

# sportscotland

## Research Report

### **An Analysis of Scotland's Performance in the Commonwealth Games 1950-2002**

Research Report no. 95

A study for  
**sportscotland**

by

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## 1. INTRODUCTION

This report has been compiled by the Sport Industry Research Centre (SIRC) at Sheffield Hallam University on behalf of **sportscotland**. The research is concerned with informing **sportscotland**'s approach to the support and development of medal winning athletes competing for Scotland in the Commonwealth Games.

The significance of the Commonwealth Games is that it is the only major multi-sports event in which athletes representing Scotland compete for Scotland rather than for a combined Great Britain and Northern Ireland team - as is the case at the summer and winter Olympic Games. The approach used to conduct the analysis is an adaptation of the secondary analysis of the performance of Great Britain and Northern Ireland at the summer Olympic Games' conducted by SIRC for UK Sport in 2003<sup>1</sup>.

## 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 and the number of athletes taking part.
- The number of countries winning a gold medal or any medal between 1950 and 2002.
- Scotland's points through medals 1950 – 2002 where a gold medal equals three points, a silver two points and a bronze one point.
- Scotland's overall market share 1950 – 2002 where market share is defined as the percentage of points won expressed as a function of the total points available.
- Scotland's market share sub-analysed for men and women 1950 – 2002.
- Analysis of the sports Scotland has medalled in overall and by gender.
- Comparison of the sports Scotland has medalled in compared with other countries (Australia, Canada, England, New Zealand, Wales, Northern Ireland, South Africa, Malaysia and India).
- Analysis of the medals won by the three most successful sports for Scotland and the comparator countries.
- Breakdown of the number and proportion of medals won by gender for Scotland and the comparator countries.
- Breakdown of the number and proportion of medals won by type (gold, silver, bronze) for Scotland and the comparator countries.
- Breakdown of success by sport – swimming, athletics, cycling, badminton, boxing, bowling, weightlifting, shooting and gymnastics.

## 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 – 2002. The Commonwealth Games takes place every 4 years and thus the results are based on 14 editions of the event. The results data for each edition

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<sup>1</sup> UK Sport (2003) European Sporting Success: A study of the development of medal winning elites in five European countries, UK Sport, London.

was downloaded from the official website of the Commonwealth Games ([www.thecgf.com](http://www.thecgf.com)) and was formatted and analysed to meet the requirements of the terms of reference. A list of the venues for each of the 1950-2002 Games and the sports contested is included in Appendix I.

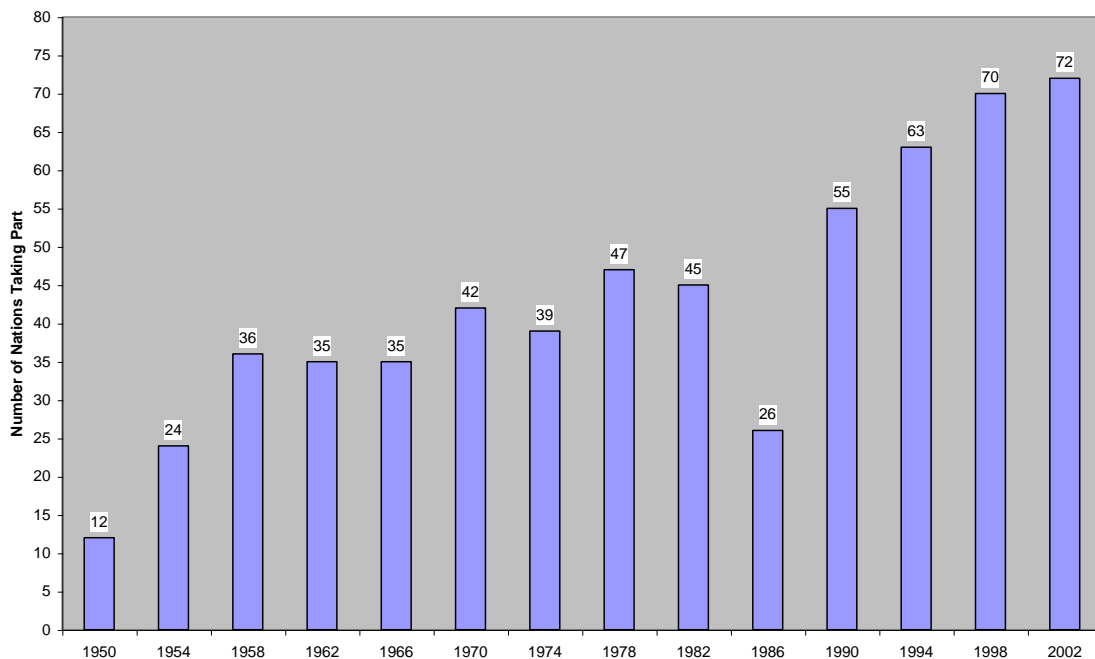
The results focus on delivering the material facts of the analysis and are not at this stage concerned with interpretation and policy implementation. Analysis of historical data can explain what has happened in the past, but the results of historical analysis in isolation can only be considered to be a contribution towards informing future direction.

## 4. RESULTS

### 4.1 Context

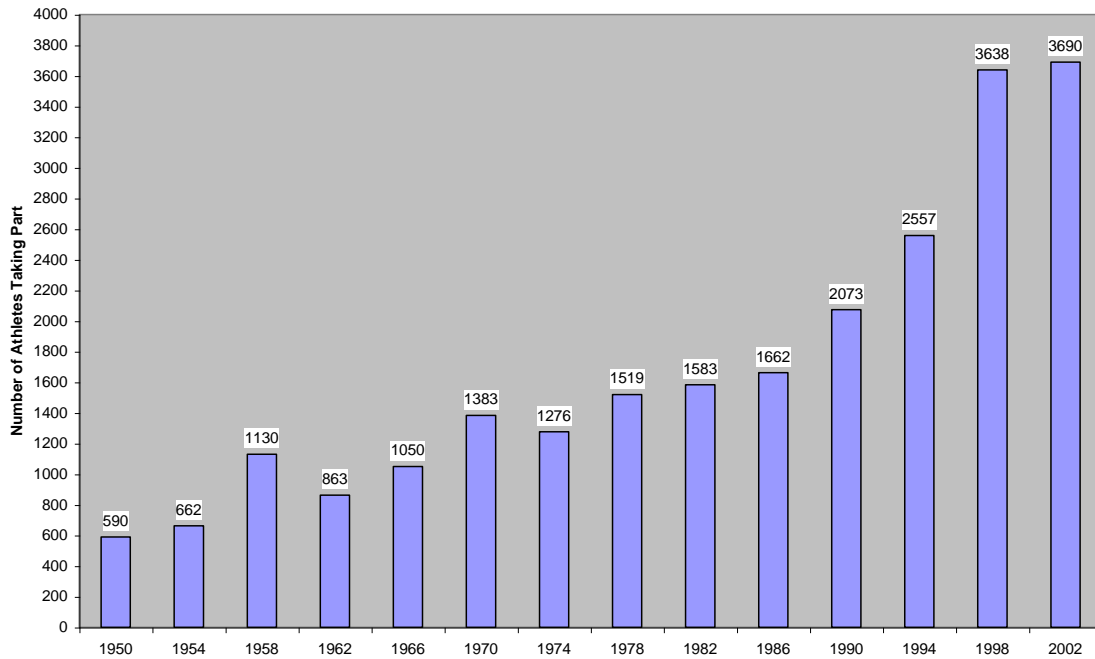
The Commonwealth is an alliance of some 72 'nations'. One of the ways in which the alliance expresses itself is via a quadrennial Commonwealth Games. Participation in the Commonwealth Games by member states is not compulsory, but as can be seen in Graph 4.1 the number of nations taking part at each edition has steadily increased to the point that all 72 nations were represented in the 2002 edition held in Manchester.

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



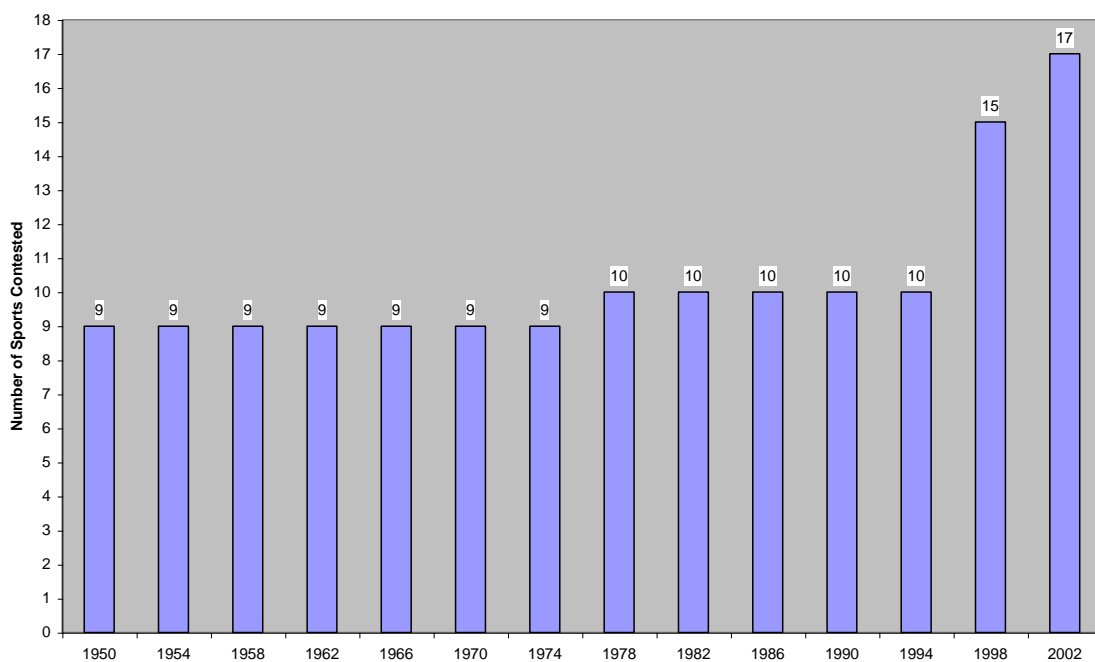
In the first post-Second World War Commonwealth Games 12 nations took part and this increased steadily over time to 1982 when 45 nations took part. A boycott led by the African nations in 1986 reduced the number of nations taking part to 26, but in the four editions since, the number of participating countries has increased to 72/72 in 2002. One of the modern themes of the Commonwealth Games is inclusivity and it is likely that future editions will attempt to emulate Manchester's feat of having at least one representative of each nation attend the Games.

Graph 4.2: The number of athletes 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 1950, 590 athletes took part in the event and there has been a growth trend in the intervening years peaking at a record 3,690 athletes in 2002. The growth in the number of athletes taking part has been driven by a number of factors, notably: increases in the number of nations taking part; increases in the number of sports contested; and, perhaps most significantly, increases in the number of events contested. The number of sports contested at each edition of the Commonwealth Games since 1950 is shown in Graph 4.3.

Graph 4.3: Number of sports contested at the Commonwealth Games 1950-2002

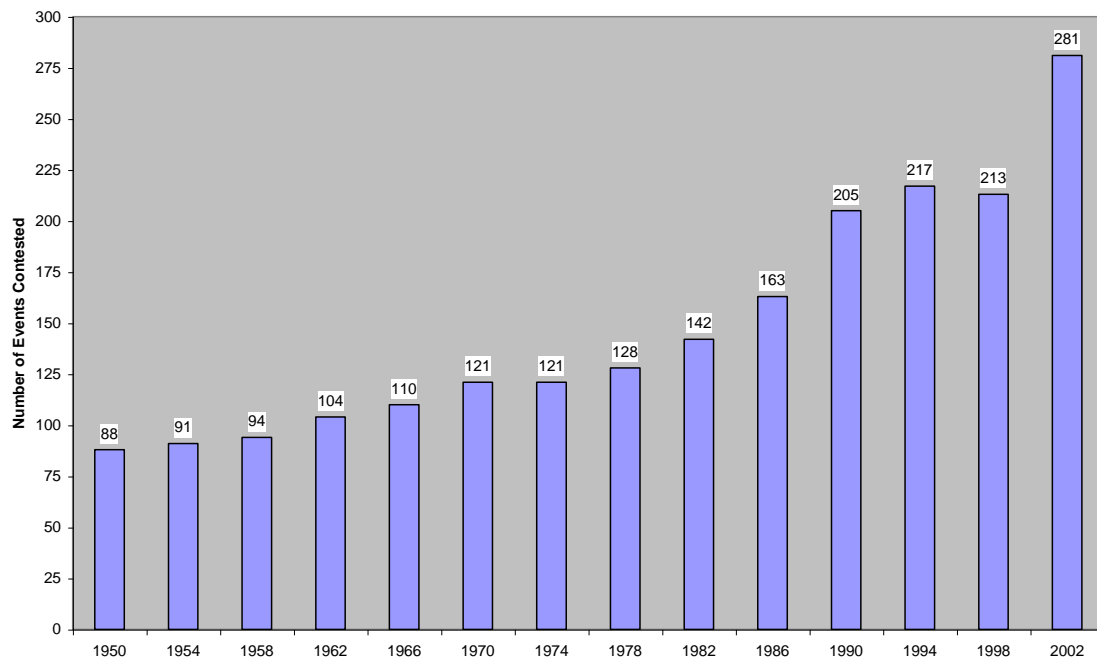


In Graph 4.3 the word 'sports' involves all aquatic 'disciplines' such as diving, swimming, water polo and synchronized swimming being counted as one sport. The sport v discipline categorisation is not applicable to any other sports. Between 1950

and 1994 (12 editions) the number of sports contested at each Commonwealth Games was either nine or ten. Kuala Lumpur 1998 showed a significant increase from ten sports to 15 when sports such as netball, cricket, ten pin bowling, squash and rugby 7s were included for the first time.

The expansion continued in 2002 with a record 17 sports contested in Manchester. It is likely that future editions of the Games will be more like Kuala Lumpur and Manchester in terms of the number of sports contested than like the nine or ten sport format of previous editions. There will be a core of sports contested at every Games such as athletics and swimming and a relatively small pool of sports that will be rotated according to where the event is being hosted and the inclusion policies of the Commonwealth Games Federation.

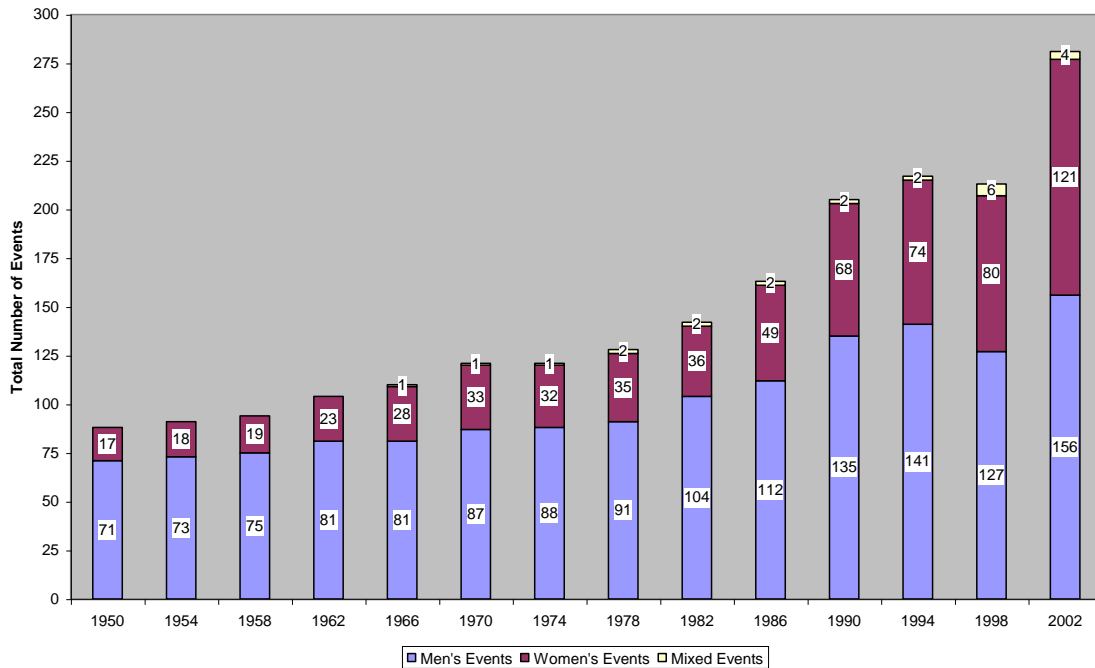
Graph 4.4: The number of events contested at each Commonwealth Games 1950-2002



In 1950 the 590 athletes taking part contested 88 events and by 2002 the 3,690 athletes contested 281 events. As a simple standardised measure the 88 events in 1950 were contested by an average of 6.7 athletes whereas in 2002 this ratio had almost doubled to 13.1 athletes per event. In simple terms this means that in 1950 each competitor had, on average, a 3 in 6.7 (45%) chance of winning a medal whereas in 2002 each competitor had a 3 in 13.1 (23%) chance of winning a medal. Some of the increase in the 'athletes per event' ratio can be attributed to the introduction of team sports in which there is a low number of events and a high number of competitors. Nonetheless, even when discounting team sports the athletes per event ratio has increased, which suggests that competition for medals has increased.

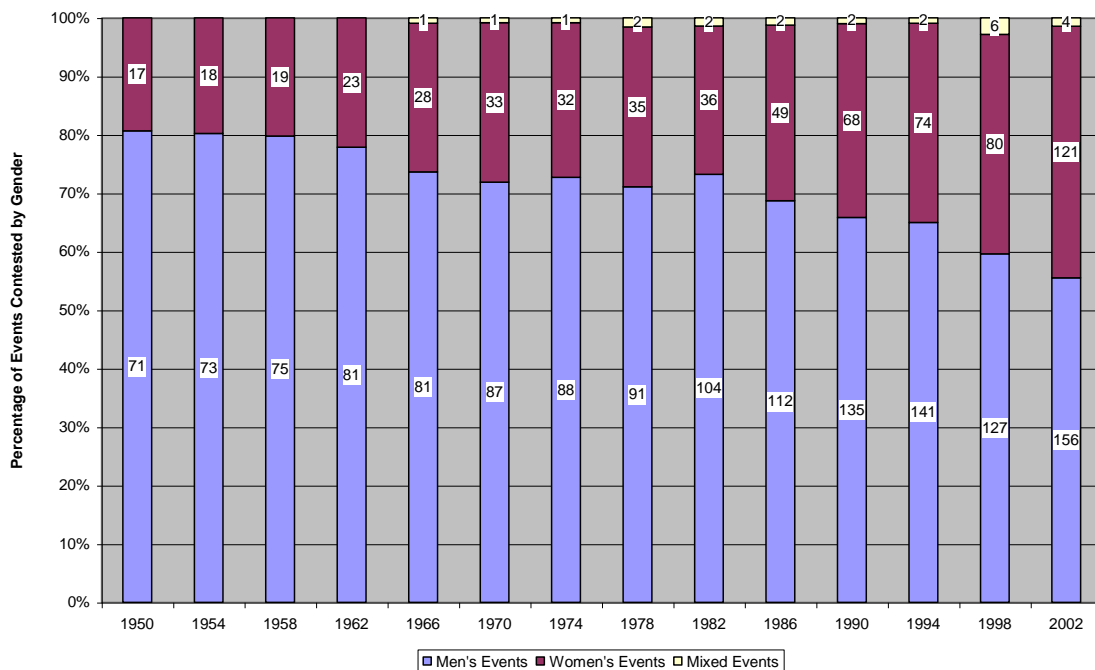
As per the Olympic Games, early editions of the Commonwealth Games were dominated by events for men and only a minority of events were available for women. To illustrate this point Graph 4.5 analyses the number of events contested by men, women, and men and women (mixed events) between 1950 and 2002.

Graph 4.5: Number of events by gender



Although Graph 4.5 shows that the majority of events in the Commonwealth Games are for men, much of the growth in the number of events contested overall has been driven by an increase in the number of events for women. This point is best appreciated by looking at the relative proportion of events for each gender over time as shown in Graph 4.6.

Graph 4.6: Proportion of events by gender 1950 – 2002



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 2002 56% of events were contested by men, 43% were contested by women and 1% was contested by both men and women. To put the growth of women's events into perspective the number of events contested by women



has grown by 612% between 1950 and 2002 whereas during the same period the percentage increase for men has been a more modest 120%.

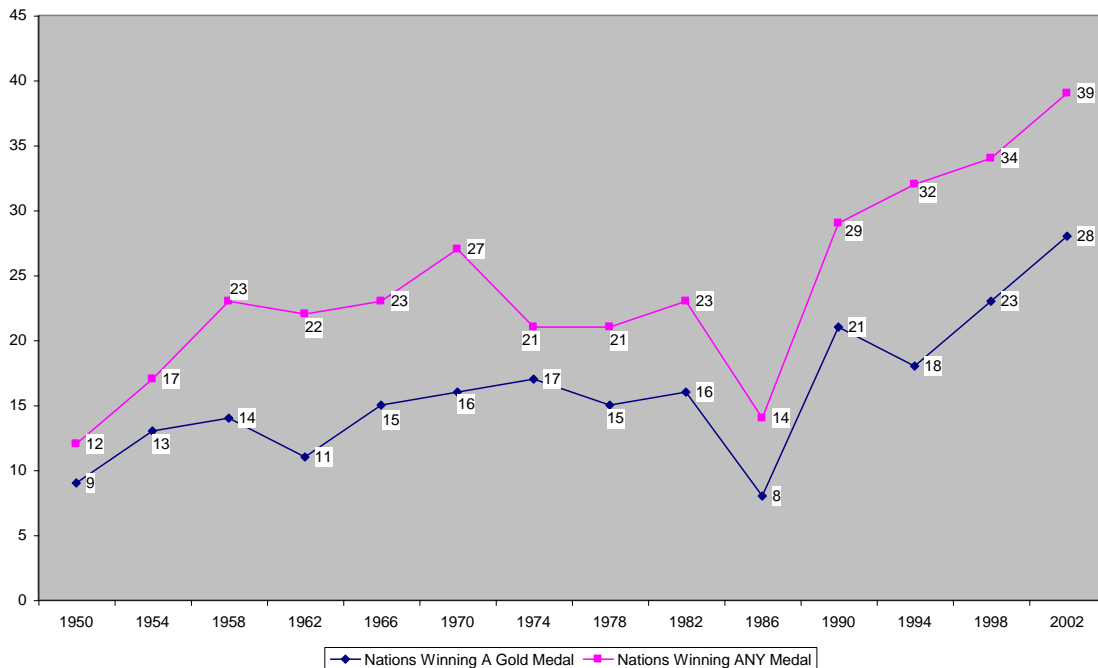
### Key points

- The number of nations contesting the Commonwealth Games has increased from 12 in 1950 to 72 in 2002.
- The number of athletes contesting the Commonwealth Games has increased from 590 in 1950 to 3,690 in 2002.
- The number of sports has increased from 9 in 1950 to 17 in 2002.
- The number of events has increased from 88 in 1950 to 281 in 2002.
- The average number of athletes contesting each event has increased from 6.7 in 1950 to 13.1 in 2002, which suggests that competition has increased.
- The number of events contested by women has grown from 17 (19%) in 1950 to 121 (43%) in 2002.

## 4.2 Evidence of increasing competition

Although the contextual material suggests that competition for medals may have increased over time, a more conclusive diagnosis can be made by looking at the number of different countries which have won a gold medal or any medal over time. Graph 4.7 presents a time series analysis of the number of countries winning a gold medal and any medal.

Graph 4.7: Number of countries winning a gold medal and any medal



In 1950, nine countries won a gold medal and all 12 of the participating countries won a medal of any colour. In the most recent edition (2002) 28 of the 72 nations taking part won at least one gold medal and 39 won a medal of any colour. Following the boycott led by the African nations in 1986 there has been a steep increase in the number of nations winning gold medals (eight in 1986, 28 in 2002) and an increase in the number of nations winning any medal (14 in 1986, 39 in 2002).

The steep rise in the trend line from 1986 to 2002 is not a coincidence and can in part be explained by some nations taking a state sponsored strategic approach towards achieving success in international competition. The extent of this approach ranges from Australia setting itself the goal of topping the Commonwealth Games medal table, through to talented athletes from the Cayman Islands being encouraged to take up sport scholarships at leading American universities.

#### Key points

- Competition, defined by the number of countries capable of winning medals, has increased thereby making medals increasingly difficult to win.
- Some of the increase in competition can be explained by nations taking a state sponsored strategic approach towards the 'production' of medal winners.

### 4.3 Scotland's performance in the Commonwealth Games

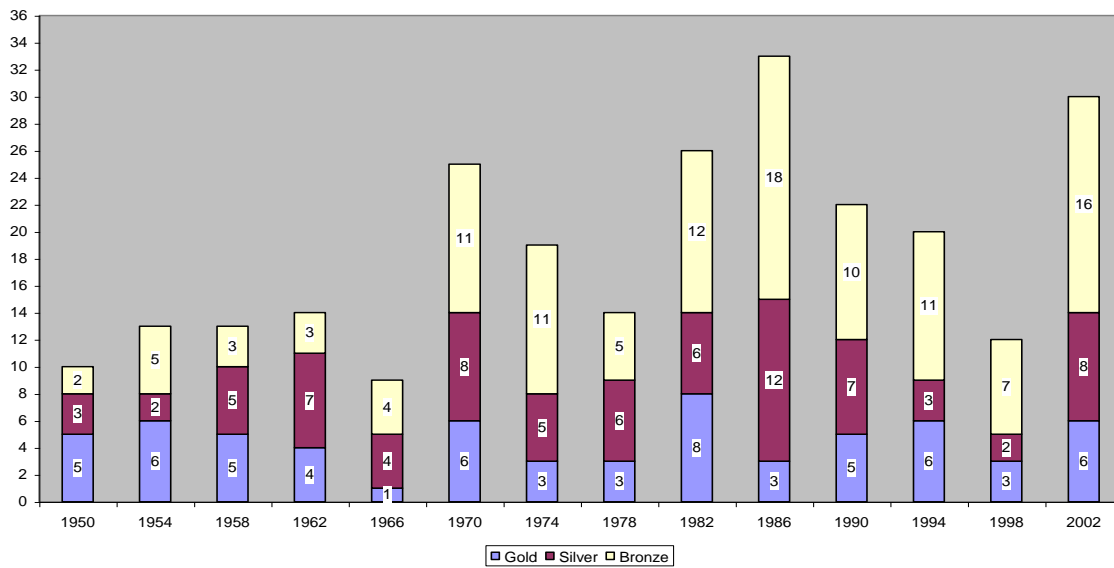
Scotland's overall performance by sport in the Commonwealth Games between 1950 and 2002 is shown in Table 4.1.

Table 4.1: Scotland's overall performance by sport 1950 - 2002

<b>Sport</b>	<b>Gold</b>	<b>Silver</b>	<b>Bronze</b>	<b>Total</b>	<b>%</b>	<b>Cumulative</b>
Athletics	15	15	20	50	19.2%	19.2%
Boxing	12	12	23	47	18.1%	37.3%
Swimming	7	14	15	36	13.8%	51.2%
Shooting	6	9	14	29	11.2%	62.3%
Lawn Bowls	11	6	6	23	8.8%	71.2%
Judo	2	6	10	18	6.9%	78.1%
Weightlifting	2	4	8	14	5.4%	83.5%
Wrestling	0	5	9	14	5.4%	88.8%
Fencing	2	4	2	8	3.1%	91.9%
Badminton	1	1	4	6	2.3%	94.2%
Diving	3	1	1	5	1.9%	96.2%
Cycling	1	1	2	4	1.5%	97.7%
Gymnastics	1	0	2	3	1.2%	98.8%
Squash	1	0	1	2	0.8%	99.6%
Rowing	0	0	1	1	0.4%	100.0%
<b>Totals</b>	<b>64</b>	<b>78</b>	<b>118</b>	<b>260</b>	<b>100.0%</b>	

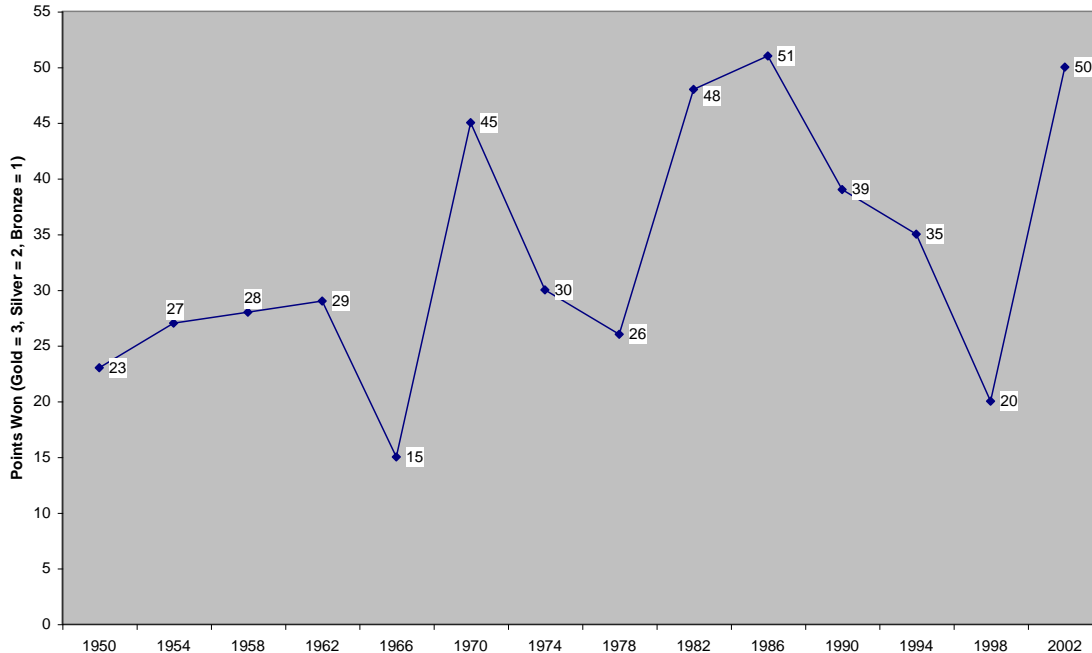
In the 14 editions of the Commonwealth Games since 1950, Scotland has won 260 medals of which 64 (25%) are gold medals, 78 (30%) are silver medals and 118 (45%) are bronze medals. In descending order of the most medals won, athletics (50/260), boxing (47/260) and swimming (36/260) are the three sports in which Scotland has achieved the greatest success. However, it should be noted that a particularly high number of gold medals has been won in Lawn Bowls (11). To illustrate how Scotland's 260 medals have been won over time, Graph 4.8 shows the number and nature of medals won between 1950 and 2002.

Graph 4.8: Scotland's medal winning performance by edition



Since 1950 Scotland has won a maximum of eight gold medals (1982) and a minimum of one gold medal (1966). Furthermore, the most frequently occurring medal category is confirmed as bronze. Converting medals won into points (gold = 3, silver = 2 and bronze = 1) gives the 'totality of achievement' trend line shown in Graph 4.9.

Graph 4.9: Scotland's points 1950 – 2002



Graph 4.9 shows a random pattern of performance with no overall systematic trend. Scotland's four best editions of the Commonwealth Games have been 1970 (45 points) in Edinburgh, 1982 (48 points) in Brisbane, 1986 (51 points) in Edinburgh and 2002 (50 points) in Manchester. Each of these high performing editions has specific circumstances that help to explain Scotland's relative success.

- 1970 - home advantage as the event was held in Scotland;

- 1982 - a world class athlete in Alan Wells who won two individual gold medals (100m and 200m);
- 1986 - home advantage as the event was held in Scotland and decreased competition arising from the African nations' led boycott;
- 2002 - highly significant increase in the number of events contested from 213 in 1998 to 281(+68) and almost 'home' advantage.

In the three editions between 1990 and 1998 Scotland showed a systematic downward trend from the all time high of 51 points in 1986 to a near all time low of 20 points in 1998 in Kuala Lumpur. Revenue funding for elite athletes via athlete personal awards and the World Class Performance Programme infrastructure (WCPP) came on stream in 1997. At national level the Talented Athlete Programme (TAP) provides support for athletes whose sport is organised mainly on a home country basis (e.g. badminton) or for athletes who show potential but who are not yet at World Class level. It might be argued that both WCPP and TAP were at least in part a causal factor in enabling Scotland to increase its 1998 score of 20 points to 50 points in 2002.

However, examining points won is of limited value because the number of events has changed over time. Thus it would be incorrect to assume that the 50 points won in 2002 was a greater achievement than the 45 points won in 1970 without relating points won to the total number of points available to win. To illustrate the point, the four best performing editions are analysed on a standardised basis in Table 4.2 below to identify the greatest level of achievement in relative terms.

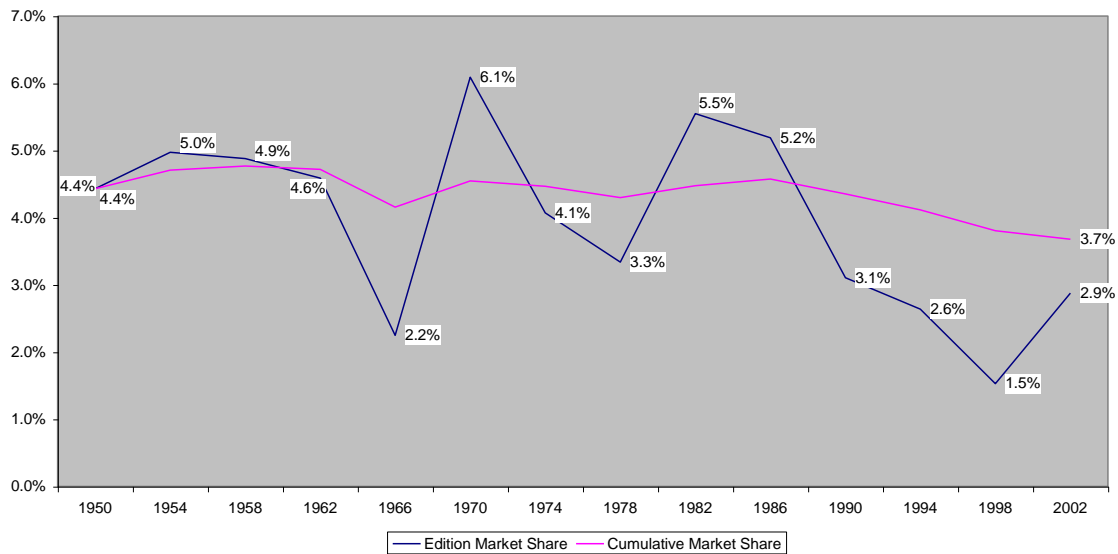
Table 4.2: Comparison of points won with market share

<b>Edition</b>	<b>Venue</b>	<b>Points</b>	<b>Points Rank</b>	<b>Points Available</b>	<b>Market Share %</b>	<b>Market Share Rank</b>
1970	Edinburgh	45	4	739	6.1%	1
1982	Brisbane	48	3	865	5.5%	2
1986	Edinburgh	51	1	983	5.2%	3
2002	Manchester	50	2	1,738	2.9%	4

Table 4.2 shows that the greatest market share achieved was in 1970 when the 45 points won represented 6.1% of the points available. The 50 points won in 2002 was, in relative terms, the worst achievement as it represented only 2.9% of the 1,738 points available. That is, as the number of events contested at each edition of the event has increased, Scotland has not maintained its market share.

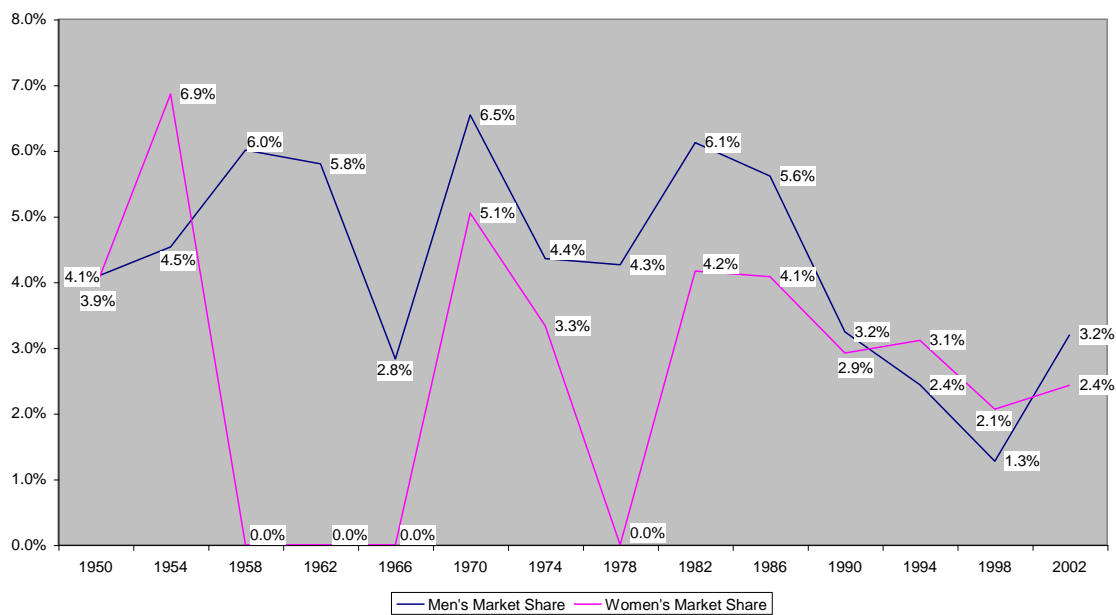
A complete time series analysis of market share from 1950 to 2002 is shown in Graph 4.10.

Graph 4.10: Scotland's market share 1950 - 2002



In the modern era (1970 to 2002) Scotland's market share peaked in 1970 (6.1%), then declined until 1982 (5.5%). It then followed a downward trend to 1998 (1.5%) followed by a rebound in 2002 (2.9%). When looking at the cumulative market share, it can be seen that this has been on a downward trend since 1986. In the same way that the points system masks relative achievement, so too, overall market share masks the difference in achievement between men and women. Graph 4.11 addresses this issue by showing time series analysis of market share by gender.

Graph 4.11: Market share by gender



Graph 4.11 illustrates that when comparing the performance of Scotland's male and female athletes on a standardised basis, men have out-performed women in 11 of the 14 editions. On four occasions between 1958 and 1978 Scotland's women athletes won no medals (0% market share). The improvement in performance from

1998 to 2002 can be largely attributed to Scotland's male athletes who improved their market share from 1.3% to 3.2%. By contrast Scotland's women athletes increased their market share from 2.1% to 2.4%. As will be shown in greater depth later, Scotland is over reliant on male athletes for its success in the Commonwealth Games.

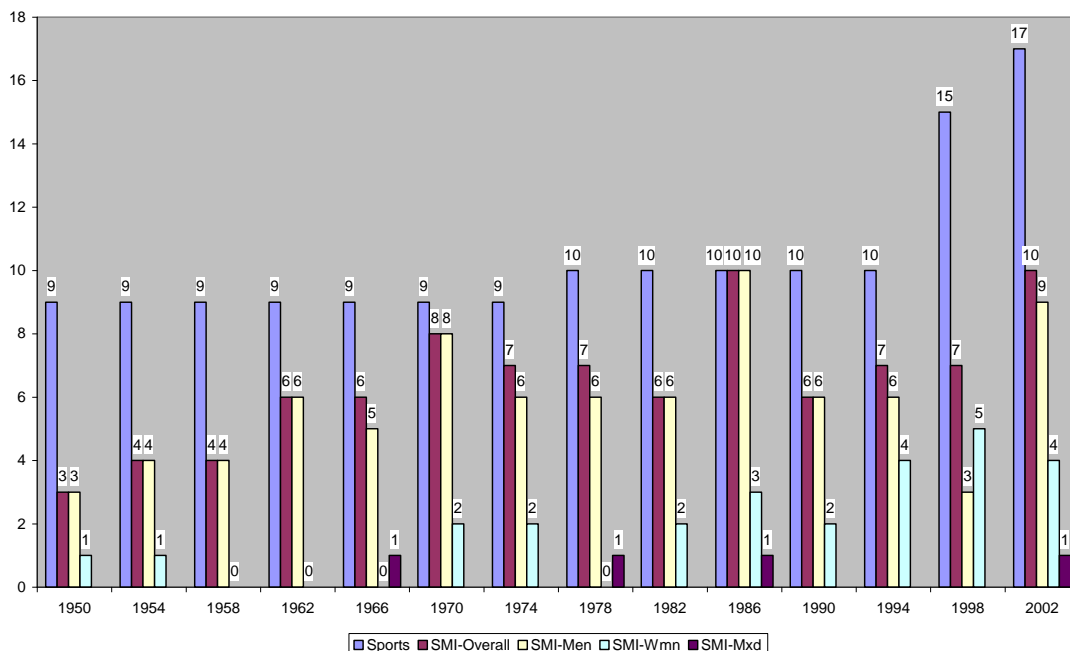
#### Key points

- Scotland showed a downward trend in its medal winning success from a peak in 1986 (51 points) to a trough in 1998 (20 points). 2002 marked the end of a period of decline with a sharp increase in points from 20 (1998) to 50.
- When standardising the performance at each edition using market share, Scotland lost market share in the four editions between 1986 and 1998.
- 2002 was the first increase in market share since 1978. Nonetheless, the 2.9% market share achieved in 2002 is below the long term average market share of 3.7%.
- In market share terms, men have out-performed women in 11 of the last 14 editions of the Commonwealth Games and Scotland is confirmed as being over-reliant on male athletes for its medal winning success.

#### 4.4 Analysis of sports medalled in overall and by gender

Graph 4.12 presents an analysis of the total number of sports contested at each edition of the Commonwealth Games since 1950 as well as an analysis of the number of these sports in which men, women, and mixed teams have won a medal.

Graph 4.12: Number of sports medalled in at each edition 1950 - 2002



Between 1970 and 1994 when the number of sports contested was either nine or ten, overall Scotland won medals in most sports (lowest 6/10 in 1982, highest 10/10 in 1986). Men invariably medal in more sports than women. This is not surprising as there are more sports available for men to contest than women. Nonetheless,

Scotland's women athletes have never medalled in more than five different sports (1998) at any one edition.

The most significant finding in Graph 4.12 is that as the number of sports contested grew rapidly in 1998 (15) and 2002 (17) Scotland has not capitalised on this expansion by winning medals in an increased number of sports. In 1998, the greatest single expansion in the number of sports contested in the history of the Commonwealth Games, Scotland's male athletes won medals in only three sports, which was the joint lowest with 1950 when only nine sports were contested. In 2002 when 17 sports were contested, Scotland won medals in ten sports, with men winning at least one medal in nine sports and women winning at least one medal in four sports.

Essentially there are three ways for Scotland to become more competitive in the Commonwealth Games. First, a strategy of specialisation whereby the aim is to win more medals in a narrow range of sports or indeed events within given sports. Second, a strategy of diversification whereby the aim is to increase the number of medals won by winning medals in a greater number of sports. Third, specialisation and diversification are not mutually exclusive and therefore a hybrid strategy of specialisation and diversification could also be effective.

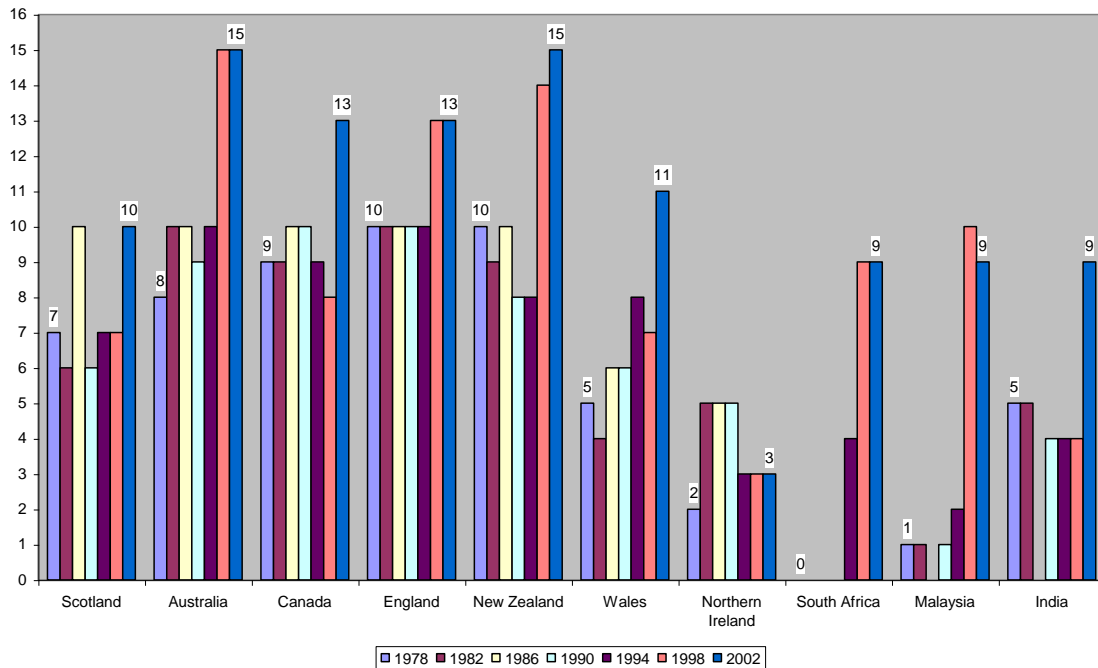
To contextualise the number of sports in which Scotland wins medals we have benchmarked Scotland against nine comparator nations. The overall performance of these nations in descending order of gold medals between 1950 and 2002 can be seen in Table 4.3.

Table 4.3: Performance of comparator nations 1950 - 2002

	<b>Gold</b>	<b>Silver</b>	<b>Bronze</b>	<b>Total</b>	<b>%</b>
Australia	611	523	463	1597	25%
England	473	456	481	1410	22%
Canada	337	358	386	1081	17%
All Other Nations	250	266	342	858	13%
New Zealand	110	144	204	458	7%
India	80	79	62	221	3%
<b>Scotland</b>	<b>64</b>	<b>78</b>	<b>118</b>	<b>260</b>	<b>4%</b>
South Africa	57	55	65	177	3%
Wales	45	57	78	180	3%
Malaysia	29	36	41	106	2%
Northern Ireland	24	23	36	83	1%
Totals	2080	2075	2276	6431	100%

Table 4.3 shows that the dominant nations over time have been Australia, England and Canada who between them have won 64% of all medals. The nine comparator nations and Scotland have won 87% of all medals between them with the remaining 62 nations accounting for the balance of 13%. Scotland's overall performance is broadly comparable to that of India, South Africa and Wales. It is against the backdrop of total performance that the number of sports medalled in at each edition between 1978 and 2002 is reviewed in Graph 4.13.

Graph 4.13: Sports medalled in by Scotland and international comparators



Graph 4.13 shows that the countries which have traditionally dominated the Commonwealth Games (Australia, England and Canada) tend to win medals in more sports than Scotland. Furthermore, these three countries have taken advantage of the expansion in the number of sports to increase the number of sports in which they win medals.

Countries that are more realistically comparable to Scotland in terms of population such as New Zealand and Wales have had positive results. New Zealand has punched well above its weight winning medals in 14/15 sports in 1998 and 15/17 sports in 2002. Wales has steadily increased the number of sports in which it wins medals from five in 1978 to 11 in 2002. Emerging nations, in sporting terms, such as South Africa (post apartheid), Malaysia and India although winning medals in fewer (9) sports than Scotland (10) have all shown a higher growth rate in sports medalled in than Scotland.

The data concerning the number of sports in which countries have won medals gives a further insight into why Scotland is losing market share. First, the traditionally dominant countries have reinforced their dominance by having the capability to win medals in the increased number of sports contested. Second, comparable and emerging nations are also increasing the range of sports in which they win medals. The net effect of these two factors is that it would appear that Scotland has been unable to maintain its relative share of points.

#### Key points

- Between 1970 and 1994 when between nine and ten sports were contested, Scotland tended to medal in the majority of sports.
- Following the expansion of the Commonwealth Games in 1998 and 2002 Scotland has not won medals in a significantly increased number of sports in absolute terms and relative to the dominant and emerging nations. These findings help in part to explain Scotland's long term reduction in market share.



## 4.5 Market concentration

The term 'market concentration' 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 the sample nations are reliant on them is shown in Table 4.4.

Table 4.4: Market concentration for Scotland and comparator nations

	<b>Most Successful</b>	<b>2nd Most Successful</b>	<b>3rd Most Successful</b>	<b>Total</b>
<b>India</b>	38% Weightlifting	26% Wrestling	20% Shooting	<b>84%</b>
<b>Northern Ireland</b>	41% Boxing	20% Athletics	19% Lawn Bowls	<b>81%</b>
<b>Malaysia</b>	42% Badminton	21% Weightlifting	11% Shooting	<b>74%</b>
<b>Australia</b>	30% Swimming	22% Athletics	8% Cycling	<b>60%</b>
<b>Wales</b>	26% Weightlifting	21% Athletics	11% Lawn Bowls	<b>58%</b>
<b>South Africa</b>	25% Athletics	20% Swimming	11% Lawn Bowls	<b>56%</b>
<b>England</b>	29% Athletics	17% Swimming	8% Shooting	<b>54%</b>
<b>Canada</b>	24% Swimming	18% Athletics	9% Shooting	<b>51%</b>
<b>Scotland</b>	<b>19% Athletics</b>	<b>18% Boxing</b>	<b>14% Swimming</b>	<b>51%</b>
<b>New Zealand</b>	22% Athletics	14% Cycling	13% Swimming	<b>49%</b>

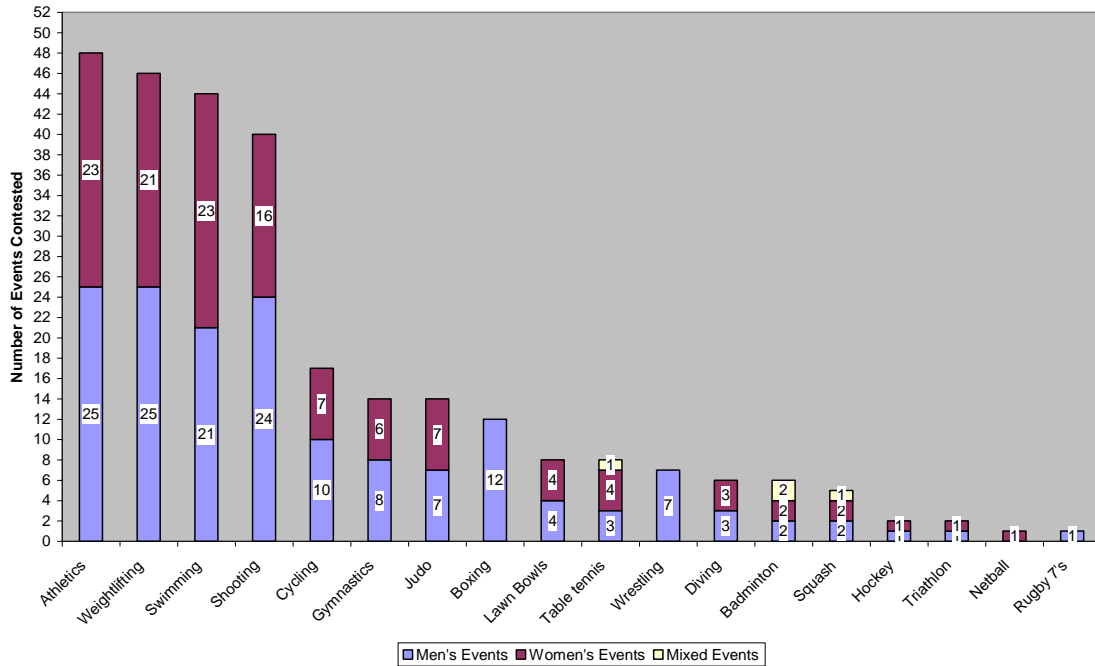
In Table 4.4 it can be seen that India is reliant on weightlifting (38%), wrestling (26%) and shooting (20%) for 84% of all the medals it has won since 1950. Northern Ireland is dependent on boxing for 41% of its medals and Malaysia is dependent on badminton for 42% of its medals. Nations with a high (greater than 60%) market concentration in their top three sports are examples of nations pursuing a strategy of specialisation (albeit intentionally or unintentionally).

Aggregate figures can mask the fact that some countries choose to specialise not just in, for example, weightlifting generally but in women's weightlifting specifically. In 2002, India won 11 gold medals out of 21 available in women's weightlifting and achieved a market share of 39% in the overall women's weightlifting competition. By contrast male athletes representing India won no gold medals and achieved a market share of only 6% in the men's weightlifting competition. This finding would suggest a deliberate strategy on the part of India to focus specifically on women's weightlifting.

Scotland has a market concentration of 51% in its three most successful sports (athletics 19%, boxing 18% and swimming 14%). Scotland is part of a group of seven countries whose market concentration for their three most successful sports ranges from 60% (Australia) to 49% (New Zealand). These are countries most likely to be pursuing a diversification strategy or a hybrid strategy of diversification / specialisation, either intentionally or unintentionally.

One obvious strategy to pursue is to target the sports in which large number of events are contested. As can be seen in Graph 4.14, the medal winning opportunities in the 17 sports contested in Manchester 2002 were not evenly distributed.

Graph 4.14: Medals available by sport 2002



The majority of events occur in athletics (48), weightlifting (46), swimming (including diving and synchronised swimming) (44) and shooting (40). These four sports and sub-disciplines accounted for 63% of the events contested in Manchester 2002 and might be regarded as priority sports to target for any nation embarking on a strategic approach to improve its performance in the Commonwealth Games. However, the past is not a guide to the future and in 2006 only 15 weightlifting events will be contested (eight for men and seven for women).

#### Key points

- Scotland's top three most successful sports generate 51% of all medals won at the Commonwealth Games. This is a relatively low level of market concentration compared with the other countries in the sample.
- The 281 events contested at Manchester 2002 were not distributed evenly across the 17 sports. Four sports, athletics, weightlifting, swimming and shooting accounted for 63% of all events. Targeting sports with the most medal winning opportunities is an obvious strategy to pursue to improve a nation's medal table performance.

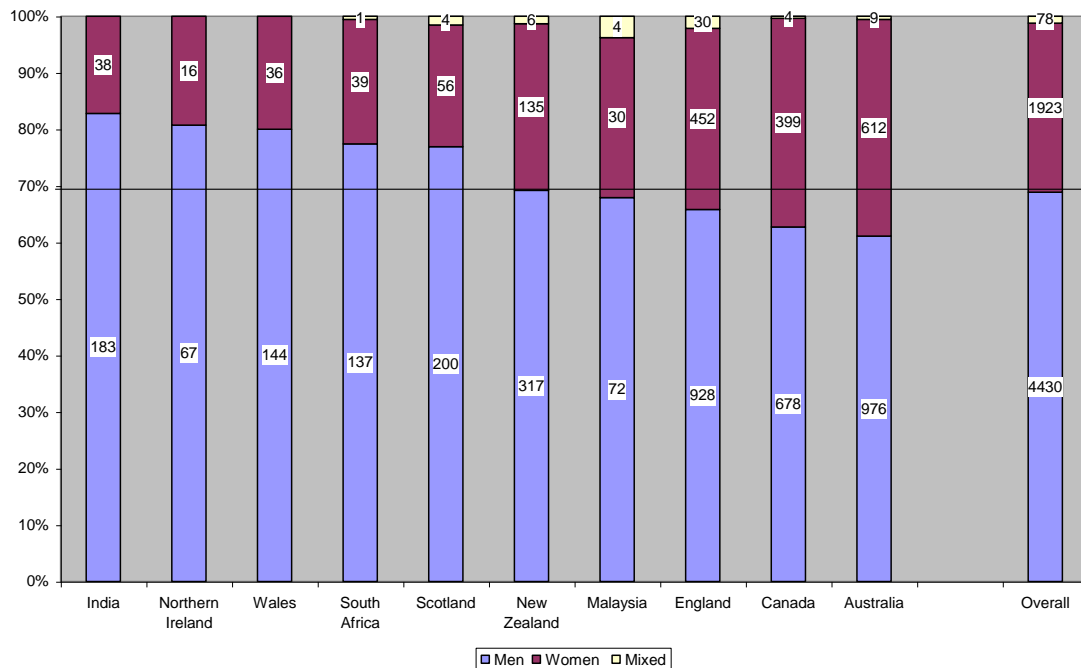
#### 4.6 Analysis of medals won by gender

Previous research (UK Sport 2003 *op. cit.*) has indicated that examining the overall success of a nation can mask considerable differences in performance by gender. To a certain extent this has already been demonstrated in the case of Scotland where men typically perform better than women (Graph 4.11).

In the Olympic Games the success of East Germany was predominantly attributable to women athletes who won more medals than their male counterparts even though there were fewer events for women than men. For the other nations in the UK Sport research Great Britain & Northern Ireland, France and Italy are all over-reliant on men for their success. By contrast, the success of the Netherlands over time generally and

at the Sydney Olympics (2000) specifically is largely attributable to women. Graph 4.14 shows the number and the proportion of medals won by gender for Scotland and the comparator countries.

Graph 4.15: Number and proportion of medals won by gender 1950 - 2002



The reference line in Graph 4.15 is drawn at the point where the proportion of medals won by gender is identical to the number of events that have been contested by gender between 1950 and 2002. During this time 69% of medals have been contested by men, 39% by women and 1% by mixed teams. It can now be seen that India, Northern Ireland, Wales, South Africa and Scotland have a disproportionately higher percentage of their medals won by men and consequently a relatively low percentage of their medals won by women. The three dominant countries, Australia, England and Canada win a disproportionately high percentage of medals from women athletes.

There is a logic to concentrating on winning women's medals as much of the growth in the number of events contested has been driven by an increase in medal winning opportunities for women. The extra detail provided by Graph 4.15 enables a more precise diagnosis to be made about Scotland's recent performance. That is, market share has been lost because Scotland has been unable to maintain its share of medals contested by women as the number of events for women has increased. In a UK context this is not an issue confined to Scotland as the same is true for Great Britain and Northern Ireland at the summer Olympic Games. However, 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 maximising their potential.

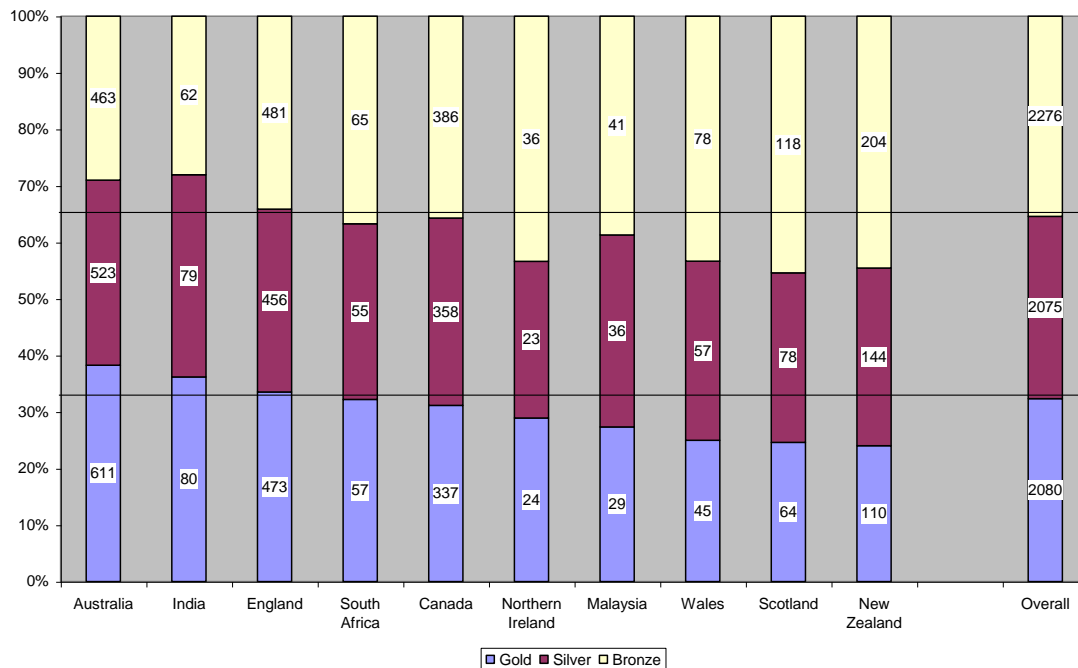
#### Key point

- Scotland is over-reliant on male athletes for its medal winning success.

#### 4.7 Analysis of medals won by type

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. In the UK Sport (2003) research Great Britain and Northern Ireland was identified as having the lowest gold medal percentage (22%) of the entire sample of five countries. The relevant data for Scotland and the comparator nations are shown in Graph 4.16.

Graph 4.16: Number and proportion of type of medal won



Since 1950, 6,431 medals have been contested of which 32.3% have been gold, 32.3% silver and 35.4% 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. Rather than having a play-off for 3<sup>rd</sup> and 4<sup>th</sup>, both losing semi-finalists are awarded a bronze medal.

Thus in boxing for example, where there are 12 events, the number of medals contested is 48 (12 x 4) rather than 36 (12 x 3). Similarly in Judo where 14 events were contested in 2002 the distribution of medals was 14 gold, 14 silver and 28 bronze. The two reference lines are drawn at the points which equal the proportion of medals awarded by type between 1950 and 2002 i.e. at 32.3% for gold, 32.3% for silver and 35.4% for bronze.

Australia (38%), India (36%) and England (34%) all achieve a higher percentage of gold medals won relative to the percentage of gold medals awarded (32.3%). Consequently these nations also win a lower proportion of silver and bronze medals. By contrast, Canada, Northern Ireland, Malaysia, Wales, Scotland and New Zealand all score a disproportionately low level of gold medals and consequently a disproportionately high level of silver and bronze medals. Scotland has the second lowest gold medal percentage (24.6%) and the highest bronze medal percentage (45.4%). Interestingly, the proportion of medals won by type by Scotland's men and women athletes is identical.

One possible strategy to improve Scotland's future performance would be to focus on providing athletes with the potential to win silver and bronze medals with some extra help to convert podium finishes into gold medals.

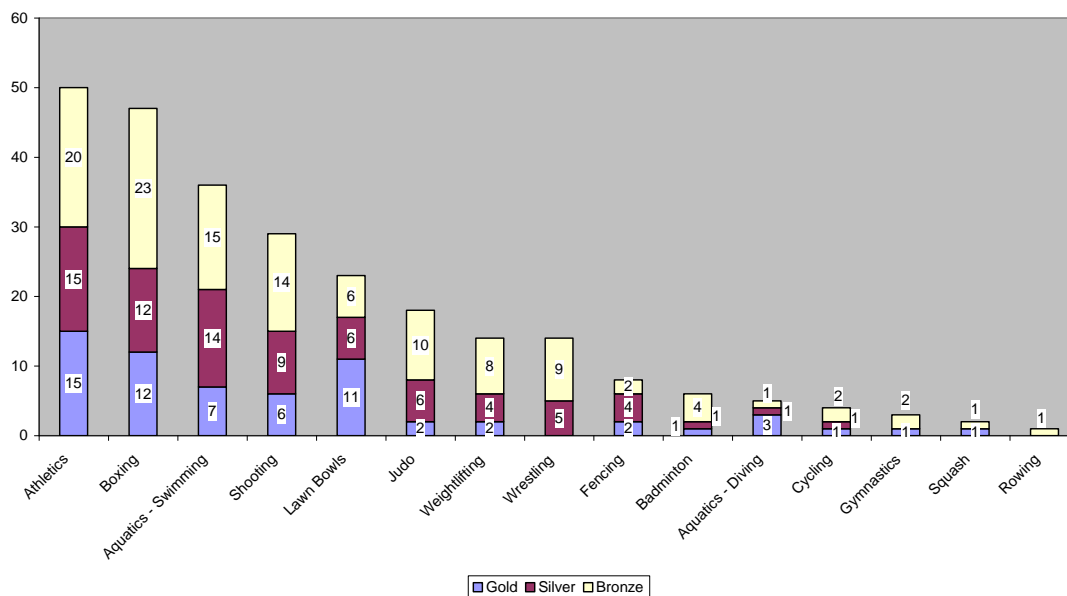
#### Key point

- Scotland has the second lowest gold medal percentage and the highest bronze medal percentage in the sample.

### 4.8 Breakdown of success by sport

Graph 4.17 provides an analysis of the medals won in each of the 15 sports in which Scotland has won at least one medal between 1950 and 2002. Graph 4.16 is, in effect, a different presentation of Table 4.1. In this regard it confirms the market concentration of more than half of all medals (51%) being won in athletics, boxing and swimming. A further point of note is that 45 of the 64 gold medals (70%) that Scotland has won have been in the four sports of athletics (15 gold medals), boxing (12), swimming (7) and lawn bowls (11).

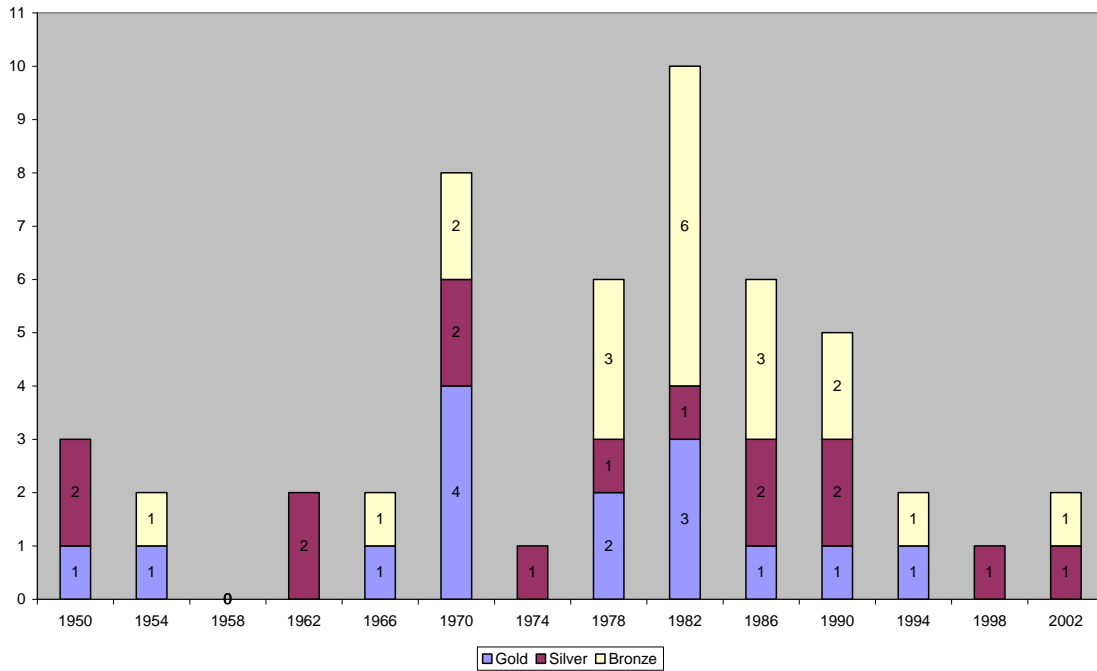
Graph 4.17: Analysis of medal winning success by sport



One notable point about Graph 4.17 is that it highlights a relatively high gold medal percentage in Lawn Bowls (11/23 medals or 48%) which compares very favourably with Scotland's overall gold medal percentage of 25%. In Scotland's three most successful sports (in terms of total medals won), athletics, boxing and swimming, 50, 47 and 36 medals have been won in each respectively. Over 14 editions of the Commonwealth Games it is worth looking at the absolute and relative performance of Scotland in these sports in isolation.

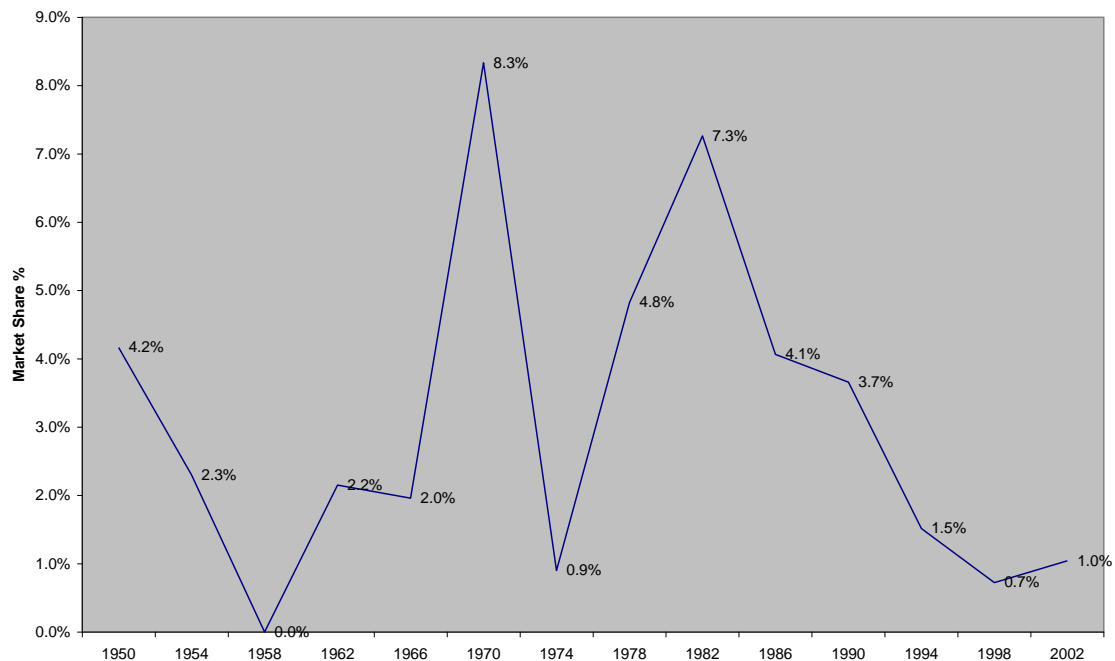
The total number of medals won in athletics by Scotland is shown in Graph 4.18 and the market share achieved in athletics is shown in Graph 4.19.

Graph 4.18: Absolute achievement in athletics



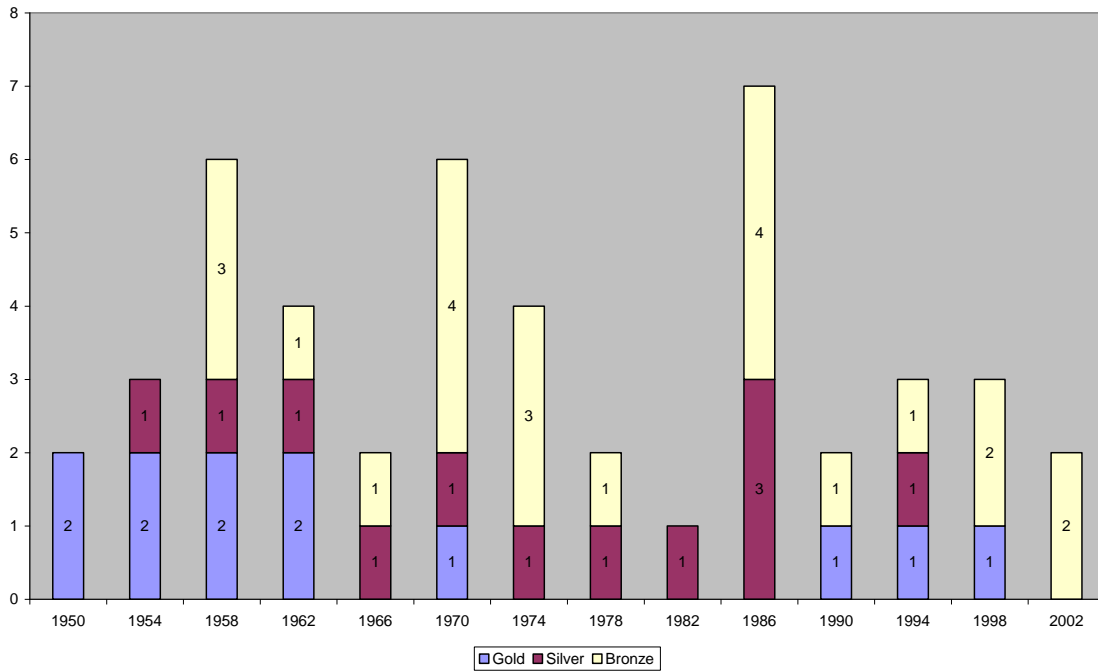
Scotland's best two editions in athletics were 1970 (four gold medals) and 1982 (three gold medals). Since 1982 there has been something of a decline in achievement in athletics such that no gold medal has been won by an athlete representing Scotland since 1994. As the number of events has increased and Scotland's performance deteriorated, it would be expected that market share has also declined; this is confirmed in Graph 4.19.

Graph 4.19: Market share in athletics



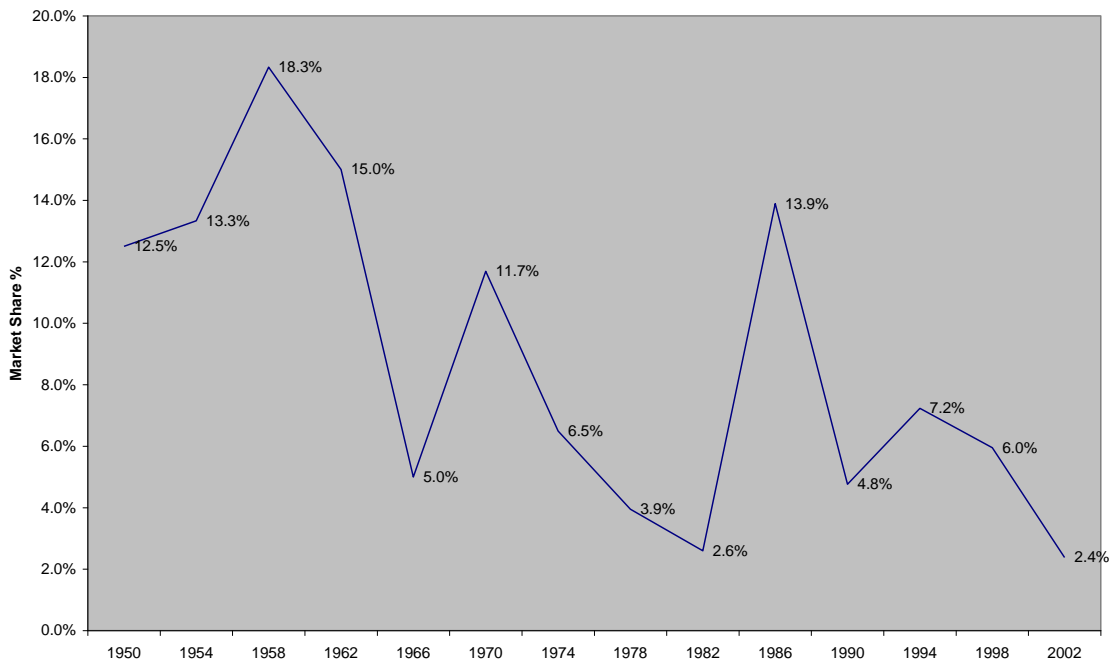
Graph 4.19 shows that in athletics Scotland's market share has been on a downward trend since 1982 and that the decline was halted with a small recovery in 2002. The sport which has provided most of Scotland's medals appears to be in decline. In boxing, a similar pattern to athletics emerges as shown in Graphs 4.20 and 4.21.

Graph 4.20: Absolute achievement in boxing



Most (9) of Scotland's 12 gold medals in boxing (75%) were won between 1950 and 1970. As for athletics, as the number of events has increased and Scotland's performance has deteriorated it would be expected that market share would decrease as shown in Graph 4.21.

Graph 4.21: Market share in boxing



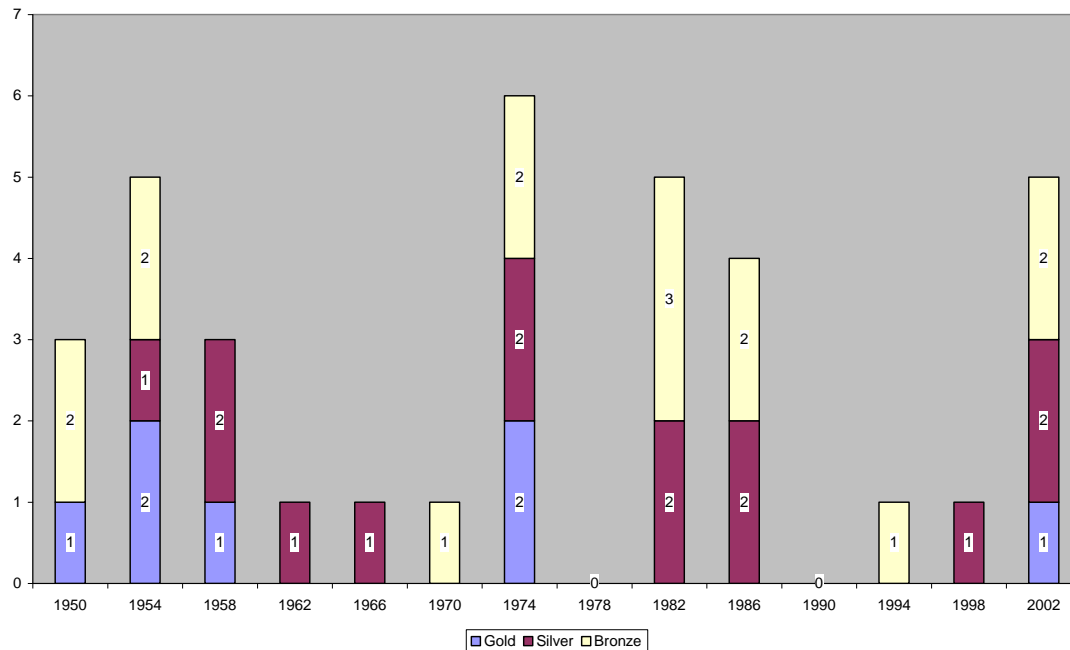
Market share in boxing has fallen from a peak of 18.3% in 1954 to 2.6% in 1982 and from 13.9% in 1986 when the Games were held in Edinburgh to an all time low of 2.4% in 2002 in Manchester.

In 1950, eight boxing events were contested with 36 medals available and by 2002 the corresponding figures were 12 events with 48 medals available. Thus, in the modern era Scotland has achieved less success in boxing despite the increased number of

events and medals available. These findings confirm that Scotland's second most successful sport is also in relative decline.

The performance by Scotland in its third most successful sport, swimming, mirrors that of athletics and boxing, that is most medals were won in earlier editions of the Commonwealth Games and contemporary successes have been relatively limited. Graph 4.22 shows Scotland's absolute performance in swimming by edition.

Graph 4.22: Absolute achievement in swimming



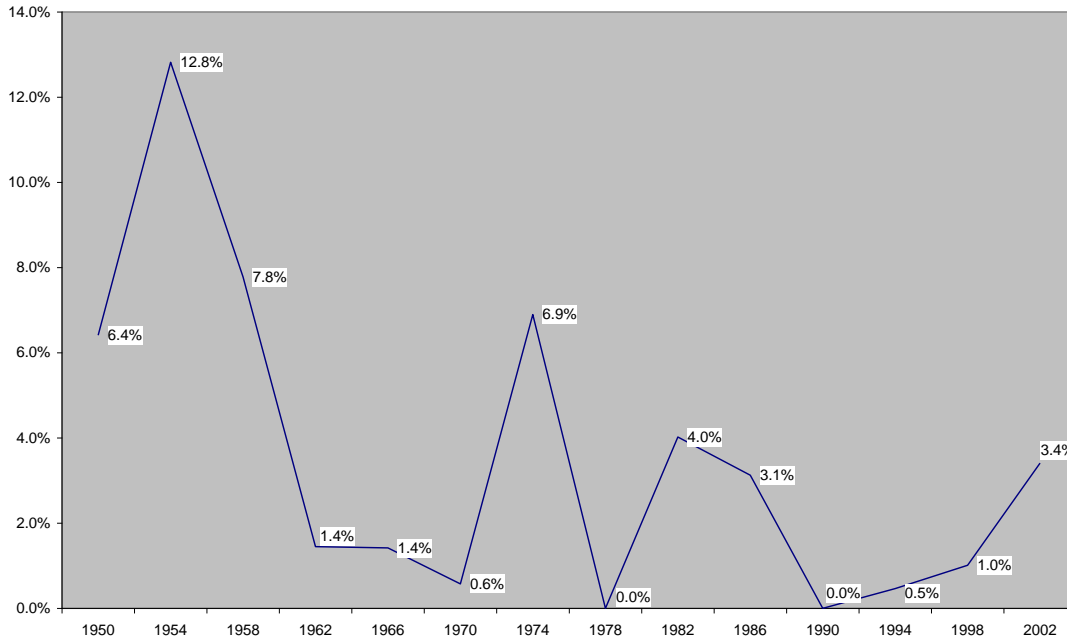
Graph 4.22 indicates that six of Scotland's seven gold medals in swimming were won between 1950 and 1974. The most successful edition of the Commonwealth Games in swimming was 1974 when Olympic gold medallist (1972) David Wilkie won two individual gold medals and a silver medal (8 points).

In 2002 Alison Sheppard became the first swimmer representing Scotland to win a gold medal for 24 years when winning the women's 50m freestyle in Manchester. Sheppard also won a bronze medal in the women's 50m butterfly event and was single-handedly responsible for winning all of the points (4) won by Scotland's women swimmers. She was the first woman swimmer to win gold for Scotland in the Commonwealth Games since 1954. An interesting feature of Alison Sheppard's success is that although she is Scottish she is not a product of a Scottish elite swimming programme. At the time she competed in Manchester she was based in Vancouver Island, Canada and is coached by her husband Gary Vandermaulen who is a former Olympian who represented Canada (1988).

Scotland's market share in swimming is shown in Graph 4.23.

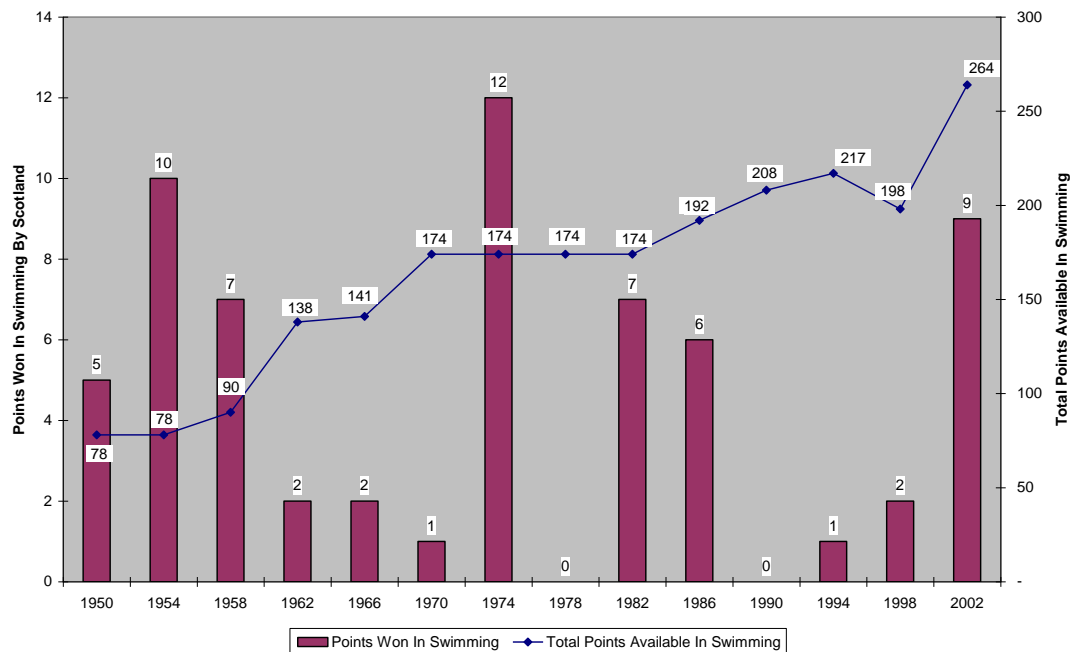


Graph 4.23: Market share in swimming



In the modern era (post 1978) Scotland's market share in swimming has ranged from 0% (twice) to 4% in 1982. From a zero base in 1990 there has been sustained increase to 3.4% in 2002 but this is largely attributable to Alison Sheppard who won a silver medal in 1998 and a gold and a silver medal in 2002. To illustrate the broad point that Scotland has failed to maintain its market share as the number of events has increased, Graph 4.24 shows points won against points available.

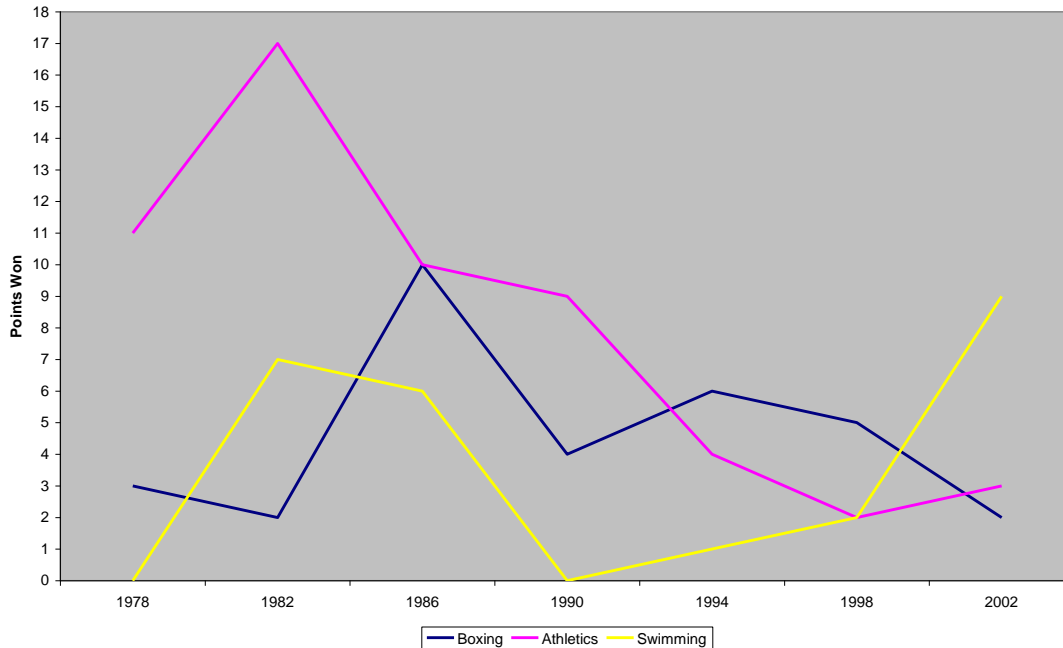
Graph 4.24: Scotland's points won compared with points available.



As a simple guide to Graph 4.24 when the 'points won' bars protrude beyond the 'points available' line (1950, 1954, 1958 and 1974), Scotland could be said to have over achieved (in relative terms) in swimming. Similarly when the 'points won' line is below the 'points available' line (all editions from 1962 to 2002 except the Wilkie games of 1974), Scotland could be said to have under achieved (in relative terms) in swimming.

To illustrate the point that achievement in Scotland's three most successful sports is based on historical rather than contemporary performance, the points won in each sport since 1978 have been plotted on a single graph as shown in Graph 4.25

Graph 4.25: Athletics, boxing and swimming 1978 - 2002

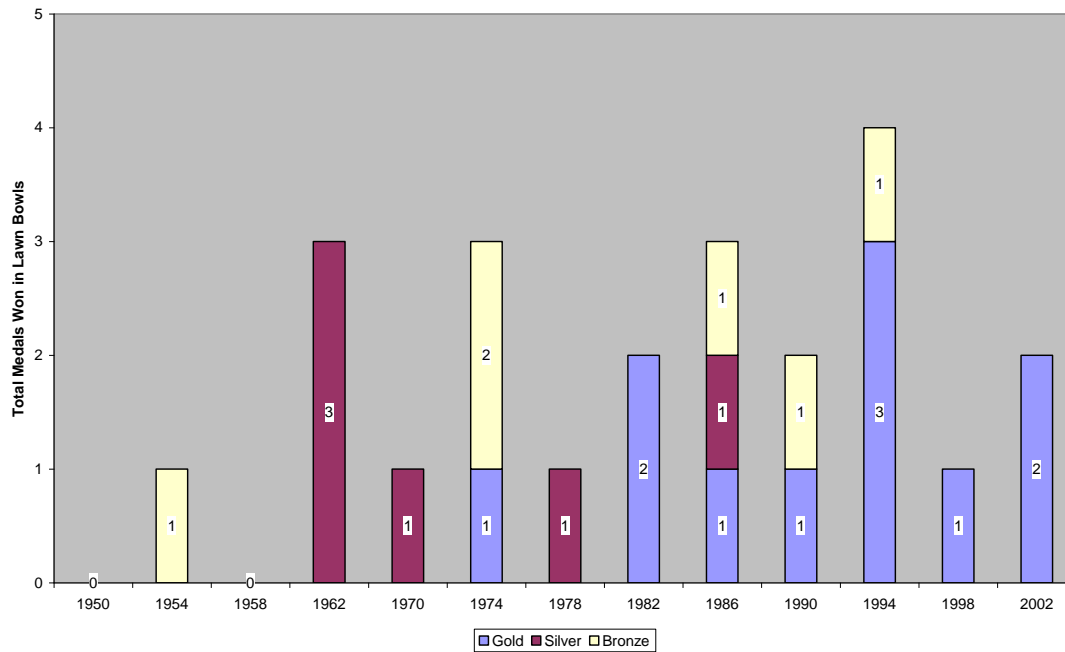


The main points of note from Graph 4.25 are outlined below

- In athletics, Scotland's performance has been in decline since 1982 when Alan Wells was at his peak. Despite the relatively recent successes of individuals such as Liz McColgan and Yvonne Murray there is no evidence of a successful programme producing medal winning Scottish athletes.
- Boxing has been in decline since the home advantage games of 1986 which also featured a boycott led by the African nations. African nations have an impressive record in boxing at the Commonwealth Games and thus for all nations taking part in 1986 competition was reduced and therefore medals were relatively easier (or less difficult) to win.
- From zero bases in 1978 and 1990 swimming has shown evidence of a recovery with three consecutive increases in points won. Much of this success is attributable to one swimmer (Alison Sheppard) and Scotland's market share has failed to keep up with the increase in the number of swimming events contested.

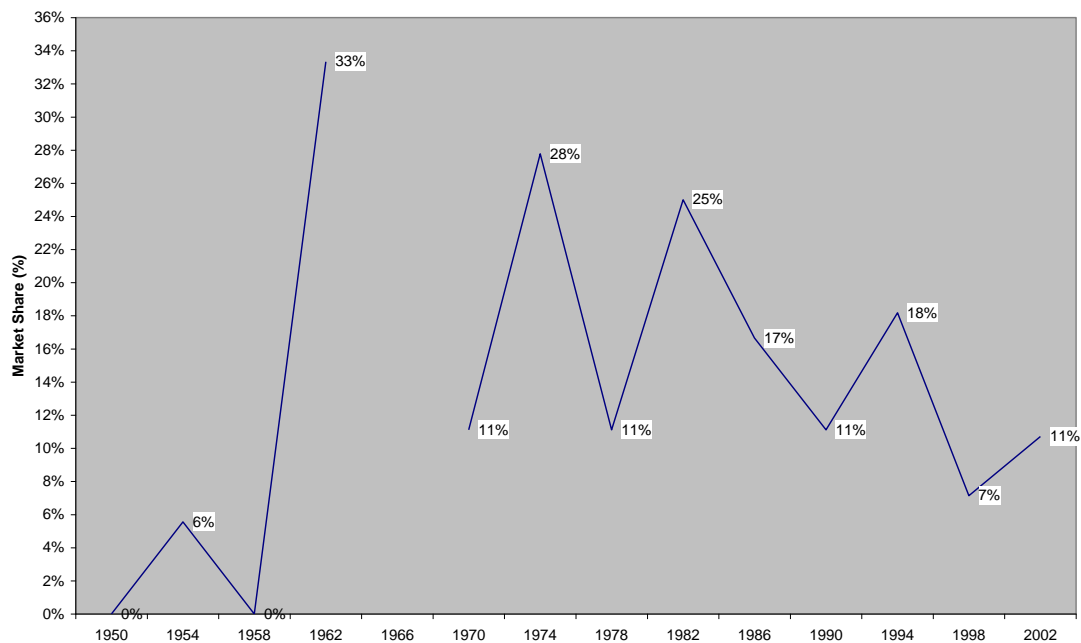
As a contrast to sports which are seemingly in decline, it is worth considering the case of lawn bowls in which Scotland appears to have a high level of contemporary achievement as shown in Graph 4.26.

Graph 4.26: Absolute achievement in lawn bowls



Although lawn bowls has been contested at 13 of the 14 editions of the Commonwealth Games since 1950, Scotland's success is relatively contemporary with ten of 11 gold medals won since 1982. The number of lawn bowls events has increased from three in 1978 to eight in 2002 and thus to appreciate underlying performance it is necessary to consider market share as shown in Graph 4.27. (Note: lawn bowls was not contested at the 1966 Games held in Kingston, Jamaica.)

Graph 4.27: Market share in lawn bowls



Market share has fluctuated since 1970 from a high of 28% in 1974 to a low of 7% in 1998 and on four occasions has been 11%. This is a much more consistent level of achievement than has been seen in athletics, boxing and swimming earlier.

## Key points

- Scotland's three most successful sports - athletics, boxing and swimming - appear to be in decline as demonstrated by decreasing absolute performance and decreasing market share.
- Lawn bowls is identified as a sport in which Scotland has performed relatively successfully with a gold medal percentage of 48% compared with an overall gold medal percentage of 25%. Furthermore, market share has dropped below 7% on only one occasion since 1970 during which time market share has typically been between 11% and 28%.

## 5. CONCLUSIONS

A NOP poll commissioned in Scotland before the 2002 Commonwealth Games found that over 80% of respondents stated that Scotland being successful in the Commonwealth Games was important to them. This finding therefore gives a mandate for **sportscotland** to use its resources to try and achieve success in the Commonwealth Games for the Scottish public. Understanding what has happened in the past and using this information to help drive future policies concerning elite sport is evidence of a transparent, evidence-led approach.

The data presented in this report, and the limited interpretation of it, are designed to stimulate debate amongst those charged with delivering medal winning success for Scotland in the Commonwealth Games. It is but a contribution to the overall debate using an independent analysis of data freely available in the public domain.

The key points emerging from the entire report are restated below.

- The number of nations contesting the Commonwealth Games has increased from 12 in 1950 to 72 in 2002.
- The number of athletes contesting the Commonwealth Games has increased from 590 in 1950 to 3,690 in 2002.
- The number of sports has increased from nine in 1950 to 17 in 2002.
- The number of events has increased from 88 in 1950 to 281 in 2002.
- The average number of athletes contesting each event has increased from 6.7 in 1950 to 13.1 in 2002, which suggests that competition has increased.
- The number of events contested by women has grown from 17 (19%) in 1950 to 121 (43%) in 2002.
- Competition, defined by the number of countries capable of winning medals, has increased thereby making medals increasingly difficult to win.
- Some of the increase in competition can be explained by nations taking a state sponsored strategic approach towards the 'production' of medal winners.
- Scotland showed a downward trend in its medal winning success from a peak in 1986 (51 points) to a trough in 1998 (20 points). 2002 marked the end of a period of decline with a sharp increase in points from 20 (1998) to 50.
- When standardising the performance at each edition using market share, Scotland lost market share in the four editions between 1986 and 1998.

- 2002 was the first increase in market share since 1978. Nonetheless, the 2.9% market share achieved in 2002 is below the long term average market share of 3.7%.
- In market share terms, men have out-performed women in 11 of the last 14 editions of the Commonwealth Games and Scotland is confirmed as being over-reliant on male athletes for its medal winning success.
- Between 1970 and 1994 when between nine and ten sports were contested, Scotland tended to medal in the majority of sports.
- Following the expansion of the Commonwealth Games in 1998 and 2002 Scotland has not won medals in a significantly increased number of sports in absolute terms and relative to the dominant and emerging nations. These findings help in part to explain Scotland's long term reduction in market share.
- Scotland's top three most successful sports generate 51% of all medals won at the Commonwealth Games. This is a relatively low level of market concentration compared with the other countries in the sample.
- The 281 events contested at Manchester 2002 were not distributed evenly across the 17 sports. Four sports, athletics, weightlifting, swimming and shooting accounted for 63% of all events. Targeting sports with the most medal winning opportunities is an obvious strategy to pursue to improve a nation's medal table performance.
- Scotland has the second lowest gold medal percentage and the highest bronze medal percentage in the sample.
- Scotland's three most successful sports, athletics, boxing and swimming appear to be in decline as demonstrated by decreasing absolute performance and decreasing market share.
- Lawn bowls is identified as a sport in which Scotland has performed relatively successfully with a gold medal percentage of 48% compared with an overall gold medal percentage of 25%. Furthermore, market share has dropped below 7% on only one occasion since 1970 during which time market share has typically been between 11% and 28%.

1950 – 2002 Commonwealth Games: Venues and Sports Contested

Appendix I

	Athletics	Aquatics	Boxing	Cycling	Weightlifting	Lawn Bowls	Wrestling	Badminton	Shooting	Fencing	Rowing	Archery	Gymnastics	Hockey	Squash	Netball	Judo	Rugby 7s	Cricket	Tenpin bowling	Table Tennis	Triathlon	No of Events
1950 Auckland	√	√	√	√	√	√	√			√	√												9
1954 Vancouver	√	√	√	√	√	√	√			√	√												9
1958 Cardiff	√	√	√	√	√	√	√			√	√												9
1962 Perth (Aus)	√	√	√	√	√	√	√			√	√												9
1966 Kingston	√	√	√	√	√		√	√	√	√													9
1970 Edinburgh	√	√	√	√	√	√	√	√		√													9
1974 Christchurch	√	√	√	√	√	√	√	√	√														9
1978 Edmonton	√	√	√	√	√	√	√	√	√				√										10
1982 Brisbane	√	√	√	√	√	√	√	√	√			√											10
1986 Edinburgh	√	√	√	√	√	√	√	√	√		√												10
1990 Auckland	√	√	√	√	√	√		√	√				√					√					10
1994 Victoria	√	√	√	√	√	√	√	√	√				√										10
1998 Kuala Lumpur	√	√	√	√	√	√		√	√				√	√	√	√		√	√	√			15
2002 Manchester	√	√	√	√	√	√	√	√	√				√	√	√	√	√	√			√	√	17