Shares that Grow

Gx

Growth Factor

A new index to select investment grade shares.

**Separate value and price.
Measure the market cycling.**

Kevin A. O'Brien

SHARES THAT GROW

Earnings, size, and liquidity determine price for investment grade tradeable securities.

Kevin Arthur O'Brien

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1. Rational Share Investment

1. Rational Share Investment

This work grew out of asking the simple question of "how do I rank shares amongst themselves as a best buy at a given date?" A simple question, with the implications that if there was a best buy, there was the second, third, fourth etc. if they could be so ranked. A unique way of ranking, **Gx**, (**Growth Factor**) has been developed by the author with implications for valuation and pricing of shares. If the shares are only to be held for quick trading, ranking may still be relevant to pinpoint undervaluation and potential bonus rights issues. It may be not relevant if buy/sell decisions are made on the basis of price pressures or charting. The implications of **Gx** flow through to valuations resulting from corporate activity such as takeovers and mergers and new offerings of securities by many companies.

Only the pricing of shares traded on securities exchanges or stock markets is dealt with. It is not about pricing bonds, options or the host of other financial offerings that brokers (sales personnel) attempt to trade. Returns on long term bonds are referred to under index forecasting.

This research is primarily about investment-grade shares, not necessarily those that might be included in indices. Companies both big and small qualify—known as 'stable' companies from here on.

Some relationships between speculative and stable companies will be looked at too.

The research on which this publication is based started while the author found himself with time on his hands while working in Samoa. He was freshly qualified as an accountant and already an experienced share valuer with an interest in valuation theory. So armed with slide rule, log tables and a Facit hand-cranked calculator which he found in the lagoon, he set to work to try and figure out what might be a best buy. All this was done BE, before Excel. It makes the research even more interesting that the author is not an investor by temperament. The newspapers gave a lot of statistics and Equity Investment published a summary of balance sheet data so information was freely available to New Zealand and Australian investors.

The formula developed worked both for future and historical pricing over a period of about 40 years. For a stable company one could, using only published data, plug in the numbers and obtain an expected price that its common shares should be trading at on a given day. This was precise, often to the cent. Changes occurred when New Zealand opened up its economy. I have revisited this research from time to time over the years.

A test of the application to the USA in 1999 revealed a situation in IBM through comparison with Intel that would require a bonus share issue to adjust the price to what I had determined to be market. The stock split duly happened on May 26 1999 in agreement with the formula. The principles to be shown are timeless and not limited to location. Substantial movements in the economy may require periodic updates. Some elements of pricing are local, but the data for those should be readily available or calculable by example.

Ultimately it shows, by inference, that the economist's model rational person invests in shares in stable companies using a measurable, intrinsic value. The price paid varies with earnings, absolute size of company, industrial activity group and ability to pay. It proves that for the same sized companies with the same earnings expectations the aggregate value should be the same.

This work has been hidden for many years as, frankly, I didn't know what to do with it. It's hard to claim that one can tell prices of shares without others expressing more than disbelief and just saying ‘prove it’. To reveal it is to destroy its personal economic value. Others have had the benefit of advice based on the formula but this publication reveals it and justifies it for the first time. The original working papers are still in my possession to prove the originality of this work. Some extracts of these appear here, so all can be tested and further developed as wished. I wish I could give more examples than included but age no longer readily allows that. So I am releasing the whole of this publication to the Public Domain.

This should prove of value to all investors, economists, analysts, business finance students and corporate finance officers. The mathematics are mostly at the level investors deal with in looking at ratios and the more advanced can be left to those who can develop it. I am persuaded now to publish this work because it speaks of the essential nature and valuation of shares and at the end of this season of speculation sanity needs a voice. We need to return to basic principles of valuation. There will still be long term returns on investment. The lesson that income drives value needs to be re-learned. Perhaps a corollary is that borrowing drives loss.

2. The Moving Target

Describing most things in economics is not like shooting fish in a barrel; it's trying to view a stable state in a sea of uncertainty. On board a ship's deck it may appear to be stable because below sea special fins have been fitted to adjust and cancel out wave movements. The sea however is still moving and the boat subject to its motion. The Captain knows this from his instruments and the passengers may have little sense of it; for their comfort they may prefer not to know. They may not even be aware of the impact of an iceberg until the alarm bells are rung. Others from a distance know of the ship too. It can be seen from radar or satellite and its geographical position determined as precisely as is useful. The sea conditions and weather too may be known from a long distance but still not warn of the iceberg.

The complete picture then is a summation of many different perspectives – some are opinion, some feelings, some instrument readings. To ask "how was the voyage?" is to get a different view from everyone on board according to their intentions.

The parallels to being a shareholder are obvious. If you have only purchased tickets because they are scarce and you expect to resell them profitably, you have little to care about the sea conditions during the trip, only the weather forecasts before you dispose of them. The ship is of little concern except that hopefully someone wants tickets and you have an opportunity to trade.

If you want to take a world trip personally you will want to consider the quality of the package on offer. There will be a lot of "what ifs" to consider. Many of these will come down to guesswork. You know the sea will move around but without being a weather expert you have to trust forecast patterns and the Captain to give you the hoped for experience. So things are compared against each other by considering everything else to be equal and only looking at one item at a time. Not surprisingly, this is revealed in the share valuation considerations where only a few items determine value.

People choose shares for different reasons and this work shows that most share market investment decisions are not fully informed, if not unwise. It will be shown that most shares, not regarded as speculative, are likely *fully priced* at their time of purchase. Pricing in most cases has nothing to do with the nature of the company's business. (Although a bank-driven boom and bust may cause investors to revise their opinions on that sector.)

Buying because someone likes the company, its principals or it meets ethical views is no direct help: buying because a broker recommends the company even less so. Consider they gain by every decision you make to buy or sell and they may also have some other personal stake in your sale of the shares, while still meeting legal disclosure requirements.

We do not have a free market, but only a market where you are free to place orders, so long as you can afford to pay without borrowing. The latter is important as that can limit your freedom to sell. Any regulation is usually after an adverse event. Note the freedom to place an order is not the freedom to control its execution, with all the opportunities that implies, for insiders trading for their own interests.

Becoming a successful shareholder means making choices. Like ships which are seaworthy for a long voyage we have to narrow the shares down to those which will survive for the period we expect to invest. That much-maligned friend to the potentially shirtless, Prudence, suggested these minimum basic tests:

- **Earnings on shareholders' funds at least 10%.**
- **Ten years of published annual accounts;**
- **No reported loss during the last ten years;**
- **Able to maintain dividends or retain earnings throughout the period.**

That tells little about the company except that it appears to have been ongoing for a reasonable period. It doesn't tell if the earnings fluctuated, but only that there was sufficient each year for some to be put aside or paid out regularly to the shareholders. The company could be a relatively young start-up with only $100,000 shareholders' funds or a veteran with billions held. However it does exclude a large unpredictable part of the share market.

Companies that meet the stability test provide a continuing return on the price paid. It is this return that provides value. Without it, the apparent price is reduced to speculation on hoped-for price movements.

Security may need to be reconsidered following such as the Chrysler and GM bankruptcies in the USA. If shareholders can be wiped out by prearranged political and legal action this makes investment hazardous. It will be seen later that the balance sheet structure has little or no influence on valuation, but that may change.

Liquidity, which is the ability to transform your investment back into cash or its equivalent, is independent of value. Value may remain but another's ability to pay for it may not be there.

Price and value are frequently confused as equals but they are also independent. Value is shown in usefulness while price distinguishes and tracks ability to pay. If one needs lunch and an egg is available which can fulfil that need, that egg is therefore useful for that purpose.

Price enters when we try to measure usefulness: 3 eggs equals 3 lunches. If you wanted one now for yourself and had two spare there are still three potential lunches or a measured value which can be exchanged for an alternative.

As money is the common item of measurement, price and the quantity of money available are related too. If nothing else was involved and the quantity of money doubled instantly prices should double likewise. If you did not change your price in the exchange the other party would gain at your expense. Fairness and justice require changes in money supply to be matched by price/volume changes to maintain the relative equities.

Next we need to look at some of the ratios used to help choose shares so we can go on to develop the **Gx** formula, the substance of this publication. Some of this may be elementary but it will show the assumptions made and extracts from the original work in justification.

Earnings, the fruit of commerce, will be shown to be the substance of value, the market price at any time being an expression of earnings and the ability/discount to pay for them. The random walk concept of market prices will be implicitly shown to be the noisy jagged edge of the underlying market price level changes. Chartists can still work on the edge but investors need to follow sensible appraisal.

3. E/S Earnings per Share

In its simplest this should be:

$$\frac{\$\text{ Earnings for period}}{\text{Number of shares}}$$

However, both earnings and share numbers need definition. Shares can be divided into different classes and earnings may be reported for varying periods and be subject also to claims for preferential payments to some shareholders. The **relevant period** should be the last 12-month financial statements as published by the company. Interim or analyst projections do not have the validity of the full-year audited accounts even though these may not be available until well after fiscal-year end. Newspaper tables of the period of this study used the annual reported financial statements. This is the *common information available to all* on which to base their investment decisions. The **relevant shareholding** throughout is the "common" or ordinary shares—these take the ultimate risk and rewards. Preferred or subordinate shares or convertibles, including debt instruments, may be part of the capital structure but their reward is usually fixed and is deducted from common earnings. These other classes could be called "uncommon" to distinguish them. The **relevant earnings** is the residue attributed to the common shares after payments to the uncommon even though they may be described as dividends. The relevant number of shares is that held throughout the year by the common. This may take some searching for as it doesn't normally appear in the media. The company annual report should show it. Adjustments may need to be made for conversions and re-purchases to arrive at a weighted average number of common shares in the fiscal year.

Example 1.

Number of common shares at start financial year	**1,000,000**
Preference shares held for half year	**600,000**
Number of common shares at end of year	**1,600,000**

Weighted average whole year = 1,000,000 x1 + (600,000) x1/2
Weighted average number of common shares = 1,300,000

In this example the total earnings after taxes allocated to the common shareholders will be treated as being earned by 1,300,000 shares which may differ from the number of shareholders. The weighted average number of shares is referred to as the "diluted". Many times the dilution will be insignificant but in conversions, mergers, major buy-backs or issues for acquisitions serious distortions can occur if the weighted average is not used. Another important use is in evaluating placement offers.

Price Earnings Ratio & Earnings Yield

Of the many numbers used by analysts to evaluate any marketable company or share the most popular would probably be the PE ratio. The Price Earnings Ratio, to use its full name is calculated:

$$\frac{\$\ \text{Price per common share -(any dividend due but unpaid included)*}}{\$\ \text{Earnings per share}}$$

OR:

$$\frac{\$\ \text{Total market price of company - (any accrued dividends on common)}}{\$\ \text{Annual profit allocated to ordinary (residual) shareholders}}$$

**The share may sometimes be referred to as having dividends attached.*

This second form is often indirectly expressed as the number of year's payback. Small businesses are frequently traded on a multiple of earnings. A "Mom and Pop" store may trade for 3x annual earnings and a doctor or lawyer for one year's fees. How long it takes to get our money back seems to be a very common and easy measure of value likely related to a sense of risk aversion. Consider that after 10 years a cashflow of $1/year discounted at 10% per year only totals to $6.41. If the PE ratio was more than that you are unlikely to get your money back. Standard & Poors showed the historic PE ratios in the USA market over the 72 year period 1936-2008 as having a minimum PE of 5.90 and mean of 15.98. The maximum of 60.7 was recorded in December 2008 before the catastrophic crash.

The payback period for a PE of only 15 is over 39 years at a 6% discount, so the PE is showing that it has little to do with value and that something else is moving prices. The relatively high mean may reflect a shortage of tradable shares and needs for pension funds to invest. We will look at market price movements in a later chapter.

Earnings Yield %

If we tip the PE upside down getting its reciprocal, and create the percentage we get EY, the Earnings Yield:

$$\frac{1}{\text{PE}} \times 100 \quad \text{Or:} \quad \frac{\$\ \text{Earnings per share}}{\$\ \text{Price per share}} \times 100$$

This is not the return on any income paid out on the shares (that would be DY, Dividend Yield) but the return on the investment excluding dividends at that point in time. S. & P. shows the median return in the USA market over 1936-2008 years as 7.40%. The EY is fundamental as earnings per share, or changes in it, will be seen as *cubed in* affect on value. Later it will also enable us to solve for market price!

ESF, RE Earnings on Shareholder's Funds %

The ESF or RE, Return on Equity, is the return on the residue of funds attributed to the common shareholders. This is the primary measure of earnings ability.

$$\frac{\text{\$ Earnings attributed to common for year x 100}}{\text{\$ Average of common shareholders' funds thoughout year}}$$

$$\text{Or: } \frac{\text{\$ Earnings per share x 100}}{\text{\$ Net tangible assets per share}}$$

This latter re-statement is particularly useful as media tables and other sources frequently list both halves, if not the ratio itself. The NTA, or net tangibles, as they may be loosely called are derived from the balance sheet this way:

Example 2.

BALANCE SHEET		$
Current assets		450,000
Fixed assets		2,500,000
Goodwill and intangibles		300,000
Total Assets		3,250,000
Current liabilities	190,000	
Term loans	1,790,000	
Deduct total liabilities		-1,980,000
		1,270,000
Deduct Goodwill/intangibles		-300,000
NTA, NET TANGIBLE ASSETS		970,000

The NTA represent the actual substance of the company and, unless the company has significant earnings from royalties or other intangibles, the NTA generate the earnings.

Following the previous Example 1 the NTA per common share would be:

$$970{,}000/1{,}300{,}000 = \$0.7462$$

Conversely: it is sometimes useful to reverse this to calculate the total of the common equity –

$$\text{(NTA per share) x (Average weighted number of common shares)}$$

DC Dividend Cover

The DC is the third of our ratios with per share earnings:

$$\frac{\$\text{ Earnings per share}}{\$\text{ Dividend per share}}$$

This is another ratio usually available from media tables. But what about companies that don't pay dividends or only minuscule apologies for them? For our purposes, with judgement, a reasonable dividend can be imputed. Companies have commonly been divided into two types: income and growth shares:

Income shares provide exactly that for their holders; usually by way of a monetary dividend per share. Other arrangements may be in place for partial re-purchase of the shares to give cash to the holders and for them possibly to escape some or all taxes. The paying company typically distributes 50% or more of its profits after tax, retaining minimal reserves for growth and business development.

Growth shares aim to retain their earnings and with a superior return on their shareholders' funds enlarge their business and earnings. Such companies seldom pay more than 30% of their earnings out annually to their shareholders.

Where shares may be re-purchased or less than 30% or none paid out it is desirable to adjust the dividend cover accordingly.

Nothing else is affected; adopting a minimum DC for these companies of 3.33 is reasonable. Inter-company comparisons will be useful. A nil-dividends policy otherwise would give an infinite or undefined dividend cover. This is a problem investors faced with Apple. A Business Week article queried why Apple's share price did not respond appropriately to superior earnings. Without dividends there is no hedge against market price reductions: an investor merely has a piece of paper whose value is solely what someone else will trade it for.

4. Gx, Growth Factor, a new Comparative

How does anyone rank shares as a best buy? Surely at any time there is such, and a second-best and so on. Why buy the sixth or other lesser ranked? Brokers will push their choice but we need to resist and question. Table 1 shows a tiny extract from my original working papers where I summarised many different ratios to look for comparisons. The PE ratio, considered in Chapter 3 seems a little guide to value, but more reflects market movements so we need to look elsewhere.

Believing income is the foundation of value (without that an asset would just wither or be consumed) relative changes in income expectations should provide a guide to comparative value. At the right hand end of Table 1 is a column '**Gx**' for **Growth factor** or growth expectations. **Gx** is derived from three of the columns.

$$\textbf{Gx} = \textbf{(Earnings retained x income they generate) x Yield on that}$$

Adding such ratios would allow the elements to cancel each other, but their *multiplication* gives a positive number which is a crude proxy for expected earnings growth. All that, from just three commonly available items, based on the last published audited financial statements. So it is based on what the company has reported, not a later analyst, market guru or broker.

Gx excludes any reference to the size of company, business nature or interpretation of any stresses revealed from the balance sheet. The latter are possibly all significant but in practice the type of company proved irrelevant. Computing **Gx** showed an anomaly for insurance companies and banks, symbols of security in earlier years. In my initial data shareholders were paying exactly 2x the expected price for those companies but that ceased in the late 1960's.

The relationship of value to risk as shown by the balance sheet seems to be ignored. Example 3 shows a test put to a final-year financial accounting class. The data, normalised, was taken from companies, all listed at that time, on the New Zealand and Australian stock exchanges. It may have been my obtuseness in the design of the test, but I believe it showed that even trained accountants have difficulty evaluating balance sheets. It is unreasonable to expect investors and their broker advisers to be even more skilled. Besides, to publicly criticise any weakness shown by a balance sheet could be seen as an attack on the company and may even have legal consequences. Investment grade shares should not be thought of as risky, so the issue of their company security or soundness, based on financial ratios, is put aside by default. However the size of the company as measured by its shareholders' funds stands in as a proxy for security: the larger the better. That is the subject of the next chapter.

DERIVATION OF Gx

	Div cover	Earnings Yield	Earnings/ Shldrs'funds	
Company	DC X	EY%	E/SF%	Gx
NZ Refining	1.7	6.1	12.9	**134**
Schofield	1.90	10.9	10.6	**219**
Scott Coml	1.70	10.1	10.3	**177**
Steell & Tube	2.20	11.3	13.45	**336**
BHP ($A) ll & Tube	1.90	0.02	5.8	**0.22**
Baitlie	2.61	13.8	11.14	**398**
Crothall	3.30	12.2	20.8	**837**
BNZ Finance	2.00	6.6	11.8	**156**
E. Lichenstein	2.20	12.8	14.1	**397**
Marl. Lucerne	2.50	19.2	11.44	**547**
Bing Harris	2.10	11.7	7.0	**172**
Dom Breweries	2.70	8.2	11.0	**244**
Lane Walker R.	2.30	7.7	12.8	**226**
Westland Brew.	3.30	15.3	11.6	**585**
Victoria Laundry	2.10	9.1	13.6	**264**
Skellerup	4.70	8.2	13.18	**505**

Extract from original workpaper K.A. O'Brien
Raw data Equity Invetsment 1968-1969
Computed with slide rule.

TABLE 1

RANK FOR FINANCIAL STABILITY (Safety of Income and Capital)

SF	352	FA	384	SF	255	FA	928	SF	178	FA	86
TL	149	INV	70	TL	674	INV	38	TL	369	INV	24
Bnk	148	CA	546	CL		CA	34	Deps	427	CA	890
Crs	459			Crs	85			Crs	26		
1	1000		1000	2	1000		1000	3	1000		1000
SF	476	FA	204	SF	505	FA	267	SF	710	FA	506
TL	44	INV	31	TL	143	INV	13	TL	163		
CL		CA	765	Bnk	76	CA	720	CL		CA	494
Bnk	165			Deps	13			Bnk	21		
Crs	317			Crs	863			Crs	106		
4	1000		1000	5	1000		1000	6	1000		1000
SF	105	FA	271	SF	127	FA	62	SF	336	FA	292
MIN	492	Intang	20	TL	424	INV	96	MIN	35	INV	56
TL	249	INV	338	Debs	314	CA	842	TL	239	CA	652
Bnk	15	CA	371	Deps	70			Bnk	142		
Crs	139			CRS	65			Crs	248		
7	1000		1000	8	1000		1000	9	1000		1000
SF	526	FA	255	SF	450	FA	328	SF	108	FA	66
TL	206	INV	15	MIN	46	CA	672	TL	690	INV	29
CL		CA	730	TL	255			CL		CA	905
Bnk	76			Bnk	84			Bnk	38		
Crs	268			Crs	165			Crs	164		
10	1000		1000	11	1000		1000	12	1000		1000

KEY

Bnk	Overdraft	**FA**	Fix Assets
CA	Current Assets	**Intang**	Intangible Assets
CL	Current Liabilities	**INV**	Investments
Crs	Creditors & accruals	**MIN**	Minority interests
Debs	Debentures	**TL**	Long term liabilities
Deps	Deposits	**SF**	Shareholders' funds

Rank safety risk from zero to max out of 10 (Low to highest.)

1	2	3	4	5	6	7	8	9	10	11	12

Kevin O'Brien. Copied from scan of original

Example 3

5. Gx and Company Size

Company size has always been significant as a measure of risk. A large company has usually survived for a long time or may be a spin-off from one that has. New companies are known to be risky and most fail within the first five years. Even large companies have that problem: they often cease new business ventures or on-sell them. Size does not guarantee profit but likely provides resources to manage risk better.

How then is Gx related to company size? I have underlined the entry for BHP in Table 1. The Broken Hill Proprietary Co Ltd was the largest industrial company in Australia and is known to all in that part of the world. Using the $Gx_{Earnings}$ formula:*

$$\begin{aligned} Gx &= DC \times ESF\% \times EY\% \\ &\quad 1.9 \times 5.9 \times 0.02 \\ &= 0.224 \end{aligned}$$

* *A multiplicative term may need to be added for the nature of the business as discussed previously.*

Another entry in Table 1 for Crothall & Co. Ltd has a Gx of 837. Crothall's did cleaning and domestic services in New Zealand and at that time had been established 24 years.

The highest Gx of 1565, not shown in the extract from which Table 1 is taken, is for a little finance company Credit Services Investments Ltd with shareholders' funds of $227000. They had been established then for 13 years.

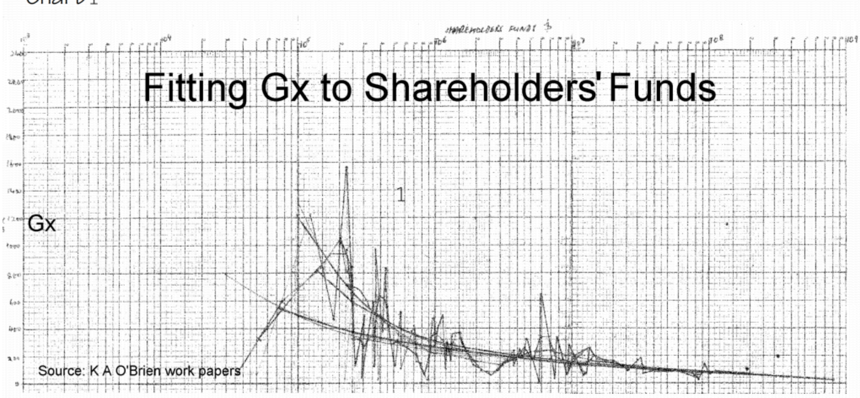
Table 2.

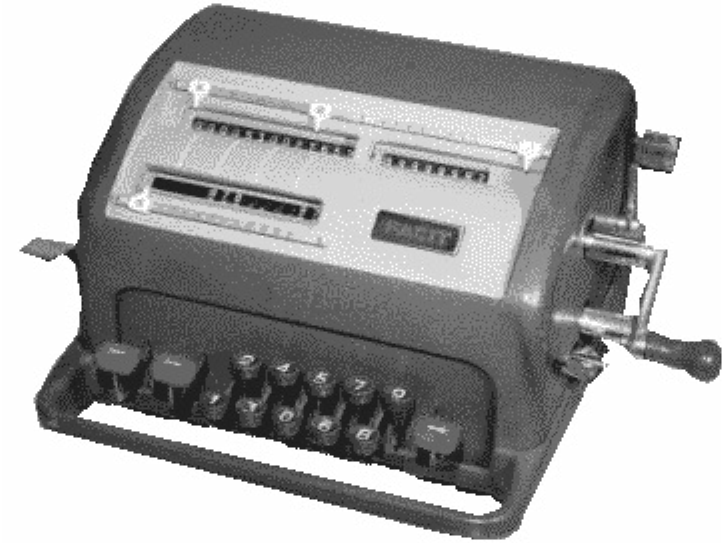
Company	*Gx*	*SF $000*
Crothall	837.4	395
BHP	0.224	804,208

So BHP has SF 2036 times greater than Crothalls and the Gx is 3738 times greater. That is not a proportional relationship. People are evidently willing to pay more for earnings from a much larger company.

Chart 1 is an early attempt to fit the data which has an obvious pattern emerging. The horizontal axis is logarithmic where equally proportionate changes in SF take the same width. This semi-log form reveals the rapid change in value as small companies grow. In Chart 2, a smoother derived version, the long tail there is almost a straight line and at 1 Billion dollars of shareholders' funds the Gx is only 34. If the equation was plotted with both axes logarithmic it would all be on a straight line. (The chart was produced by hand pre-Excel using a flexible ruler and is intended as indicative rather than mathematically perfect.)

·Chart 1





Facit calculator as found in lagoon at Apia.

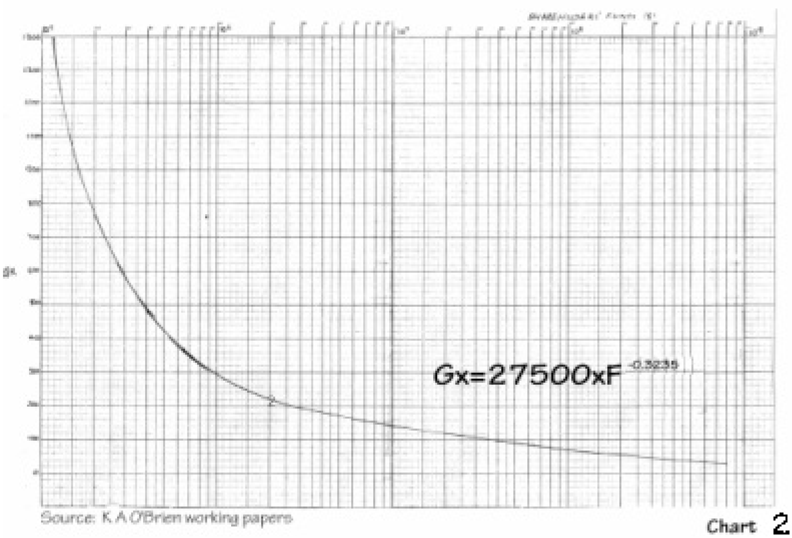
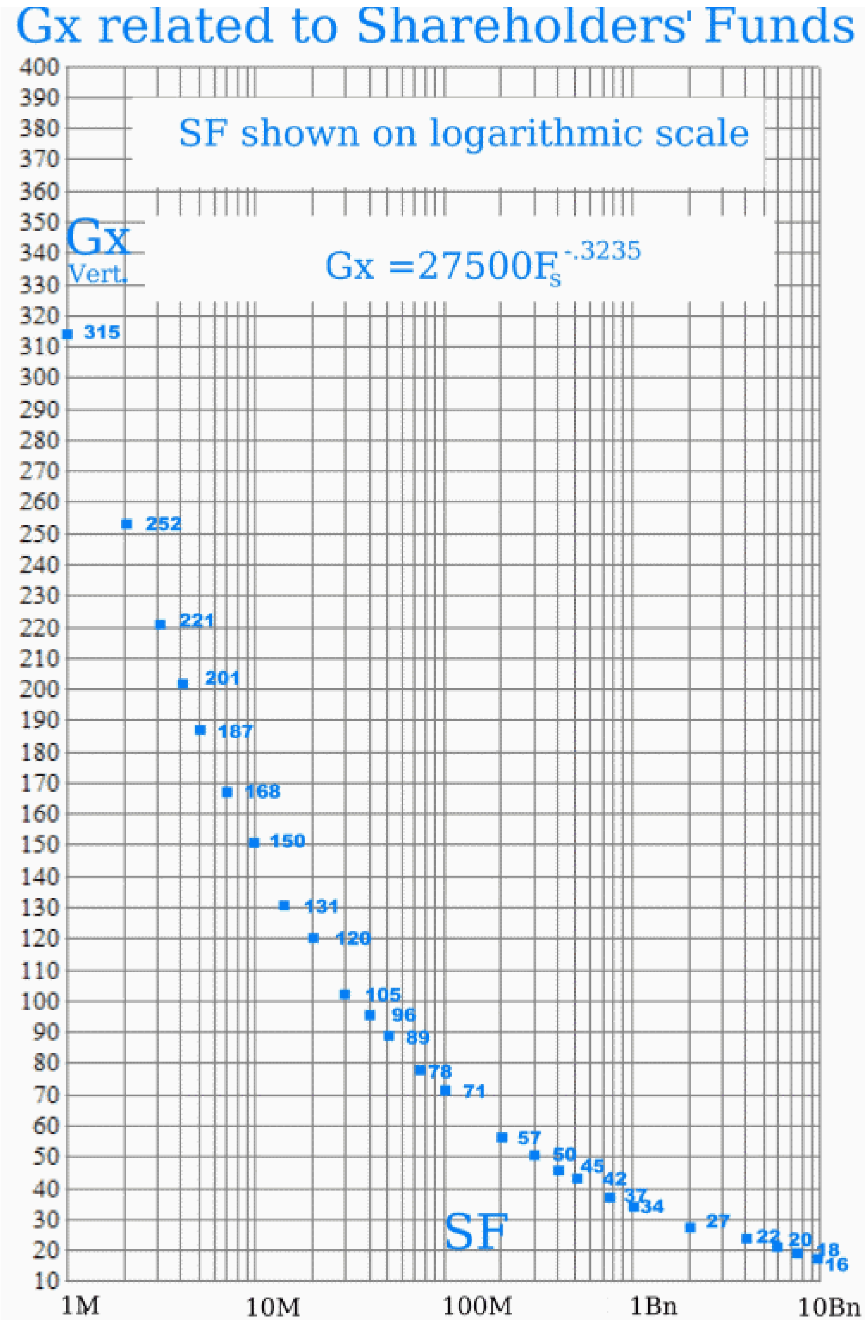


Chart 2

This can be derived by solving the linear equations resulting from using the data in log form for Crothall and BHP in Chart 1. The exponent for F can also be derived from the slope.


Gx related to Shareholders' Funds
SF shown on logarithmic scale
Gx =27500F
s
-.3235
Gx
Vert.
SF
400
390
380
370
360
350
340
330
320
310
300
290
280
270
260
250
240
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40
30
20
10
1M
10M
100M
1Bn
10Bn
315
252
221
201
187
168
150
131
120
105
96
89
78
71
57
50
45
42
37
34
27
22
20
18
16

Chart 3

6. Solving for Price

We originally defined Gx as:

$$\mathbf{Gx} = \frac{\text{Earnings}}{\text{Dividends}} \times \frac{\text{Earnings x100}}{\text{Shareholders' Funds}} \times \frac{\text{Earnings x100}}{\text{Price}}$$

Now we also have Gx as:

$$\mathbf{Gx} = 27{,}500 \times F^{-0.3235}$$

Solving for price:

$$P_{\text{Total}} = \frac{E^3 \times 10^4}{(27{,}500 \times F^{-0.3235}) \times D \times F}$$

$$P_{\text{Total}} = \frac{E^3 \times 0.36364}{F^{0.6765} \times D}$$

Note: the items are all from the fiscal statements so the Price is for the *Total* of the shares.

This is the first time I believe anyone has shown such a formula for share prices which is dependent only on earnings, shareholders' funds and dividends. (Subject still to adjustment for liquidity.) It is possible to express it in terms of the common units like PE and NTA per share and only the relevant numbers of shares need to be found.

Unit share price formula in usual data:

$$P_{share} = \frac{36.37 \text{ x } E_{share} \text{ x } DC \text{ x } EF_{\%}}{(NTA_{share} \text{ x } Shares_{number})^{0.3235}}$$

The constants are only valid for NZ and Australia in the earlier time period.

The original data from 1968 coincided fortuitously with a market high which provided a reference. The challenge now is to update the constants needed for different world markets.

Example 4.

Company data

# Shares	1,000,000
$Earnings_{share}$	\$0.15
Dividend cover	1.875x
$Earnings_{funds}$	12%
NTA_{share}	\$1.25

$$P_{share} = \frac{36.37 \text{ x } 0.15 \text{ x } 1.875 \text{ x} 12}{(1.25 \text{ x } 1{,}000{,}000)^{0.3235}}$$

$$P_{share} = \$1.31$$

This data does not apply to a real company.

$Gx_{Earnings}$ from DCxEF%xEY% = 257.6. Gx_{Funds} is 293.1. The price is a given at \$1.31/share providing a PE of 8.73, which suggests possible room for movement. Gx use is best comparing other similar companies to reveal opportunities. The adjustment following for the market is still to be applied.

Initially price and value were the same because Gx was unknowingly pegged to a peak data set. It was not long before the price needed to be adjusted as the market moved downwards so a term needs to be added accordingly.

Empirical investigation showed the correction for price level changes could be made by use of the market indices. The Reserve Bank of New Zealand had a broad-based monthly index which worked well. The NZFT index based on a basket of companies could give a daily price adjustment if required. There was little difference between the two. In the US the S&P 500 gave a broad-based index likewise. Effectively the current price is:

$$P_{current} = P_{value} \text{ x } \frac{Index_{current}}{Index_{base}}$$

Where P_{value} is the price calculated by the formula based on the last published annual financials as in Example 4;

$Index_{base(I_0)}$ is the value of the chosen index at the date of the data set on which Gx is based;

$Index_{current(I_1)}$ is the value of the chosen index at the current or other date for which the expected price is required.

From this the generic form becomes:

$$P_{Total} = \frac{E^3 \text{ x } 0.36364}{F^{0.6765} \text{ x } D} \text{ x } \frac{I_1}{I_0}$$

And the current price/share:

$$P_{share} = \frac{36.37 \text{ x } E_{share} \text{ x } DC \text{ x } EF_{\%}}{(NTA_{share} \text{ x } Shares_{number})^{0.3235}} \text{ x } \frac{I_1}{I_0}$$

Gx is the limit price, effectively the intrinsic value of a common share or their total. This affirms that there is a universal sense of value which may vary with individual markets. The constants for each will need to be so determined and reviewed from time to time for changes in economic conditions affecting the bottom and peak trendlines. Hints as to doing that appear later.

The index movements track the liquidity which is itself a composite of regulatory action, traders and speculators, derivatives, news, banks and government programs... We do not need to be concerned at the time. Predicting the movement in the indices is a separate exercise.

The formula shown worked well using the available indices. If a share is priced below the **Gx** prediction that pinpoints unrealised value and a potential buy.

We will look at how to calculate expected movements in prices in later chapters. Meanwhile, a taster: highlighted in the equation below is an expression predicting a future index value modifier. I have shown value to have a foundation in earnings; changes in stock market price levels will be shown to be related to interest rates.

Example 5

$$G_x = 27500\, r^{-0.3235} \Big/ \boxed{\left[1-\left(0.00009249422t^2 - 0.001668356t\right)\right]}$$

Origin mid April 1969 unit $\frac{1}{2}$ months

(The only surviving remnant of a highly significant work paper. The divisor is the liquidity adjustment relative to the indices.)

7. Pt 2, Implications of Gx

International application

The fact that the Gx derived from company performance data can be related to shareholders' funds enables a Gx formula and chart, similar to Chart 2, to be created for different places and times. As the original chart, based on the dual market worked for over 10 years for Australia and New Zealand, two close but separate countries, the underlying principles should hold true elsewhere. For large companies on the tail of a Gx Chart it is easy to pinpoint relative anomalies.

The rational economic person emergent

The preceding chapters have shown the derivation of the Gx formula. Now we need to consider its implications and use. Gx is a crude proxy for a return on growth but it also can be equated to company size.

$$\mathbf{Gx = 27{,}500 \times F^{-0.3235}}$$

$$\mathbf{Gx = DC \times ESF\% \times EY\%}$$

What these equalities show is that:

Companies of the same size with the same earnings potential have the same total value.

Commonsense tells us that: "that is obvious", but now we have proof. This implies the economists' rational person exists and applies its collective mind to the valuation of investment grade shares. Gx infers there is a common understanding as to what constitutes value and how it is measured. Despite the fact that many people have imperfect knowledge Gx requires that there is an agreed collective knowledge.

Consistency

The only consistent base for information is the most recent annual financial report with ratios and statistics based on them in daily papers or online. Daily media reports of share price changes and why are largely irrelevant.

Price level changes could just as easily be ascribed to sunspot changes as any other factor reported. It may even be more entertaining to read chicken entrails nightly on the TV market slot. Underneath it all the market's rational collective person knows the truth. This also applies to non-investment grade shares of some larger developing companies like in mining where the Gx price appears as the upper limit when extrapolating market price trendlines.

Pinpointing special situations

Gx will enable us to detect companies where short-term unrecognised potential for price appreciation exists and to choose a best buy at that time. If the Gx as expected is out of line with expectations for the company size a share issue may be needed to adjust that. There is further application for evaluating offers, prospectuses and post-merger pricing. When dealing with quality issues Gx can be used to predict offer prices and opening prices.

When the Gx price was calculated earlier it became obvious that:

At any time, most investment shares are fully priced, and the Gx price is the limiting value.

This is consistent with a rational person setting day to day prices. Shares are revalued when a new set of annual financials are published. A reduction in Gx will be reflected in price immediately; increases in Gx may lag even by months, but not beyond the next annual accounts. A good example of this was in an issue by NZFP, where the shares were underpriced for some months by a $1, then about 25%, which disappeared in the course of a few days after the start of rights trading.

As shares are typically fully priced, being an investor puts one in the position of being a price taker. There is limited opportunity to pick undervalued shares at the time of purchase. Being in "for the long haul" puts an investor at the risk of market price declines which have to be balanced by increased company growth. The alternative is to try and figure out where the market is heading, sell up at a peak and go fishing for a while. The risk that way, in getting the timing wrong, can be catastrophic, so frequently sitting tight for a period is the wisest option.

Hidden in Gx is the fact that:

Small companies have greater potential for relative increase in value than large ones.

From Chart 2 and Chart 3, a much greater proportionate change in Gx occurs in the under $500,000 range. This change in Gx translates to a disproportionate increase in value as investors are willing to pay a higher price for the same earnings of a larger company. The change in this Gx example only becomes approximately a straight line on the illustrated semi-log charts at $3 billion.

8. Practical Index Forecasting

The question "where is the market heading?" may mean what is happening now to the price of a particular stock or, just as often, what's happening to the S&P 500, DOW (DJIA), or other index? Is there a discernible trend? Market-speak suggests a sort of war going on, making media theatre, but that reveals little or nothing of reality.

How can one tell what the index will be at a future date? A review of theoretical work quickly leads most people into a never-land of obscurity. One paper with a moderate success at predicting the DAX index for the *following day* even referred to applied thermodynamics! To be helpful for investment we need to be able to look beyond tomorrow out to a working forecast of at least 6 and preferably 12 months.

The random walk theory has not provided an answer. If information is equally disseminated throughout the market in place and time how can so many lose so much to so few? With 70% or more of trading in the USA and UK now being computers buying and selling to each other even close proximity to the exchange servers has become a factor!

A standard approach is to estimate future company incomes from which to derive a new set of individual index share values. No matter how the future income is determined, a discount interest rate is implicitly applied even if hidden in a guesstimated PE.

Elliot's wave theory is potentially more useful even though its patterns might be fractal. Followers may see patterns that speak to them of selling or buying support at given market prices or indices or stock prices moving within constrained bands. Buying support follows the judgement or lack of it of those or their computer quant who bought at the earlier price. Support pressure can provide a market dynamic but can it provide the long term push we need to explain major stock market cycles?

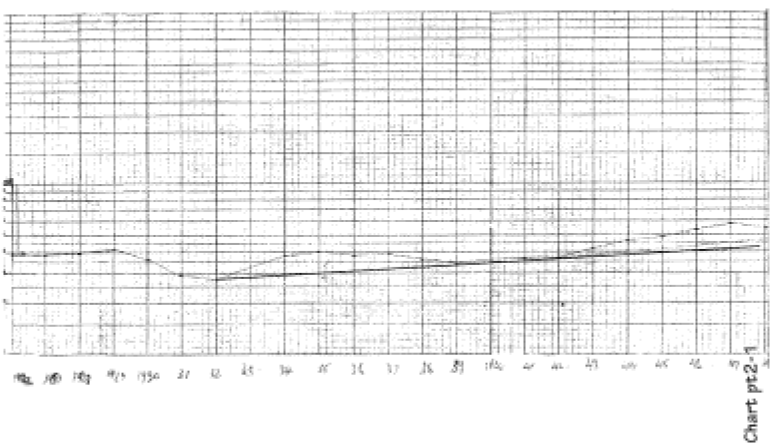
Momentum is measured by some analysts by comparing two moving averages of a market index. As one moving averages uses more time periods than the other a persistent difference can reveal a trend. However it is easier to read from momentum charts where one has been, not where one is going to be a few months hence. Barrons have provided a handy set of on-line tools for analysis of momentum. Earlier chapters established the independence of price and value and introduced a term to represent liquidity:

$$\mathbf{L} = \frac{\mathbf{I}_1}{\mathbf{I}_0}$$

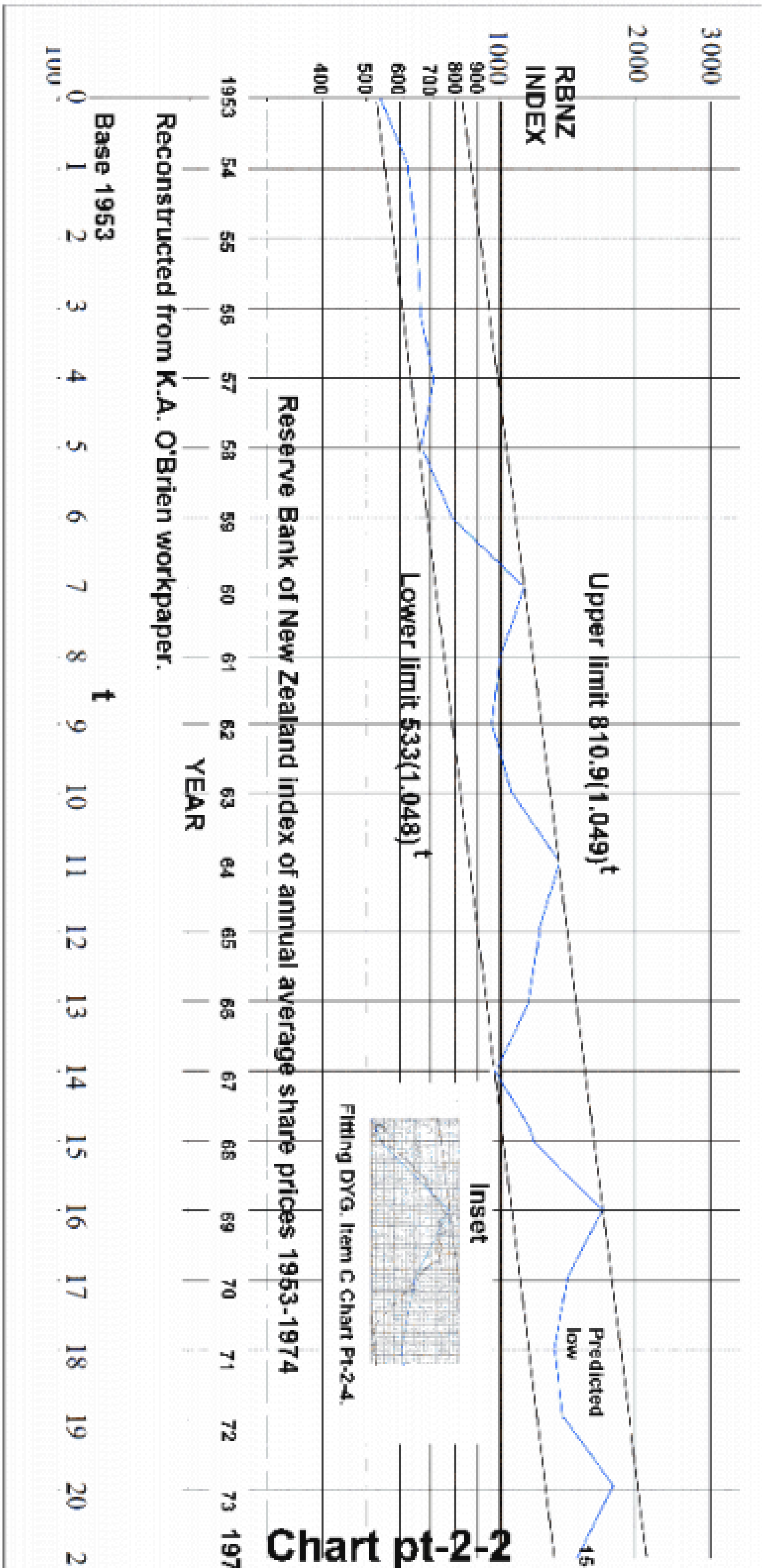
L being the ratio of the chosen index at the date of determining Gx as a function of shareholders' funds and the date of its application. Serendipitously the original work was based on a market peak, giving an automatic signal when the market price dropped, but the then incomplete Gx formula did not follow. If Gx was to be useful, the quest then became to find what drives L. Could it be the money supply and interest rates? The fact that the monthly Reserve Bank of New Zealand (RBNZ) index worked at least showed it was a good proxy.

9. A Long-Term View

New Zealand may be small and isolated allowing market data to reveal major changes of domestic policy. Chart pt2-1 has the RBNZ average annual stock market index plotted logarithmically against time for the years 1926-48. Equal proportional changes fall on a straight line.



RBNZ index with slope fitted 1926-1952, K, A. O'Brien work papers, (The semi-log graph paper of 50 years ago is hard to reproduce for print.)


RBNZ
INDEX
Upper limit 810.9(1.049)t
Lower limit 533(1.048)t
Reserve Bank of New Zealand index of annual average share prices 1953-1974
Reconstructed from K.A. O'Brien workpaper.
Base 1953
YEAR
Inset
Fitting DYG. Item C Chart Pt-2-4.
Predicted low
Chart pt-2-2

Base lines have been fitted through the low readings. The first holds through from 1932-1952. At 1953 the slope changed after the 1951 five-month strike-busting lockout of the waterfront workers. This new slope persisted until the 1984 Labour Government opened up the economy and floated the NZ dollar. We no longer had to get exchange control approval, even for magazine subscriptions! It was not surprising then, with now nearly free access to world markets, that the **Gx** relationship to shareholders' equity changed as well. These baselines show a predictable stock market.

Chart pt2-2 has an upper limit line too. The idea for fitting these lines came from charts of short-term trading ranges describing "support" or "break-out" levels. These provide a channel within which the minima and maxima at any given time are being predicted to lie. The charts show formulae for the upper and lower limit lines. The market was predictable within the trend lines.

10. Dividend Yield Gap - DYG Forecasting

I'm sure the idea is not originally mine, but even after much searching I still do not know where I got the clue that there was or had been a zero yield gap at the market bottom.

The proposition is:

When the stock market is at a relative long term bottom its dividend yield equals that on long-dated Government bonds.

It makes sense that in a crisis no one would be willing to pay more for dividend returns on a stock portfolio than they could get from a risk-free loan to the Government. If the dividend yield gap, DYG, could be tracked or predicted it might be possible to determine when a future index bottom would occur.

The DYG is not the Yield Ratio YR. The two seem to be currently commonly confused.

The DYG is the average market dividend yield *minus* the yield on bonds.

The YR is the average market dividend yield *divided* by the yield on bonds.

The confusion may be caused by the YR sometimes using the earnings yield instead of the dividend yield.

The YR is always a positive number equalling 1 when the yields are the same; i.e. the DYG is zero. The DYG is usually positive but could be negative particularly if inflation is a factor.

The index baseline is likely related to population growth and productivity but does the DYG reflect the cyclical timing of highs and lows? What changes the yield gap is the movement of funds between the stock market and the Government, which for this purpose includes the Fed or such like and other major contributors to the money supply.

The drivers of growth are likely found in human aspiration. A natural inclination to "better oneself" is motivation for investment; the same is also motivation to avoid loss of capital. Speculation is gaming, informed or not. Investment is an expression of a desire for prosperity; not just consumption, but the ability also to enjoy the use of gains which may be deferred for a long time into the future. Investment is ultimately about gain with certainty which can be satisfied by low-risk long-dated Government bonds. Consumer price level changes being common to all strategies are neutral across investment options unless only current income is required.

It seems logical then the minimum return on a liquid stock portfolio should at least equal the coupon yield on a long term Government bond. There are active markets for both shares and bonds so yields can be compared daily.

Chart Pt2-3 is a published forecast 10 months in advance of a market low based on DYG data. The original was sent to some leading economists in NZ from Samoa 10 months in advance. The low is underlined. The date was within the fortnight and the index differed by only 3 points!

This was the result of taking the DYG of 1.68 at the top of the market and looking closely at the relative changes in both directions using a half-month unit. The ratio of the top and bottom trend lines had to be maintained. Eventually a quadratic was fitted to the DYG data and the properties of that function having a defined turning point were useful. I measured both relative and cumulative changes. The peak was in 1969 so the market was known to be descending. The analysis of the data in both stages, partly up and down, enabled the prediction. What was also revealed was that the market had turned about 2 months before it showed up in the statistics. The smart money had dumped their shares on the speculative hungry public. When all the amateurs jump in to buy it's probably time to sell. Such frenzy betrays the market turning point.

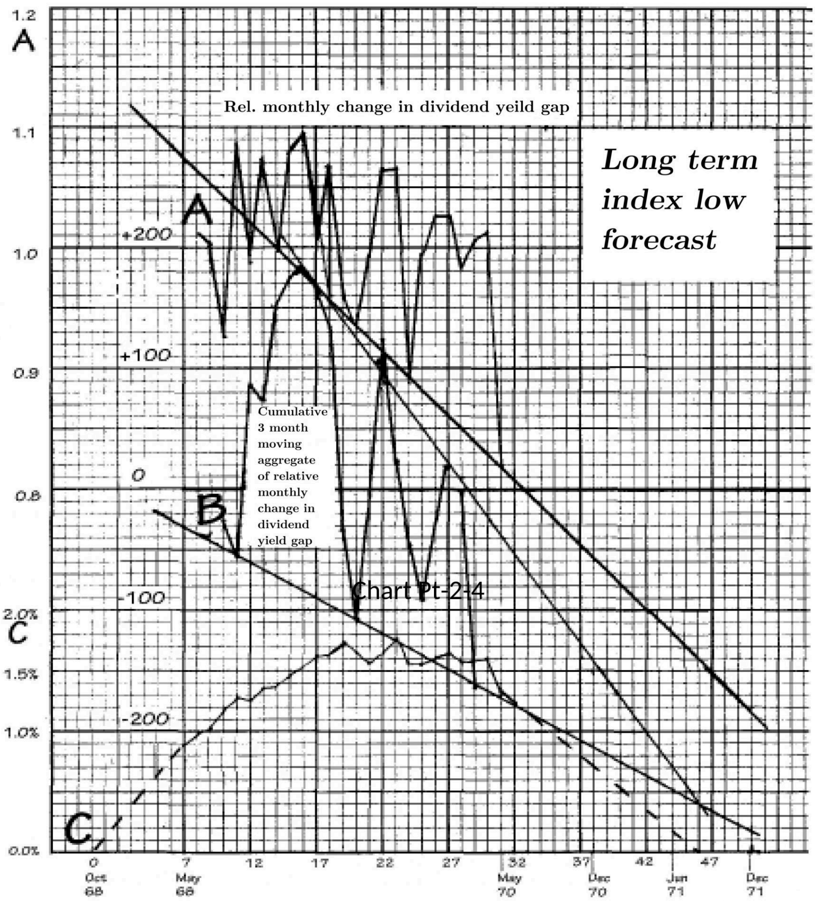
NZ SHARE MARKET PRICE INDEX MODEL

DATE	Predicted Index rel. To peak	Decline from peak %	Predicted NZ Financial Times Index
Mid Oct 1970	0.905	9.55	**307**
End Oct 1970	0.899	10.1	**305**
Mid Nov 1970	0.893	10.7	**303**
End Nov 1970	0.887	11.3	**304**
Mid Dec 1970	0.880	12.0	**298**
End Dec 1970	0.873	12.7	**296**
Mid Jan 1971	0.866	13.4	**294**
End Jan 1971	0.859	14.1	**291**
Mid Feb 1971	0.852	14.8	**289**
End Feb 1971	0.844	15.6	**286**
Mid March 1971	0.836	16.4	**284**
End March 1971	0.828	17.2	**281**
Mid April 1971	0.820	18.0	**278**
End April 1971	0.811	18.9	**275**
Mid May 1971	0.803	19.7	**272**
End Mat 1971	0.794	20.6	**269**
Mid June 1971	0.784	21.6	**266**
End June 1971	0.774	22.6	**263**
Mid July 1971	0.764	23.6	**259**
End July 1971	0.754	24.6	**256**
Mid August 1971	0.744	25.6	**252**
End August 1971	0.745	24.6	**256**
Mid Sept. 1971	0.764	23.6	**259**
End Sept. 1971	0.775	22.3	**263**
Mid Oct 1971	0.786	21.4	**267**

Copied from Kevin O'Brien's working papers.

Chart Pt-2-3

Model derived from DYG movements.



Source: Kevin O'Brien working papers. Digitally enhanced & legends set.

Convergence to August 1971 low

A: Relative monthly change in DYG.

B: Cumulative 3-month moving aggregate of the monthly change in DYG.

C: Change in DYG (See inset on Chart pt-2-2). **Chart Pt-2-4**

The plot "C" above is based on an analysis of the movements in the DYG. A quadratic fitted also affirms the timing suggested by the convergence of the trend lines.

The base reference was the equation for the lower limit in Chart pt2-2. That was $533(1.048)^t$ where t is the number of years elapsed from 1953, the start of the chart. The upper limit boundary was $810(1.049)^t$.

Unfortunately some work papers are too complex preventing giving more detail. What's omitted shows fitting a curve so that the DYG goes to zero at the future boundary with the quadratic turning point at the peak. From that is derived the timing of the market bottom event.

Business cycles

These are all that is left to explain. My tentative explanation is that they are based on human need to better themselves and generations borrow and spend to excess as greed not to be left behind takes over. The liquidity claw-back enriches the lenders and the borrowers rebuild. Their hardship is visited on their children and the following generation and it is the 3rd generation that starts the cycle all over again.

Meanwhile the sun is periodically altering the climate producing dust bowls etc. and that great driver enhances or retards as it wills.

I hope this is of use in the world.
Blessings.
Kevin.
Christchurch, New Zealand, Feb. 2022
S.G.D.