Assessing Australia's Innovative Capacity: 2004 Update

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We thank IPRIA for financial assistance. Part of this report is drawn from Porter, Stern and COC (1999) and Gans and Stern (2003). All views expressed are solely those of the authors and do not necessarily represent those of the above individuals and organisations. Responsibility for all errors lies with the authors.

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Contents

Page

1 Background 2

2 Measuring National Innovative Capacity 2

2.1 Measuring Innovative Output 3

2.2 Calculating the Index 4

2.3 Findings on Innovative Capacity 5

3 Australian Innovative Capacity 5

4 Summary 12

Appendix: Econometric Methodology 14

References 24

1 Background

Gans and Stern (2003) provided a new set of results and a focus on Australian innovation in their study of the drivers of national innovative performance. This is an update of Gans and Stern (2003); itself part of the National Innovative Capacity Project conducted by Michael E. Porter, Scott Stern and several co-authors over the past several years. The goal of these projects has been to understand the drivers of innovation across countries and use this to generate a measure of innovative performance. This update refines the empirical study further with more data and a greater coverage of years. It gives us our clearest picture yet of the innovative state of the world.

This report complements Gans and Stern (2003). As such, we do not repeat their discussion outlining the national innovative capacity framework and its underlying history. Instead, we report only changes to some of the quantitative results and any changes in methodology and interpretation.

The report proceeds in three sections. Section 2 outlines the latest methodology used in this update while Section 3 provides the main results from this quantitative assessment. In general, despite data improvements and a larger sample, the results of Gans and Stern (2003) are largely confirmed. A final section concludes reiterating the policy conclusions of Gans and Stern (2003).

2 Measuring National Innovative Capacity

The distinctive feature of the Porter-Stern approach is a clear distinction between innovation output (specifically, **international** patenting) and its drivers (infrastructure, clusters and linkages) as well as a careful determination of the 'weights' attached to each innovation capacity driver.[1] Each weight is derived from regression analysis relating the **development** of new-to-the-world technologies to drivers of national innovative capacity. This has the advantage of avoiding an 'ad hoc' weighting of potential drivers and instead using the actual relationship between innovative capacity and innovation to provide those weights. Thus, measures which historically have been more important in determining high rates of innovative output across all countries are weighted more strongly than those which have a weaker (though still important) impact on innovative capacity. The end result is a measure of

[1] See the Appendix and Furman, Porter and Stern (2002) for a more thorough discussion of this methodology and prior research in this area.

innovative capacity that is measured in per capita terms to allow for international comparisons as well as a set of weights that focuses attention on **relative** changes in resources and policies both over time and across countries.

2.1 Measuring Innovative Output

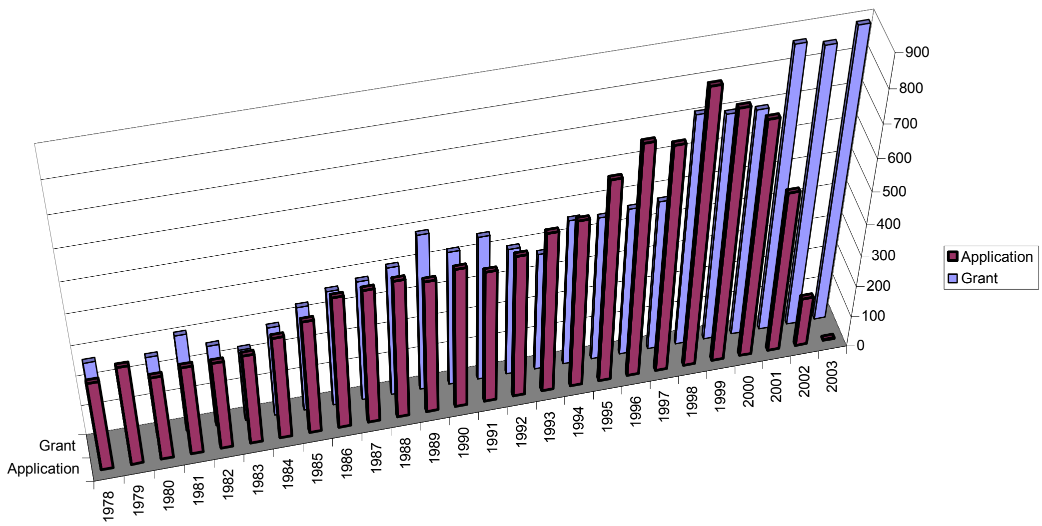
In order to obtain the weights for the Innovation Capacity Index, we must benchmark national innovative capacity in terms of an observable measure of innovative output. In this study, we use the number of "international" patents **granted** in a given year for each country in the sample, as captured by the number of patents granted to inventors of a given country by the United States Patent and Trademark Office. While no measure is ideal, as explained by Gans and Stern (2003), measures of international patenting provide a comparable and consistent measure of innovation across countries and across time.

Gans and Stern (2003) used applications as a measure of innovative output. This was primarily to take into account some missing data issues. In contrast, this update returns to the use of patents granted in a given year, as in the original Furman Porter and Stern (2002) work. As seen by the graph below, patents by date of application and patents by date of grant are generally highly correlated. However, there is a 'tail off' effect in the later years of data for patents by date of application. This is because older patent applications have all either been granted or rejected whereas some more recent patent applications would not yet have been reviewed. So in 2001, for example, it is difficult to predict what portion of the change in patents by date of application is due to any actual drop in innovative capacity or is merely a result of there being more unreviewed patents in the patent examination process. Looking at the number of patents granted by date of grant it is obvious that the drop is due to unreviewed patents. This 'tail off' effect limits the usefulness of very recent patent data using this measure.

Using the number of patents measured by date of grant does not have this 'tail off' effect and so avoids this issue. However, using this measure requires it to be lagged. This is because the innovation environment pertinent for the patent grant is that environment that prevailed at the time of application. Recent advice from the USPTO indicates that the average lag between patent application and patent grant is now 2 years. Accordingly, we have used this lag, rather than the three years used by Furman, Porter and Stern (2002).

That said, patent applications and patent grants are highly correlated, and the use of one or the other measure as the innovation output measure does not affect the core findings of this study.

Patents by date of grant versus patents by date of application: Australia



2.2 Calculating the Index

The Index is calculated and evaluated in two stages. The first stage consists of creating the database of variables relating to national innovative capacity for our sample of 29 OECD countries from 1978 to 2001. These measures are described in Gans and Stern (2003). This database is used to perform a time series/cross sectional regression analysis determining the significant influences on per capita international patenting and the weights associated with each influence on innovative capacity.

In the second stage of the analysis, the weights derived in the first stage are used to calculate a value for the Index for each country in each year given its actual resource and policy choices. It is in this sense that we refer to national innovative capacity: the extent of countries' current and accumulated resource and policy commitments. The Index calculation allows us to explore differences in this capacity across countries and in individual countries over time.[2]

[2] Gans and Stern (2003) also used some extrapolations to forecast the Innovation Index five years in the future. We have decided not to do this exercise this year but may include it in future studies.

2.3 Findings on Innovative Capacity

Stern, Porter, and Furman (2002) and Gans and Stern (2003) found that there was a strong and consistent relationship between various measures of national innovative capacity and per capita international patenting. The appendix details these for the expanded dataset and largely confirms the findings of previous studies. This indicates the general robustness of this approach as the underpinnings of any measure of innovative performance. As such, we refer the reader to Gans and Stern (2003) for a comprehensive discussion of these findings.

3 Australian Innovative Capacity

In this section, we provide updated results of the determinants of Australian Innovative Capacity. **Figure 3-1** depicts the value of the Innovation Index value for each country over time. The Index, interpreted literally, is *the expected number of international patent grants per million persons given a country's current configuration of national policies and resource commitments.*

Figure 3-1: Predicted Patents Per Million Persons

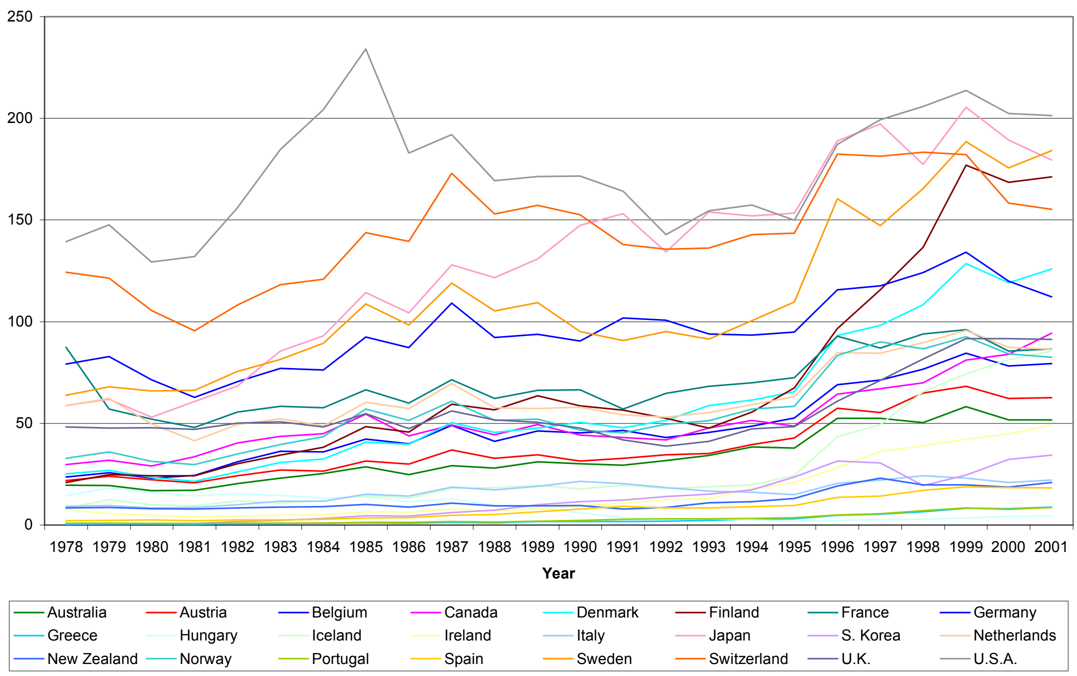
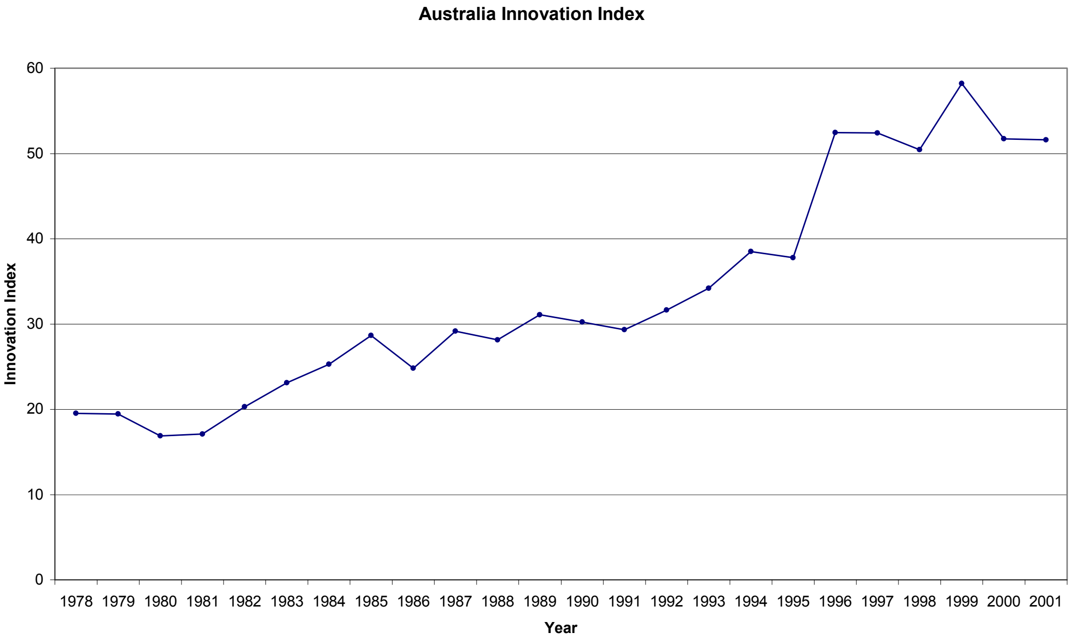


Figure 3-2: Evolution of Australia's Innovative Capacity



As shown in **Figures 3-2 and 3-3**, the updated Index confirms our earlier finding of three groups of nations – first, second and third tier innovators. It also reconfirms the finding of Gans and Stern (2003) that during the 1980s, Australia moved from a classic imitator economy to a second-tier innovator

Figure 3-3: Innovation Index Rankings

Country	1980 Rank	1980 Innovation Index
USA	1	129.2
Switzerland	2	105.4
Germany	3	72.1
Sweden	4	66.0
Japan	5	53.1
France	6	52.4
Netherlands	7	49.8
UK	8	47.8
Norway	9	31.3
Canada	10	29.0
Finland	11	24.6
Denmark	12	23.4
Belgium	13	23.1
Austria	14	22.2
Australia	**15**	**16.9**
Hungary	16	16.2
Iceland	17	10.1
Italy	18	8.5
New Zealand	19	8.0
Ireland	20	4.8
Spain	21	2.5
Portugal	22	0.8
S Korea	23	0.7
Greece	24	0.5

Country	1985 Rank	1985 Innovation Index
USA	1	234.1
Switzerland	2	143.7
Japan	3	114.3
Sweden	4	108.7
Germany	5	93.1
France	6	67.0
Netherlands	7	60.2
Norway	8	57.0
UK	9	54.8
Canada	10	54.6
Finland	11	49.0
Belgium	12	42.3
Denmark	13	40.7
Austria	14	31.4
Australia	**15**	**28.7**
Italy	16	15.3
Iceland	17	14.8
Hungary	18	14.1
New Zealand	19	10.2
Ireland	20	6.6
S Korea	21	4.6
Spain	22	3.4
Portugal	23	1.3
Greece	24	1.1

Country	1990 Rank	1990 Innovation Index
USA	1	171.6
Switzerland	2	152.6
Japan	3	147.4
Sweden	4	95.2
Germany	5	91.2
France	6	66.9
Finland	7	59.4
Netherlands	8	58.0
Denmark	9	50.5
UK	10	47.6
Norway	11	46.6
Belgium	12	45.4
Canada	13	44.1
Austria	14	31.6
Australia	**15**	**30.2**
Italy	16	21.5
Iceland	17	17.9
S Korea	18	11.5
New Zealand	19	9.6
Ireland	20	9.5
Spain	21	8.0
Hungary	22	6.1
Portugal	23	2.3
Greece	24	1.8

Country	1995 Rank	1995 Innovation Index
Japan	1	153.3
USA	2	149.8
Switzerland	3	143.5
Sweden	4	109.7
Germany	5	95.6
France	6	72.9
Finland	7	68.4
Denmark	8	65.5
Netherlands	9	63.3
Norway	10	58.4
Belgium	11	52.7
Canada	12	48.6
UK	13	48.4
Austria	14	42.8
Australia	**15**	**37.8**
Iceland	16	24.6
S Korea	17	23.5
Ireland	18	21.1
Italy	19	14.9
New Zealand	20	13.0
Spain	21	9.7
Portugal	22	3.7
Greece	23	3.1
Hungary	24	2.0
Poland	25	1.2
Mexico	26	0.4
Turkey	27	0.3

Country	2000 Rank	2000 Innovation Index
USA	1	202.4
Japan	2	189.2
Sweden	3	175.6
Finland	4	170.8
Switzerland	5	158.3
Germany	6	121.0
Denmark	7	119.2
UK	8	91.6
Netherlands	9	87.5
France	10	86.2
Norway	11	84.2
Canada	12	84.0
Iceland	13	82.1
Belgium	14	78.2
Austria	15	62.2
Australia	**16**	**51.8**
Ireland	17	45.1
S Korea	18	32.2
Italy	19	21.0
New Zealand	20	18.6
Spain	21	18.5
Greece	22	8.0
Portugal	23	7.8
Hungary	24	4.2
Poland	25	2.4
Turkey	26	1.0
Mexico	27	0.9

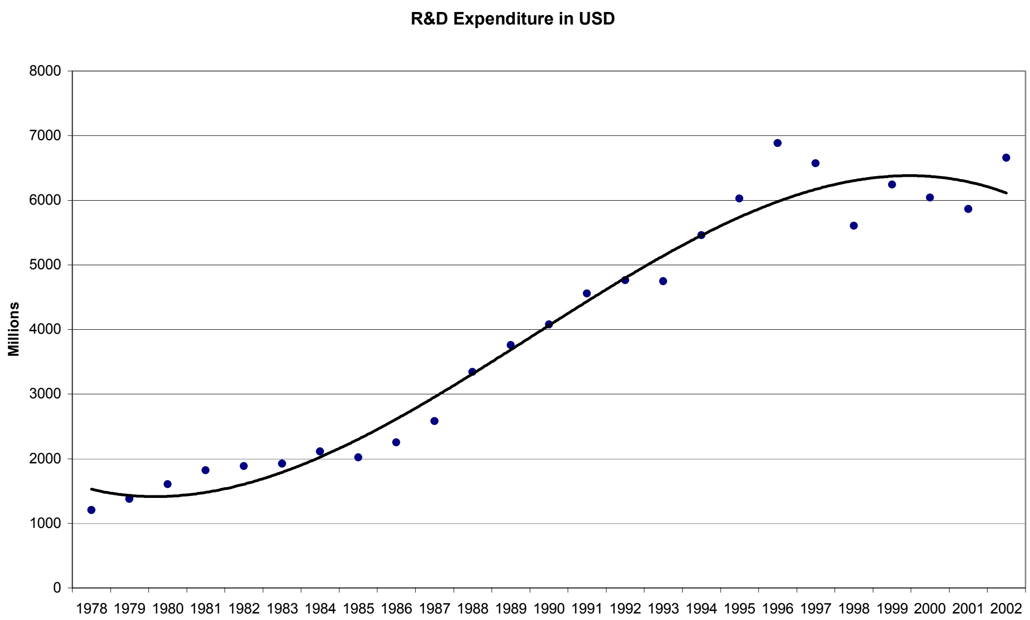
Country	2001 Rank	2001 Innovation Index
USA	1	201.4
Sweden	2	184.1
Japan	3	179.4
Finland	4	173.5
Switzerland	5	155.3
Denmark	6	125.9
Germany	7	113.1
Canada	8	94.3
UK	9	91.2
France	10	87.3
Iceland	11	86.6
Netherlands	12	86.5
Norway	13	82.4
Belgium	14	79.3
Austria	15	62.7
Australia	**16**	**51.6**
Ireland	17	49.6
S Korea	18	34.4
Italy	19	22.0
New Zealand	20	21.0
Spain	21	18.2
Greece	22	8.8
Portugal	23	8.7
Hungary	24	4.5
Poland	25	2.6
Mexico	26	1.0
Turkey	27	1.0

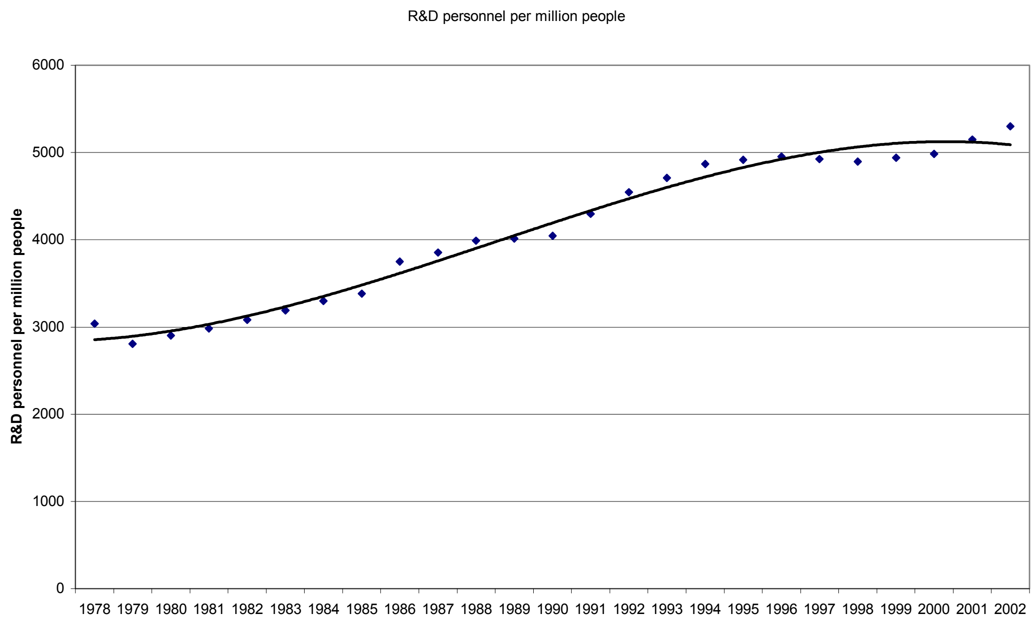
In contrast to the findings of Gans and Stern (2003), Australia's innovation index rose slightly from 1996 and has in recent years fallen back. This means that there have been no gains in our innovative capacity since 1996.

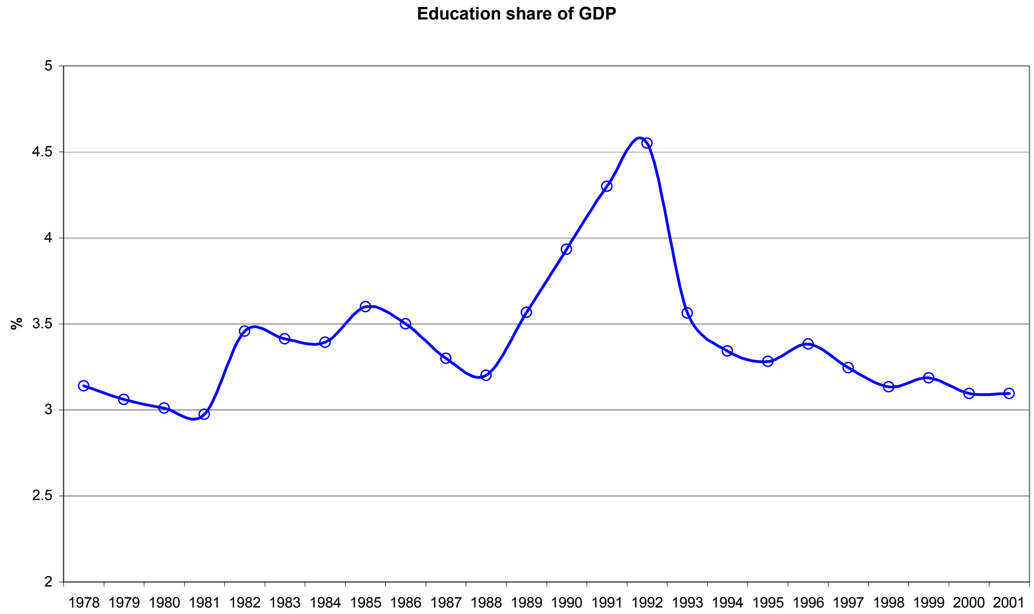
To understand this, it is useful to look at the drivers of innovative capacity for Australia. **Figure 3-4** presents each the changes over time in each of the measures used in the benchmarking analysis. It will be seen that the reasons for recent declines have been (i) a decline in R&D expenditure; (ii) a decline in IP protection; and (iii) continuing decline in education funding.

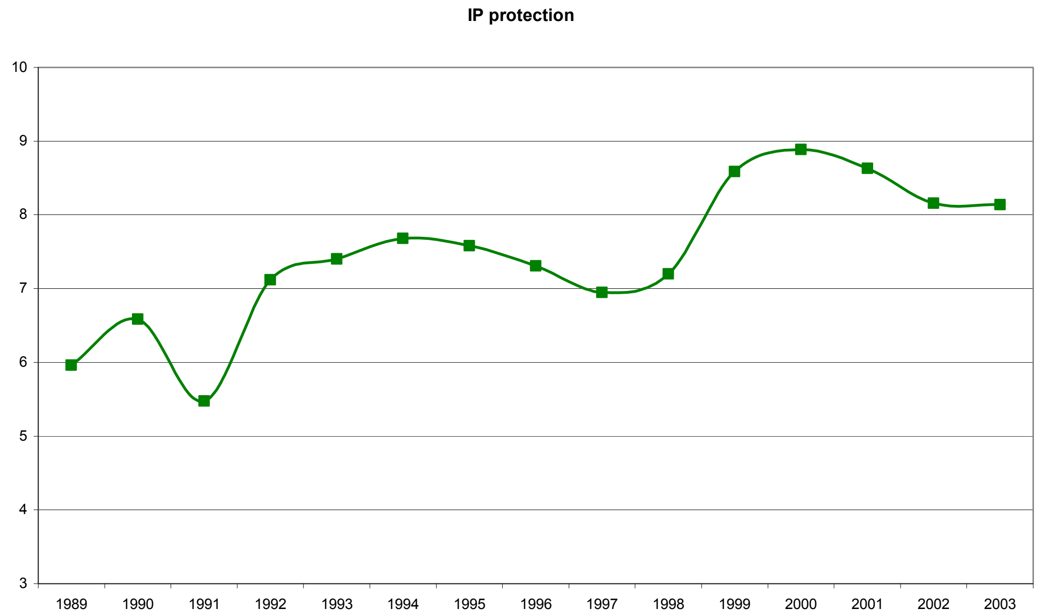
Figure 3-4: Drivers of Australia's Innovative Capacity

Common Innovation Infrastructure

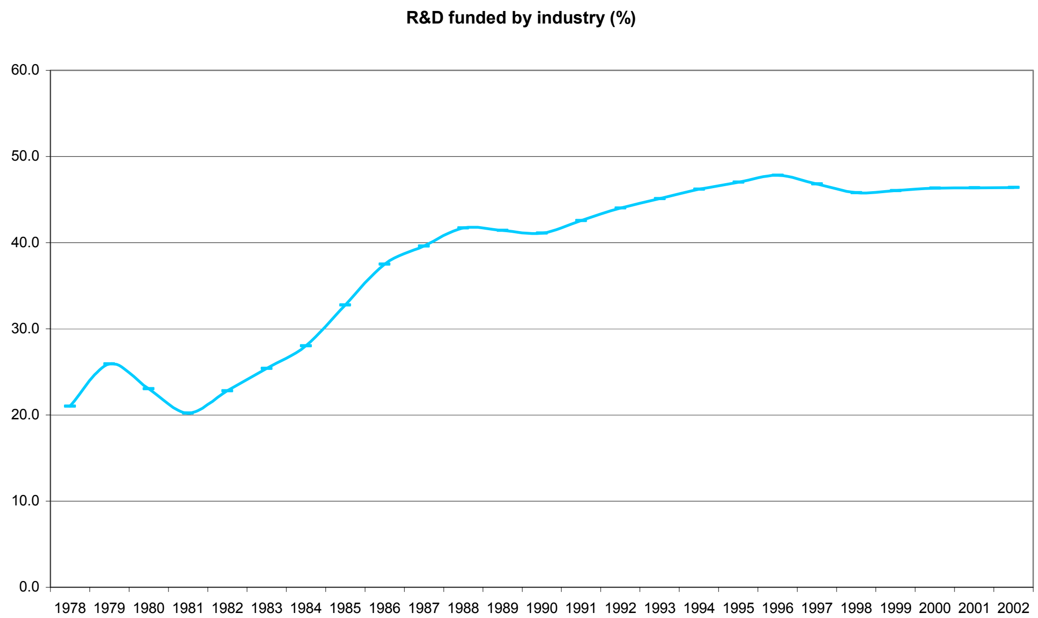



R&D personnel per million people
R&D personnel per million people
6000
5000
4000
3000
2000
1000
0
1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002

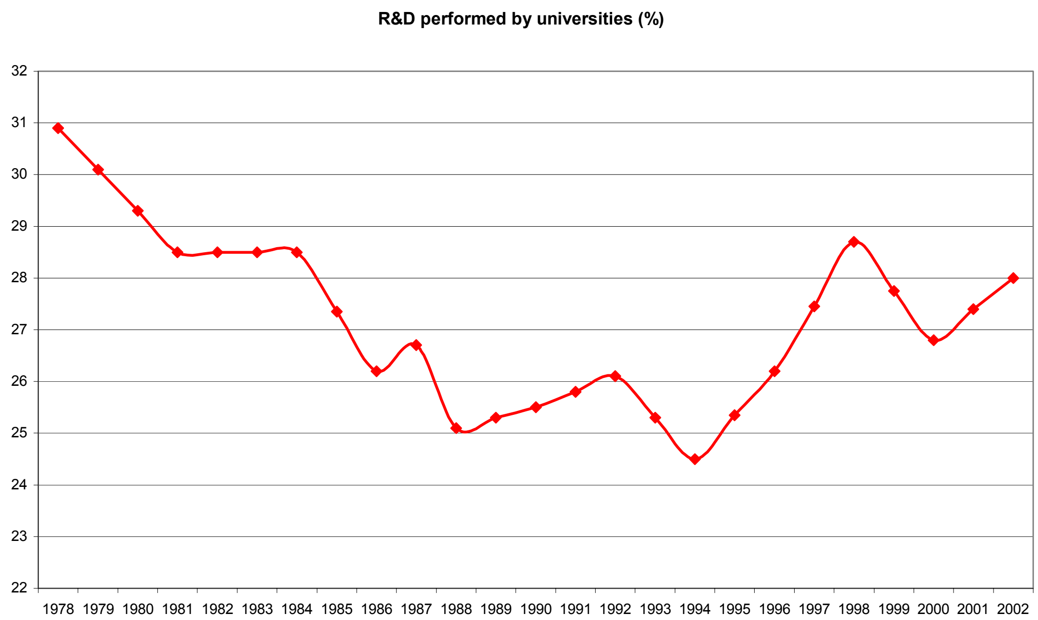

Education share of GDP
%
5
4.5
4
3.5
3
2.5
2
1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001



Cluster-Specific Environment



Quality of Linkages



4 Summary

Given the robustness of the conclusions of Gans and Stern (2003), it is appropriate to reiterate their policy recommendations for Australian innovation. Our expectation is that overtime, with changing policy directions, this general conclusion will change and evolve.

In a global economy, innovation-based competitiveness provides a more stable foundation for productivity growth than the traditional emphasis on low-cost production. Having secured a position as a leading user of global technology and creating an environment of political stability and regional leadership, Australia has an historic **opportunity** to pursue policies and investments to establish itself as a leading innovator nation. Australia must build upon a foundation of openness to international competition and the protection of intellectual property rights. However, Australia needs to focus upon the areas that appear to have become neglected over the past two decades. In particular, Australia should significantly increase its investment in order to:

- Ensure a world-class pool of trained innovators by maintaining a high level of university excellence and providing incentives for students to pursue science and engineering careers

- Provide incentives and opportunities for the deployment of risk capital
- Facilitate innovation as a cumulative step-by-step process
- Continue to open up Australia to international competition and investment and upgrading the effectiveness of intellectual property protection
- Maintain a vigorous yet sophisticated approach to antitrust enforcement
- Reduce barriers to entry and excessive regulation that hinder effective cluster development
- Build innovation-driven dynamic clusters based on unique strengths and capabilities
- Enhance the university system so that is responsive to the science and technology requirements of emerging cluster areas
- Encourage the establishment and growth of institutions for collaboration within and across industrial areas.

Australia's innovation policy must be cohesive in order to create a favourable environment for private sector innovation. Rather than micro-management of individual projects or short-term schemes that do not necessarily fit within the overall plan, innovation policy must be consistent and allow markets and investors to ultimately choose where to deploy resources and capital for global innovation. Indeed, in the Australian context, high-technology investments may not be in what are conventionally regarded as high-technology industries, as Australia's key strengths build on historical advantages in primary industries. Ultimately, policy should not be judged on whether a particular company or industry flourishes but on whether, taken as a whole, Australian firms are increasingly able to develop and commercialise innovation for global competitive advantage and as a source of prosperity for Australia going forward.

Appendix: Econometric Methodology

This Appendix provides a brief, more technical review of the procedures underlying the calculation of the updated Index and includes the results from our regression analysis. We proceed by reviewing the procedures associated with each of the three stages of the analysis.

Stage I: Developing a Statistical Model of National Innovative Capacity

The first stage consists of creating the database of variables relating to national innovative capacity for our sample of 29 OECD countries from 1978 to 2001. This database is used to perform a time series/cross sectional regression analysis determining the significant influences on per capita international patenting and the weights associated with each influence. Variables, definitions, and sources are listed in Table A-1. Table A-2 lists the 29 countries in the primary sample. Finally, Table A-3 provides some summary statistics.

Data choices are discussed in Furman et.al. (2002). Importantly, the data draws on several public sources, including the most recently available data from the OECD *Main Science and Technology Statistics,* the World Bank, and the National Science Foundation (NSF) *Science & Engineering Indicators*. Where appropriate, we interpolated missing values for individual variables by constructing trends between the data points available. For example, several countries only report educational expenditure data once every other year; for missing years, our analysis employs the average of the years just preceding and following. The primary measure of innovative output employed in the Index is international patent output. The data are provided by the United States Patent & Trademark Office. For all countries except the United States, the number of patents is defined as the number of patents granted in the United States. Since nearly all U.S.-filed patents by foreign companies are also patented in the country of origin, we believe that international patents provide a useful metric of a country's commercially significant international patenting activity. For the United States, we use the number of patents granted to establishments (non-individuals) in the United States. To account for the fact that U.S. patenting may follow a different pattern than foreign patenting in the United States, we include a dummy variable for the United States in the regression analysis (the coefficient is however statistically insignificant). It is crucial to recall that patenting rates are used only to calculate and assign weights to the variables in the Index. The Index itself is based on the weighted sum of the actual components of national innovative capacity described.

Table A-1: Variables & Definitions

VARIABLE	FULL VARIABLE NAME	DEFINITION	SOURCE
INNOVATION OUTPUT			
PATENTS $_{j,t+2}$	International Patents Granted by Year of Grant	For non US countries, patents granted by the USPTO. For the US, patents granted by the USPTO to corporations or governments. To ensure this asymmetry does not affect the results we include a US dummy variable in the regressions.	USPTO patent database
QUALITY OF THE COMMON INNOVATION INFRASTRUCTURE			
FTE R&D PERS$_{j,t}$	Aggregate Personnel Employed in R&D	Full time equivalent R&D personnel in all sectors	OECD Science & Technology Indicators
R&D \$$_{j,t}$	Aggregate Expenditure on R&D	Total R&D expenditures in millions of US$	OECD Science & Technology Indicators
IP$_{j,t}$	Strength of Protection for Intellectual Property	Average survey response by executives on a 1-10 scale regarding relative strength of intellectual property	IMD World Competitiveness Report
ED SHARE$_{j,t}$	Share of GDP Spent on Secondary and Tertiary Education	Public spending on secondary and tertiary education divided by GDP	World Bank, OECD Education at a Glance
OPENNESS$_{j,t}$	Openness to international trade and investment	Exports plus imports, in constant dollar prices, divided by GDP, as a %	Penn World Tables
GDP/POP$_{j,t}$	GDP Per Capita	Gross Domestic Product per capita, 1995 US$	World Bank GDP & population series
GDP78$_{j,t}$	GDP in 1978	1978 Gross Domestic Product, billions of 1995 US$	World Bank GDP series
CLUSTER-SPECIFIC INNOVATION ENVIRONMENT			
PRIVATE R&D FUNDING$_{j,t}$	Percentage of R&D Funded by Private Industry	R&D expenditures funded by industry divided by total R&D expenditures	OECD Science & Technology Indicators
QUALITY OF LINKAGES			
UNIV R&D PERF$_{j,t}$	Percentage of R&D Performed by Universities	R&D expenditures performed by universities divided by total R&D expenditures	OECD Science & Technology Indicators

Table A-2: Sample Countries (1980-2000)

REGRESSION DATA FROM 1978-2001 INDEX CALCULATIONS FROM 1978-2001				
Australia	Finland	Ireland	Norway	Sweden
Austria	France	Italy	Poland	Switzerland
Belgium	Germany*	Japan	Portugal	Turkey
Canada	Greece	Mexico	South Korea	United Kingdom
Denmark	Hungary	Netherlands	Spain	United States
	Iceland	New Zealand		

* Prior to 1990, figures are for West Germany only; after 1990 results include all Federal states

Table A-3: Regression Means & Standard Deviations

VARIABLE	Observations	Mean	Standard Deviation
INNOVATION OUTPUT			
PATENTS	533	3683	9876
QUALITY OF THE COMMON INNOVATION INFRASTRUCTURE			
FTE R&D PERS	533	193461	369101
R&D $	533	16422	37982
IP	533	6.45	1.22
ED SHARE	533	3.34	1.02
OPENNESS	533	58.7	29.4
GDP/POP	533	16418	9587
GDP78	533	919	1602
CLUSTER-SPECIFIC INNOVATION ENVIRONMENT			
PRIVATE R&D FUNDING	533	51.8	14.8
QUALITY OF LINKAGES			
UNIV R&D PERF	533	21.9	6.6

The statistical model draws heavily on a rich and long empirical literature in economics and technology policy (Dosi, Pavitt, and Soette, 1990; Romer, 1990; Jones, 1998). Consistent with that literature, we choose a functional form that emphasizes the interaction among elements of national innovative capacity, namely a log-log specification between international patent production and the elements of national innovative capacity:

Table A-4: Innovation Index Regression Model

Dependent variable = L $PATENTS_{t+2}$

Coefficient (Std Error)

QUALITY OF THE COMMON INNOVATION INFRASTRUCTURE	
L FTE R&D PERS	0.74 (0.11)
L R&D $	0.60 (0.09)
IP	0.092 (0.030)
ED SHARE	0.05 (0.02)
L GDP/POP	0.49 (0.08)
L GDP78	-0.21 (0.07)
CLUSTER-SPECIFIC INNOVATION ENVIRONMENT	
PRIVATE R&D FUNDING	0.007 (0.002)
QUALITY OF LINKAGES	
UNIV R&D PERF	0.008 (0.004)
CONTROL VARIABLES	
US DUMMY	0.27 (0.06)
YEAR EFFECTS	Significant
REGRESSION STATISTICS	
R SQUARED	0.997
NUMBER OF OBSERVATIONS	533

$$LPATENTS_{j,t+2} = \beta_t YEAR_t + \beta_{USA} USDUMMY_j + \beta_{FTE} LFTER\&DPERS_{j,t} + \beta_{R\&D\$} LR\&D\$_{j,t} + \beta_{IP} IP_{j,t} + \beta_{EDSHARE} EDSHARE_{j,t} + \beta_{GDP/POP} L(GDP/POP)_{j,t} + \beta_{GDP78} LGDP78_j + \beta_{OPENK} OPENNESS_{j,t} + \beta_{PRIVATER\&D} PRIVATER\&D_{j,t} + \beta_{UNIVR\&D} UNIVR\&D_{j,t} + \varepsilon_{j,t}$$

This specification is inspired by 4.4 of Furman et.al. (2002). It has several desirable features. First, most of the variables are in log form, allowing for natural interpretation of the estimates in terms of elasticities. This reduces the sensitivity of the results to outliers and ensures consistency with nearly all earlier empirical research (see Jones, 1998, for a simple explanation of the advantages of this framework). Note that the variables expressed as ratios are included as levels, also consistent with an elasticity interpretation. Second, under such a functional form, different elements of national innovative capacity are assumed to be complementary with one another. For example, under this specification and assuming that the coefficients on each of the coefficients is positive, the marginal productivity of increasing R&D funding will be increasing in the share of GDP devoted to higher education.

Table A-4 reports the results from the principal regression. The coefficients on the variables are significant at the 5% level with the exception of UNIV R&D PERF, which is significant at the 10% level. Consistent with prior research, the time dummies largely decline over time, suggesting a substantial "raising the bar" effect over the past 20 years (see Jones, 1998, for a discussion of declining worldwide research productivity).

Stage II: Calculating the Index

In Stage II, the Innovation Index was calculated using the results of the regression analysis in Stage I. The Index for a given country in a given year is derived from the predicted value for that country based on its regressors. This predicted value is then exponentiated (since the regression is log-log) and divided by the population of the country:

$$\text{Innovation Index}_{j,t} = \frac{\exp(\mathbf{X}'_{j,t}\boldsymbol{\beta})}{\text{POP}_{j,t}}$$

To make our results comparable across countries, we included the U.S. DUMMY coefficient in the calculation. The issue of its inclusion or exclusion remains an area for closer examination in the future.

Table A-5 provides the Index value for each country for each year. The Index, interpreted literally, is the *expected number of international patents per million persons given a country's current configuration of national policies and resource commitments*. It is important not to interpret the Innovation Index as a tool to predict the exact number of international patents that will be granted to a country in any particular year. Instead, the Index provides an indication of the relative capability of the economy to produce innovative outputs based on the historical relationship between the elements of national innovative capacity present in a country and the outputs of the innovative process.

Table A-5: Historical Innovation Index 1978-2001

Year	Australia	Austria	Belgium	Canada	Denmark
1978	19.5	21.9	23.7	29.8	25.2
1979	19.4	24.1	25.8	32.0	26.8
1980	16.9	22.2	23.1	29.0	23.4
1981	17.1	20.7	24.4	33.6	21.6
1982	20.3	24.1	31.1	40.3	26.1
1983	23.1	27.1	36.3	43.6	30.8
1984	25.3	26.6	35.8	45.0	32.4
1985	28.7	31.4	42.3	54.6	40.7
1986	24.8	30.0	40.0	43.8	39.8
1987	29.2	37.0	48.9	49.2	50.4
1988	28.1	32.9	41.2	44.4	45.5
1989	31.1	34.6	46.2	49.4	47.6
1990	30.2	31.6	45.4	44.1	50.5
1991	29.4	32.9	46.6	43.1	47.8
1992	31.6	34.7	43.1	41.8	51.5
1993	34.2	35.2	45.6	47.7	58.8
1994	38.5	39.7	48.7	51.4	61.5
1995	37.8	42.8	52.7	48.6	65.5
1996	52.5	57.5	69.0	64.4	93.2
1997	52.4	55.4	71.3	67.1	98.2
1998	50.4	64.9	76.6	69.9	108.3
1999	58.2	68.2	84.5	81.1	128.6
2000	51.7	62.2	78.2	84.0	119.2
2001	51.6	62.7	79.3	94.3	125.9

Year	Finland	France	Germany	Greece	Hungary	Iceland
1978	21.0	52.7	73.1	0.5	17.3	13.2
1979	25.2	57.4	83.5	0.6	18.4	12.6
1980	24.6	52.4	72.1	0.5	16.2	10.1
1981	24.6	48.3	63.3	0.5	14.6	9.5
1982	30.6	55.8	71.1	0.7	15.6	11.9
1983	34.8	58.9	77.8	0.8	14.9	10.9
1984	38.8	58.0	77.0	0.9	13.4	12.1
1985	49.0	67.0	93.1	1.1	14.1	14.8
1986	46.4	60.3	88.0	1.0	11.7	13.3
1987	60.3	72.0	110.0	1.3	13.1	18.3
1988	57.4	62.7	93.1	1.2	9.8	18.6
1989	64.5	66.7	94.6	1.7	8.6	19.7
1990	59.4	66.9	91.2	1.8	6.1	17.9
1991	57.3	57.5	102.6	1.8	3.6	19.8
1992	53.2	65.2	101.5	2.0	2.9	18.3
1993	48.4	68.6	94.8	2.4	3.1	19.0
1994	56.2	70.4	94.2	2.8	2.6	19.9
1995	68.4	72.9	95.6	3.1	1.9	24.6
1996	97.9	93.5	116.7	4.7	2.3	43.9
1997	117.2	87.6	118.6	5.5	2.8	49.9
1998	138.4	94.6	125.1	6.5	3.0	66.1
1999	179.4	96.7	135.3	8.3	3.4	75.0
2000	170.8	86.2	121.0	8.0	4.2	82.1
2001	173.5	87.3	113.1	8.8	4.5	86.6

* For 1980-1989, the index value is for West Germany only.

Year	Ireland	Italy	Japan	Mexico	Netherlands	New Zealand
1978	5.1	9.2	58.8		58.8	8.4
1979	5.7	9.6	61.9		62.3	8.7
1980	4.8	8.5	53.1		49.8	8.0
1981	4.0	8.7	60.7		41.6	7.9
1982	4.5	10.1	68.5		49.3	8.5
1983	4.8	11.7	85.5		52.2	8.8
1984	5.1	11.7	93.0		48.7	9.0
1985	6.6	15.3	114.3		60.2	10.2
1986	6.4	14.2	104.4		57.3	8.8
1987	8.0	18.6	128.0		69.5	10.7
1988	6.9	17.4	121.6		57.6	9.4
1989	8.2	19.0	130.8		57.2	9.5
1990	9.5	21.5	147.4		58.0	9.6
1991	10.9	20.4	153.2		54.2	7.9
1992	12.6	18.4	134.3		53.1	8.6
1993	13.0	16.8	154.0	0.4	55.3	11.0
1994	18.0	16.0	152.0	0.5	59.1	11.5
1995	21.1	14.9	153.3	0.4	63.3	13.0
1996	28.5	20.5	188.9	0.5	84.7	19.2
1997	36.6	22.2	197.2	0.6	84.5	23.0
1998	39.2	24.3	177.3	0.8	89.8	19.9
1999	42.5	23.1	205.5	0.9	95.7	19.8
2000	45.1	21.0	189.2	0.9	87.5	18.6
2001	49.6	22.0	179.4	1.0	86.5	21.0

Year	Norway	Poland	Portugal	South Korea	Spain
1978	32.9		0.9	0.8	2.0
1979	36.0		1.0	0.8	2.3
1980	31.3		0.8	0.7	2.5
1981	29.8		0.8	0.8	2.1
1982	35.0		0.9	1.7	2.6
1983	39.6		1.0	2.4	2.6
1984	43.3		1.0	3.2	2.8
1985	57.0		1.3	4.6	3.4
1986	51.4		1.3	4.5	3.6
1987	61.0		1.7	6.2	4.8
1988	51.4		1.6	7.3	5.2
1989	52.2		2.0	9.9	6.6
1990	46.6		2.3	11.5	7.9
1991	45.4		2.8	12.2	9.2
1992	49.5		3.2	14.1	8.4
1993	51.4		3.2	15.1	8.4
1994	57.1	1.1	3.3	17.2	9.1
1995	58.4	1.2	3.7	23.5	9.7
1996	83.3	2.1	4.9	31.5	13.6
1997	90.2	2.2	5.6	30.6	14.2
1998	86.8	2.3	7.1	19.4	17.1
1999	92.6	2.5	8.5	24.6	18.9
2000	84.2	2.4	7.8	32.2	18.5
2001	82.4	2.6	8.7	34.4	18.2

Year	Sweden	Switzerland	Turkey	United Kingdom	United States
1978	63.7	124.3		48.2	139.2
1979	68.0	121.4		47.6	147.6
1980	65.9	105.4		47.8	129.2
1981	66.3	95.5		47.1	131.9
1982	75.5	108.2		50.2	156.0
1983	81.6	118.2		50.7	184.6
1984	89.4	120.9		48.3	204.4
1985	108.7	143.7		54.8	234.1
1986	98.4	139.5		47.5	183.0
1987	119.0	173.0		56.1	192.0
1988	105.2	152.9		51.6	169.4
1989	109.4	157.3		50.6	171.5
1990	95.2	152.6		47.6	171.6
1991	90.7	137.9		42.0	164.0
1992	95.1	135.7		38.8	142.7
1993	91.4	136.3	0.4	41.2	154.5
1994	100.6	142.8	0.3	47.3	157.4
1995	109.7	143.5	0.3	48.4	149.8
1996	160.5	182.4	0.5	61.0	187.1
1997	147.1	181.4	0.7	71.1	199.3
1998	165.4	183.3	0.8	81.6	205.9
1999	188.6	182.1	0.8	91.6	213.6
2000	175.6	158.3	1.0	91.6	202.4
2001	184.1	155.3	1.0	91.2	201.4

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