

# The More Things Change ...

Long term behaviour in Australian market indices

**Neville Hathaway**

© **Capital Research Pty Ltd**

**October 2004**

For all correspondence regarding the analyses and examples in this paper please contact

Neville Hathaway  
Capital Research  
Melbourne, Vic.  
Ph (613) 9654 6277  
Email: [njh@capitalresearch.com.au](mailto:njh@capitalresearch.com.au)

## *Background*

### ***The stock market index has changed many times over the 20<sup>th</sup> century to reflect the changing composition of the Australian economy.***

Up until 1980, the Australian stock market was a set of state-based companies each running their own exchange businesses. Gradually, these businesses coalesced into one joint business, now called the Australian Stock Exchange. This business history is reflected in the history of the market indices.

Melbourne and Sydney indices were independently calculated for many years. The Melbourne series commenced first in May 1926. Four monthly series were calculated, Ordinaries, Mining, Finance and Preference Shares. In 1963, a new set of Melbourne end-of-month indices was introduced, covering 15 industry groups. These indices covered 80% of the market by number of stocks. These were backdated to 1960, except the 50 Leaders group which was backdated to 1948. An Oil & Gas index was added in September 1964 along with a gold index. But this gold index was subsequently subsumed into the Metals & Mining index in June 1967 as many gold miners diversified into nickel (and one cannot but recall the subsequent Poesidon nickel boom and bust of 1969!) These changes reflect the emergence of a strong resource industry in Australia over this period.

The Sydney series began as a monthly series in 1928. These were discontinued in 1938 and replaced by a daily series based on samples of stocks within sectors. These sectors were Banking & Insurance & Trustees, Pastoral, Retail, Industrials, Silver & Copper & Tin and Preference Shares. Post World War II, new listings reflected the emergence of new industries so new indices were calculated. As part of this exercise, the Commercial & Industrial sub-index (but not the Finance nor the Mining sub-indices) was backdated to 1875. These new daily series covered between 54% (1966) and 77% (1978) of listed companies. But this included many foreign listed companies in Australia and if these are excluded, the domestic-only coverage of these series ranged from 69% (1966) to 84% (1978). These revisions reflect the extent of foreign shares listed on the Australian markets, which was 21% of all companies in 1966, 8% in 1978 and 5% in 1980.

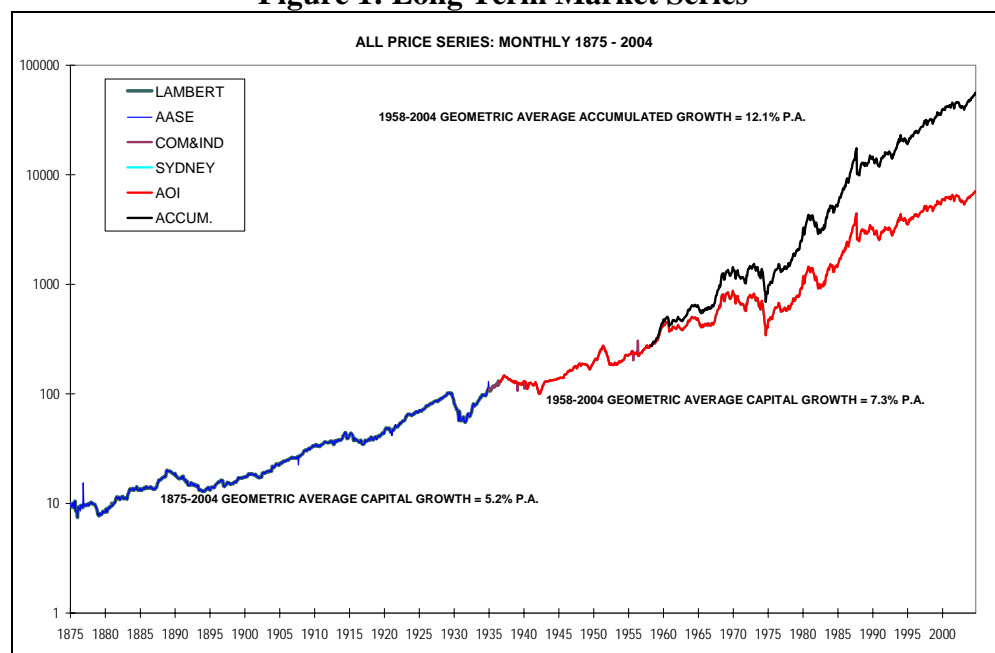
A drawback of these daily series is that they were initially value-weighted by paid-up value and then market-cap weighted from 1960 with double counting adjustments added in 1973. Hence, they really only reflect investment performance from 1973 forward.

From 1974 forward, the Melbourne and Sydney stock exchanges began to coordinate their index calculations, ultimately resulting in an Australian-wide set of indices in 1980.

Most of these historical indices are price (or capital) indices and do not reflect the dividend yield from equity investments. A month-end accumulation index was introduced in 1971 (the Statex-Actuaries Accumulation Index) but it was flawed as dividends were held out in a pool and re-invested at the end of each year. Hence dividends were included at face value with no reinvestment return within a year. It was calculated daily from 1973. It is not until 1980 that proper accumulation indices are calculated. Some accumulation indices have been backdated but only for the broad market index, not for market sectors.

The following plot is my composite of all of the series I could obtain under their different titles.

**Figure 1: Long Term Market Series**



**Comment:**

Apart from a couple of suspicious data points, the Lambert, AASE, Commercial & Industrial and Sydney indices all coincide for the period 1875-1934. This indicates they are all essentially the same series. Mr. D. Lamberton was engaged by the Sydney Exchange for the post World War II index revision and for the back-calculation of the Commercial & Industrial Index. So we have an historical index of industrials only. It excludes mining and finance for the period pre-1934. It is a price series only. Accumulation series were not introduced until much later. The Statex Actuaries index is not shown on this plot.

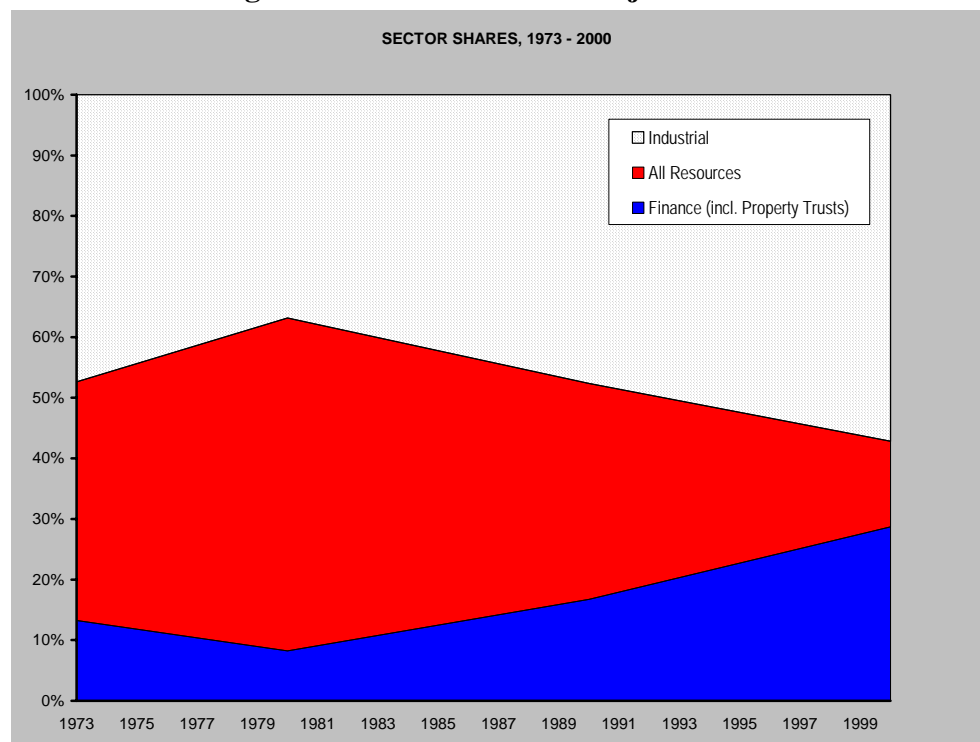
**Index Sub-Sectors**

The Stock Market used to categorise companies by physical activity (eg gold mining, banking etc). This has caused many problems for categorising conglomerates such as BHP (industrial and resources) and CSR (rural and coal). These two problems arose when steel-producer BHP found oil and gas in Bass Straight (1966) and CSR diversified from sugar into coal.

In 1973-74, major revisions were made to the sub-indices to reflect the strong emergence of the resource industry, the disappearance of the pastoral index (which was highly correlated with the decline in wool prices) and the banks absorbing many of the other finance companies.

These changes in the Australian economy are reflected within the market indices. The following diagram demonstrates the major sector changes taking place within our market.

**Figure 2: Market Share of Major Sectors**



- In 1958, the Metals, Oil & Gas, Solid Fuels sector comprised 10% of the market. The other 90% were made up from Manufacturers, Service and Finance companies. (These early numbers were calculated by the exchange using book values, not market values).
- In 1973, Resources (incl. BHP & CSR) comprised **39.4%**, Industrials 47.4 % and Financials 13.3%.

- In 1980, Resources (incl. BHP & CSR) comprised **54.9%**, Industrials 36.8 % and Financials 8.2%.
- In 1990, Resources comprised **35.6%**, Industrials 47.6 % and Financials 16.7%.
- In 2000, Resources comprised **14.1%**, Industrials 57.2 % and Financials 28.7%.

Clearly, a large wave of resource activity has passed through the Australian economy, peaking in about 1980. One can still recall the euphoria associated with the “1980 Resources Boom” by then Prime Minister Malcolm Fraser. This is reflected in the volatility of returns on the market, a point to which we will return below.

Along the way, the finance sector has been growing steadily, though temporarily depressed as a percentage of the total by the wave of resources activity. Industrials have also made a very pronounced comeback as a proportion of economic activity. However, this disguises a major shift in the composition of economic activity within this sector. Table A1 of Appendix A shows the sub-sector market shares.

For example, Media went from 2.1% in 1980 to 17.8% in 2000, with most of this post 1990 (2.3%). (Prior to 1973, Media stocks were combined with Retailers & Merchants so could not be individually measured). Classical industrial activity has commensurately declined.

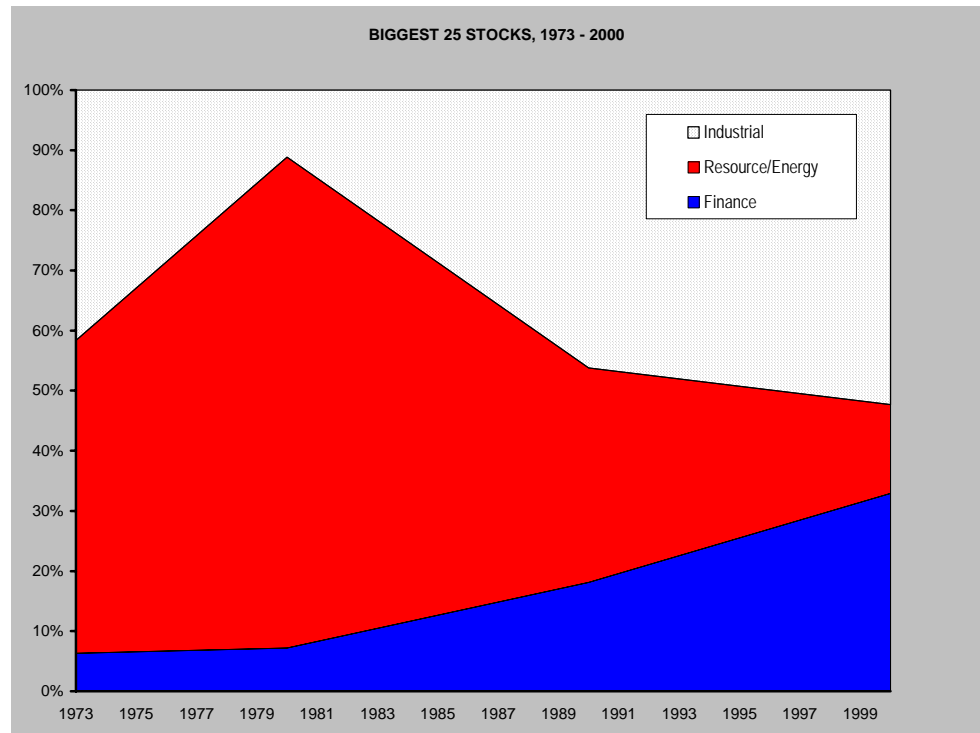
Alcohol, Tobacco, Food, Drink & Household Goods collectively have declined, ranging from 13.3% (1973), 10.4% (1980), 3.8% (1990) to 3.0% (2000).

### **Top 25 Stocks**

These changes in industry composition are reflected in the top stocks but in this cohort the shift of value away from resource stocks is even more pronounced.

- In 1973, nine of the top 25 stocks were in the resource/energy sectors and they comprised 52% of the collective value of these top 25 stocks – see Figure 3. Just two were in finance (Bank of NSW and AGC and BNSW later took over AGC) which made up just 6% of the collective value. The remaining 14 were ostensibly industrials, making up 42% of collective value, but the then conglomerate nature of companies meant some of these might have had resource divisions.

Figure 3: Top 25 Stocks by Sector Share of Capital Value



- In 1980, the top 10 stocks were resource stocks and overall 17 of the top 25 were resource stocks (82% by value). Three banks (7% by value) have made it into the top 25 (NAB, BNSW and ANZ) and there were just five industrial companies inside the top 25 (11% by value).
- In 1990, the number of large resource companies was waning with just seven in the top 25 (36% by value) and just two in the top 10. There were now four finance companies (18% by value) and 14 industrial companies (46% by value). This represents an almost exact counter-swing between industrials and resources.
- In 2000, there were just four resource stocks in the top 25, making up only 15% of the collective value of the top 25 stocks. The big change has been the increase in the number of finance and property companies. There were 12 in the top 25 stocks (35% by value). The remaining 9 stocks were industrials (50% by value) but, as mentioned above, there has been a big change in the type of activities conducted by these industrial companies. There is now a large element of media and telecommunications stocks in this industrial sector.

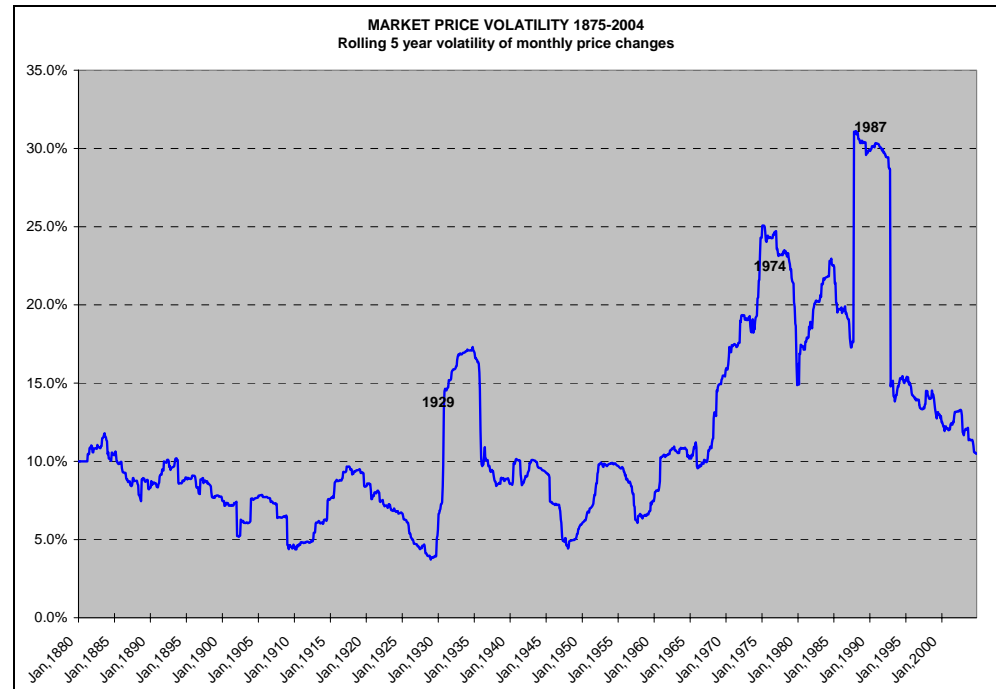
Table A2 in the Appendix contains the detailed list of these companies.

### Repercussions for Market Volatility

The ASX flagship benchmark, the AOI, is a portfolio that has undergone many structural changes. It could almost be called an uncontrolled portfolio – uncontrolled in the sense that it is subject to all the vagaries of changes in

economic activity with the economy which cause companies to list and to grow while others wither and delist.

**Figure 4: Price Volatility: 1875-2004**



The obvious and over-arching feature of this plot is the initial decline in volatility up to 1930 followed by a relatively small set of cycles in volatility and then the much larger cycle beginning in the mid-1960s which is now waning. Superimposed in this general picture are three sudden increases in volatility (in 1929, 1974 and 1987) which are artefacts of the estimation process caused by three big drops in market price. These three big drops in share price remain in the respective five-year estimation windows then suddenly drop out as the window leaves behind that single point of change.

While this plot only shows volatility of prices, the volatility of the accumulation index (if we had it that far back) would be almost identical because dividend payments are very stable in comparison to stock prices. This should not be confused with volatile dividend *yield* series but then all the volatility of dividend yields is due to the volatile price denominator and next to nothing is due to the non-volatile numerator of the dividend amount. The Appendix presents a plot of price versus accumulation volatility for the period 1980 – 2004. It confirms the intuition that accumulation and price volatility are for all practical purposes identical.

**Reasons for These Structural Changes in Volatility**

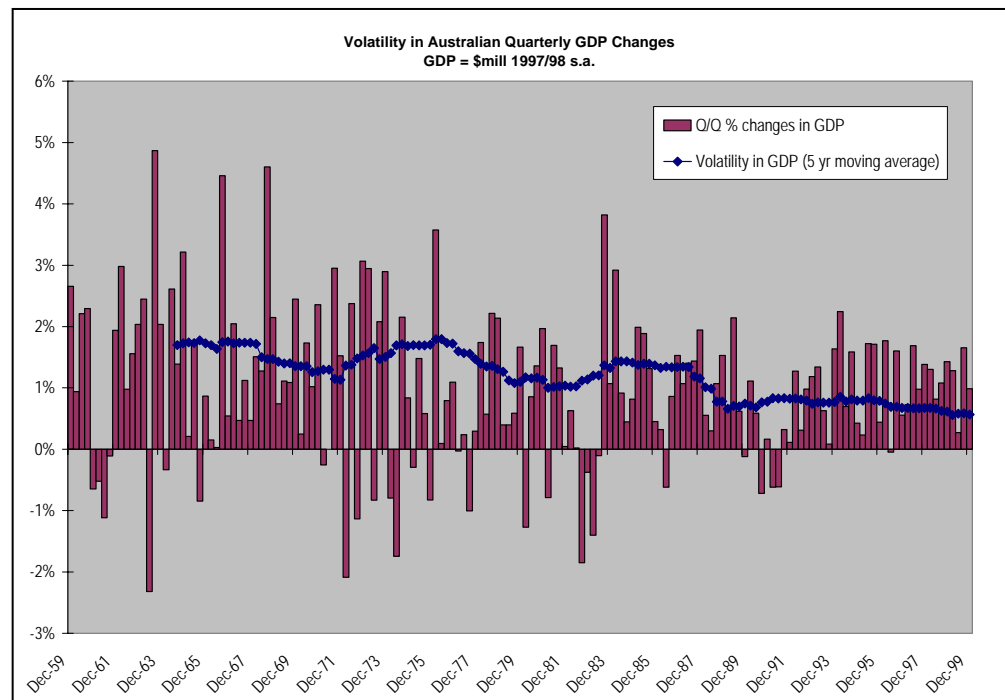
Minor cycles in volatility can be associated with events such as World Wars I and II, the Korean War, and recessions such as in 1963.

The timing of the observed cycles in volatility is suggestive of changes due to structural causes. If we think of the national economy as an aggregation of businesses, private and government, and personal exertions, then any

structural changes among these broad components should show up in broad measures of the economy.

There are two basic and related reasons why there would be a decline in market-wide volatility of listed companies. Either the systematic risk (the discount rate) is declining or the cash flows (corporate earnings) are becoming less volatile. These two reasons are not automatically related. Corporate earnings could retain their volatility but become less correlated, so reducing systematic risk among companies. There is some evidence for this in USA statistics<sup>1</sup>. This is attributed to a structural move in the USA towards service industries that possibly have sales inherently less inter-correlated than industrial company sales. (I have no such evidence for declining correlation among Australian corporate earnings.)

Figure 5: Declining Volatility in Australian National GDP, 1959-2000



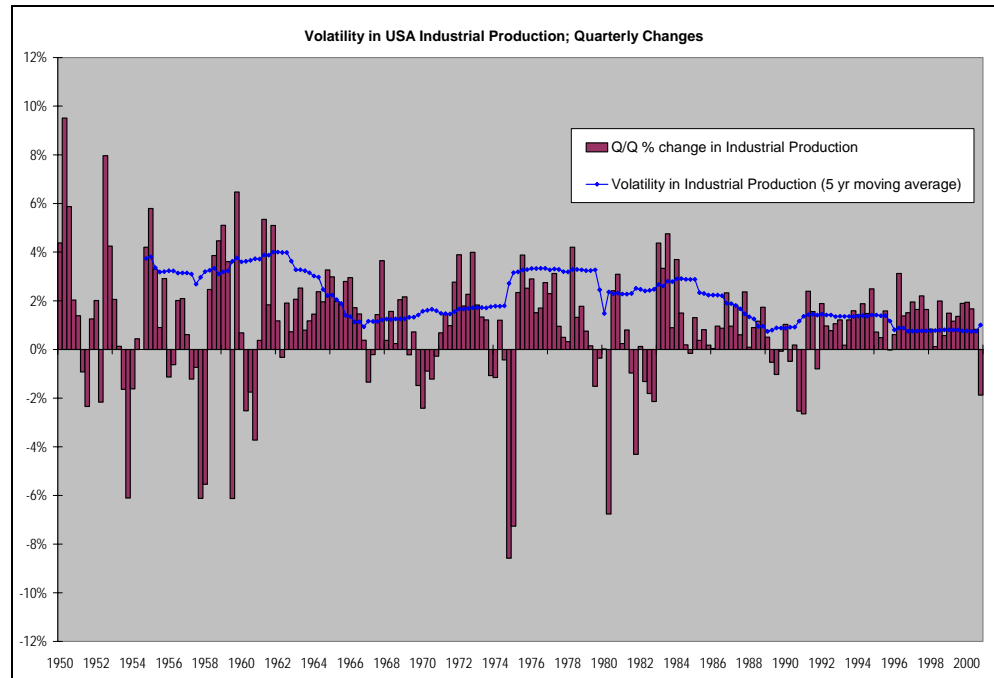
The second reason of declining corporate earnings volatility is potentially borne out by the decline in national GDP volatility: see Figures 5 and 6 for Australia and America respectively. We could be getting better at measuring GDP so this decline could be illusory - the plot of the statistical discrepancy in annual GDP numbers suggests this is not the case: see Appendix. However, this is not a strong refuting argument. We may have been consistently poor at measuring GDP on both input and output sides with the statistical discrepancy being used as the balancing item. In effect, the attribution of GDP components may be just as inaccurate as before but we are getting better at measuring the quantum of GDP. In this case, the relatively constant volatility in statistical discrepancy would not

<sup>1</sup> Woody Brock, *Strategic Investment Decisions*



refute the argument that declining GDP volatility is due to better measurement of total GDP.

Figure 6: Declining Volatility in USA Industrial Production, 1950-2000



There will be a timing difference between GDP volatility (as a proxy for corporate earnings volatility) and stock market price volatility because the stock market anticipates future earnings whereas GDP numbers would represent historical earnings. Notwithstanding any such timing difference, there is an overall similar pattern coinciding with the growth and then decline of the resource sector in the economy.

The argument that the overall volatility in the Australian stock market post 1970 follows the fortunes of the resource sector cannot be cast as a purely domestic argument because we see a similar overall pattern in Australian GDP volatility as we see in USA Industrial Production volatility. A possible explanation is that fortunes of the Australian resource sector as a *supplier* of resources are tied to world *demand* (historically dominated by America) for resources as seen in industrial production.

## **Summary**

There have been some very major changes in the economic mix of industries in Australia over the last 130 years. This is reflected in the composition of the ASX indices and all of their predecessors.

It is also very strongly reflected in the volatility of those series. Very large waves of volatility have passed through the various ASX indices. The last major one corresponded with the rise and decline of the resource sector within the ASX market. The decline in that volatility is still happening today in that we are still experiencing the post boom decline in volatility.

There are major repercussions for the cost of capital in these observations. The new industries that are replacing the current ones have seemingly less systematic risk inherent in them as investments. This is seen in the both the overall market risk (assuming risk is captured by market volatility) and the associated decline in volatility of GDP (assuming it is a proxy for corporate earnings). There may even be a double-effect in that if the correlation between companies' earnings is declining as well as overall volatility then systematic risk might be coming down faster than the decline in market volatility.

We must be cautious in asserting that there is a consequent reduction in the market risk premium. At the national market level, whilst both the USA and Australian market volatility may be declining, the national beta of the Australian market versus the USA market, for instance, might still remain rather stable because the beta is the correlation of the markets multiplied by the *relative volatility*. Both markets may experience declining total volatility but retain constant relative volatility in the future. In such a scenario, only the change in the correlation of the markets would alter the systematic risk.

The declines in GDP volatility are not unique to Australia. It is seen around the world. The story in Australia is dramatised by the occurrence of the resource boom which added a prolonged burst in market volatility but the underlying story of declining market volatility is not unique to Australia. It is a function of the investment risk of the underlying industries that are evolving in the western world.

**Table A1: Sector Capitalisations 1973-2000**

1973				1980			
Group Number and Name		Market Capitalisation at June 30, 1973		Group Number and Name		Market Capitalisation at June 30, 1980	
1	Banks, Insurance and Trustees	\$1,152	7.8%	1	Banks, Insurance & Trustees	\$2,128	6.8%
2	Other Finance	\$807	5.5%	2	Finance and Investment	\$450	1.4%
3	Pastoral	\$227	1.5%	3	Pastoral	\$187	0.6%
4	Transport	\$290	2.0%	4	Transport	\$926	3.0%
5	Trade, Services & Media	\$1,633	11.0%	5	Retailers and Merchants	\$1,375	4.4%
6	Food, Drink and Tobacco	\$1,963	13.3%	6	Media and Other Services	\$648	2.1%
7	Textiles and Clothing	\$219	1.5%	7	Food, Drink and Tobacco	\$3,264	10.4%
8	Chemicals, Paper, Glass	\$946	6.4%	8	Textiles and Clothing	\$271	0.9%
9	Steel and Engineering	\$1,651	11.2%	9	Chemicals, Glass	\$929	3.0%
10	Property & Construction	\$1,147	7.8%	10	Steel and Engineering	\$5,790	18.5%
11	Electrical	\$171	1.2%	11	Builders' Suppliers	\$1,919	6.1%
12	Automotive	251	1.7%	12	Developers and Contractors	\$519	1.7%
13	Metals and Minerals	\$4,167	28.2%	13	Electrical and Durables	\$327	1.0%
14	Fuel & Power	\$155	1.0%	14	Automotive	\$654	2.1%
15	All Ordinaries	\$14,779	100.0%	15	Metals and Minerals	\$11,424	36.5%
16	Groups 3 - 14 inclusive (non finance)	\$12,819	86.7%	16	Paper and Paper Products	\$526	1.7%
17	Groups 6 - 14 inclusive	\$10,669	72.2%	21	All Ordinaries	\$31,335	100.0%
18	Preference	\$39	0.3%	22	Groups 3-16 Inclusive (non finance)	\$28,758	91.8%
19	Ordinaries excl. 13 (non resource)	\$10,612	71.8%	23	Groups 7-16 Inclusive	\$25,623	81.8%
20	Ordinaries excl. 9 and 13 (excl. resource, BHP & CSR)	\$8,961	60.6%	24	Ordinaries excl. 15 (non resource)	\$19,911	63.5%
				25	Ordinaries excl. 15 and 10 (excl. resource, BHP & CSR)	\$14,121	45.1%
Resources (incl. BHP & CSR)		39.4%		Resources (incl. BHP & CSR)		54.9%	
Industrial (excl. Finance)		47.4%		Industrial (excl. Finance)		36.8%	
Finance		13.3%		Finance		8.2%	

**Table A1 (cont): Sector Capitalisations 1973-2000**

1990				2000			
Group Number and Name		Market Capitalisation at June 30, 1990		Group Number and Name		Market Capitalisation at Mar 31, 2000	
1	Gold	\$8,211	5.5%	1	Gold	\$7,341	1.2%
2	Other Metals	\$21,888	14.6%	2	Other Metals	\$18,162	2.8%
3	Solid Fuels	\$1,804	1.2%	3	Diversified Resources	\$50,122	7.9%
4	Oil and Gas	\$5,740	3.8%	4	Energy	\$14,652	2.3%
5	Diversified Resources	\$15,860	10.6%	5	Infrastructure & Utilities	\$10,123	1.6%
6	Developers and Contractors	\$3,652	2.4%	6	Developers and Contractors	\$18,976	3.0%
7	Building Materials	\$10,288	6.8%	7	Building Materials	\$12,261	1.9%
8	Alcohol and Tobacco	\$1,891	1.3%	8	Alcohol and Tobacco	\$10,362	1.6%
9	Food and Household Goods	\$3,708	2.5%	9	Food and Household Goods	\$9,076	1.4%
10	Chemicals	\$2,043	1.4%	10	Chemicals	\$3,126	0.5%
11	Engineering	\$2,751	1.8%	11	Engineering	\$1,481	0.2%
12	Paper and Packaging	\$5,424	3.6%	12	Paper and Packaging	\$5,175	0.8%
13	Retail	\$5,206	3.5%	13	Retail	\$22,261	3.5%
14	Transport	\$5,407	3.6%	14	Transport	\$14,984	2.3%
15	Media	\$3,408	2.3%	15	Media	\$113,402	17.8%
16	Banks and Finance	\$16,680	11.1%	16	Banks and Finance	\$104,451	16.4%
17	Insurance	\$926	0.6%	17	Insurance	\$32,721	5.1%
18	Entrepreneurial Investors	\$4,291	2.9%	18	Telecommunications	\$93,000	14.6%
19	Investment and Financial Services	\$2,436	1.6%	19	Investment and Financial Services	\$13,589	2.1%
20	Property Trusts	\$5,108	3.4%	20	Property Trusts	\$32,300	5.1%
21	Miscellaneous Services	\$2,019	1.3%	21	Healthcare & Biotech	\$10,894	1.7%
22	Miscellaneous Industrials	\$2,132	1.4%	22	Miscellaneous Industrials	\$16,021	2.5%
23	Diversified Industrials	\$19,350	12.9%	23	Diversified Industrials	\$14,194	2.2%
24	All Ordinaries	\$150,222	100.0%	24	Tourism & Leisure	\$9,631	1.5%
					All Ordinaries	\$638,305	100.0%
All Resources		35.6%		All Resources		14.1%	
Industrial (excl. Finance)		47.6%		Industrial (excl. Finance)		57.2%	
Finance (incl. Property Trusts)		16.7%		Finance (incl. Property Trusts)		28.7%	

**Table A2: Top 25 Stocks 1973 - 2000**

	1973	1980
	Shareholders' Funds At June 30 1973 (\$000,000)	Market Cap at June 30 1980 (\$000,000)
Company		
1	Broken Hill Proprietary Co. Limited	4,449
2	Colonial Sugar Refining Co. Limited	2,076
3	I.C.I.A.N.Z. Limited	1,608
4	Conzinc Riotinto of Aust. Limited	1,564
5	Myer Emporium Limited	1,385
6	Bank of N.S.W. Limited	1,267
7	Australian Consolidated Industries Limited	1,084
8	Mount Isa Mines Limited	1,079
9	British Tobacco Co. Limited	963
10	Hamersley Holdings Limited	721
11	Coles, G. J. and Co. Limited	662
12	Ampol Petroleum Limited	636
13	Aust. Paper Manufacturers Limited	573
14	C.U.B. "Z"	529
15	Dunlop Aust. Limited	514
16	Woolworths Limited	510
17	Tubemakers of Aust. Limited	497
18	E.Z. Industries Limited	457
19	Aust. Guarantee Corporation Limited	426
20	Carpenter, W. R. Limited	395
21	Consolidated Gold Fields Aust. Limited	365
22	North Broken Hill Limited	347
23	I.A.C. Holdings Limited	330
24	Herald and Weekly Times Limited	303
25	Peko Wallsend Limited	302
	Resource/Energy	17
	Finance	3
	Industrial	5

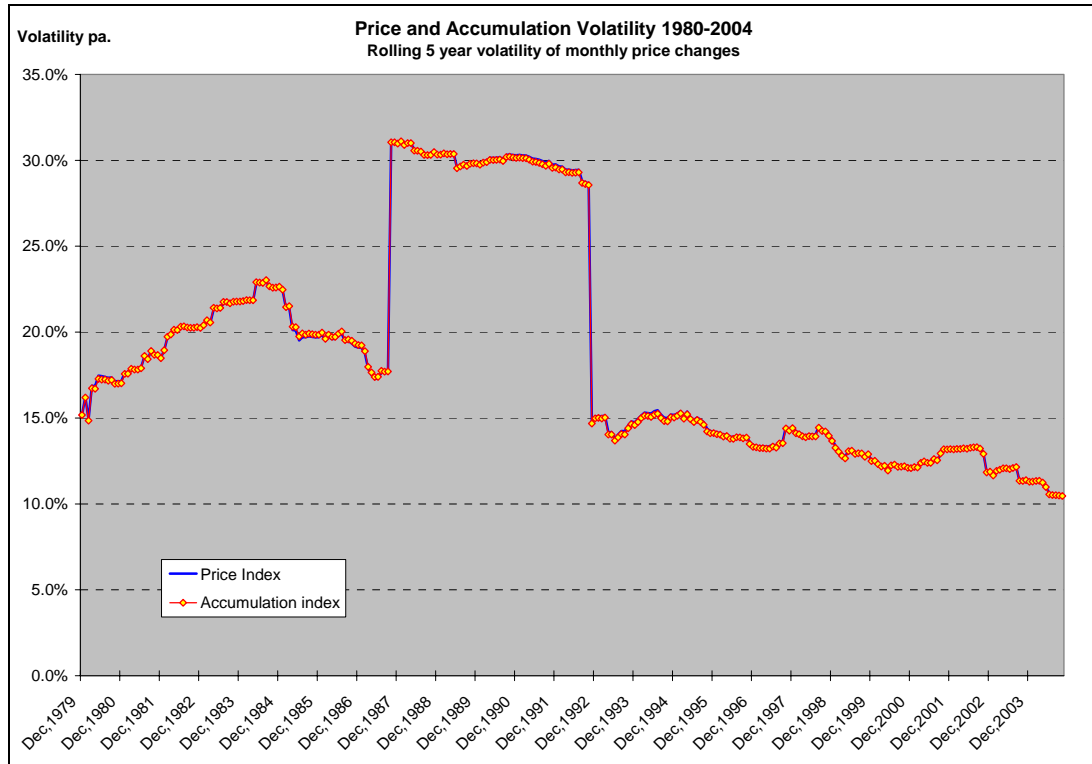
**Table A2 (cont): Top 25 Stocks 1973 - 2000**

1990		2000
Company	Market Cap at June 30 1990 (\$000,000)	Company Market Cap at Mar 31 2000 (\$000,000)
1	<b>The Broken Hill Proprietary Company Limited</b>	Telstra Limited
	14,066	49,914
2	<b>CRA Limited</b>	The News Corporation Limited
	7,284	90,504
3	BTR Nylex Limited	<b>Broken Hill Proprietary</b>
	6,860	32,666
4	<b>National Australia Bank Limited</b>	<b>National Australia Bank Limited</b>
	6,042	32,654
5	<b>Westpac Banking Corporation</b>	C&W Optus Limited
	5,246	24,909
6	Elders IXL Limited	<b>Commonwealth Bank Limited</b>
	4,945	20,781
7	<b>Australia and New Zealand Banking Group Ltd</b>	<b>Westpac Banking Corporation</b>
	4,848	19,127
8	Coles Myer Ltd	<b>AMP Limited</b>
	4,503	17,658
9	Fletcher Challenge Limited	<b>Australia and New Zealand Banking Group Ltd</b>
	4,422	16,086
10	The News Corporation Limited	<b>RIO Limited</b>
	4,204	14,783
11	<b>CSR Limited</b>	<b>Lend Lease Corporation Limited</b>
	4,088	10,700
12	<b>Western Mining Corporation Holdings Limited</b>	Brambles Industries Limited
	3,951	10,076
13	Pacific Dunlop Limited	Publishing & Broadcasting Limited
	3,894	8,681
14	<b>M.I.M. Holdings Limited</b>	Coles Myer Limited
	3,164	7,723
15	Brambles Industries Limited	<b>Western Mining Corporation Holdings Limited</b>
	3,082	7,682
16	Boral Limited	Fosters Brewing Group Limited
	3,031	7,346
17	Brierley Investments Limited	<b>Colonial Group Holdings Limited</b>
	2,648	7,235
18	<b>Lend Lease Corporation Limited</b>	<b>Woodside Petroleum Limited</b>
	2,442	6,800
19	Amcor Limited	Woolworths Limited
	2,380	5,843
20	<b>Comalco Limited</b>	<b>Westfield Trust Limited</b>
	2,282	5,203
21	The Adelaide Steamship Company Limited	<b>St George Bank Limited</b>
	2,277	4,959
22	<b>Woodside Petroleum Limited</b>	<b>Westfield Holdings Limited</b>
	1,820	4,728
23	Pioneer International Limited	<b>Macquarie Bank Limited</b>
	1,741	4,483
24	TNT Limited	Fairfax (John) Limited
	1,727	4,445
25	Goodman Fielder Wattie Limited	<b>AXA Asia Pacific Limited</b>
	1,713	4,283
	<b>Resource/Energy</b>	<b>4</b>
	<b>Finance</b>	<b>12</b>
	<b>Industrial</b>	<b>9</b>

### Price versus Accumulation Volatility

The following is a plot of rolling 5-year volatility of both All Ordinaries price and accumulation series.

**Figure 1: Price and Accumulation index volatility: 1980-2004**

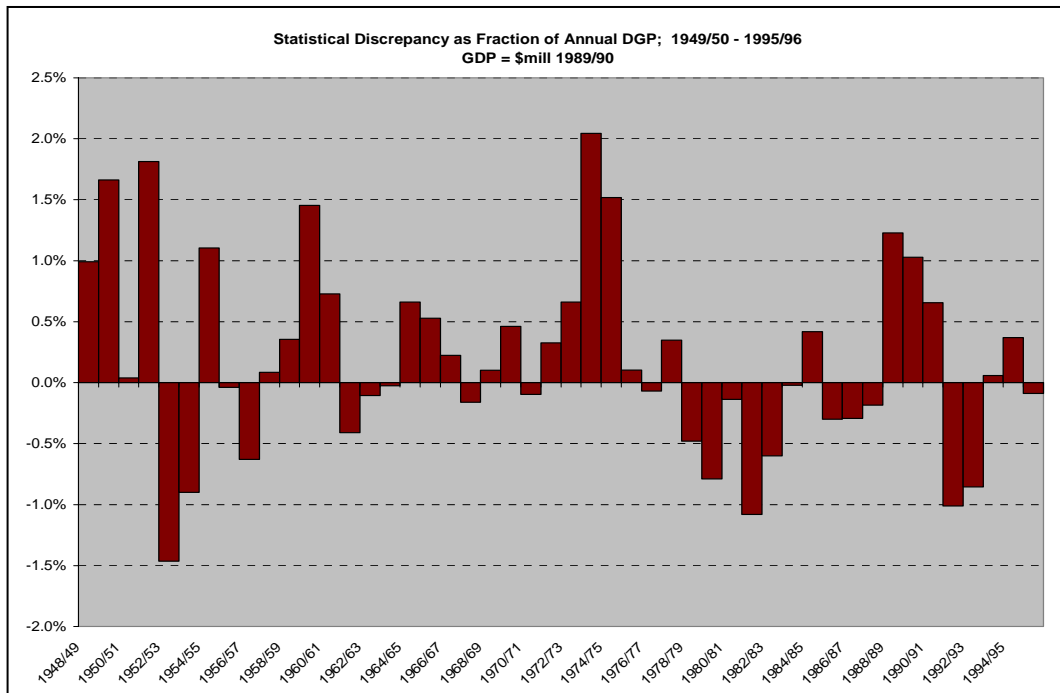


The difference between these two volatility series is insignificant. For all intents and purposes, there is only one source of volatility within the accumulation index and that is price volatility. As one would expect, reinvested dividends contribute nothing to the index volatility.

**Measurement Error in GDP**

The following plot suggests there has been little, if any, significant improvement in the estimation error for GDP statistics.

**Figure A2: Statistical Discrepancy as Percent of Annual GDP**



As a consequence of this plot, we can reasonably assume that the decline in the volatility of the GDP measure is not due to decreasing measurement errors.

Neville Hathaway  
 Capital Research  
 October 2004