Documento de Trabajo

8 9 2 0

EQUITY PRICING:
HOW REASONOBLE ARE INVESTORS?

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SIMPOSIO 1.989

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At the conference last year the view was expressed by Peter Gripaios that the world wide collapse of share price reflected a 'follow my leader' process which sucked in all countries, that a collapse of the Dow Jones index was bound to affect the FT index. Insofar as the 1973 collapse on Wall street was mirrored by a huge fall in the City of London I can even provide evidence consistent with that view. But it lacks commonsense. Share certificates are merely entitlements to a future, uncertain, dividend stream and only when a common event threatens all income streams can they collapse in parallel. A new competitor in fertilisers will depress I.C.I. stock but will have only a very weak linkeage with that of United Biscuits.

The 'October Crash' of 1987 certainly disillusioned Professor Myers of MIT, a former strong advocate of efficient markets. He disowned the 'simple' eficient market hypothesis at an LSE conference on the crash (reported in the Financial Times 5th April 1988, P14).

I do not know what caused the crash. It would be very easy for me to say the uncertainties of the time caused the market to discount the future more heavily (adopt a higher risk premium) but this borders on tautology. What worries me more is the alternative views advanced.

At the same conference a number of authors took positions at variance with rational models. Lawrence Summers has argued that some investors engage in negative feedback and stabilise prices whereas others have positive feedback and destabilise the system. The latter sometimes get the upper hand. This idea has been espoused by non-economists in the form of catastrophe theory back in 1973 and resurfaced with Shiller's 1981 article in the American Economic Review. A less plausible and more mechanical model is not easy to imagine. Just as there are an infinite number of straight lines that go through a point and an infinite number of polynomials of degree 'n' that go through (n-1) points they do not provide an explanation. only one straight line will go through two points and it is that sort of fit that is required to avoid the label ad hoc.

THE FUNDAMENTALIST VIEW.

Let us see how equities 'should' be valued. The constituent companies of any of the FT Actuaries Indices generate a stream of dividends which must be compared with the earnings streams that can be obtained by investing in more secure assets like government bonds. Assuming no risk aversion, if 10% can be obtained on 'long' bonds then 10% will be required on equities. The value of a share will then be equal to the net present value of the future dividend stream discounted at 10%.

$$P_0 = D_1/(1+R) + D_2/(1+R)^2 + D_3/(1+R)^3 + \ldots\ldots$$

If there is no growth in the dividends then

$$D_1 = D_2 = D_3 = \ldots\ldots\ldots\ldots = D$$

$$\text{and } P = D/R.$$

If D is growing at a rate 'g' then $P = D/(R-g)$.

In steady state then dividends will grow at a rate 'g' and so must the price if the dividend yield, D/P, plus 'g' is to remain equal to the yield on bonds.

Putting this another way the condition for being indifferent between bonds and equities is that

$$R - g = D/P$$

Or $R = D/P + g.$

ARBITRAGE AND BULL MARKETS.

Ignoring property, works of art and foreign securities where similar considerations apply a portfolio manager has the choice of putting money into short term funds on a rollover basis, putting money into long term bonds and putting money into the equity market. Hicks delineated the linkeage between the first two with his expectations theory - the long run rate being a geometric average of future one year rates. Our simple arbitrage condition applies equally well for the decision to switch into or out of the equity market from shorts or longs. The portfolio manager will constantly review the yield on equity over 1 year and infinite horizons and compare with the known redemption yields of 1 year gilts and irredeemables respectively.

Remember (D/P + g) represents the expected return on equity and it must be equated to the readily available gross redemption yield on bonds for the same time horizon. ie it must hold for a three month view (taking the yield on treasury bills as the comparator) and into the infinite future (taking the flat yield on consols for comparison).

Let $(dP/P)_S$ and $(dP/P)_L$ represent expected capital gains over 1 year and five year horizons respectively.

Let R_S and R_L be the current gross redemption yields on one and five year bonds. It follows that two relationships must hold simultaneously:

$$[1] \qquad D/P + (dP/P)_S = R_S$$

$$[2] \qquad D/P + (dP/P)_L = R_L$$

and hence that $$(dP/P)_L = (dP/P)_S + R_L - R_S$$

In steady state the index should grow at a constant rate but if short rates rose for one year above long rates then short run growth in the index must exceed long run growth. This would take the form of a collapse in the share price now to equalise yields. The rebound of the share price is presumably the only solid interpretation

that can be given to the idea of a 'bull' market. Otherwise a bull market can only be more loosely ascribed to a rising share price in the face of a string of good news, like throwing two sixes on three consecutive throws of a pair of dice.

At any moment in time portfolio managers will not only be interested in in the indefinite yield on equities relative to the indefinite yield on gilts. They will also be interested in the 1 year holding return on them both.

Thus if interest rates were anticipated to be 10% into the indefinite future, 'g' was anticipated to be 1% and 'D' =10, then the market price would be 111.1. But if the rate of interest unexpectedly rose for one year to 20% (a BOP crisis, an inflationary scare) then the market price would have to fall by 9.16% (to 100.916) in order to equalise returns. [D/P will then be 9.90923% and expected capital gain for the year will be (111.1-100.916)/100.916 = 10.09156%. This makes the total 20% for the year, which it must be to compare with 1 yr returns.

Quite dramatic 'overshooting' can occur where unexpected policy change takes place even when the future flow of dividends is expected to remain unchanged. The effect would be greater if companies had to roll over their debts on a short term basis for then the higher interest rate would hit firms profits as well as lowering the present value of any given future dividends.

Of course expectations of future interest rate rises are embodied in the yield curve and when they unfold the market price should not be affected. Even a large blip forseen in 5 years time should not affect the share price much now and not at all when it comes. But a sustained anticipated blip would make a sizeable difference now, with one important exception. In particular a rising yield curve not only expresses a belief in rising interest rates but also in a higher level of inflation in the future. If held with confidence the sudden expectation of higher inflation in the future should not affect the level of share prices today, even though it will affect long term bond prices. Gross redemption yields on bonds should rise as bond investors seek the same real returns as before but in the case of equities we would expect dividends to rise with inflation and so their expected return rises with the inflationary expectations without any need for an adjustment in their own current dividend yield. The difference (GRY on longs - D/P) reflects 'g' as before but it has both a real and an inflation expectation component. We cannot simply look at it and say that the gap is historically high and stock prices are 'obviously' overvalued. The Bank of England, in it's post-crash Quarterly Bulletin, and a number of articles in the 'Economist' all drew attention to the 'extraordinary' reverse yield gap with the implication that investors had pushed equities too high. If such readily available information had such an obvious meaning the reverse yield gap would not fluctuate as it has.

Similarly with exchange rates. A long run decline maintaining purchasing power parity would not affect the stock market even though some 45% of earnings for UK companies currently come from abroad. However 'unexpected' changes in government policy would have a profound effect. The point I am making is that dividend yields and gross redemption yields should move together only in response to unexpected changes in policy (both those of our own government and of other governments in a world of high capital mobility). Just as the volatility of exchange rates owes less , in my view to the capricious behaviour of speculators so the capricious behavior of the stock market owes less to the 'fads' of market

operators than it does to the unpredictable nature of policy and the existence of genuinely unforecastable events.

In another guise our fundamental equation is the familiar interest rate parity condition that holds continuously on the foreign exchanges.

$$R_{UK} = R_{USA} + dE/E$$

Both are arbitrage relationships, one between bonds and equities over each time horizon and the other between bank deposits in different currencies at a point in time.. It is now a commonplace to refer to exchange rates as behaving like equities in their volatile behaviour. Indeed the concept of 'overshooting' was long recognised among participants of bond and equity markets long before it was born in the macroeconomics literature.

INVESTORS AND SPECULATORS.

Standard texts in finance suggest there exists two sorts of operators in the second hand market for financial assets - investors and speculators. The former care only for dividends the latter for short run capital gains. The standing of the latter is enhanced by the writings of Keynes (by the now dated speculative demand for money at one level, more popularly by the tale of the beauty contest).

> "Or to change the metaphor slightly, professional investment may be likened to those newspaper competitions in which competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole; so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he thinks likliest to catch the fancy of the other competitors, all of whom are looking at the problem from the same point of view. It is not a case of choosing those which, to the best of one's judgement, are really the prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligences to anticipating what average opinion expects the average opinion to be. And there are some, I believe, who practice the fourth, fifth and higher degrees."
>
> (The General Theory, P156).

Specifically Keynes drew the distinction between 'speculation', by which he meant the activity of forecasting the psychology of the market and 'enterprise', the activity of forecasting the prospective yield of stockmarket assets.

But fundamental analysis encompasses both points of view. Starting from the fundamental equation favoured by investors it is easy to derive the equation ascribed to speculators and vice versa.

Some people hold equities for a long time - some buy and sell over a short time horizon. So do holders of building society accounts! Are there any intrinsic differences? The latter are more secure so people holding them may be more risk

averse but it is not obvious that we can differentiate between short term and long term holders of any particular asset. Both are after yield. The composition of the yield differs as between securities. Short term buyers incur more transaction costs but they may merely be putting their savings to good use for the period before they need to spend.

The concept of 'short termism' amounts to saying that the stock market fundamentally values equities at below their net worth. In the extreme case the purchaser cares only for the dividends accruing in one years time and his expected resale price when the stock goes 'ex div'. But of course, even if there are no long term investors, our speculator knows that the market price in one years time must reflect the value then of dividends accruing one year further on and its associated ex div price. A rational view, even in a musical chairs market, must reflect the entire future stream of dividends.

LET P_0 BE VALUE TO A SPECULATOR.
LET D_1 BE THE EXPECTED DIVIDEND IN 1YR.
LET P_1 BE THE EXPECTED PRICE IN ONE YEARS TIME.
LET 'R' BE THE REDEMPTION YIELD ON A ONE YEAR GILT (and hence the required equity yield since we are, for the moment still taking the risk premium as zero).

$$P_0 = [D_1 + P_1]/[1+R]$$

$$P_0 + RP_0 = D_0 + P_1$$

$$R = D_0/P_0 + [P_1 - P_0]/P_0$$

The speculator therefore equates the safe bond yield to the prospective dividend yield plus expected capital gain. Since pursuit of easy money popularly distinguishes speculators from investors it would seem that the above behaviour characterises speculative activity but it also of course captures investors behavior.

Since $P_1 = [D_2 + P_2]/[1+R]$

It follows that

$$P_0 = [D_1]/[1+R] + [D_2]/[1+R]^2 + [P_2]/[1+R]^2 + \ldots\ldots$$

Of course tax considerations have dictated that some investors be capital gains seeking rather than dividend seeking. This presumably accounts for much of the 'churning' of stocks and bonds. 'Bond washing' may be illegal but it is undoubtedly attractive where differential taxation and low transactions costs coexist. Such activity though should not invite the charge of short termism. Nor should any preference for more risky, non 'Blue Chip', stocks since the division between returns in the form of income and of capital gain has often influenced portfolio choice even between risk neutral individuals.

This is not to say that equities will not be discounted heavily. The quality of their earnings is obviously less secure than on gilts because of various market risks and the possibility of bankruptcy. Equally bonds differ in their default risks and 'short

and longs' in their capital and income risks. Some risk premium will be added but it is not obvious that more distant earnings should be discounted at a higher rate than nearer ones for the same security.

The main limitation of the 'short termism view' is the lack of any anchor for expected price change other than that provided firmly by fundamental analysis.

PERFECT FORESIGHT MODEL.

Knowing all future one year rates of interest on government debt and all future dividends we can work out a rational price for a share, or indeed the FT index and the subsequent evolution of that price.

Going back 30 years we can see this reasonably. Going back three years to 1985 there is a problem since most of the value then will depend upon future rates of dividends and interest beyond the present. Market operators must work these out but this is of no concern to us here. If they guess correctly the FT index will go on a 'random walk' as it is hit by 'news'. What we can do is, assuming it is right now (and if you believe it is obviously to high/low you sell/buy) we can use the current price as the terminal price and evaluate

$$P_{87} = [\ D_{87}\ ]/[1+R_{87}] + [\ D_{88} + P_{88}\ ]/[1+R_{87}]\ [1+R_{88}]$$

where the R's denote 1 yr bond rates.

This generates a synthetic 'rational' price series which may be compared with the actual one to give a measure of surprises as time rolled on. Since expected inflation should affect both numerator and denominator equally only unexpected changes in real profitability, inflation and government policy should affect the share price.

Shiller did this for the United States and it has recently been done for the UK. In both cases real dividends were discounted by a constant discount rate. The actual index, unlike the rational one, has been found to fluctuate far more than can be justified by subsequent changes in dividends.

THE EXPECTED RETURN FROM EQUITY.

By assuming perfect foresight we can find the successive expected returns on equity. This is simply the internal rate of return, the interest rate that equates the future dividend stream and terminal price to the market value in each year. I have calculated these for the period 1963 to 1988 and graph them against the gross redemption yield on 20 year bonds. The difference represents the risk premium demanded by investors. With perfect foresight of course a premium would not be demanded!

As a practical matter the future looks cloudier the further you look into it. The prospective dividend is somewhat less of a problem than ascertaining its path in future years or its growth rate. This is quite familiar to economists and it is not surprising that rules of thumb develop to meet it.

'Buy in May - sell on St Swithans Day'.
'October. This is one of the peculiarly dangerous months to speculate in stocks'. Mark Twain. (Unfortunately no simple rule is suggested here - 11 others are also named).

My own experience was that for individual stocks analysts tried to forecast earnings (and hence dividends if the payout ratio is constant) for the next three years and then assumed that earnings growth followed that of the market as a whole. Earnings growth was always a multiple of 5% for that three year period! I knew the arbitrage condition as the 'POLICY EQUATION' and earnings growth was forecast by fitting an equation of the form:

$$E_t = (1 + g)^t E_0$$

by least squares to data for the previous twenty years. This was our estimate which was then modified by considering the range of estimates offered by reputable research departments through whose companies we dealt. This produced a value for 'g' of 4.19% and one of my first jobs on a monday morning would be to employ the 'policy equation' using this figure, the current flat yield on consols and the historical dividend yield to decide how new monies were to be allocated that week. (The allocation was complicated by having substantial alternative outlets in property development - back of the envelope was an exaggeration for the calculations that went into Brent Cross - and speculative activity in overseas securities, primarily American). Of course 4.19% takes on the attribute of a magic number and one may question whether it was optimistic. My own contribution was to point out that such growth in a non inflationary world would cause a most improbable shift in the functional distribution of income and that it was too high. The consensus view was that the last twenty years contained enough variety of experience for one to feel that the next twenty years was unlikely to produce any significant change in earnings per share growth. A nagging doubt still remained that only with a fairly detailed assessment and balancing out of all the factors that affect 'g' could we assess the liklihood that the past would repeat itself.

Team members were strongly of the opinion that in the long run equity earnings (and associated dividends) would at least keep up with inflation since real assets producing real goods should maintain their real value. Furthermore that earnings per share ought to do better than inflation to the extent that there is real growth. So the growth rate of dividends in the long run can be found by combining an estimate of future inflation with an estimate of real growth. Although the historical fit won in 1971, I shall use this more satisfactory method in calculating returns to equity and the associated risk premiums.

Some team members were 'cyclists' (indeed one was a 4:1 cyclist bear at the time and another was a 2:1 non-cyclist bull!) which raises question of the suitable beguinning and end dates for the regression.

Personally I was a non-cycling atheist at the time having sought the philosophers stone in Harvard Finance Journals and found the "Efficient Market Hypothesis" instead. However the Policy Equation did tell me that equities were the wrong place to be in 1971 and my reservations about $g = 4.19\%$ reinforced this. The FT indices fell precipitously over the next few years, much more so in real terms. It was said that the markets discounted everything except all out nuclear war.

This should have shaken my belief in efficient markets but the fall was precipitated on a world level by the first OPEC shock and the ensuing slowdown in growth. Domestically it was reinforced by the secondary banking crisis. Neither of these events were forseeable in 1971 so I did not really outguess the market. We were all in the dark and a sharp correction in prices was quite rational in view of the new circumstances, though my results may suggest that the trough of December 1974 in the index was unreasonably low.

THE EQUITY RISK PREMIUM.

I will start off with the view that bonds and equities are very close substitutes. A characteristic of perfect substitutes, in asset markets at least, is that the yields on them should move in a 'locked step' fashion. Whilst expectations that people have about future short term interest rates can be 'read' from the yield curve expectations of future dividend growth are less visible, as is the required yield on equity. By making assumptions first of perfect foresight and then of extreme myopia about the future course of dividends we can derive an expected yield on equity and compare this with the known yield on bonds. Then we might take a more intermediate view, which coincides with typical practice among analysts.

The dividend series was constructed by multiplying the June dividend yield by the June market price for each year. Since the dividends embedded in the dividend yield figure reflect the dividends for the previous four quarters I treated them as being paid exactly 6 months previously. In the calculations that follow I use the January prices for each year, treating the index as a price for a composite stock that goes ex dividend on December 31st. The next dividend accrues in 1 yrs time.

The monthly prices are in fact an average of the closing jobbers price for each wednesday of the month. As with all arbitrage relationships it would be ideal to have prices on a specific day for both the index and gross redemption yields as well as a more factual basis for the distribution of dividend payments about the year.

MODEL 1

By assuming perfect foresight we can find the return on equity demanded by investors. Knowing all dividends that will accrue from 1963 to 1988 and the terminal price in 1988 investors will fix a price in 1963 that will provide their required return. Since we know the price that was set we can calculate what that return was. It is simply the internal rate of return derived from the following equation:-

$$P_{63} = \sum_{t=1963}^{1988} D_t/(1+R)^{t-1962} + P_{88}/(1+R)^{26}$$

This can be done for 1964, 1965 etc to date and compared to the yield on

longs. The difference is a measure of the risk premium. This is the Shiller approach, in reverse as it were, and I have labelled it 'model 1'.

MODEL 2 and MODEL3

Alternatively we can take the 'mypopic' view that investors assume the present will be much like the past. They know last years dividend and expect it to grow at a rate 'g' where 'g' is the long run growth rate of the economy as gleaned from historical data. For this I use the magic 4.19 % figure and label this 'model 2'.

For 'model 3' I have taken long run growth as being expected real growth in the economy plus expected inflation. The level of inflation expected into the future is gleaned from bond market operators. Remember it is only the valuation of equities relative to gilts with which we are concerned. The approach rests on three foundations.

[1] In the long run dividends cannot grow faster than money GDP.

[2] The real interest rate does not vary in the long run (looking forward that is, actual real rates can vary quite a lot) so the nominal yield on bonds minus this rate gives us an estimate of future inflation. I take the real interest rate to be 3%.

[3] Long run real growth for the UK economy is 2.5%

[2] and [3] in particular may be termed heroic. But in fact it is only the difference between real interest rates and real growth that matters, not their absolute magnitudes.

Since we are dealing with historic dividends the correct valuation equation is , for 1963,

$$P_{63} = D_{62}(1+g)/(R-g)$$

Again we can do this for the next 26 years and calculate required returns and compare them to the known yields to redemption on twenty year bonds for each date to 1988.

MODEL 4

I call these approaches myopic because they have no information which would indicate the level of specific dividends in the future. Finally we can apply a more sophisticated version. Analysts have lots of information pertaining to the near future, although the constraints applied in [1], [2] and [3] above might be the only guide to the distant future.

They will typically take a considered view of earnings for an individual share over a time horizon of say three years and then assume that growth continues as defined by 'g' above. If we now assume that on average the markets estimate of dividends over the next three years is correct we can calculate the required yield on equity by solving for 'R' in an equation of the form

$$P_0 = D_1/(1+R) + D_2/(1+R)^2 + Z/(1+R)^3$$

$$\text{where } Z = D_3[\ 1+(1+g)/(R-g)]$$

This I have labelled 'model 4'.

From the different data requirements of these models and the readily available information to hand I was able to calculate expected returns from:

model 1 for 1963 to 1987 inclusive
model 2 for 1964 to 1988 inclusive
model 3 for 1964 to 1988 inclusive
model 4 for 1963 to 1985 inclusive.

Models 2 and 3 could be solved quite easily and hence the spurious precision given in the results. Models 1 and 4 were solved by an iterative search for roots over an economically reasonable range (0 to 50%). Model 1 returns were calculated to only the nearest 1/2% because I did not expect very sensible results. Model 4 was calculated to 2 decimal points, as is normal practice with bond yields.

RESULTS.

These I have shown in graphical form but I will make brief observations.

MODEL 1

The calculated equity premium is far too volatile to be reasonable. Either the premium required or the perceptions of future dividends fluctuates considerably. The approach does have merit in reminding us that in the long run equity does provide a higher return than does bonds.

Note that $E(R) = b + m$ where E(R) represents expected equity yield
'b' represents GRY on 20 yr bonds.
'm' represents the risk premium.

But for any particular year:

$$R_{actual} = b + m + e$$

where 'e' represents a stochastic shock.

If all returns were in the form of equity growth then:

$$P_1 = P_0\, e^{R0}$$
$$P_2 = P_1\, e^{R1}$$
$$P_3 = P_2\, e^{R2}$$

So that

$$P_3 = P_0\, e^{R0}\, e^{R1}\, e^{R2}$$
$$= P_0\, e^{[R0+R1+R2]}$$

The exponent is then $(b_0 + b_1 + b_2 + m_0 + m_1 + m_2 + e_0 + e_1 + e_2)$. If bond yields are unchanged and and the e's are independent of each other then the longer the run considered the closer the actual return approximates the required yield. The variability in my model 1 risk premium can reflect a number of these things. Not surprisingly perhaps the assumption of perfect foresight has lead to a view that investors are unreasonable. Note the correlation coefficient between expected return and gross redemption yield on 20 yr bonds is 0.817. Because the run of years over which yields are calculated is decreasing, the more recent the calculation the less likely are the errors to cancel out. Thus the variance in the risk premium appears to be increasing over time.

MODEL 2

Here we have the case of extreme myopia and investor behaviour is again quite unreasonable. The risk premium nonsensibly turns negative quite early on. Either investors have not done their sums in this way (obviously) or they appear willing to accept a loss of return by holding equities rather than gilts. Risk - seeking behaviour might be invoked here but the variability of the risk premium makes this an ad hoc explanation - quite apart from the well established fact that over long periods of time equities do yield appreciably more than bonds. I see no reason for a revolutionary change in attitudes by investors in 1969. Similar results would have been found for any fixed 'g'. Again it is the model that is unreasonable and not the underlying behavior of investors.

MODEL 3

Here we take quite limited infomation by investors but it is firmly grounded in it's long run assumptions regarding dividend growth. It splits this up into real and expected inflation components. The correlation coefficient between expected equity and 20 yr bond returns moves up to 0.96. This reinforces my belief in the reasonableness of investors and of my assumptions. This includes the one about the high degree of substitutability between bonds and equities. The correlation coefficient of 0.66 for model 2 would otherwise have cast doubt on this.

MODEL 4

The market is widely thought of as a leading indicator of the real economy with a lead time of 6 - 18 months. I was surprised then that by making the assumption that it could 'see' dividends three years hence (my proxy for it being able to make unbiased predictions) that the excessive risk premium of January 1975 should still remain stubbornly high at 11.28%.

Of course the next logical step would be to develop a model 5 in which real growth itself was a variable. Notably productivity growth dipped below 1% over the period 1973 - 1980 and since I have taken real growth as a constant the risk premium residually picks up this error. It would have been rational for market participants to downgrade growth for a while in a period of following a rapid rise in oil prices and so the higher plateau for the risk premium is consistent with reasonable behaviour. Unfortunately the very high figure for 1975 is also consistent with panic - as evidenced by the strong bounce back of the market in the subsequent couple of months.

However a word of caution is required in interpreting these results. A variation of even 1% in the risk premium is not to be taken lightly. If 'g', the bond yield and the risk premium are each 5% and the prospective dividend is 5 then the current price will be 100. If the premium rose to 6% then the price would fall to 83.33, a decline of 16.66%. Ultimately we are down to the Heisenberg Uncertainty Principle and what Wallich refers to as 'radical revisions of the distant future'.

The value of stock depends very heavily (via an obvious multiplier) on the anticipated growth rate of dividends and the required yield on equity.

CONCLUDING COMMENT.

Dr Alexandra of Exeter University disturbingly suggested that a concomitant of a random walk is a random set of footprints in the snow if one looks behind. This is my interpretation and it must be said that she argued that the inability to explain the crash of 1987 was itself supportive of market efficiency. But failure to predict because of an inability to forecast 'news' is hardly to deny the ability to explain when that news is now history! If our civilisation should be obliterated and some distant archeologist should uncover a series of price - earnings ratios as our only remain I hope he will treat it akin to how a biologist would treat the thickness of tree rings -not as some haphazard pattern but representing a measure of confidence in the future, reasonably based.

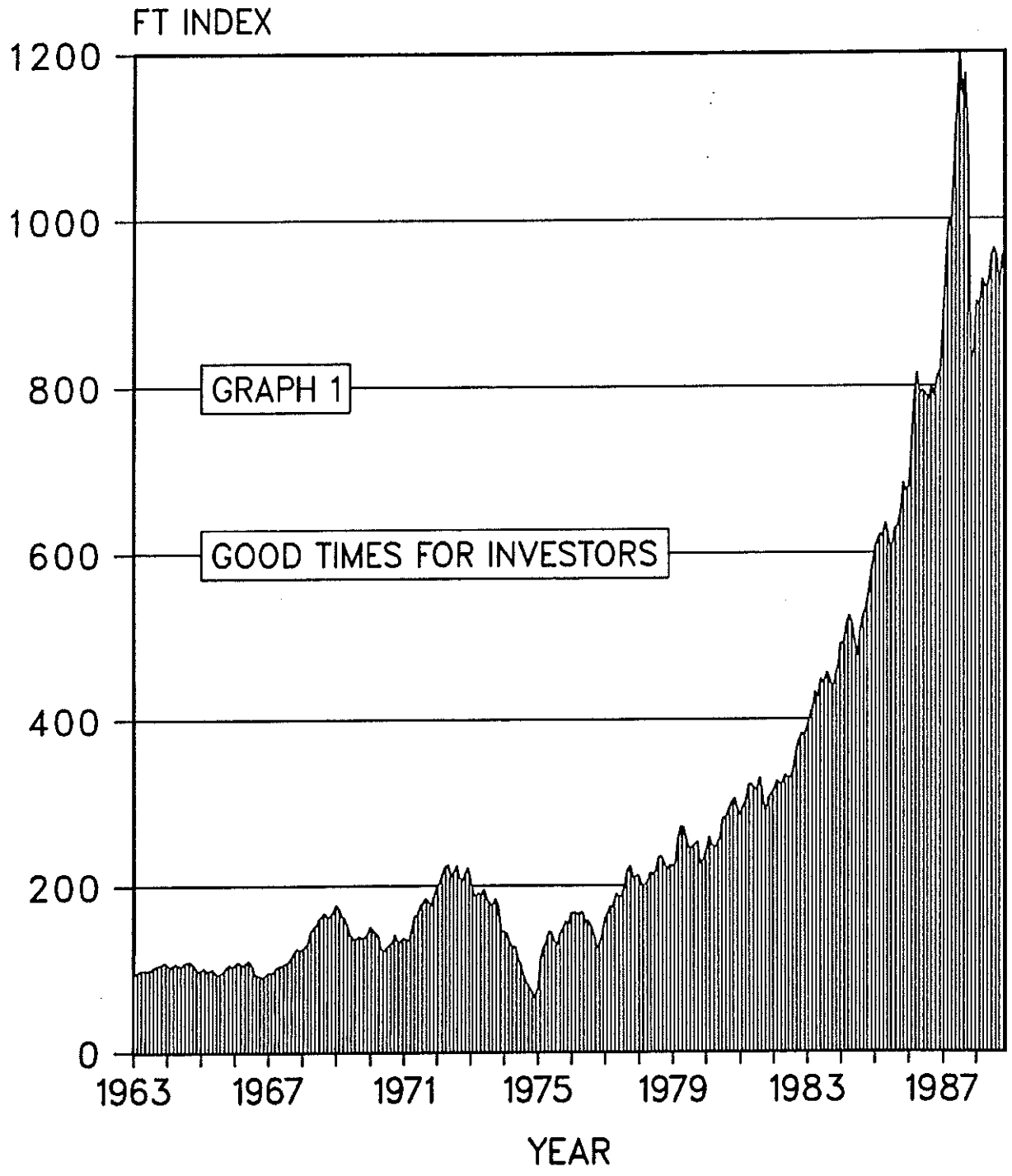
In the 1960's it's fair to say that adaptive expectations, monsters, money illusion and witches roamed the economic landscape. But in the new era of rational expectations I find it difficult to accept the way these concepts are pulled out again to explain share prices.

		REQUIRED EQUITY RETURNS, %				RISK PREMIUM, %.			
ROW	YEAR	GRY20	MODEL1	MODEL2	MODEL3	MODEL4	MODEL1	MODEL2	MODEL3	MODEL4
1	1963	5.34	13.5	*	*	10.20	8.16	*	*	4.86
2	1964	5.53	13.0	8.8536	9.7972	9.70	7.47	3.32362	4.2672	4.17
3	1965	6.18	14.0	9.7876	11.4415	10.65	7.82	3.60763	5.2615	4.47
4	1966	6.53	14.5	9.6358	11.6648	10.95	7.97	3.10579	5.1348	4.42
5	1967	6.73	16.0	9.9715	12.2230	11.80	9.27	3.24146	5.4930	5.07
6	1968	7.26	15.0	8.7150	11.5076	11.20	7.74	1.45498	4.2476	3.94
7	1969	8.36	12.5	7.5622	11.4893	11.20	4.14	-0.79783	3.1293	2.84
8	1970	9.03	14.5	8.2969	12.9646	12.65	5.47	-0.73315	3.9346	3.62
9	1971	9.51	16.5	8.8376	14.0426	13.90	6.99	-0.67238	4.5326	4.39
10	1972	7.93	14.0	7.6815	11.1574	11.20	6.07	-0.24847	3.2274	3.27
11	1973	9.56	14.0	7.6691	12.8711	12.85	4.44	-1.89091	3.3111	3.29
12	1974	12.89	19.5	9.7413	18.6386	18.30	6.61	-3.14871	5.7486	5.41
13	1975	16.02	29.5	15.3648	28.2704	27.30	13.48	-0.65518	12.2504	11.28
14	1976	13.79	21.0	9.9004	19.7837	19.80	7.21	-3.88955	5.9937	6.01
15	1977	14.48	23.5	10.9959	21.7310	22.40	9.02	-3.48415	7.2510	7.92
16	1978	11.06	21.5	10.0298	16.9697	17.70	10.44	-1.03017	5.9097	6.64
17	1979	13.68	23.0	10.4155	20.2256	20.30	9.32	-3.26451	6.5456	6.62
18	1980	14.17	24.0	11.6261	22.0818	20.70	9.83	-2.54390	7.9118	6.53
19	1981	13.96	24.0	10.8024	20.9522	20.20	10.04	-3.15755	6.9922	6.24
20	1982	15.58	25.0	10.6764	22.5783	22.20	9.42	-4.90359	6.9983	6.62
21	1983	11.60	24.0	9.7389	17.2432	17.70	12.40	-1.86115	5.6432	6.10
22	1984	10.28	22.0	9.2016	15.2511	15.80	11.72	-1.07840	4.9711	5.52
23	1985	10.96	19.5	9.1112	15.8857	16.00	8.54	-1.84882	4.9257	5.04
24	1986	10.80	20.5	8.9732	15.5676	*	9.70	-1.82677	4.7676	*
25	1987	10.09	7.0	8.3226	14.1210	*	-3.09	-1.76738	4.0310	*
26	1988	9.57	*	8.7798	14.0462	*	*	-0.79018	4.4762	*

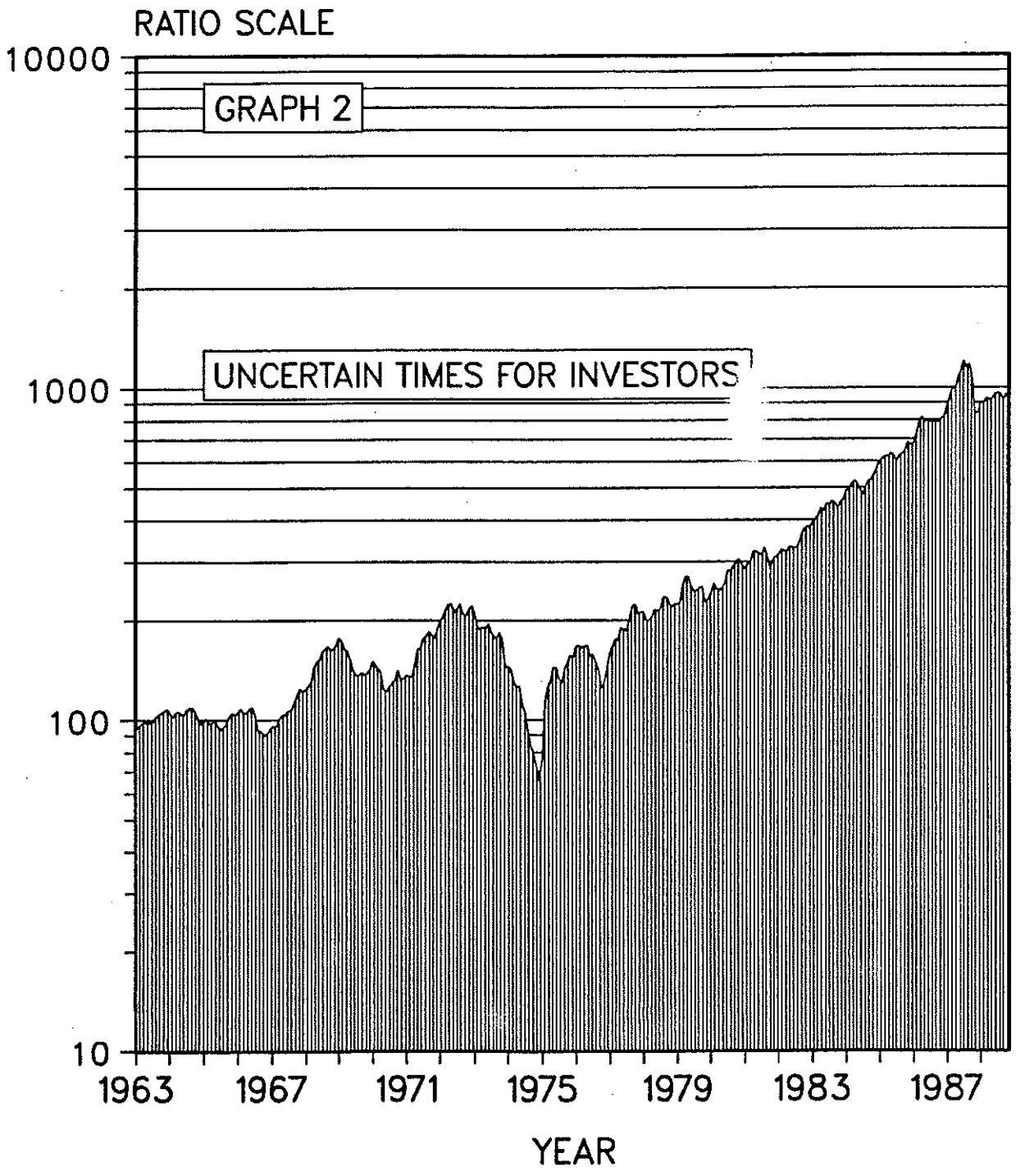
CORRELATION MATRIX OF MODEL EQUITY RETURNS
AND GROSS REDEMPTION YIELD ON 20 YR BONDS.

	GRY20	MODEL1	MODEL2	MODEL3
MODEL1	0.817			
MODEL2	0.660	0.782		
MODEL3	0.959	0.871	0.845	
MODEL4	0.969	0.958	0.814	0.994

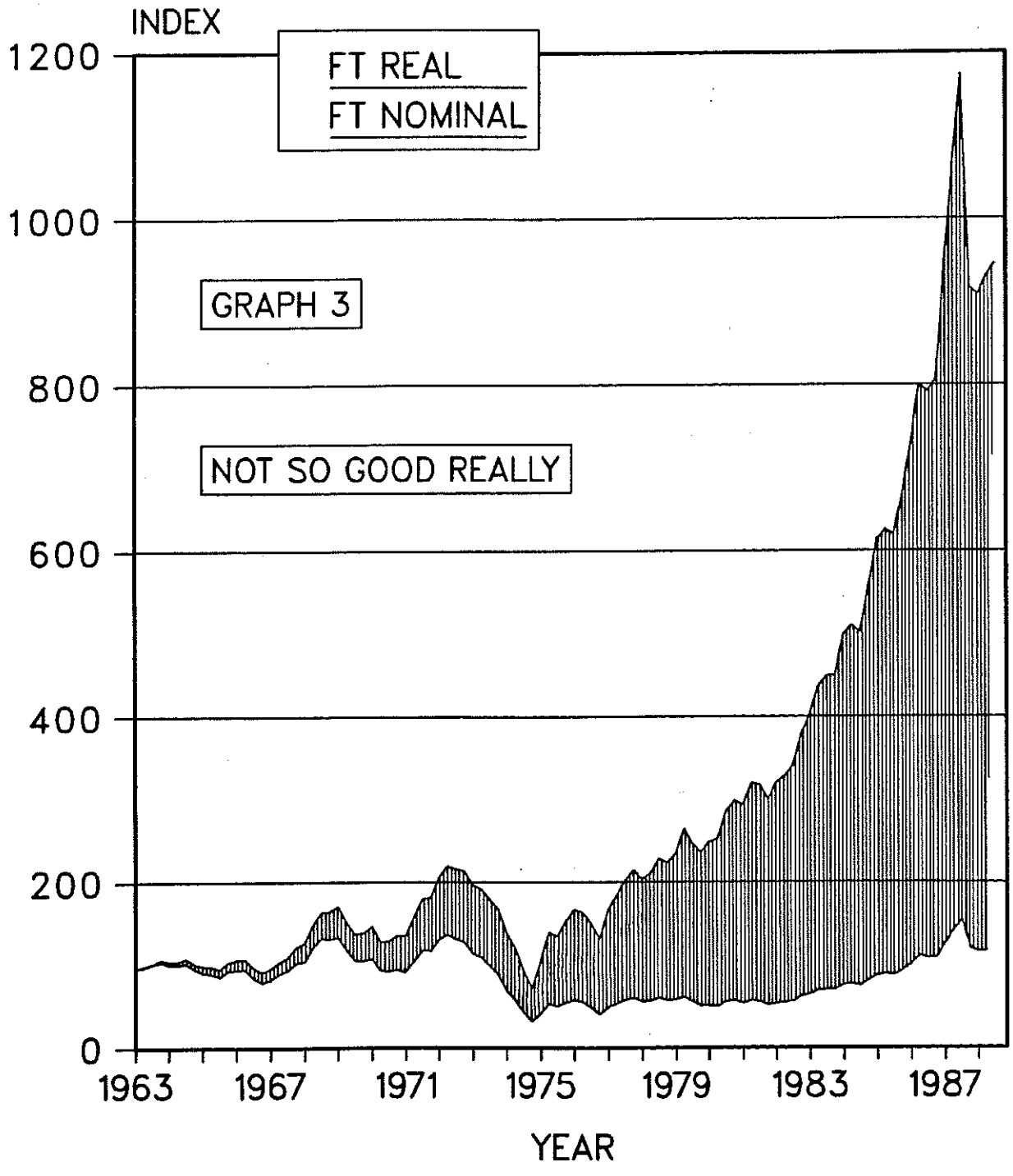
25 YEARS
OF THE
FT ACTUARIES
ALLSHARE INDEX



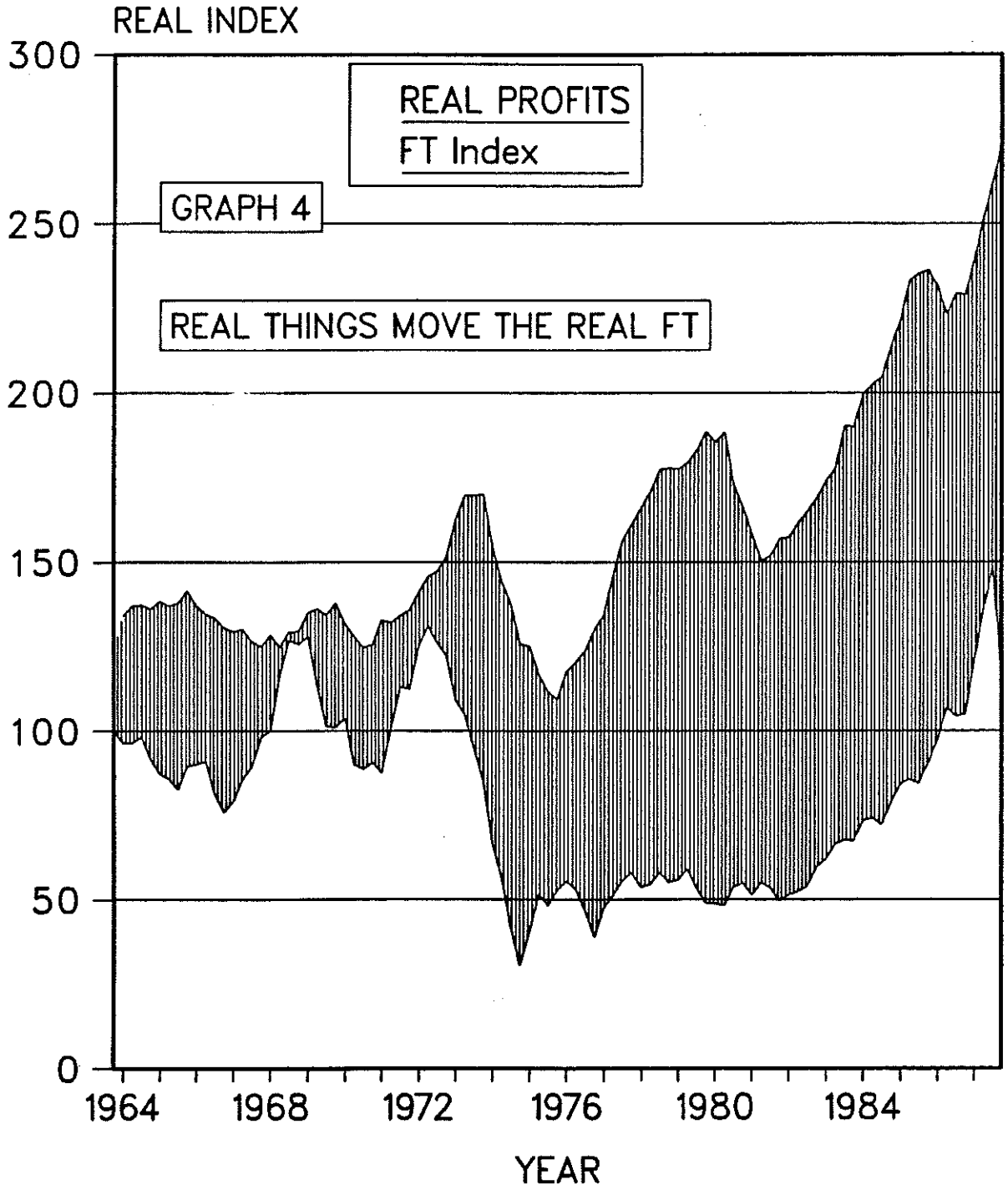
25 YEARS
OF THE
FT ACTUARIES
ALLSHARE INDEX



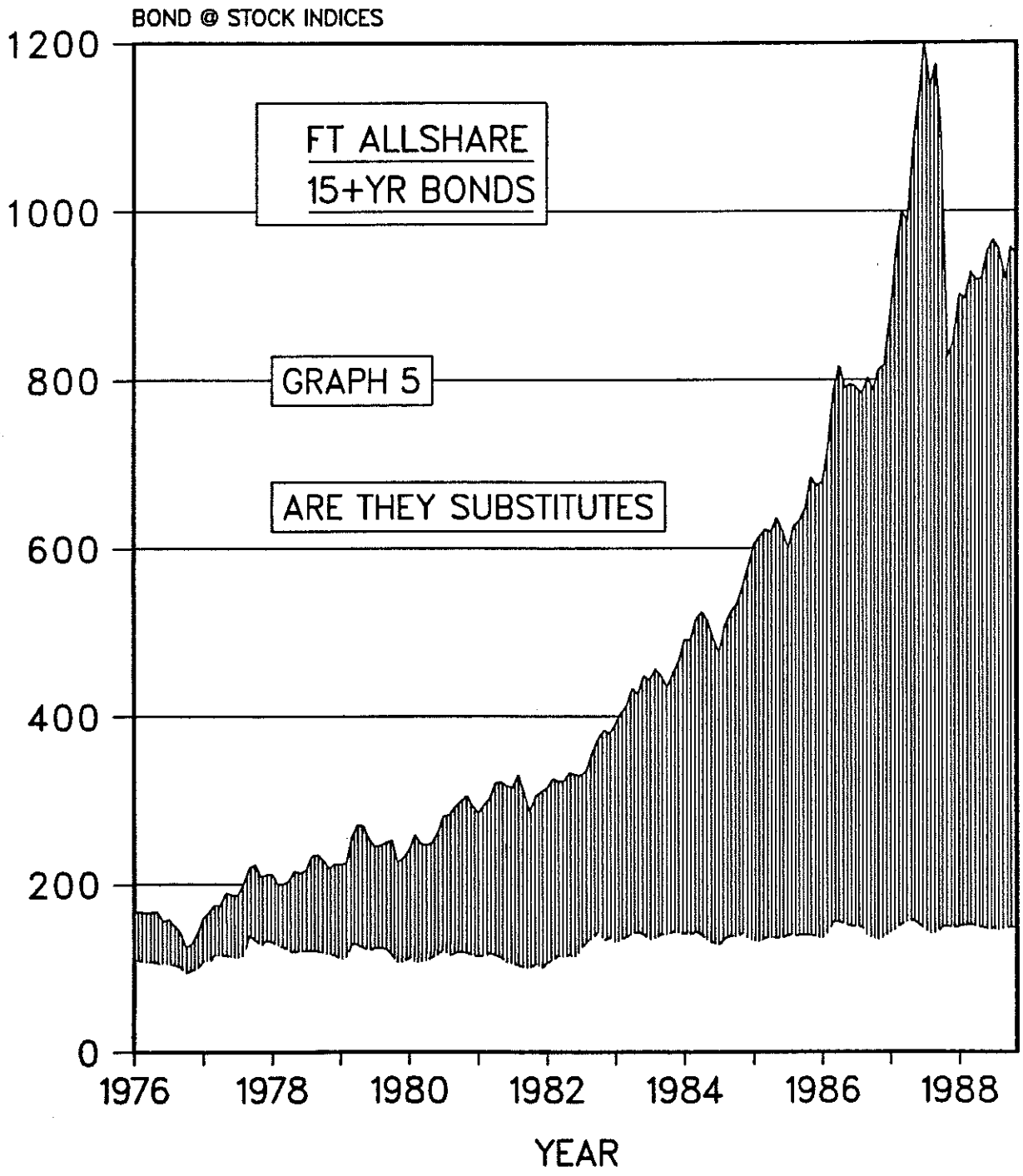
FT ACTUARIES ALLSHARE INDEX REAL AND NOMINAL



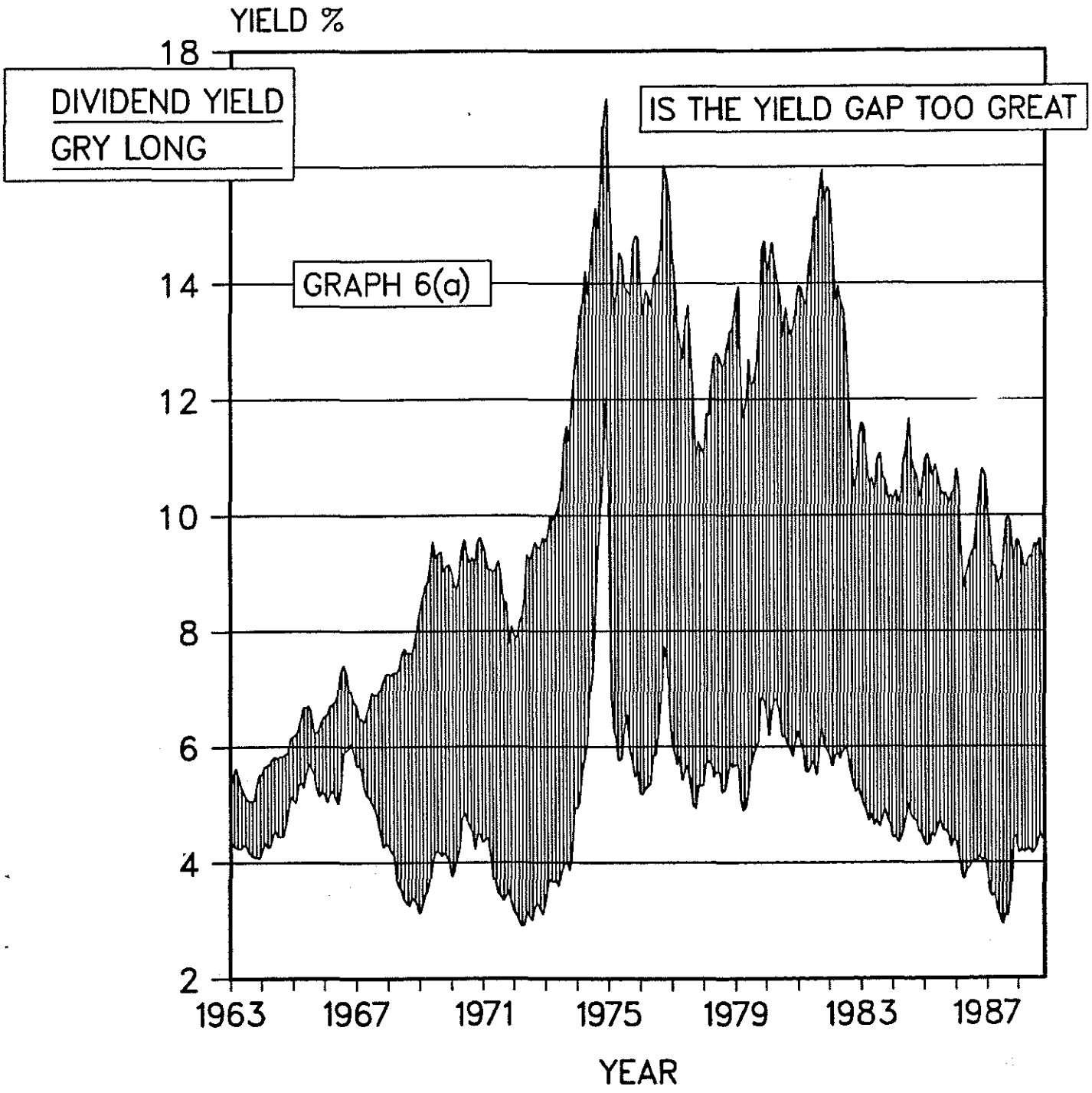
THE REAL FT (october 1963 = 100) and REAL PROFITS (october 1963 =125) (commercial and industrial ccompanies)



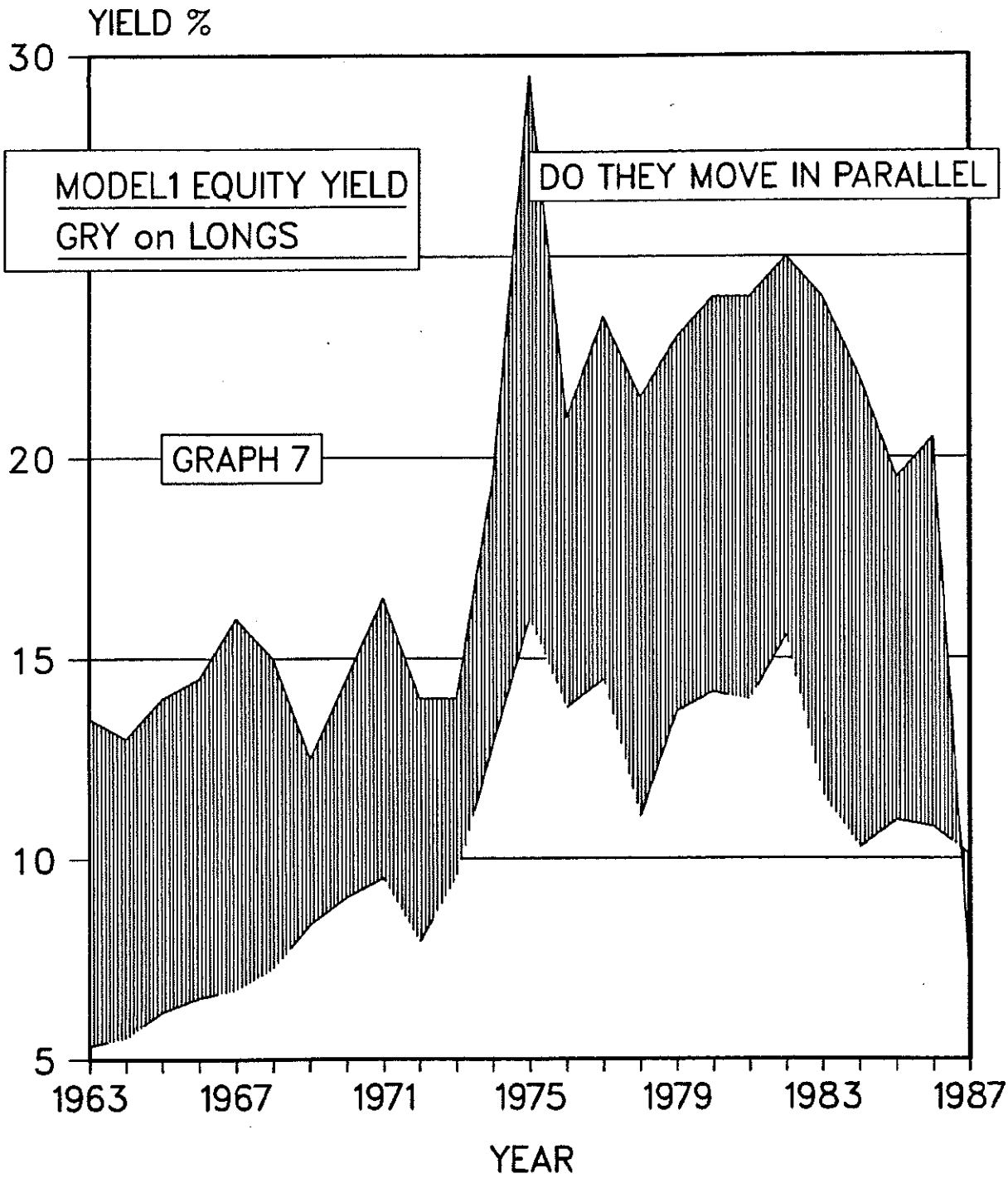
15+ YR BOND AND FT ALLSHARE INDICES JAN 1976 TO DEC 1988



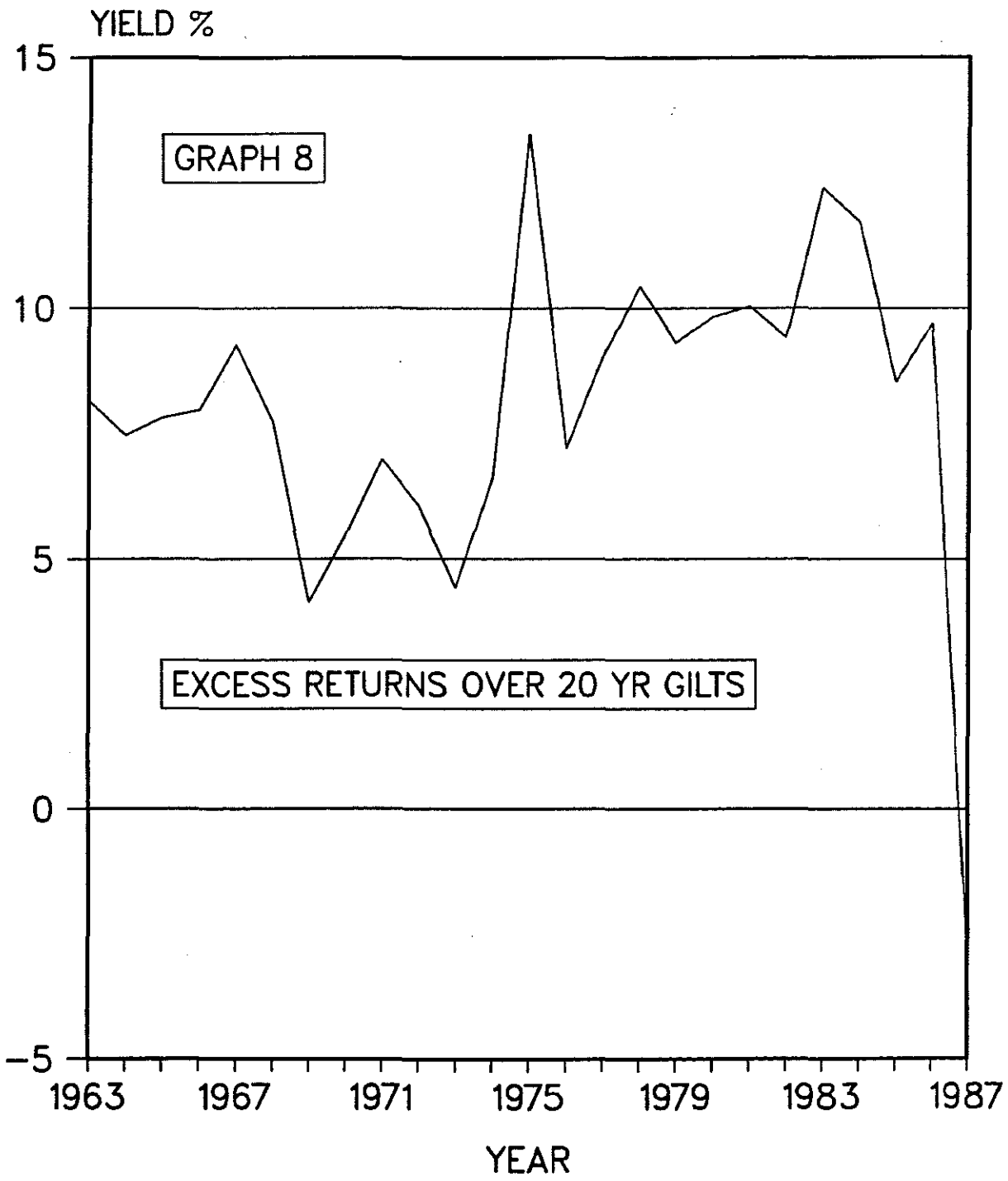
THE REVERSE YIELD GAP
GROSS REDEMPTION YIELD
ON 20 YR BONDS - D/P



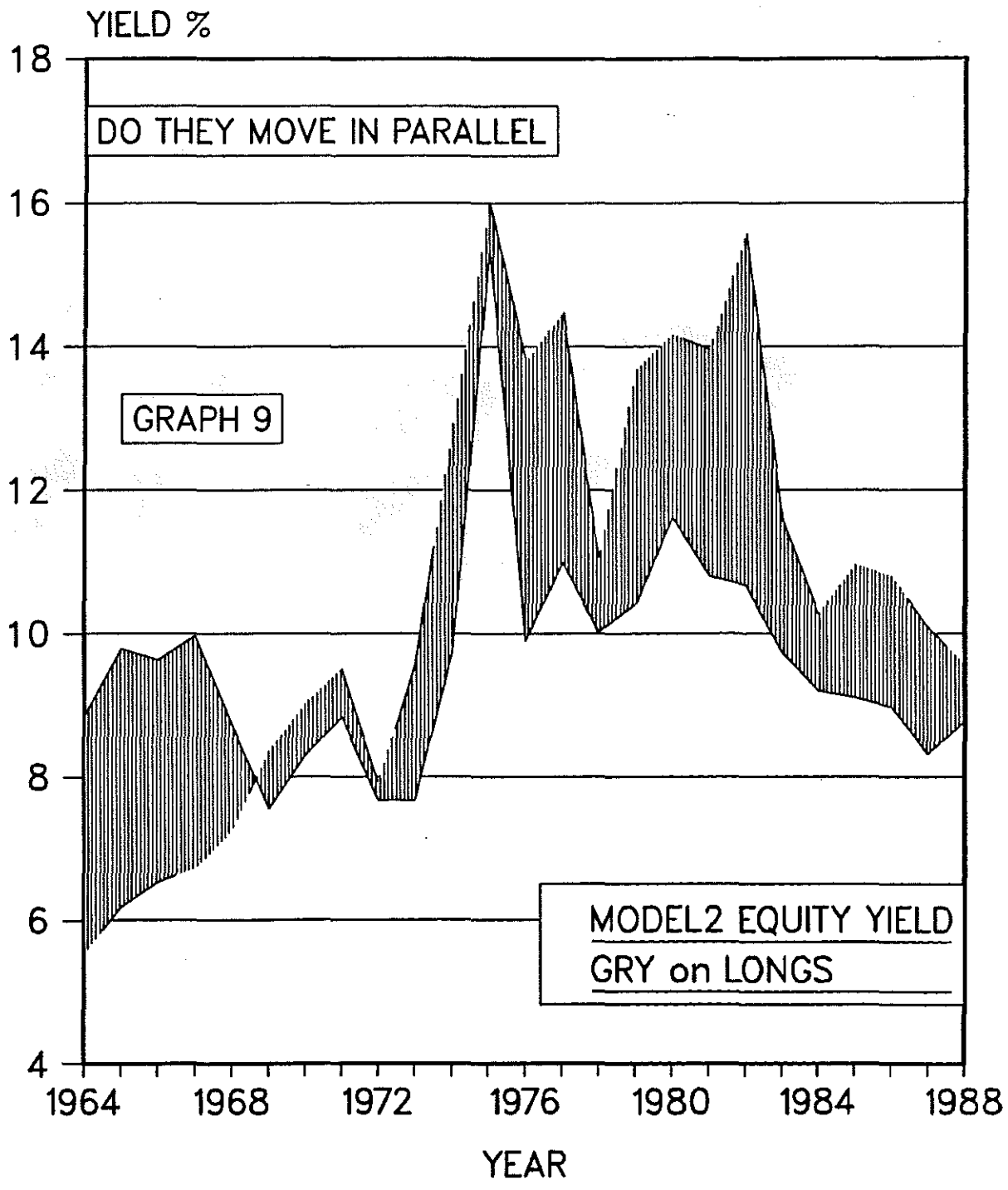
THE EXPECTED RETURN ON EQUITY
MODEL 1
AND GROSS REDEMPTION YIELD
ON 20 YEAR BONDS



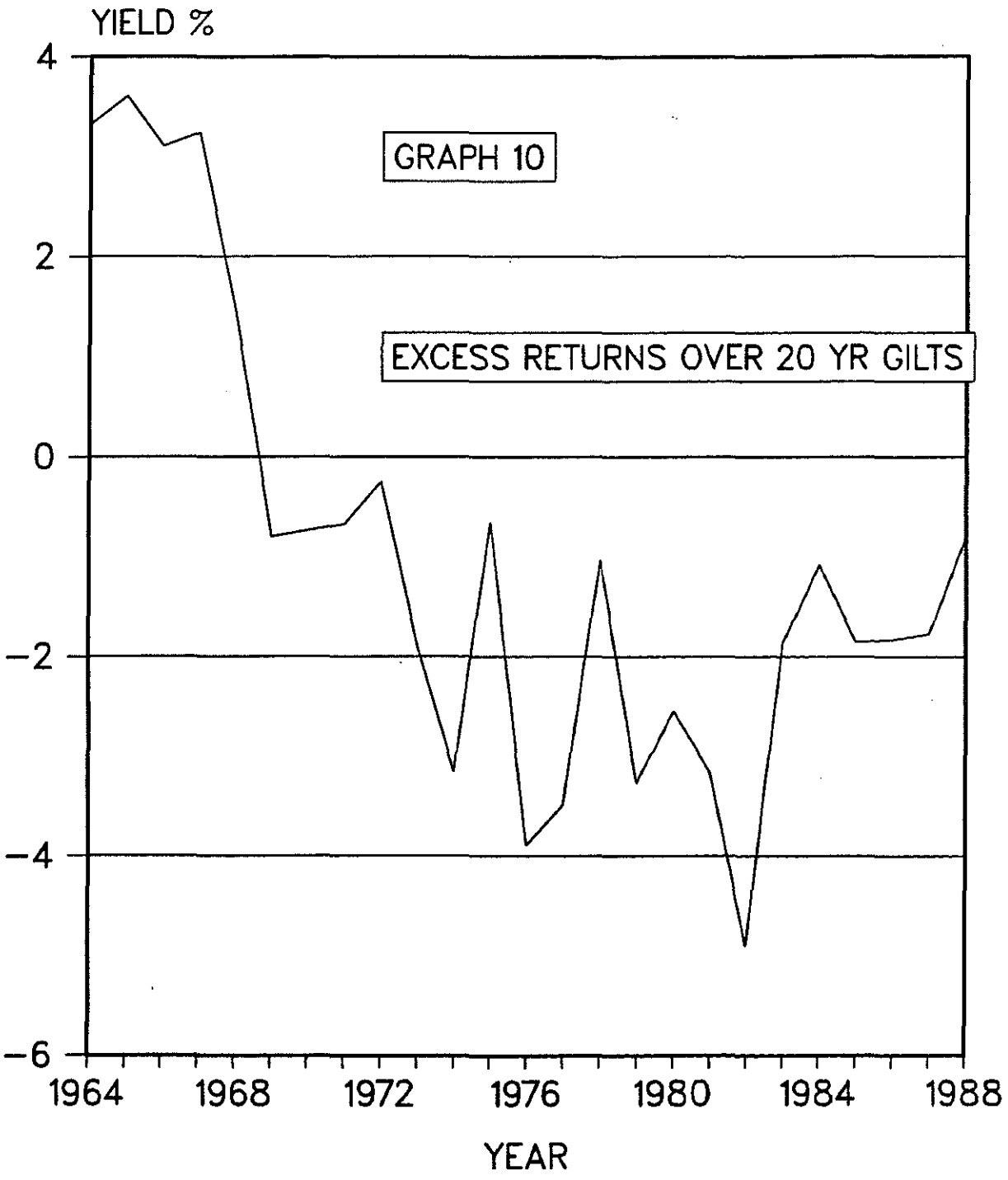
THE EQUITY RISK PREMIUM
MODEL 1



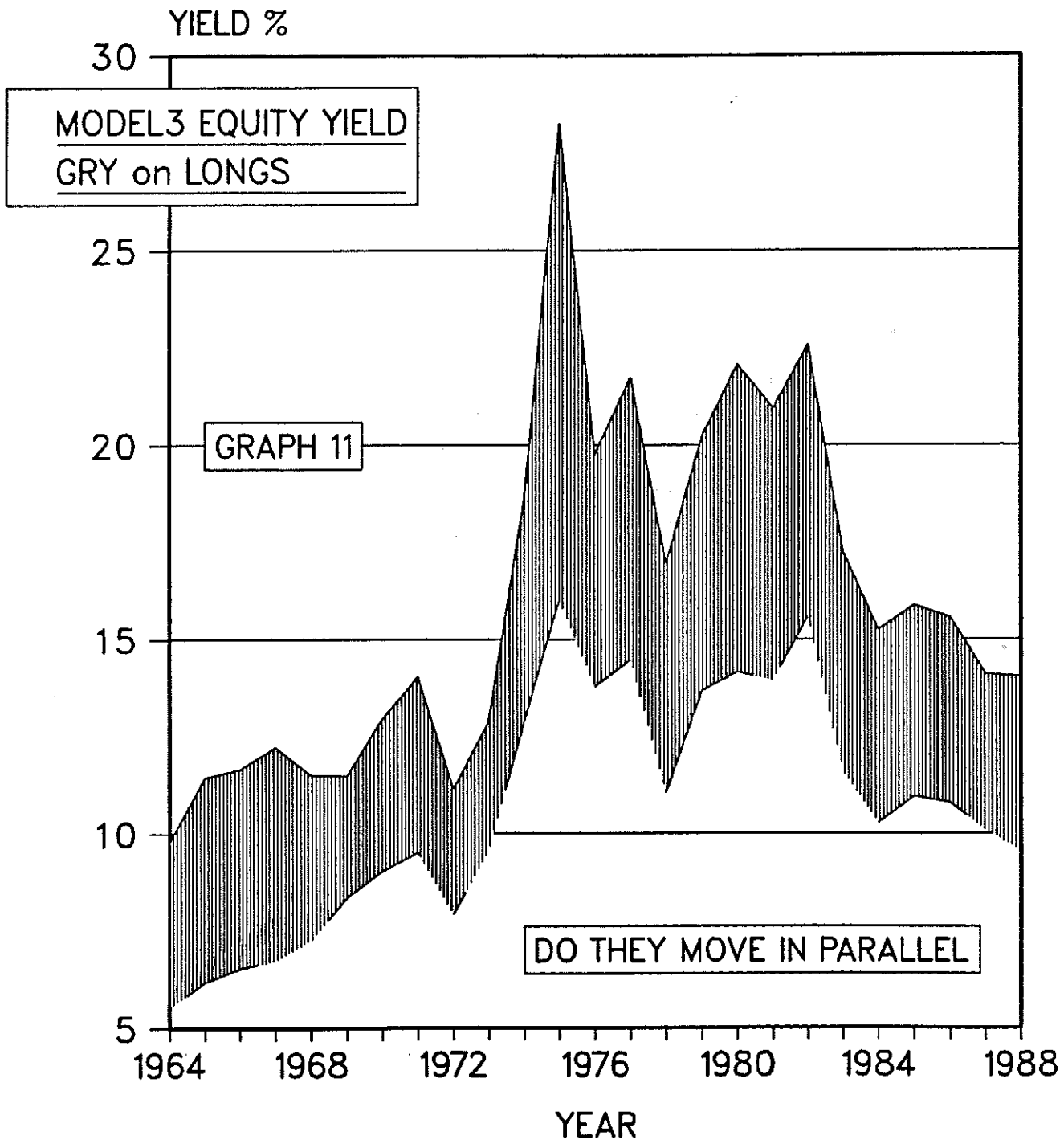
THE EXPECTED RETURN ON EQUITY
MODEL 2
AND GROSS REDEMPTION YIELD
ON 20 YEAR BONDS



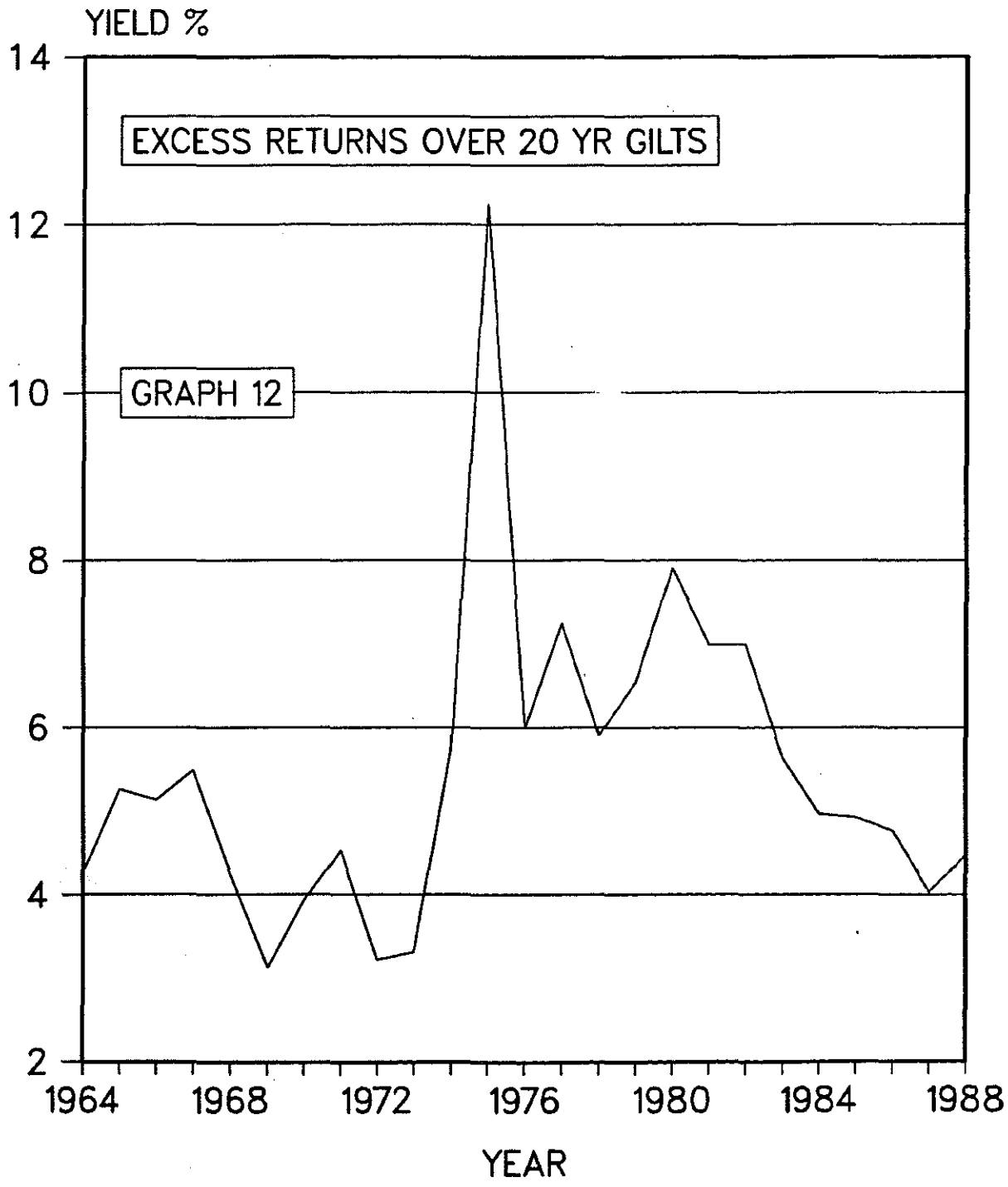
THE EQUITY RISK PREMIUM
MODEL 2



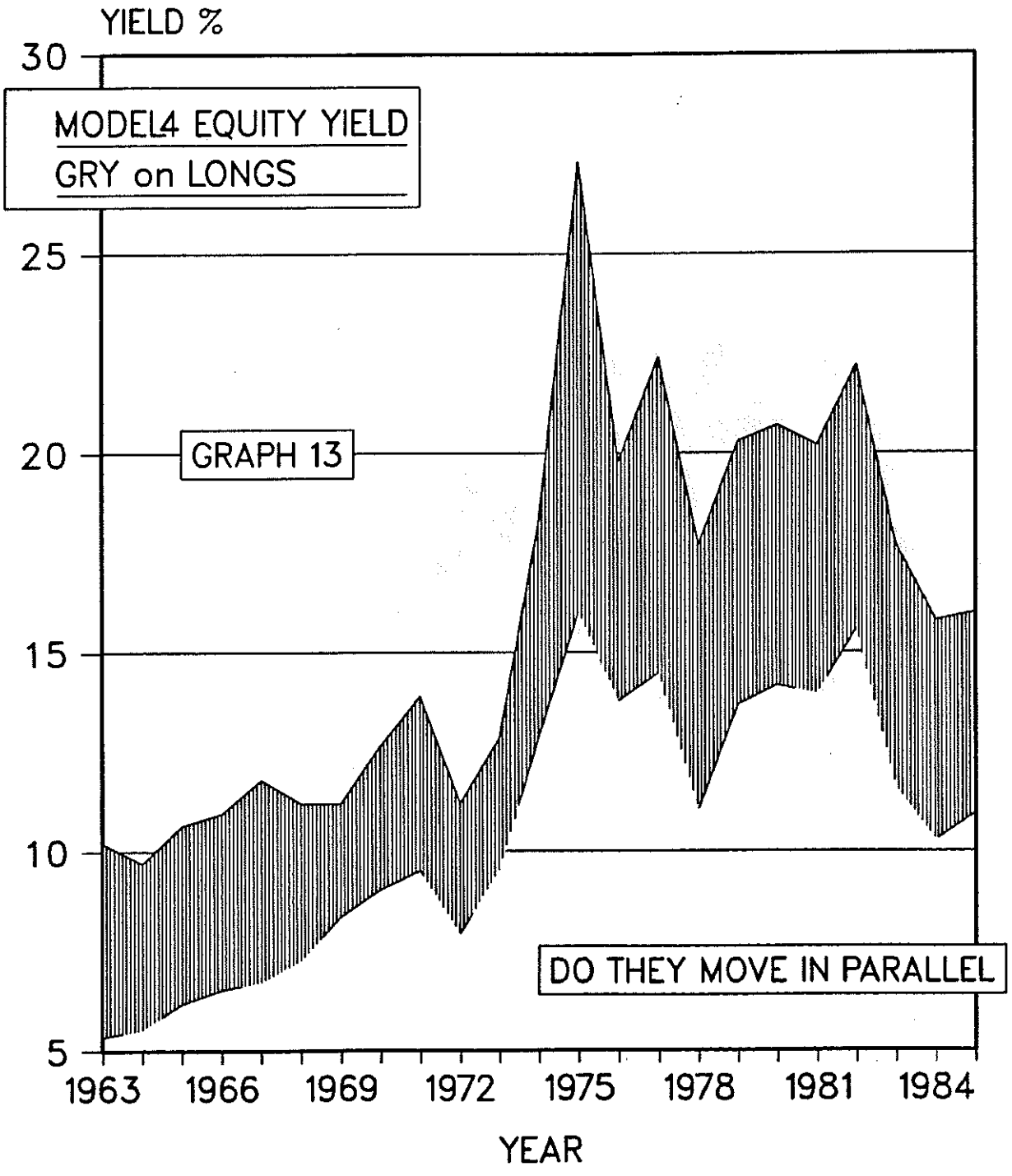
THE EXPECTED RETURN ON EQUITY
MODEL 3
AND GROSS REDEMPTION YIELD
ON 20 YEAR BONDS



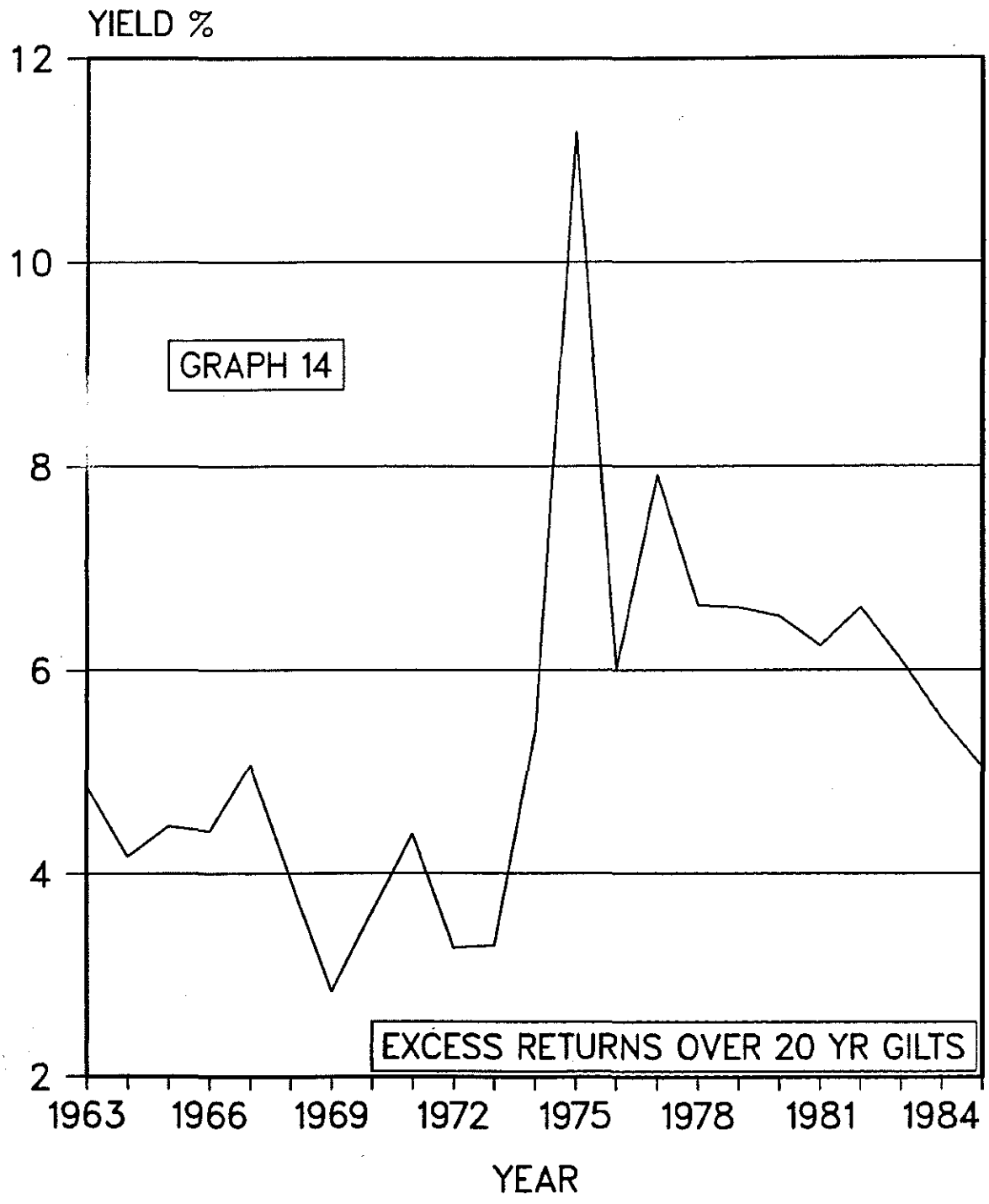
THE EQUITY RISK PREMIUM
MODEL 3



THE EXPECTED RETURN ON EQUITY
MODEL 4
AND GROSS REDEMPTION YIELD
ON 20 YEAR BONDS



THE EQUITY RISK PREMIUM
MODEL 4



THE RISK PREMIUM
MODELS 3 AND 4 COMPARED