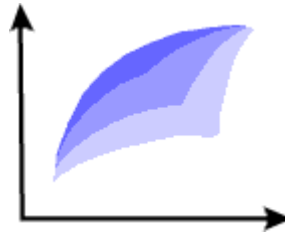


Efficient Frontier



An Online Journal of Practical Asset Allocation

Edited by William J. Bernstein

April 1998

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*Note: There will be no July edition of **EF**. The next edition will come out sometime in September and will contain the Coward's portfolios.*

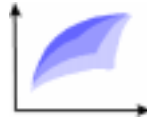
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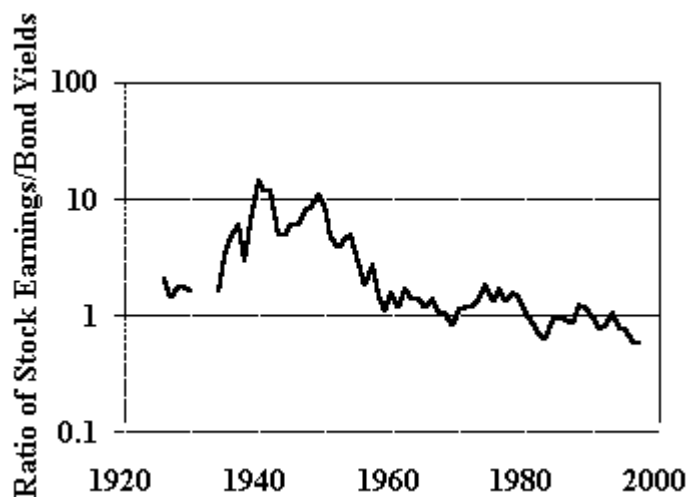
Cost of Capital/Cost of Oil

The Cost of Capital

The concept of cost of capital ("COC") is familiar to the corporate treasurer, and it should also be equally so to the investor. The corporate CFO is in the business of "purchasing" capital from investors, and it is in the interest of investors not to sell it too cheaply. Bonds present a simple example. The US government can currently obtain loans from the investing public for 5 years at about 5.8%. This is its COC. A small company with uncertain prospects may be shut out of the bond market entirely, and might have to pay 10%-12% to a bank. On the other hand, in today's inflated market the same company may be able to go public at a PE of 20 times earnings. This represents an equity COC of only 5%. Obviously, unless the CFO's IQ is considerably below room temperature, she will go with the stock offering. Unfortunately, this says little for the discriminatory powers of the average IPO investor in today's market.

The calculation of the true COC of a company selling stock is complex, and involves discounting to net present value all of the company's future cash flow or earnings. However, when considering the aggregate COC of the market as a whole, the earnings yield of the market is a reasonable, and easily available proxy. If you wish a lucid explanation of the COC concept, take a look at March's *Asset Class* (You'll need Acrobat to read this.) from TAM Asset Management Inc.

I've chosen to compare the earnings yield of the Dow Jones Average versus that of the 5 year treasury note back to 1926. Comparing the two gives a rough index of the COC of equity relative to debt. Below I've logarithmically plotted the ratio of two numbers: the earnings yield of the DJIA (that is, the inverse of its P/E) and the yield of the 5 year treasury note.



Note that the COC of equity relative to bonds soared during the great depression to about a factor of 10 (i.e., with the DJIA earnings yields at around 15%, and 5 year treasury yields of 1.5%). The carnage of the 1929-32 bear market had so traumatized investors that the earnings yields of stocks had to be ten times higher for stocks than for bonds before folks would consider buying them. Then, over the next 60 years the stock/bond COC ratio fell slowly and gradually. It may be that in the 1970s-1980s investors were more traumatized by bonds than stocks, as this ratio has of late fallen below 1.0. We have arrived at a point where the COC of an Iomega (or a ZZZZ Best) is considerably less than that of the US Treasury.

In nominal terms at least, the COC for both stocks and bonds has been falling for the past 17 years. This can be traced to the salubrious economic conditions during this period, with slow but steady growth and falling inflation -- the so-called "goldilocks economy." It may be that we have reached a permanently high plateau of economic nirvana, but history suggests otherwise.

The Cost of Oil

This Time, It's for Real

Remember the oil crises of the 70s? Crude was inexorably heading towards \$100 per barrel. Humanity, depicted as a cancer on the face of the planet, was greedily consuming in the blink of an eye resources accrued over the eons. Paul Erlich and the Club of Rome were all the rage, spreading a neomalthusian gospel hairy enough to make you feel like a Christian Scientist with appendicitis. We were all going to freeze in the dark.

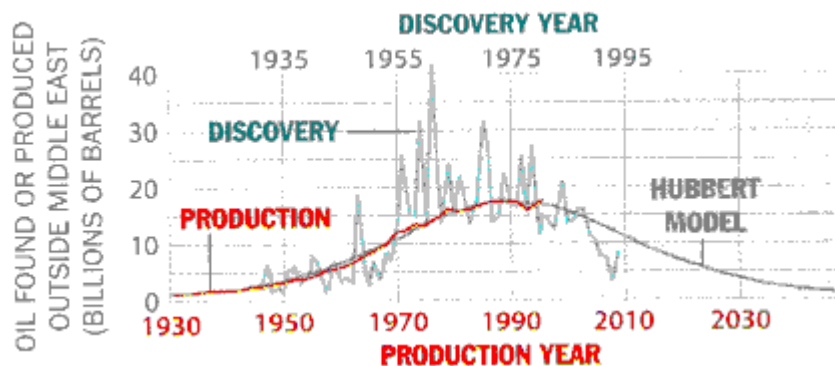
Only one problem-- economically speaking, these folks were a few bricks shy of a load. None of them realized that it is human enterprise alone which creates a

commodity's value, and if it becomes too expensive production can be increased, or substitutes found. They forgot that towards the end of the last century people worried about how we were going to be able to continue lighting our cities. You see, the major source of illumination of our streets was whale oil, and it was clear even then that we were running out of the beasts. Who would ever have guessed a few short decades ago that the major engine of wealth creation in today's economy would be manufactured from sand?

The end result is that the seers of scarcity cried wolf once too often. Mr. Erlich and his ilk today pack all the credibility of carnival barkers. The conventional wisdom is that we are awash with oil. Let's all pile into our Suburbans and Winnebagos and hit the road.

It now appears, however, that this particular wolf may actually be at the door. Enter Colin Campbell and Jean Laherrere. With over half a century in the oil exploration between them, they analyze the state of the planet's petroleum reserves in the March issue of *Scientific American*. The picture isn't pretty. Yes, sophisticated seismographic and drilling techniques have increased production. But they also assert that most of the increase in reserves reported over the past few decades simply represents accounting slight-of-hand. OPEC rules award production allotments according to known reserves, hence an incentive to inflate them. There are other reasons as well to inflate reserves--to improve credit rating, attract exploration, or military aid, for example.

Campbell and Laherrere focus instead on the *discovery* of new reserves. In the 1990s oil companies found an average of only 7 billion barrels per year versus consumption at 24 billion and rising. Further, the iron law of oil accounting, first described by oilman W. King Hubbert in 1956, is that production peaks about 20 years after the peak of discovery. It turns out that the discovery peak occurred about 1975. The relation between discovery and production is represented graphically below. (The graph is taken from the Campbell/Laherre article.)



The question is not when we will run out of oil; the law of supply and demand necessitates that we never will. Rather, we are rapidly approaching the point where oil demand will begin to outstrip supply, and prices will rise. In the 1970s the constriction of supply was artificial; early in the next millennium it will be very real. Eventually we shall compensate with gassification, tar sands, oil shale, and alternative energy sources, but the transition will be long and painful.

Most of you are aware that I disdain macroeconomic analysis in financial decision making, but this is one area that I do not believe has been factored into anybody's security analyses yet. The current goldilocks climate of steady growth and low interest rates may not survive a sustained rise in energy prices.

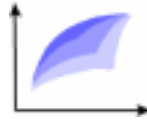
I'm not foolish enough to spin a scenario of general stock and bond market collapse precipitated by an impending rise in oil prices. However, it is useful to consider just how fragile a favorable current investment climate can be, and how fast changes in investment sentiment can occur. If and when the next severe market decline comes, it will most likely be caused by something completely unforeseen. Obviously, it would be nice to know just how the next market collapse will occur; a 1970s scenario could be hedged by hard asset purchases, whereas a 1930s scenario by the purchase of long high quality bonds. Next time, the right answer may be none of the above.

However, one thing seems certain. If inflation heats up the equity COC will likely rise sharply, with possibly dire consequences for investors. Just remember, at the end of the day we are all selling capital to corporate treasurers. In every transaction there is often a fool, and if you don't know who it is, then it's most likely you.

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Falling REIT Correlations

In the 1995 and 1997 editions of *The Intelligent Asset Allocator* I poured a bit of cold water on the diversification value of Real Estate Investment Trusts ("REITs"). Noting a 0.88 correlation of annual returns for REITs and US small stocks I said:

The correlation coefficient for these 2 assets is quite high -- 0.88. REITs have been touted as effective "real estate" portfolio exposure. However, this high correlation indicates that the diversification value of this asset is overstated, as it behaves more like small company stocks (which REITs are) than real estate.

Since the REIT debacle of 1988-90 however, this sector has reinvented itself. Consider that the total value of US commercial real estate is currently about \$3 trillion. A decade ago the total market cap of all REITs was well under \$10 billion; according to NAREIT it is now \$158 billion. Five years ago there were 7 REIT mutual funds, now there are 70.

What happened? Very simply, private real estate developers realized that the cost of capital in the equity markets had fallen to low levels as the public, hungry for equity of any sort, began to snap up REITs in the form of individual securities and mutual funds. In other words, owners and developers realized that they could acquire vast amounts of capital for the cost of a 5%-6% annual dividend. Why not? The ducks are quacking, feed 'em.

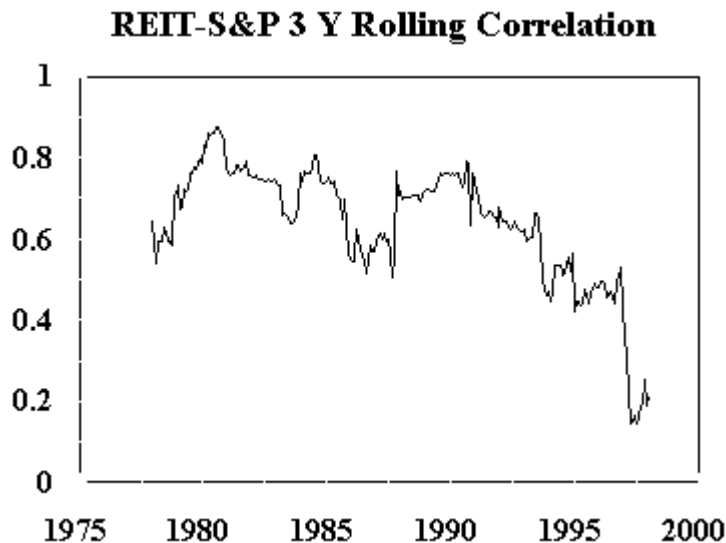
So, almost overnight REITs have become the proprietors of over 5% of commercial US real estate. This figure seems destined to mushroom in the coming years.

Astute investors should be made a bit uneasy by all this. For starters, when corporate treasurers decide en masse that it is a good idea to sell their company's equity, beware. In every poker game there's a patsy. If you don't know who it is, then it's you. The average long term return of initial public offerings ("IPOs") is considerably less than the market's. Secondly, there is a palpable gold rush

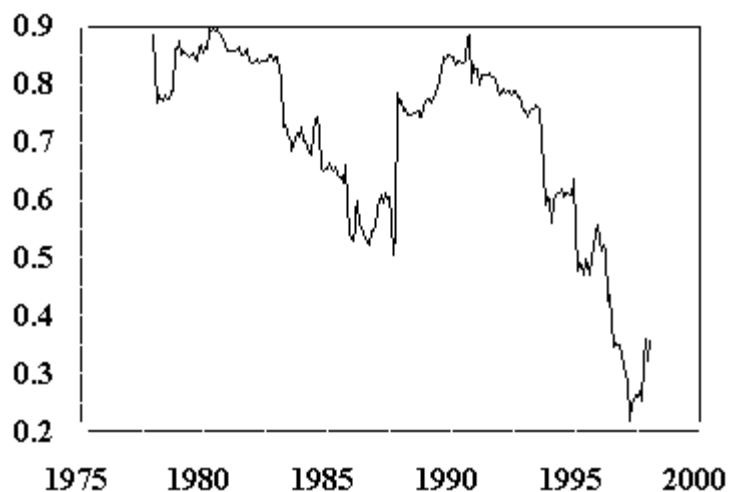
mentality surrounding this phenomenon. Just about every popular magazine, right down to ***Time***, fairly gushes about the opportunities offered to small investors by REITs. (NAREIT offers a nifty compilation of the most obvious of these. Take a look -- it'll raise the hair on the back of your neck.) Lastly, most REIT IPOs are now selling at a considerable premium to their underlying assets, always a danger sign in the real estate area.

For all the negatives, however, there is one upside to all of this. The nature of the business has changed. A decade ago the industry was dominated by staid property management companies typified by New Plan and Washington REIT -- conservative outfits with strong balance sheets who took risks only when a payoff seemed certain. Now the industry is dominated by companies like Vornado, run by highly aggressive property managers bent on rapidly acquiring vast tracts of income producing assets.

It turns out that this change in the nature of the industry has resulted in dramatically falling correlations with both small and large US stocks, as the below graphs demonstrate:



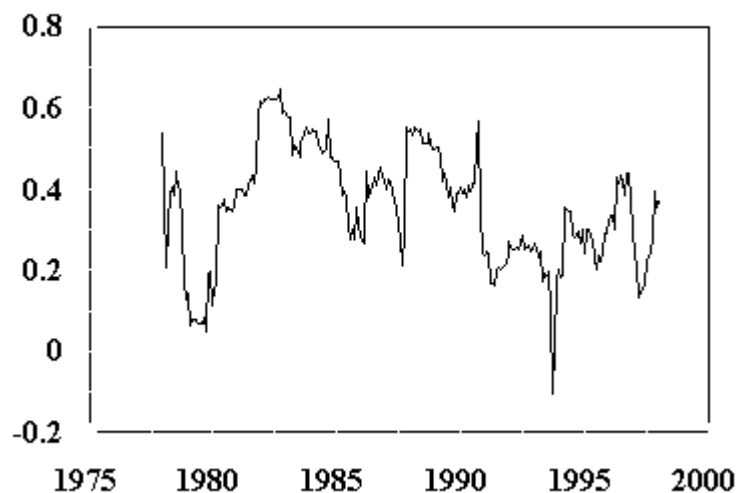
REIT-US Small 3 Y Rolling Correlation



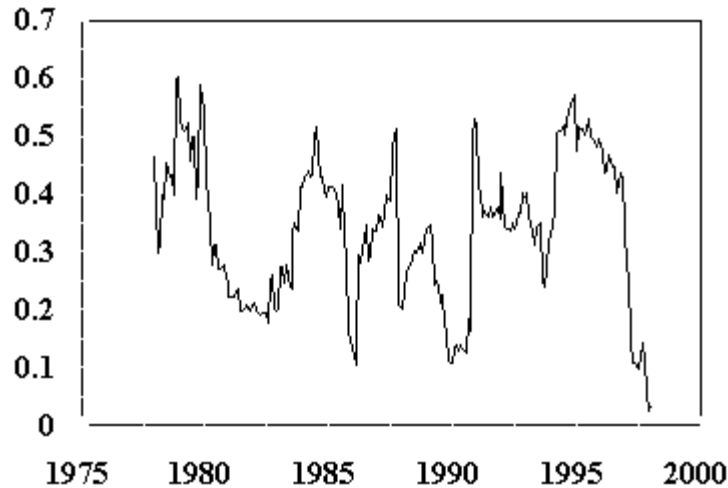
(Monthly returns of the NAREIT index before 1995, and the DFA REIT fund after were used. Rolling 3 year correlations are calculated.)

I've also graphed, for comparison, the correlations with the EAFE and Lehman Brothers long term government/corporate indexes. These correlations were fairly low to begin with, and do not seem to have changed much.

REIT-EAFE 3 Y Rolling Correlation



REIT-US Bond 3 Y Rolling Correlation

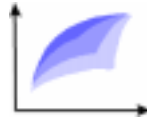


The bottom line? The nature of the REIT industry has changed, and not necessarily for the better. However, this change has at least improved the portfolio characteristics of the asset. The REIT industry, like real estate itself, is prone to boom/bust cycles, and often presents investors with striking buying opportunities, as occurred in 1990, and to a lesser extent, in 1994. One easy way of following REIT valuations is to keep abreast of the aggregate dividend yield of the NAREIT index. Unfortunately, this is not publicly available. A good proxy is the dividend yield of the Vanguard REIT Index fund. Currently, it's about 5%, fairly low by historical standards. In 1997 it was in excess of 7%, and in 1990 in excess of 9%.

This area deserves the attention of the alert asset allocator.

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What's Cheap

It would be nice to have Morgan Stanley's database of country specific index data to determine the valuations of individual national markets. Since my net worth is considerably shy of the billion or so dollars requisite for getting my phone calls answered, this data is not easily available. A good proxy would be the valuation data for the WEBS index funds, but they're not available either.

An even less desirable method involves looking at the valuation data, available from Morningstar, of the single country and regional closed end funds. It's not perfect, but it's all we have. Where 3 or 4 funds are available for a country -- say Germany or Korea, a pretty good idea of the P/E, P/B, and P/C of a country can be obtained. Warning: because of space limitations, I've not listed the fund premiums/discounts. This is a critical piece of data for each of the funds. For example, the Indonesian and Thai funds are fairly cheap by some criteria, but the funds themselves are selling at very large premia. Check **Barrons** or the **WSJ** for these. One more caveat. None of these countries can even spell GAAP, so comparing parameters between countries needs to be done carefully.

That said, I've tabulated the 30 cheapest funds as of 12/31/97 by P/B, P/C, and P/E, in the below three tables. Happy hunting. If anybody knows how I can obtain the MSCI data, let me know.

Funds Arranged by P/B Ratio

	Std		Price/					
	Dev	P/E	Cash	P/B	Med Mkt	Turnover	Exp	Income
Fund Name	3 Yr	Ratio	Flow	Ratio	Cap \$MM	Ratio	Ratio	Ratio
Korea Equity	20.6	12	3.8	0.5	153	53	1.89	-0.73
Korean Investment	20.67	9.1	3.5	0.5	481	32	2.11	-0.73
Fidelity Advisor Korea	22.08	13.1	4.1	0.7	402	51	1.88	-0.64
Brazilian Equity	29.57	-	5.5	0.8	528	69	1.86	-0.62
Korea Fund	22.66	15.5	3.1	0.9	506	13	1.63	0.46
Templeton Vietnam Opports	17.78	9.4	12.8	0.9	621	4	1.47	2.62
Brazil Fund	30.39	10	8.3	1	415	9	1.6	2.22
Templeton China World	24.66	10.9	12.8	1.1	2049	14	1.65	2.14
Templeton Dragon	23.59	10.4	13.4	1.2	6527	9	1.5	1.93
Thai Fund	19.81	7.1	9.4	1.2	1160	24	1.43	1.42

Japan Equity	16.6	27.9	9.1	1.3	2058	34	0.9	-0.04
Latin America Growth	15.21	24.1	17.2	1.7	333	22	2.2	0.04
Asia Pacific	20.96	13	15.9	1.8	6457	43	1.57	0.43
Thai Capital	18.75	16.9	12.3	1.8	696	33	2.22	0.15
Austria Fund	13.79	19.1	9.8	2	1468	19	1.71	0.07
Czech Republic Fund	17.01	25.5	11	2	268	42	2.09	-0.51
Jardine Fleming China Region	25.24	15.7	16.2	2	1067	44	2.18	0.26
Argentina Fund	26.79	18.9	11.1	2.1	6027	19	1.9	2.11
First Australia	16.03	21.3	8.5	2.1	3622	133	1.41	1.86
Herzfeld Caribbean Basin	10.54	24.2	19.2	2.1	872	26	3.32	-0.62
Morgan Stan Asia-Pacific	18.05	22.5	13.9	2.1	4880	28	1.39	0.16
Greater China	31.76	18.1	21.2	2.2	2201	37	2.07	0.65
Singapore Fund	18.85	13.7	14.3	2.3	1478	63	1.85	-0.48
China Fund	25.97	15.5	20.8	2.4	1340	41	2.56	0.49
First Philippine	19.93	15.9	16.3	2.4	2156	15	1.75	-1.1
Latin America Equity	21.82	20	11.8	2.5	3891	43	1.69	1.16
Malaysia Fund	25.91	9.4	20.5	2.5	575	50	1.29	-0.18
Jakarta Growth	29.68	13.9	14.2	2.6	2314	44	1.94	0.7
Schroder Asian Growth	18.16	17.4	18.9	2.6	2899	35	1.57	-0.19
Growth Fund of Spain	19.73	23.9	7.9	2.7	7358	45	1.25	2.46

Funds Arranged by P/C Ratio

	Std		Price/					
	Dev	P/E	Cash	P/B	Med Mkt	Turnover	Exp	Income
Fund Name	3 Yr	Ratio	Flow	Ratio	Cap \$MM	Ratio	Ratio	Ratio
Korea Fund	22.66	15.5	3.1	0.9	506	13	1.63	0.46
Korean Investment	20.67	9.1	3.5	0.5	481	32	2.11	-0.73
Korea Equity	20.6	12	3.8	0.5	153	53	1.89	-0.73
Fidelity Advisor Korea	22.08	13.1	4.1	0.7	402	51	1.88	-0.64
Portugal Fund	15.36	25.3	4.6	2.9	2124	36	1.62	0.75
Brazilian Equity	29.57	-	5.5	0.8	528	69	1.86	-0.62
Germany Fund	18.78	33.3	6	3.8	20622	55	1.26	0.56
Turkish Investment	58.48	36.6	6.8	11.4	1725	60	2.07	3.23
Pakistan Investment	27.77	15.8	7.7	4.9	536	15	2.2	-0.36
Scudder Spain and Portugal	19.88	21.2	7.7	2.7	1826	66	1.92	0.83
Growth Fund of Spain	19.73	23.9	7.9	2.7	7358	45	1.25	2.46
Emerging Germany	15.87	24.7	8.2	3.2	20622	40	1.51	0.76
Brazil Fund	30.39	10	8.3	1	415	9	1.6	2.22
Central European Equity	18.77	25.7	8.4	3.6	20622	-	-	-
First Australia	16.03	21.3	8.5	2.1	3622	133	1.41	1.86
Italy Fund	23.18	24.6	8.6	3.2	2450	58	1.42	1.12
United Kingdom Fund	9.51	17.8	8.6	3.6	4608	21	1.55	3.45
New Germany	12.71	27.1	9	3.9	2743	109	1.01	0.58
Chile Fund	18.38	16	9.1	4.8	2207	5	1.48	1.79
Japan Equity	16.6	27.9	9.1	1.3	2058	34	0.9	-0.04

Thai Fund	19.81	7.1	9.4	1.2	1160	24	1.43	1.42
Spain Fund	19.84	26.2	9.7	3.7	11623	44	1.73	0.93
Austria Fund	13.79	19.1	9.8	2	1468	19	1.71	0.07
France Growth	17.78	27.1	10	3.2	13491	83	1.54	0.84
Swiss Helvetia	18.55	29	10.8	3.9	28329	19	1.22	0.25
Czech Republic Fund	17.01	25.5	11	2	268	42	2.09	-0.51
Argentina Fund	26.79	18.9	11.1	2.1	6027	19	1.9	2.11
Mexico Fund	46.04	21.8	11.2	3.1	3672	10	1	2.93
Latin America Equity	21.82	20	11.8	2.5	3891	43	1.69	1.16
Morgan Stan India Invest	22.61	19	12.1	4.8	922	28	2.1	-0.85

Funds Arranged by P/E Ratio

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Thai Fund	19.81	7.1	9.4	1.2	1160	24	1.43	1.42
Korean Investment	20.67	9.1	3.5	0.5	481	32	2.11	-0.73
Malaysia Fund	25.91	9.4	20.5	2.5	575	50	1.29	-0.18
Templeton Vietnam Opports	17.78	9.4	12.8	0.9	621	4	1.47	2.62
Brazil Fund	30.39	10	8.3	1	415	9	1.6	2.22
Templeton Dragon	23.59	10.4	13.4	1.2	6527	9	1.5	1.93
Templeton China World	24.66	10.9	12.8	1.1	2049	14	1.65	2.14
Korea Equity	20.6	12	3.8	0.5	153	53	1.89	-0.73
Indonesia Fund	31.67	12.2	15.2	2.7	412	35	1.91	0.1
Asia Pacific	20.96	13	15.9	1.8	6457	43	1.57	0.43
Fidelity Advisor Korea	22.08	13.1	4.1	0.7	402	51	1.88	-0.64
Singapore Fund	18.85	13.7	14.3	2.3	1478	63	1.85	-0.48
Jakarta Growth	29.68	13.9	14.2	2.6	2314	44	1.94	0.7
Fidelity Advisor Emerg Asia	20.5	15.4	17.1	2.9	5582	69	1.79	0.08
China Fund	25.97	15.5	20.8	2.4	1340	41	2.56	0.49
Korea Fund	22.66	15.5	3.1	0.9	506	13	1.63	0.46
Jardine Fleming China Region	25.24	15.7	16.2	2	1067	44	2.18	0.26
Pakistan Investment	27.77	15.8	7.7	4.9	536	15	2.2	-0.36
First Philippine	19.93	15.9	16.3	2.4	2156	15	1.75	-1.1
Chile Fund	18.38	16	9.1	4.8	2207	5	1.48	1.79
Latin American Discovery	37.57	16.5	16.1	3	5713	186	1.81	1.24
Thai Capital	18.75	16.9	12.3	1.8	696	33	2.22	0.15
Schroder Asian Growth	18.16	17.4	18.9	2.6	2899	35	1.57	-0.19
United Kingdom Fund	9.51	17.8	8.6	3.6	4608	21	1.55	3.45
Greater China	31.76	18.1	21.2	2.2	2201	37	2.07	0.65
Argentina Fund	26.79	18.9	11.1	2.1	6027	19	1.9	2.11
Morgan Stan India Invest	22.61	19	12.1	4.8	922	28	2.1	-0.85
Austria Fund	13.79	19.1	9.8	2	1468	19	1.71	0.07
Emerging Mexico	41.08	19.1	13	2.8	2876	71	1.64	0.6
Latin America Equity	21.82	20	11.8	2.5	3891	43	1.69	1.16

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