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Disagreement, Tastes, and Asset Prices

Eugene F. Fama and Kenneth R. French*

Abstract

Standard asset pricing models assume that (i) there is complete agreement among investors about probability distributions of future payoffs on assets, and (ii) investors choose asset holdings based solely on anticipated payoffs; that is, investment assets are not also consumption goods. Both assumptions are probably unrealistic. We provide a simple framework for studying how disagreement and tastes for assets as consumption goods can affect asset prices.

* Graduate School of Business, University of Chicago (Fama), and Amos Tuck School of Business, Dartmouth College (French).
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Standard asset pricing models, like the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965), Merton's (1973) intertemporal CAPM (the ICAPM), and the consumption based model of Lucas (1978) and Breeden (1979), share the complete agreement assumption: all investors know the true joint distribution of asset payoffs next period (or in all future periods, for intertemporal models). The assumption is unrealistic, and there are two strands of research that relax it.

The first begins with Lintner (1969). He makes all the assumptions of the CAPM, except complete agreement. Lintner (1969) takes the first-order condition on asset investments from the investor's portfolio problem, aggregates across investors, and then solves for market clearing prices. The result is that current asset prices depend on weighted averages of investor assessments of expected payoffs (dividend plus price) and the covariance matrix of payoffs. Other research (for example, Fama, 1976 chapter 8, Williams, 1977, Jarrow, 1980, Mayshar, 1983, Basak, 2003) proceeds along the same lines. Much of this work focuses on the CAPM, but similar results hold for other models.

The pricing expressions in these papers imply that if the relevant weighted averages of investor assessments are equal to the true expected values and the true covariance matrix of next period's payoffs, asset pricing is as if there is complete agreement. This is the sense in which disagreement can produce CAPM pricing, as long as investor expectations are "on average" correct. The way they must be correct is, however, quite specific, and thus probably unlikely, except perhaps as an approximation.

In the second strand of the disagreement literature, investors get noisy signals about future asset payoffs, but they learn from prices. This work examines conditions in which a rational expectations equilibrium produces fully revealing prices. In a fully revealing equilibrium, prices are set as if all investors know the joint distribution of future payoffs, so when the other assumptions of the CAPM hold, we get CAPM pricing. Again, the conditions under which this is true are restrictive. Papers in this spirit include Admati (1985), DeMarzo and Skiadas (1998), and Biais, Bossaerts, and Spatt (2003).

The existing work on disagreement is rather mathematical. Our goal is to provide a simple framework for analyzing how disagreement can affect asset prices. For simplicity, we focus on a world that conforms to all assumptions of the CAPM, except complete agreement. We argue that our framework for analyzing disagreement is useful for characterizing the price effects that arise in behavioral models that assume expectations are irrational, for example, the models of underreaction and overreaction to information of Barberis, Shleifer, and Vishny (1998) and Daniel, Hirshleifer, and Subrahmanyam (1998). Our framework is also useful for analyzing the price effects that arise when all investors are rational, but some (for whatever reason) have finer information sets than others.

Another common assumption in asset pricing models is that investors are only concerned with the payoffs from their portfolios; that is, investment assets are not also consumption goods. This assumption has many potential violations. For example, loyalty or the desire to belong may cause an investor to hold more of his employer's stock than is justified based on payoff characteristics (Cohen, 2003). Or some investors may get pleasure out of holding the common stock of strong companies (growth stocks) and dislike holding distressed (value) stocks (Daniel and Titman, 1997). Socially responsible investing (Geczy, Stambaugh, and Levin, 2003), and home bias (French and Poterba, 1991, Karolyi and Stulz, 2002), are also examples. Finally, tax effects (for example, the lock-in effect of unrealized capital gains) and restrictions on holdings of securities (for, example, stock issued to employees that must be held for a minimum period) can also have price effects like those due to tastes for assets as consumption goods.

Our second goal is to characterize the potential asset pricing effects of tastes for assets as consumption goods. It turns out that the framework we use to study disagreement can also be used to analyze this issue.

Our interest in these topics is in part due to evidence that the CAPM fails to explain average stock returns. Two CAPM anomalies attract the most attention and controversy. The first is the value effect (Statman, 1980, Rosenberg, Reid, and Lanstein, 1985, Fama and French, 1992): stocks with low prices relative to fundamentals like cash flow or book value have higher average returns than predicted by the CAPM. The second is the momentum effect of Jegadeesh and Titman (1993): stocks with high returns over the last year tend to continue to have high returns for a few months, and low short-term past returns also tend to persist.

We argue that some of the stories offered to explain the value and momentum effects fall under the rubric of disagreement while others in effect assume tastes for assets as consumption goods. Moreover, even models (like Fama and French, 1993) that propose multifactor versions of Merton's (1973) ICAPM to explain CAPM anomalies leave open the possibility that ICAPM pricing arises because of investor tastes for assets as consumption goods, rather than through the more standard ICAPM channel – investor demands to hedge uncertainty about future consumption-investment opportunities.

We add no new results likely to move readers toward one or another explanation of the empirical failures of the CAPM. And we take no stance on which of the stories are empirically more relevant. Our goal is just to offer a simple framework in which to view competing stories.

We begin (Section I) with an analysis of the asset pricing implications of disagreement. Section II turns to tastes for assets as consumption goods. Section III concludes.

I. Disagreement

For a simple perspective on the effects of disagreement, we focus on a one-period world where all assumptions of the Sharpe (1964) – Lintner (1965) CAPM hold except complete agreement. Specifically, suppose there are two types of investors: group A, the informed, who know the joint distribution of one-period asset payoffs implied by all currently knowable information, and group D, the uninformed (or less informed), who either misinterpret current information or do not have all information. Group D investors need not agree among themselves. Does asset pricing conform to the CAPM despite the absence of complete agreement? The answer is no, except in special cases.

A. The CAPM

Market equilibrium in this world is easy to describe. Each investor combines riskfree borrowing or lending with what the investor takes to be the tangency portfolio from the minimum-variance frontier for risky securities. The informed investors in group A choose the true tangency portfolio, call it T. But except in special cases, the uninformed investors of group D do not choose T. Indeed, the perceived tangency portfolio can be different for each group D investor. The aggregate of the risky portfolios of uninformed investors is called portfolio D.

Market clearing prices require that the value-weight market portfolio of risky assets, M, is the wealth-weighted aggregate of portfolio D and the true tangency portfolio T chosen by informed investors. If x is the share of informed investors in total wealth invested in risky assets, n is the number of risky assets, and w_{jM}, w_{jT}, and w_{jD} are the weights of asset j in portfolios M, T, and D, the market clearing condition can be expressed as,

(1) $$w_{jM} = x\, w_{jT} + (1-x)\, w_{jD}, \qquad j = 1, 2, \ldots, n;$$

or, in terms of returns,

(2) $$R_M = x\, R_T + (1-x)\, R_D.$$

All variables in (1) are, of course, outputs of a market equilibrium; equilibrium asset prices determine the weights of assets in M, T, and D, as well as the wealth shares of investors.

Figure 1 illustrates the relations among portfolios M, T, and D. The tangency portfolio T is the portfolio on the true minimum-variance frontier for risky assets (curve ABC) with the highest possible Sharpe ratio,

(3) $$S_T = [E(R_T) - R_f]/\sigma(R_T),$$

where $E(R_T)$ and $\sigma(R_T)$ are the expected return and standard deviation of the return on T, and R_f is the riskfree rate. Group D investors are uninformed, so their aggregate portfolio D is not typically the true tangency portfolio, and the Sharpe ratio for D, S_D, is less than S_T. Since the market portfolio M is a positively weighted portfolio of T and D, M is between T and D on the hyperbola that links them and S_M is between S_D and S_T.

In the CAPM, the true tangency portfolio is the market portfolio. When all assumptions of the CAPM hold except complete agreement – and there is at least one investor in each group (so $0 < x < 1$) – equation (1) implies that T is M only if D is also M. In other words, the CAPM holds only if uninformed investors as a group hold the market portfolio. This can happen when the mistaken beliefs of the uninformed wash (they are on average correct), or when prices are fully revealing (which also says that, given prices, beliefs are on average correct). But the simple message from (1) is that a necessary condition for CAPM pricing when there is disagreement is that the uninformed in aggregate hold the market portfolio.

Necessary does not imply sufficient. A problem arises when there are no informed investors (x = 0 in (1)). Market clearing then requires that the aggregate of the risky portfolios chosen by uninformed investors is the market portfolio: D = M. But M is not the true tangency portfolio and we do not get CAPM pricing, except in the special case where the beliefs of the uninformed are on average correct in the way required by aggregate pricing equations. If the average beliefs of the uninformed are incorrect (they do not lead to the joint distribution of payoffs implied by all currently knowable information), realized returns, which are drawn from the true joint distribution implied by all currently knowable information, will ultimately confirm that M is not the mean-variance-efficient (MVE) tangency portfolio T.

Put differently, market clearing implies that the aggregate portfolio D of the uninformed moves closer to the market portfolio M as x (the market share of the informed) approaches zero in (1). But this does not mean that T, the true tangency portfolio held by the informed, is closer to M. When the share of the informed in invested wealth is small, T can be far from M even though portfolio D of the uninformed is close to M. Indeed, when the market share of the informed is small, the uninformed can have a big effect on asset prices. As a result, though portfolio D of the uninformed is close to the market portfolio M, both D and M can be far from the true MVE frontier.

In short, without complete agreement, the central prediction of the CAPM – that securities are priced to make the market portfolio mean-variance-efficient – holds only in special cases. Equation (1) implies that we get CAPM pricing (the market portfolio is truly MVE) if and only if, for whatever reason, the aggregate risky portfolio of the uninformed is the true tangency portfolio T, which is also held by the informed. The market clearing condition of equation (1) then implies that T must be the market portfolio M.

B. Market (Information) Efficiency

Is the pricing of securities rational (informationally efficient) in the absence of complete agreement? It is reasonable to argue that when the uninformed do not in aggregate hold the true tangency portfolio, their erroneous (or incomplete) beliefs affect asset prices, so prices are less than completely rational (relative to all currently knowable information).

Can one measure the extent to which prices deviate from complete rationality? If all assumptions of the CAPM hold, except complete agreement, deviations from the expected return predictions of the CAPM can be attributed to price effects produced by disagreement. The CAPM predicts that the market portfolio is the tangency portfolio. Thus, the difference between the Sharpe ratio for the true tangency portfolio and the Sharpe ratio for market portfolio, $S_T - S_M$, is one measure of the aggregate effect of uninformed beliefs on asset prices.

Since all investors try to combine the riskfree asset with the risky portfolio that has the highest Sharpe ratio, it is tempting to conclude that $S_T - S_M$ and $S_M - S_D$ measure (respectively) the gain to informed investors and the loss to the uninformed due to market inefficiency, that is, the effects of uninformed beliefs on asset prices. This is true, but only relative to the equilibrium obtained with informed and uninformed investors. One cannot conclude that the presence of the uninformed makes the informed better off, since this conclusion involves a comparison of the welfare implications of alternative equilibria, about which we know nothing.

The difference in Sharpe ratios, $S_T - S_M$, is a good measure of aggregate mispricing, but Jensen's (1968) alpha is better if we want to measure deviations from the CAPM for specific assets. If β_{jM} is the market beta of asset j (the slope in the regression of its return on the market return), the asset's CAPM expected return is,

(4) $$E(R_j) = R_f + \beta_{jM}[E(R_M) - R_f].$$

Jensen's α is the deviation of the actual expected return from its CAPM expected value,

(5) $$\alpha_{jM} = E(R_j) - \{R_f + \beta_{jM}[E(R_M) - R_f]\}.$$

The cross-section of α_{jM}, j = 1,…, n, for the n available assets gives a full picture of the effects of deviations from CAPM pricing on the cross-section of expected returns.

Unless the uninformed happen to hold the tangency portfolio T, so T, M, and D coincide, Jensen's alpha for T is positive. To see this, divide α_{TM} by the standard deviation of R_T,

(6) $$\frac{\alpha_{TM}}{\sigma(R_T)} = \frac{E(R_T) - R_f}{\sigma(R_T)} - \beta_{TM}\frac{E(R_M) - R_f}{\sigma(R_T)} = S_T - \rho(R_T, R_M)S_M,$$

where $\rho(R_T, R_M)$ is the correlation between R_T and R_M. Since the Sharpe ratio for T is greater than the Sharpe ratio for M, and $\rho(R_T, R_M)$ is less than one, α_{TM} is positive. And like S_T - S_M, α_{TM} is an overall measure of the effects of mispricing on expected returns. Moreover, Jensen's alpha for the market portfolio, α_{MM}, is zero. Since equation (3) implies that,

(7) $$\alpha_{MM} = x\,\alpha_{TM} + (1 - x)\,\alpha_{DM},$$

we can infer that α_{DM} for the aggregate risky portfolio of uninformed investors is negative. Like S_M - S_D, α_{DM} is a measure of the overall cost borne by uninformed investors due to mistaken or incomplete beliefs.

A problem, of course, is that we do not know the composition of the true tangency portfolio T. And the problem is serious. The power of complete agreement in the CAPM is that, along with the model's other assumptions, it allows us to specify that the MVE tangency portfolio T is the market portfolio M. Thus, the composition of T is known. The first-order condition for MVE portfolios, applied to the market portfolio, can then be used to specify expected returns on assets – the pricing equation of the CAPM.

Without complete agreement, using theory to specify T, or any other portfolio that must be on the true MVE boundary, is probably a lost cause, except for special cases where the uninformed in aggregate end up holding T. This likely means that, without complete agreement, testable predictions about how expected returns relate to risk are also a lost cause. And the problem is not special to the CAPM. In short, complete agreement is pretty much a necessary ingredient of testable asset pricing models – unless we are willing to specify the nature of the beliefs of the uninformed and exactly how they affect prices.

If disagreement is the only potential violation of CAPM assumptions, we can, however, use the F-test of Gibbons, Ross, and Shanken (GRS 1989) to infer whether disagreement indeed affects asset prices. The GRS test in effect constructs a candidate for the true tangency portfolio T using sample estimates of expected returns and the covariance matrix of returns on the assets used in the test, including the market portfolio. The F-test then measures whether the tangency portfolio constructed from the full set of assets has a reliably higher Sharpe ratio than the market portfolio alone ($S_T > S_M$). If disagreement is the only potential violation of CAPM assumptions, the GRS test allows us to infer whether it has measurable effects on asset prices.

C. Limits to Arbitrage

Shleifer and Vishny (1997) argue that because most arbitrage is risky, arbitrageurs do not fully offset the price effects of uninformed investors. Our analysis provides a simple equilibrium perspective on the problem. Market-clearing prices must be set so that the portfolios of the informed and the uninformed add up to the market. If the uninformed in aggregate do not hold the market portfolio M, then (in a world where all CAPM assumptions except complete agreement hold) the true tangency portfolio chosen by the informed cannot be M. Thus, in general, the actions of the informed do not lead us back to CAPM pricing.

Since informed investors hold the complement of the aggregate portfolio of uninformed investors, the informed do to some extent offset the price effects of the uninformed. But the offset is not complete. The pricing of securities must induce the informed to overweight (relative to the market portfolio) the assets the uninformed underweight, and vice versa. Since this means the risky portfolio of the informed (the true tangency portfolio T) is not the market portfolio M, some price effects of erroneous or incomplete beliefs remain. These price effects disappear (we get CAPM pricing) only in the special case where the uninformed in aggregate hold M, so the informed also hold M, and T must be M. But when this happens, it is a result of the offsetting beliefs of different uninformed investors, not the offsetting portfolio actions of the informed.

There is an obvious special case where the informed do totally offset the price effects of the uninformed. One cannot have an equilibrium in which the beliefs of the uninformed produce a riskless arbitrage for the informed, that is, a zero variance return that exceeds the riskfree rate. The actions of the informed ensure prices that preempt riskless arbitrage and so totally offset actions of the uninformed that might produce one.

D. Examples

Some examples give life to the analysis. A common hypothesis in behavioral finance is that investors under-react to firm-specific information (Daniel, Hirshleifer, and Subramanyam, 1998). Suppose this is a characteristic of uninformed investors, and suppose we are otherwise in a world where the assumptions of the CAPM hold. As a result of their beliefs, the uninformed tend to buy too little (relative to market weights) of the assets that get hit with positive news and too much of the assets with negative news. Since in aggregate all assets must be held, asset pricing must induce informed investors to hold the complement of the portfolio chosen by the uninformed. As a result, the informed offset to some extent the price effects of erroneous beliefs. The offset is not complete, however, since the informed do not hold the market portfolio (T is not M), which means we do not get CAPM pricing.

It is important to note that in a multiperiod world, the price effects of under-reaction to current news by uninformed investors do not disappear with the passage of time, unless the beliefs of the uninformed about today's news converge to the beliefs of the informed. Without movement by the uninformed, the informed (who always hold the complement of portfolio D) have no incentive to take further actions that erase the price effects of the uninformed. For prices to converge to rational values, the truth must become known to one and all, so eventually there is complete agreement about old news.

Another common behavioral story is that investors do not understand that profitability tends to mean-revert. As a result, investors over-extrapolate persistent good times or bad times of firms, causing growth stocks to be overvalued and distressed (value) stocks to be undervalued (DeBondt and Thaler, 1987, Barberis, Shleifer, and Vishny, 1998). Suppose such overreaction is a characteristic of our uninformed investors. Then, in a world where all CAPM assumptions except complete agreement hold, the uninformed underweight value stocks (relative to market weights) and they overweight growth stocks. Informed investors partially offset the actions of the uninformed; the informed overweight value stocks and underweight growth stocks. But the offset is incomplete. Market clearing prices again simply induce the informed to hold the complement of the aggregate portfolio of the uninformed. Although it is the true tangency portfolio, the complement is not the market portfolio, so we do not get CAPM pricing. Moreover, the prices of today's value and growth stocks eventually converge to rational values only when the beliefs of the uninformed converge to those of the informed. This seems to be the scenario Debondt and Thaler (1987), Haugen (1995), and Barberis, Shleifer, and Vishny (1998) have in mind, with the cycle repeating with each new vintage of growth and value stocks.

Does asset pricing in a world where the uninformed over-extrapolate the past fortunes of growth and value stocks move away from the CAPM to a multifactor version of Merton's (1973) ICAPM? Generally, the answer is no. In an ICAPM, the market portfolio is not mean-variance-efficient, but it is multifactor efficient in the sense of Fama (1996). Since the portfolio actions of the uninformed are based on incorrect or incomplete beliefs, it is unlikely they produce price effects that land the market portfolio on the true multifactor efficient frontier (that implied by all currently knowable information). A multifactor ICAPM, like that of Fama and French (1993), where the additional factors are portfolios of value and growth stocks, may nevertheless provide a good approximation to average returns. But because the market portfolio is probably not on the true multifactor efficient frontier, the model should be rejected in large samples.

But there is a circumstance where overreaction and other behavioral biases can lead asset pricing away from the CAPM to the ICAPM. This happens when the biases produce price effects that are proportional to covariances of asset payoffs with state variaboles or common factors in returns. Style investing may be an example. Thus, sponsors of defined benefit plans often allocate investment funds based on groupings of assets into so-called asset classes (large stocks, small stocks, value stocks growth stocks, etc.). The groupings seem to correspond to common factors in returns (Fama and French, 1993). And asset allocation decisions are often based on exposures or sensitivities to (covariances with) these factors. If in the end plan sponsors do not choose the market portfolio, their actions can lead pricing away from the CAPM to an ICAPM that may be driven by behavioral biases (for example, the overreaction to the recent past performance of asset classes proposed by Barberis and Shleifer, 2000).

E. Active Management

It is widely believed that active investment managers (stock pickers) help make prices rational and that prices are less rational when active managers switch to a passive market portfolio strategy. Indeed, this is often offered as a justification for the existence of active managers, despite poor performance. The analysis above provides a simple framework for analyzing (i) the impact of active management on prices, and (ii) what happens to market (information) efficiency when active managers switch to a passive market portfolio strategy.

In our model, active managers make prices more rational only when they are among the informed. The price effects of uninformed active managers are like those of other uninformed investors: trading based on bad or incomplete beliefs makes prices less rational. And the world is a better place (prices are more rational) when uninformed investors admit their ignorance and switch to a passive market portfolio strategy. This typically reduces the overweighting and underweighting of assets left for informed investors to offset. The difference between the tangency portfolio T and the market portfolio M shrinks and market efficiency improves.

In one special case switching uninformed investors to a passive market portfolio strategy makes prices less rational. This happens when the old portfolio choices of the newly passive investors happen to offset those of other uninformed investors – overweighting assets the others underweight and vice versa. Converting these investors to a passive market portfolio strategy likely increases the gap between T and M and reduces market efficiency. In general, however, converting uninformed investors to the market portfolio makes prices more rational.

For example, if all uninformed investors turn passive and switch to the market portfolio, then D = M, which means asset prices must induce the informed to hold M. The tangency portfolio T is then the market portfolio M, the CAPM holds, and prices are the rational result of the beliefs of the informed. Moreover, if all uninformed investors switch to the market portfolio, most of the informed can also turn passive and just hold the market portfolio. Specifically, when uninformed investors hold the market portfolio, complete rationality of prices simply requires one active informed investor, who may have infinitesimal wealth, but whose rational beliefs nevertheless drive asset prices.

In general, however, when active managers have superior information, they are among the informed investors who partially offset the portfolio choices of the uninformed and so make asset prices more rational. And except in the special case where uninformed investors all hold the market portfolio, market efficiency is reduced when informed investors switch to a passive market portfolio strategy. Because the remaining informed investors are risk averse, they do not take up all the slack left by newly passive informed investors, and the uninformed have a larger impact on prices.

In our model informed investors generate positive values of Jensen's alpha, and the uninformed have negative alphas. The performance evaluation literature (for example, Carhart, 1997) suggests that, judged on alphas, the ranks of the informed among active managers are at best thin, and the ranks of the uninformed are more robust. Perhaps informed active managers act like rational monopolists and absorb the expected return benefits of their superior information with higher fees and expenses. But the performance evaluation literature suggests that the ranks of the informed remain thin when returns are measured before fees and expenses.

Carhart (1997) is puzzled by his evidence that there are mutual fund managers (about ten percent of the total number but a smaller fraction of aggregate mutual fund assets) who generate reliably negative estimates of Jensen's alpha, before fees and expenses. This is a puzzle only if prices are completely rational so the uninformed are protected from the adverse price effects of their erroneous or incomplete beliefs. But in our model, if the uninformed do not in aggregate hold the market portfolio, their beliefs affect prices, and they pay for their beliefs with negative alphas. The practical implication of this is that, even ignoring fees and expenses, a bad choice of active managers can be hazardous to your wealth.

Overall, the evidence from the performance evaluation literature is that it is difficult to distinguish between informed and uninformed active managers. This can be good news or bad news. It is good news if the difficulty arises because the cost of becoming informed is low. Then there are many informed investors, and the returns to being informed are low because prices are near completely rational. But it is bad news (for the capitalist system itself) if it means that it is extremely difficult or costly to become informed. In this case there are few if any informed investors, and prices are quite irrational but in random ways that are hard to identify in empirical tests.

Finally, our simple model ignores portfolio management costs, but it does produce an insight about their potential price effects. When there are informed and uninformed investors, one can't say whether costs make prices more or less rational. Because costs deter some trading by the uninformed, they tend to reduce the perverse price effects of erroneous beliefs. But portfolio management costs also dampen the response of informed investors to the actions of the uninformed. Since costs impede both the uninformed, who distort prices, and the informed, who counter the distortions, the net effect of portfolio management costs on market efficiency is ambiguous.

There is some confusion on this point in the literature. For example, going back at least to Miller (1977), it is commonly assumed that limits on short-selling make asset prices less rational. In our model, this is true when all short-selling is by informed investors. But it may be false when short-selling can be the result of uninformed beliefs.

II. Tastes for Assets

A common assumption in asset pricing models is that investors are concerned only with the monetary payoffs from their portfolios; that is, investment assets are not also consumption goods. We provide a simple analysis of how tastes for assets as consumption goods can affect asset prices. We consider two cases. (i) Utility depends directly on the quantities of assets held. (ii) Tastes for assets as consumption goods depend on the covariances of asset returns with common return factors or state variables.

A. Tastes for Assets Do Not Depend on Returns

For simplicity, and to highlight the contrast with the analysis of disagreement, we assume that there is complete agreement and asset prices are completely rational. At time 1, investors must allocate current wealth, W_1, to pure time 1 consumption goods and to n assets that generate the wealth to be split between consumption and investment at time 2. The tastes of investor i are described by the utility function $U_i(C_1, q_1,\ldots, q_n, W_2)$, where C_1 is the dollar value of time 1 pure consumption goods, $q_1,\ldots, q_n$ are the dollar investments in the n portfolio assets, $W_2 = \Sigma_j q_j(1 + R_j)$ is the wealth at time 2 from investments at time 1, and $\Sigma_j q_j = W_1 - C_1$.

The idea conveyed by $U_i(C_1, q_1,\ldots, q_n, W_2)$ is that the investor gets utility from the dollar amounts of different assets held at time 1, just as he gets utility from C_1. Utility need not depend on time 1 holdings of all assets, and the holdings with zero marginal utility can differ across investors. We also assume that some investors, called group A, have no tastes for assets as consumption goods. Investors who do have such tastes are called group D.

Suppose all assumptions of the CAPM hold, except some investors have tastes for assets as consumption goods. As usual, group A investors (no such tastes) combine riskfree borrowing or lending with the true mean-variance-efficient (MVE) tangency portfolio T of risky assets. A group D investor also combines riskfree borrowing or lending with a portfolio of risky assets. But the risky portfolio chosen in part depends on the investor's tastes for assets as consumption goods, so it is not typically in the unconditional MVE set. Since the investor is risk averse, his portfolio is conditionally MVE: given the investments in assets with non-zero marginal utility as consumption goods, the portfolio maximizes expected return given its return variance and minimizes variance given its expected return.

As usual, market clearing prices require that the market portfolio of risky securities is the aggregate of the risky portfolios chosen by investors. We can again express this condition as,

(8) $$w_{jM} = x\, w_{jT} + (1-x)\, w_{jD}, \qquad j = 1, 2, \ldots, n,$$

where w_{jD} is the weight of asset j in the wealth-weighted aggregate portfolio of the risky portfolios of group D investors, and x is the share of group A investors in total wealth invested in risky assets.

As indicated by the choice of symbols, this equilibrium is like the one obtained when deviations from CAPM pricing are due to uninformed investors. Again, asset prices must be set to induce group A investors to offset the actions of group D investors; that is, investors in group

A overweight (relative to the market portfolio) the assets underweighted by investors in group D. But in terms of price effects, the offset is partial; we do not get CAPM pricing except in the unlikely case where the tastes of group D investors are perfectly offsetting and in aggregate they hold the tangency portfolio T, which then must also be the market portfolio M.

Other results like those obtained when group D investors are uninformed also hold. For example, since the aggregate portfolio of group D investors is not unconditionally MVE, the market portfolio also is not MVE, and this central implication of the CAPM is lost. And because we have not identified the aggregate portfolio of group D investors, we cannot identify group A's tangency portfolio T, which is MVE and so could be used to describe the expected returns on assets. Thus, testable predictions about expected return and risk are lost. But if tastes for assets as consumption goods are the only potential problem for the CAPM, we can at least use the GRS F-test and estimates of Jensen's alpha to infer whether such tastes actually affect asset prices.

Some examples are helpful. "Socially responsible investing" is an extreme form of tastes for assets as consumption goods that are unrelated to returns. Thus, some investors do not hold the stocks of tobacco companies, or gun manufacturers. In a world where all other assumptions of the CAPM hold, socially responsible investors hold portfolios that are conditionally MVE, given their asset exclusions, but their portfolios are not unconditionally MVE. Another example is loyalty or the desire to belong that leads to utility from holding the stock of one's employer (Cohen, 2003), one's favorite animated characters, or one's favorite sports team that is unrelated to the payoff characteristics of the stock. The home bias puzzle (French and Poterba, 1991, Karolyi and Stulz, 2003), that is, the fact that investors hold more of the assets of their home country than would be predicted by standard mean-variance portfolio theory is another, perhaps related, example. Finally, there may be investors who get pleasure from holding the common stocks of strong companies (growth stocks) and dislike holding distressed (value) stocks, and these tastes influence investment decisions. This seems to be what the characteristics model of Daniel and Titman (1997) is intended to capture.

Even when employees do not have tastes for employer stock as a consumption good, options and grants that constrain an employee to hold the stock for some period of time affect portfolio decisions in the same way as tastes for the stock. The lock-in effects of capital gains taxes and tax rates on investment returns that differ across assets can also affect portfolio decisions and asset prices in much the same way as tastes for assets as consumption goods.

B. Tastes for Investment Assets Depend on Their Returns

If investor utility depends directly on the amounts invested in specific assets, asset prices do not conform to the CAPM. And prices are unlikely to conform to Merton's (1973) ICAPM. ICAPM pricing arises when the utility of time 2 wealth, $U_i(C_1, W_2 \mid S_2)$, depends on stochastic state variables, S_2. Covariances of time 2 asset returns with the state variables then become an ingredient in portfolio decisions and asset pricing. In contrast, when utility $U_i(C_1, q_1,\ldots, q_n, W_2)$ depends on the quantities of assets chosen at time 1, we do not typically get ICAPM pricing.[1]

ICAPM pricing does arise, however, if investor tastes for assets as consumption goods depend not on the amount of each asset held, but instead on the covariances of asset returns with common return factors or state variables. This is not, of course, the motivation for the ICAPM in Merton (1973). He emphasizes that the utility of wealth depends on how it can be used to

[1] To be precise, we get ICAPM pricing only if we trivialize the model by including the returns for all assets as state variables. The ICAPM assumes the covariance matrix of asset returns is known and positive definite, so there is a one-to-one mapping between the vector of quantities, $q_1,\ldots, q_n$, and the vector of covariances of W_2 with all asset returns. Thus, we can rewrite utility that depends on the quantity invested in each asset, $U(C_1, q_1,\ldots, q_n, W_2)$, as a function of the covariances between W_2 and all asset returns, $U'(C_1, Cov(W_2, R_1), \ldots, Cov(W_2, R_n), W_2)$ or, with all asset returns included as state variables, $U'(C_1, W_2 \mid S_2)$. Since every asset has its own state variable, this ICAPM is vacuous.

generate future consumption. Thus, utility is a function of the consumption goods that will be available in future periods and their prices. It also depends on the portfolio opportunities that will be available to move wealth through time for future consumption. Thus, the state variables, S_2, are usually assumed to be related to future consumption and investment opportunities.

We suggest that, as a logical possibility, ICAPM pricing can also arise because some state variables affect the utility of investors solely as a matter of tastes. For example, investors may get more utility out of returns associated with high-tech or cutting edge activities. If these tastes can be expressed in terms of sensitivity to a high-tech state variable or common factor in returns, this leads to multifactor ICAPM pricing.

Style investing may be another example. Thus, as discussed earlier, many investors, such as sponsors of defined benefit plans, often allocate investments based on asset classes (for example, large stocks, small stocks, value stocks, growth stocks, etc.). The groupings often correspond to common factors in returns (for example, Fama and French, 1993), and asset allocation decisions are often based on exposures or sensitivities to these factors. If in the end asset class investors do not choose the market portfolio, and if their tilts away from the market are largely based on tastes, their actions can lead to ICAPM pricing that may, in effect, involve a large element of tastes.

An obvious problem is that it may be difficult to distinguish between rational ICAPM pricing that arises because of tastes for state variables as consumption goods and irrational pricing due to uninformed investors. For example, low returns on high tech stocks or growth stocks may be due to tastes for a high tech or growth stock state variable, or they may instead be due to irrational optimism about the prospects of such firms. Similar comments apply to style investing.

Another problem is that when one opens the door to tastes for assets as consumption goods as a source of ICAPM pricing, there may be a flood of applicants, and meaningful restrictions on expected returns may be lost. But this is a general problem in moving from the CAPM to the ICAPM. The ICAPM has interesting testable content only when the number of priced state variables is relatively small, whether the state variables trace to consumption and investment opportunities or to tastes.

III. Conclusions

How important are the price effects of disagreement and tastes for assets as consumption goods? We do not know. But our analysis at least provides a way to frame the problem.

For example, estimates of Jensen's alpha and the GRS test applied to portfolios of common stocks sorted on various characteristics of firms produce evidence that the CAPM cannot explain expected stock returns. Two of these CAPM "anomalies" attract the most attention, and controversy. The first is the value effect (Statman, 1980, Rosenberg, Reid, and Lanstein, 1985, Fama and French, 1992): stocks with low prices relative to fundamentals like cash flow or book value have higher average returns than predicted by the CAPM. The second is the momentum effect of Jegadeesh and Titman (1993): stocks with high returns over the last year tend to continue to have high returns for a few months, low short-term past returns also tend to persist, and these patterns in returns are left unexplained by the CAPM.

If the CAPM would hold in the presence of complete agreement, then the value effect and the momentum effect can be attributed to uninformed or erroneous beliefs – market inefficiency, due perhaps to the behavioral biases discussed by DeBondt and Thaler (1987), Barberis, Shleifer, and Vishny (1998), and Daniel, Hirshleifer, and Subrahmanyam (1998). This is essentially the argument of these papers and of Lakonishok, Shleifer, and Vishny (1994) and Haugen (1995).

It is possible, however, that tastes for assets as consumption goods have a role in explaining the value effect or the momentum effect. It may be that investor tastes for growth stocks and distastes for (relatively distressed) value stocks are at least part of the reason the CAPM cannot explain the value effect. If so, the problem is a bad asset pricing model (no allowance for asset tastes), not bad asset prices. Such differences in tastes seem to be what the characteristics model of Daniel and Titman (1997) is intended to capture. Perhaps investor tastes for recent losers and distastes for recent winners also contribute to the momentum effect. It is unlikely, however, that tastes explain both the value effect and the momentum effect, since the value effect requires that investors like winners and dislike losers and the momentum effect requires the opposite.

Fama and French (1993) argue that the value effect can be explained by a multifactor version of Merton's (1973) ICAPM. In this view, however, there is still an open issue. Does the priced state variable that produces the value effect trace to uncertainty about future consumption-investment opportunities (the standard ICAPM story), or does it reflect investor distaste for a state variable that might simply be wealth generated by distressed or humdrum activities?

An ICAPM story, of either variety, seems an unlikely explanation of momentum. The momentum effect is a property of short-term future returns on recent short-term winners and losers. It seems unlikely that covariances of stock returns with a state variable change dramatically, but only temporarily, based on short-term past returns. But perhaps we are wrong.

We do not have and may never have definitive answers to the questions posed above. But our analysis does provide a framework for thinking about potential answers.

Finally, our analysis may provide perspective on the asset pricing information delivered by the three-factor model of Fama and French (1993). It is possible that disagreement, tastes for assets as consumptions goods, and state variable risks all play a role in asset pricing. Whatever the forces generating asset prices, the mean-variance-efficient tangency portfolio T can always be used, along with the riskfree rate, to describe differences in expected asset returns. In the Sharpe-Lintner CAPM, T is the market portfolio M. But when asset pricing is affected by disagreement, tastes for assets as consumption goods, and state variable risks, T is no longer M, and theory no longer specifies the composition of T. One (perhaps the only) approach to capturing T is to form a set of diversified portfolios that seem to cover observed differences in average returns. If these portfolios span T, they can be used (along with the riskfree rate) to describe differences in expected asset returns (Huberman and Kandel, 1987). And one can be agnostic about whether T is not M because of disagreement, tastes for assets as consumption goods, state variable risks, or an amalgam of the three. This may, in the end, be a reasonable view of the pricing information captured by the three-factor model.

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Figure 1-- Investment Opportunities and Portfolios T, M, and D