletics include Australia, Jamaica, South Africa, Nigeria, India and Canada. Nations in decline include England, Bahamas and Wales. Scotland lost market share because it won a static share (one silver, one bronze in both 2002 and 2006) of an expanding 'market'.

4.8.2 Performance in boxing

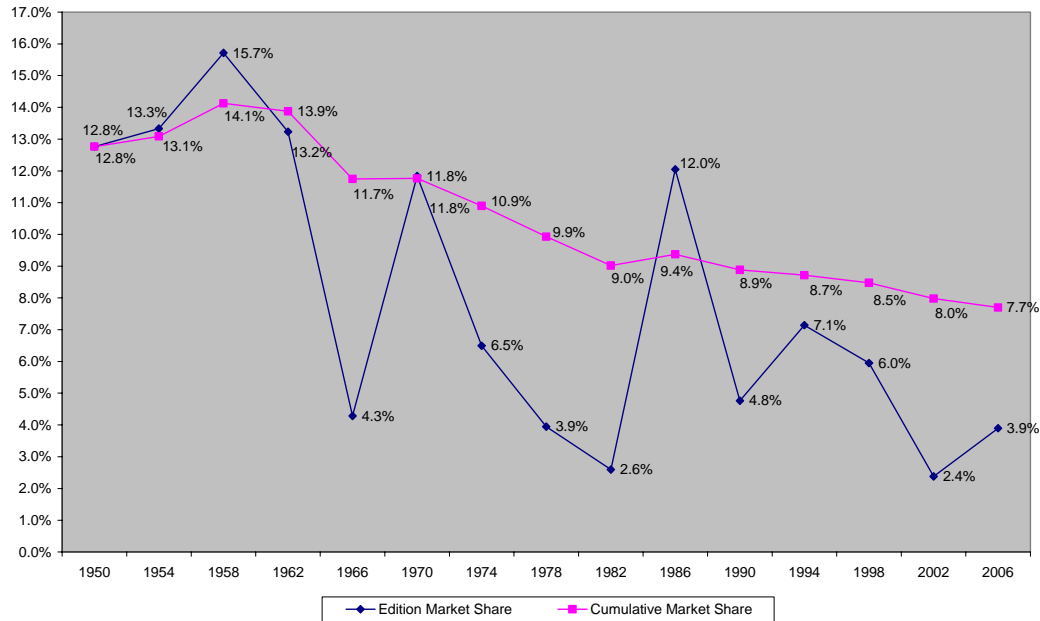
The total number and type of medals won in boxing by Scotland over the period 1950 to 2006 is shown in Graph 4.29.

Graph 4.29: Scotland's absolute achievement in boxing



Scotland's greatest achievements in boxing occurred between 1950 and 1962 when for four consecutive Commonwealth Games it won two gold medals. Scotland has not won two gold medals in a single edition since 1962. Although the gold medal won in 2006 was an improvement on two bronze medals in 2002 it does not mask the fact that Scotland's success in boxing is more in the past than the present. This point is well illustrated in the time series trend lines shown in Graph 4.30.

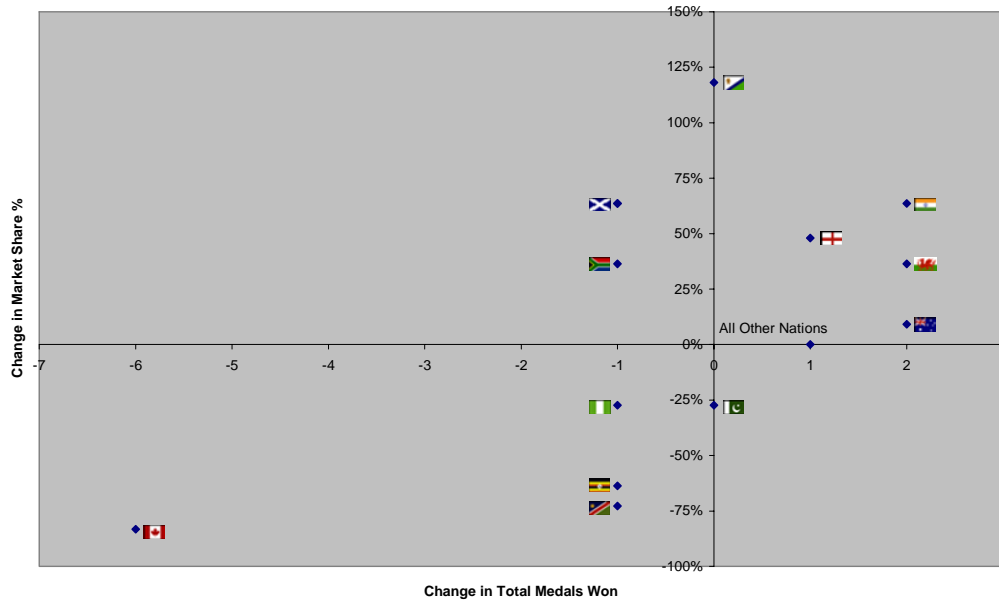
Graph 4.30: Scotland's market share in boxing



The last two editions of the Commonwealth Games feature two of Scotland's worst four performances (2006, 2002, 1982 and 1978) in the boxing tournament. The long term trend line has been in almost continuous decline since 1970. The increase in market share for 2006 was driven by an improvement in the quality of medals won (one gold vs. two bronze) but also a reduction in the number of events contested in boxing from 12 to 11. Thus market share increased because Scotland won an increased share of a declining market.

To contextualise Scotland's performance in boxing and to identify the nations that are performing well currently, we have re-analysed the 2002 and 2006 medal tables for boxing and plotted the change in total medals won against change in market share as shown in Graph 4.31.

Graph 4.31: The change in total medals won against change in market share for boxing

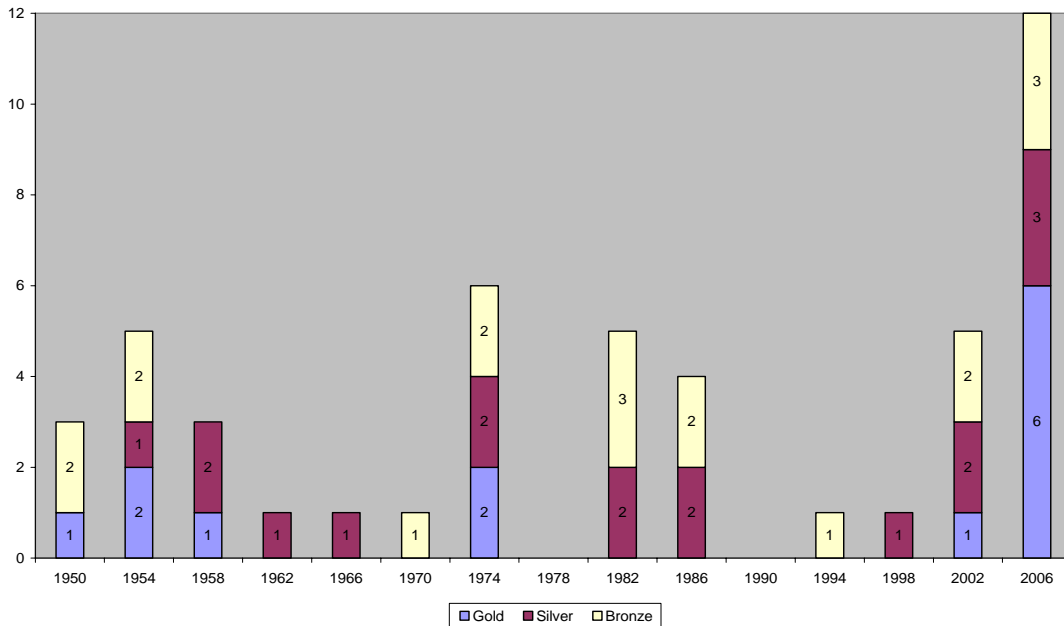


The nations increasing their total medals won and market share in boxing include India, Wales, Australia and England. Nations in decline include Canada, Nigeria, Uganda and Botswana. Scotland and South Africa are nations which reduced their medals won and increased market share, that is, they improved the quality of medals won.

4.8.3 Performance in swimming

The total number and type of medals won in swimming by Scotland over the period 1950 to 2006 is shown in Graph 4.32.

Graph 4.32: Scotland's absolute achievement in swimming

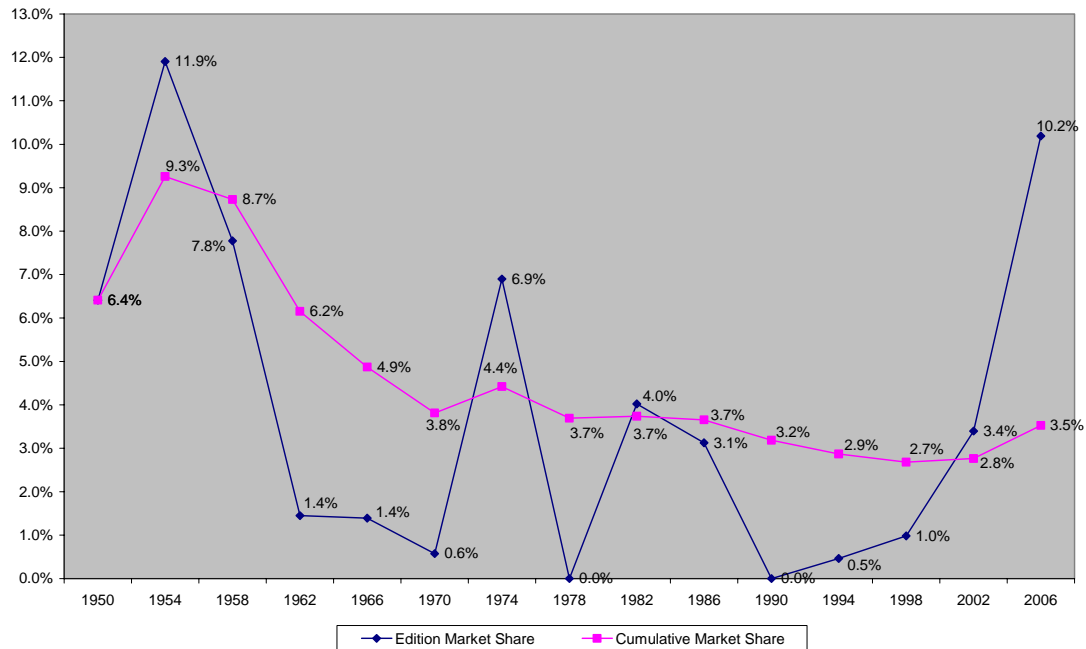


Scotland's performance in swimming in 2006 was a spectacular success with the six gold medals won wholly unprecedented. In the previous 14 editions of the Commonwealth Games Scotland had won seven gold medals in swimming. It is particularly noteworthy that three swimmers representing Scotland won two gold medals each which is a considerable contrast to the past where success in swimming has typically been a function of the efforts of one-off talented athletes such as David Wilkie or Alison Sheppard. For the first time in the Commonwealth Games Scotland is showing signs of having strength in depth in swimming.

The magnitude of Scotland's performance in swimming can perhaps be emphasised by the fact that swimming accounted for 17% of the events in the Commonwealth Games and 41% of Scotland's 29 medals in 2006.

The swimming programme was slightly reduced in 2006 relative to 2002 (-2 events) and thus it would be expected that Scotland shows increasing market share by virtue of winning a greater number of medals from a declining number of events. This and Scotland's long term market share trends are shown in Graph 4.33.

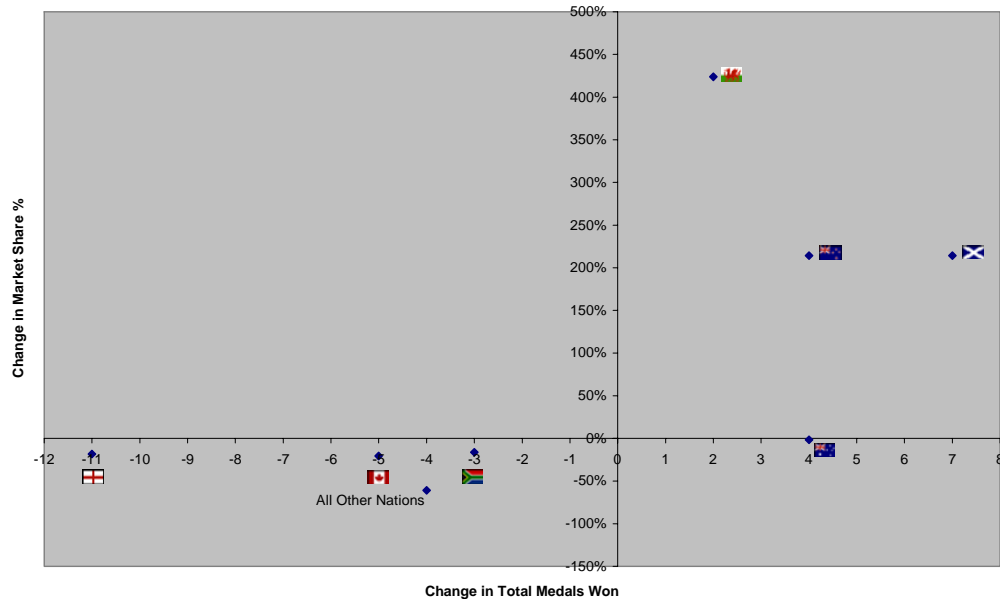
Graph 4.33: Scotland's market share in swimming



Since 1990 when Scotland failed to win any swimming medals there has been a long term increase in market share achieved by Scottish swimmers. It is rare to see examples of continuous improvement in two editions of the Commonwealth Games and this puts into perspective Scotland's achievement of four consecutive editions of continuous improvement at an accelerating rate.

It will be an impressive task for Scotland to repeat its success in swimming in 2010 and therefore realistically an improvement in its medal table ranking will need to be delivered by other sports complementing the success of swimming. Graph 4.33 indicates that Scotland has improved relative to itself over the period 2002 to 2006 and in Graph 4.34 we show how Scotland has performed relative to other medal winning nations in swimming.

Graph 4.34: The change in total medals won vs. change in market share for swimming



Scotland is identified as the most improved nation in swimming in 2006 having increased its medals won by seven and increasing its market share by 214%. Other improving nations were New Zealand and Wales albeit from much lower baselines than Scotland. Nations in decline, losing medals and market share, include England, Canada and South Africa.

Key Points

Athletics

- Historically athletics has been Scotland's most successful sport in the Commonwealth Games, but success in this sport is in decline.
- Scotland has not won a gold medal in athletics since 1994 and the last male to win a gold medal in athletics was Allan Wells in 1982.

Boxing

- Scotland's performance in boxing is also mainly historical with the most successful period being between 1950 and 1962. Consequently the cumulative trend line for boxing is in decline.

Swimming

- In swimming Scotland performed exceptionally in 2006, winning an unprecedented six gold medals and 41% of all Scotland's medals.
- Scotland was the most improved nation in swimming in 2006 and has improved its market share in the last four editions of the Commonwealth Games.

4.9 Elite Athletes with a Disability (EAD)

In Melbourne 2006, events for Elite Athletes with a Disability (EAD) were integrated within the overall programme and final medal table following their successful introduction in Manchester 2002. A total of 12 events in four different sports were contested as listed in Table 4.7.

Table 4.7: EAD events contested in 2006

| Sport | 2006 |
|---------------------------|----------------------------|
| Athletics | Men's 100m EAD |
| Athletics | Women's 100m EAD |
| Athletics | Men's 200m EAD |
| Athletics | Women's 800m Wheelchair |
| Athletics | Women's Seated Shot Put |
| Athletics | Men's Seated Discus |
| Powerlifting ¹ | Male Open Bench Press |
| Aquatics - Swimming | Men's 50m Freestyle |
| Aquatics - Swimming | Women's 50m Freestyle |
| Aquatics - Swimming | Men's 100m Freestyle |
| Aquatics - Swimming | Women's 100m Freestyle |
| Table Tennis | Women's Wheelchair Singles |
| Total Events | 12 |

¹EAD powerlifting is included in the weightlifting programme

The 12 EAD events accounted for 4.9% of the overall programme in Melbourne 2006 and exceeded the number of boxing events (11). Clearly, there exists an opportunity for nations to capitalise on the medal winning opportunities available in EAD events by ensuring that people eligible to take part in EAD events are given the opportunity to fulfil their potential and to contribute meaningfully to Scotland's future success in the Commonwealth Games medal table.

In order to analyse performance in the 12 EAD events contested in 2006 we have produced an EAD medal table which is shown in Table 4.8.

Table 4.8: The Melbourne 2006 EAD medal table

| Nation | Gold | Silver | Bronze | Total | Points | Market Share % |
|---------------|-----------|-----------|-----------|-----------|-----------|----------------|
| Australia | 4 | 2 | 3 | 9 | 19 | 26.4% |
| Nigeria | 3 | 2 | 2 | 7 | 15 | 20.8% |
| South Africa | 2 | 2 | 0 | 4 | 10 | 13.9% |
| Canada | 1 | 5 | 2 | 8 | 15 | 20.8% |
| England | 1 | 1 | 2 | 4 | 7 | 9.7% |
| Jamaica | 1 | 0 | 0 | 1 | 3 | 4.2% |
| Wales | 0 | 0 | 2 | 2 | 2 | 2.8% |
| India | 0 | 0 | 1 | 1 | 1 | 1.4% |
| Totals | 12 | 12 | 12 | 36 | 72 | 100% |

Australia was the dominant nation in EAD events winning four of the 12 gold medals contested and achieving a market share of 26.4%. Nigeria improved on its success in 2002 by winning three gold medals in Melbourne and was the most improved nation in EAD events. Jamaica and India won their first ever medals in EAD events. The change in the balance of power in EAD events over the period 2002 to 2006 is shown in Graph 4.35.

Commonwealth Games. There are three key questions which we would pose to begin this debate.

1. Causality

To what extent is Scotland's unprecedented success in the Commonwealth Games of 2006 a function of the elite sports development systems implemented in Scotland post 1997? In other words, are medal winning athletes the products of Scottish systems or other systems such as UK Sport's World Class Performance Programme?

2. Effectiveness

To what extent is Scotland's actual performance in line with expected performance? Are those in charge of performance required to account for their use of resources by stating publicly the number of medals they are targeting (as per World Class Performance Plans)? If 'yes', how has performance been at individual sport / discipline level?

3. Efficiency

How satisfied are the funders of elite sport in Scotland that there is a satisfactory relationship between the inputs (money, time and expertise) and the outputs (medal winning success and other indicators) of the elite sport developments system in Scotland?