

Review

Views and asymmetric information effects on asset pricing

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Abstract

In this paper we show the effect of views and asymmetric information on asset pricing. It is well shown that individuals invest in assets that they know about. In addition, people differ from each other and each individual has his own personality, characters, experiences etc. So he expresses different reactions, sentiments and views depending on moods, situations and circumstances. In this paper we present a new reading of Merton (1987)'s model by including investor's views. We suppose that each investor has information and particular views about a subset of available assets.

Keywords: asset pricing, views, investor’s psychology, asymmetric information, investors’ views.

INTRODUCTION

Recently, many researchers prove that most investors invest in assets that they know about. In addition, in all over the world peoples differ from each other. Each individual has his own personality, character, experience etc. In life, each one expresses different reactions, sentiments and views depending on moods, situations and circumstances. In capital markets, sometimes investors take investment decisions using personnel perception, judgement or interpretation that are not found on proof or certainty. This non justified behaviour may cause misvaluations in capital markets.

In this paper we look at this issue in more details. We develop a two-period model of asset pricing where each investor has information and particular about a subset of the available securities. The model is an extension of Merton (1987)'s model in which we include investors views and sentiments. We try to prove that investors invest only in assets that they know about and express personnel views about future returns. Thus, in section 2 we develop a description of our model.

Asymmetric information and investor’s views: A literature review

Asymmetric information.

Traditional financial theory suggests that one should hold nationally and internationally well diversified portfolio. However, Investors do not behave according to fundamental predictions. Differences between available information about firms may justify people irrational behaviour. Many researches show that people overweight their portfolios with a special kind of assets (domestic, large firm assets etc.) on which they have more precise information. Because of the lack of information agents exhibit significant biases in their portfolios. At a domestic level, this bias is referred to as local home bias. Merton (1987) develops a simple model
that includes shadow costs of incomplete information. He shows that asymmetric information has the potential in explaining investors’ portfolio allocation. Coval and Markowitz (1999) show that people tend to invest close to home. They show that the American investment managers exhibit a strong preference for quarterly headquartered firms. These later are particularly small, highly levered firms that produce non traded goods. Results prove that asymmetric information between local and non local investors may drive the performance for geographically proximate investments. Coval and Markowitz (1999) argue that the relation between investment proximity and firm size and leverage may explain some asset pricing anomalies.

Advertising is a growing phenomenon that may play an important role in portfolio decisions. Cronqvist (2003) used two datasets on portfolio choices and advertising from the recent social security reform in Sweden in order to examine empirically why funds advertise and whether advertising affects people’s portfolio choices. Results show that only a very small percentage of fund ads could be construed as “informative” and that most are performance-ads or “seemingly non-informative” ads. In addition, exposure to non-informative advertising has the strongest effect on the behaviour of those who consider themselves the least knowledgeable with regard to portfolio choice, and word-of-mouth reinforces an effect of such ad-exposure. The most important contribution of Cronqvist (2003)’s paper is that performance-advertising plays on an extrapolation bias, steering people towards “hot” sectors of the overall market portfolio.

At an international level, investors manifest a net preference to domestic assets. This bias may be justified by asymmetric information. Proponents of asymmetric information theory argue that since investors have more precise information about their domestic assets, they manifest a reticence to international portfolio diversification. Kang and Stulz (1995) use data on foreign stock ownership 1975 to 1991 in Japan to examine the determinants of the home bias in portfolio holdings. They find that foreign investors overweight shares of large Japanese firms, manufacturing industries and firms with good accounting performance. The investors have an easy access to information about those firms. Jeske (2001) argues that differences in accounting standards, industrial structure, regulation, and corporate composition are elements of asymmetric information that play an important role in explaining the equity home bias. Ahearne, Griever and Warnock (2004) find that information asymmetry that owe to the poor quality and low credibility financial information in many countries cause investors to hesitate in investing in foreign markets. Results prove that foreign countries whose firms do not alleviate information costs by opting into the US regulatory environment are more severely underweighted in US equity portfolios.

**Investors’ views in asset allocation**

The traditional capital asset pricing model theory assumes that investors are the same and have homogeneous expectations. However, we all know that every individual has his own character, personality and knowledge. Therefore they express different views about something that is not founded on proof or certainty. Black and Litterman (1990) were the first to develop an asset allocation by combining investors’ views with market equilibrium. This approach has several features. The most important one is the use of the international capital asset pricing model equilibrium as a reference point for evaluating expected returns. The authors argue that this result helps investors to solve two practical problems when using quantitative international asset allocation:

- It addresses the fact that investors often have in translating their views into a set of expected returns for all assets.
- It covers the problem of tendency of allocation models to choose unbalanced portfolios unless artificial constraints are imposed on portfolio composition.

The authors show how to construct portfolios by choosing the optimal weights to invest in assets in each country and the optimal degree of hedging of currency exposure, given investors’ views for interest rates and exchange rates. The model allows the investor to compare and combine his outlook for currencies and interest rates with expected returns generated by an international capital asset pricing model equilibrium. Black and Litterman (1990) allow investors to specify views in much more flexible way. In other words, rather than requiring investors to specify views about absolute returns on every asset, investors can specify views about relative returns and with different degrees of confidence.

Moreover, the model has other advantages. The first one determines the optimal allocations of bonds into different countries and the most desirable currency hedges. The second advantage is the fact that the model includes many choices for its user in both expressing views and in estimating the risks from historical data and in starting objectives and constraints. Black and Litterman (1990)’s model brought several innovations. In effect, standard approach investors take a set of assets’ forecasts and for a given risk they find the portfolio with the highest expected return. However, in the international capital asset pricing model assets’ yields will adjust in equilibrium. Black and Litterman allow agents to combine their views with this equilibrium by using relative than absolute returns and taking a degree of confidence with the views.
In our model we suppose that individuals express personal and pessimistic view, \( Q_k \), about the future return of the asset \( k \). The return on portfolio for an investor \( j \) in the absence of transaction costs and in the presence of views can be written as follows:

\[
\tilde{R}^j = \sum_{k=1}^{n+2} w^j_k \left( \tilde{R}_k - (Q_k + \tilde{\tau}_k) \right) + w^j_{n+1} \tilde{R}_{n+1} + w^j_{n+2} R
\]  

(4)

\( Q_k \) : is a particular view about the asset \( k \). For example, security \( k \) will increase (decrease) by 100 basis point when investor manifests an optimistic (pessimistic) view, \( Q \) is positive (negative). In addition, \( Q \) is considered as a constraint in the model. In a perfect framework returns are expressed in function of riskless asset, risk premium and beta. Adding views, returns deviate from their fundamental value, so when adding views to the model we will extract them from the equation (views are considered as constraint in the model).

\( \tau_k \) : is an unobserved variable normally distributed with

\[
E(\tilde{\tau}_k) = \tau_k \text{ and } Var(\tilde{\tau}_k) = \sigma_{\tau_k}^2 .
\]

This variable is characteristic of each investor; it reflects the confidence level on views. (The idea is heavily borrowed from Black F. and Litterman R. (1991), "Global Asset Allocation with Equities, Bonds and Currencies", Fixed Income Research, Goldman, Sachs and Co).

In our framework we relax the hypothesis of homogeneity. Individuals are not the same. Each one has his own character, personality and experience. So they may express different views based on personal judgements, perceptions and beliefs. Many decisions are subject to agents’ mood, actual situation or circumstances. Therefore, we allow investors to include their perceptions about future returns of the subset securities that they know about.

Inserting (1) and (2) in (4) we get:

\[
\tilde{R}^j = \sum_{k=1}^{n+2} w^j_k \left( \tilde{R}_k + b_k \tilde{Y} + \sigma_k \tilde{\epsilon}_k \right) - (Q_k + \tilde{\tau}_k) + w^j_{n+1} \tilde{R}_{n+1} + w^j_{n+2} R
\]

(5)

Equation (5) can be written as:

\[
\tilde{R}^j = \sum_{k=1}^{n+2} w^j_k \left( \tilde{R}_{n+1} - (Q_k + \tilde{\tau}_k) \right) + \left( \sum_{k=1}^{n+2} w^j_k b_k + w^j_{n+1} \tilde{Y} \right) + \sum_{k=1}^{n+2} \sigma^2_k \tilde{\epsilon}_k + w^j_{n+1} \tilde{R}_{n+1} + w^j_{n+2} R
\]

(6)

Let

\[
\sum_{k=1}^{n+2} w^j_k b_k + w^j_{n+1} = b^j
\]

(7)

\[
\sum_{k=1}^{n+2} w^j_k = 1
\]

(8)
From (7) and (8), we can write (6) as follows:

\[
\hat{R}^j = \sum_{i=1}^{n} w_{ij} \bar{R}_i + \sum_{i=1}^{n} w_{ij}(Q_i + \tau_i) + b^j \bar{Y} + \sum_{i=1}^{n} w_{ij} \sigma_i \varepsilon_i + \left( b^j - \sum_{i=1}^{n} w_{ij} b \right) \bar{R}_{n+1} + \left( 1 - b^j + \sum_{i=1}^{n} w_{ij} b - \sum_{i=1}^{n} w_{ij} \right) R
\]

\[\tag{9}\]

With the properties of \( \bar{Y} \) and \( \bar{\varepsilon}_k \), we can write the variance of the portfolio of investor \( j \) as follows:

\[
Var(\hat{R}^j) = b^{j^2} + \sum_{i=1}^{n} \left( w_{ij}^2 \sigma^2_k + \sum_{k=1}^{n} \left( w_{ij}^2 \right)^2 \sigma^2_{\varepsilon_k} \right)
\]

\[\tag{10}\]

According to equation (10), the portfolio variance of investor \( j \) includes the common factor risk \( (b^j)^2 \) and the risk of all assets of the portfolio.

By using the equation (9), we derive the portfolio expected rate of return of investor \( j \):

\[
E(\hat{R}^j) = \sum_{i=1}^{n} w_{ij} \bar{R}_i + b^j E(\bar{Y}) + \sum_{i=1}^{n} w_{ij} \sigma_i E(\varepsilon_i) - \sum_{i=1}^{n} w_{ij}(Q_i + E(\tau_i)) + b^j \bar{R}_{n+1} - \sum_{i=1}^{n} w_{ij} b \bar{R} + b^j R + \sum_{i=1}^{n} w_{ij} b R - \sum_{i=1}^{n} w_{ij} R
\]

\[\tag{11}\]

Using (11) the expected rate of return for portfolio \( j \) is:

\[
\hat{R}^j = R + b^j (\bar{R}_{n+1} - R) + \sum_{i=1}^{n} w_{ij} \Delta_k
\]

\[\tag{12}\]

With \( \Delta_k = (\bar{R}_k - (Q_k + \tau_k) - R - b \bar{R}_{n+1} - R) \)

From equation (3), in order to determine the investor optimal portfolio we have to look for a solution to the following constrained maximization problem:

\[
\max_{b^j,w_{ij}} \left[ \hat{R}^j - \frac{\delta^j}{2} Var(\hat{R}^j) - \sum_{i=1}^{n} \lambda_{ij}^k w_{ij}^2 \right]
\]

\[\tag{13}\]

Where \( \lambda_{ij}^k \) is Lagrange multiplier showing that investor \( j \) cannot invest in security \( k \) if he does not have information about this asset. Investors have to be informed about security \( k \) So we have:

\[
\lambda_{ij}^k = 0 \quad \text{if} \quad k \in J^j \quad \tag{14}\]

\[
w_{ij}^k = 0 \quad \text{if} \quad k \in J^{j^c} \quad \tag{15}\]

The first-order conditions showing the optimal common factor and portfolio weights for investor \( j \) is given from the optimization problem (relation (13), relation (12) and (10)):

\[
\frac{\partial U^j}{\partial b^j} = \hat{R}_{n+1} - R - \delta^j b^j = 0 \quad \tag{16}\]

\[
\frac{\partial U^j}{\partial w_{ij}^k} = \Delta_k - \delta^j w_{ij}^k (\sigma^2_k + \sigma^2_{\varepsilon_k} - \lambda_{ij}^k) \quad \tag{17}\]

From (16), we have:

\[
\frac{\Delta_{n+1} - R}{\delta^j} = b^j \quad \tag{18}\]

Relation (18) represents the common factor exposure affecting the portfolio of investor \( j \).

From the relation (17), we have:

\[
w_{ij}^k = \frac{\Delta_k}{\delta^j (\sigma^2_k + \sigma^2_{\varepsilon_k})} \quad \tag{19}\]

For an informed investor, using (14), relation (19) becomes:

\[
w_{ij}^k = \frac{\Delta_k}{\delta^j (\sigma^2_k + \sigma^2_{\varepsilon_k})} \quad \tag{20}\]

From the relation (20), we can conclude that investor \( j \) invest only on assets that he knows about. The weight of investor’s wealth placed on asset \( k \) depends on the required return, the risk and views. From equation (19) we have:

\[
\Delta_k = \lambda_{ij}^k \quad \text{if} \quad k \in J^j \quad \tag{21}\]

Having determined investor’s portfolio allocation, we pass now to the elaboration of equilibrium prices and expected return. We focus on the effect of views and incomplete information on equilibrium prices. In our analysis we assume that investors have the same initial wealth and there are no transaction costs. we can write: \( \delta^j = \delta \)

\( \forall j \) And \( W^j = W, j = 1,2, ..., N \).

Under these assumptions it follows that all investors choose the same exposure to the common factor, \( b^j = b \) for \( j = 1,2,3, ..., N \). Relation (16) becomes:

\[
D_k = \sum_{j=1}^{n} w_{ij}^k W^j \quad \tag{23}\]

Since we have supposed that investor \( j \) invests only in the securities that he is informed about, equation (23) becomes with reference to (15) and (20):

\[
D_k = \frac{N_k W \Delta_k}{\delta (\sigma^2_k + \sigma^2_{\varepsilon_k})} \quad \tag{24}\]

With \( N_k \) is the number of investors who have information about security \( k \).

However, these investors may have either optimistic, pessimistic or no views about these assets. When all investors have information about security \( k \), then we have \( N_k = N \).

Let assume that \( \chi \) to be the weight of the market portfolio placed in security \( k \), and then we have:
\[ x_k = \frac{D_k}{M} \]  

(25)

Where \( M \) represents the equilibrium national wealth:

\[ M = \sum_{j=1}^{N} W_j \]  

(26)

Since not all investors have information about the security \( k \), the fraction of all investors who have information about security \( k \) can be written as follow:

\[ q_k = \frac{N_k}{N} \]  

(27)

Where \( 0 < q_k \leq 1 \)

\( q_k \) is interpreted as follow:

When there is one or several investors informed about the security \( k \) \( q_k \) is greater than zero.

- When all investors are informed about the asset \( k \), \( q_k \) is equal to one.

From equations (24), (26), (27), equation (25) allows to write:

\[ x_k = \frac{q_k \Delta_k}{\delta(\sigma_k^2 + \sigma_{t_k}^2)} \]  

(28)

Since the market portfolio represents a weighted average of optimal portfolios and since all investors choose the same common factor exposure \( \{b^j\} \), it follows that \( b^j = b \).

We suppose that assets \( (n+1) \) and \( (n+2) \) are inside securities. Then we can write \( b \sum_{k=1}^{n} b_k \). In addition we have: \( \Delta_k = (\overline{R_k} - R - (Q_k + \tau_k) - b_k(R_{n+1} - R)) \).

By inserting (18) in the expression of \( \Delta_k \), we obtain:

\[ \Delta_k = \overline{R_k} - R - (Q_k + \tau_k) - b_k \delta b^j \]  

(29)

\( b^j = b \) and \( \delta = \delta^i \), equation (29) becomes:

\[ \Delta_k = \overline{R_k} - R - (Q_k + \tau_k) - b_k b \delta \]  

(30)

From (30), we have:

\[ \overline{R_k} = R + (Q_k + \tau_k) + b_k b \delta + \Delta_k \]  

(31)

From (28) the expression of \( \Delta_k \) is given by:

\[ \Delta_k = \frac{x_k}{q_k} \delta(\sigma_k^2 + \sigma_{t_k}^2) \]  

(32)

Inserting (32) in (31) we obtain:

\[ \overline{R_k} = R + (Q_k + \tau_k) + b_k \delta \beta + \frac{x_k}{q_k} \delta(\sigma_k^2 + \sigma_{t_k}^2) \]  

(33)

In order to see the relation between the effects of views and the shadow cost of incomplete diffusion of information among investors, let suppose that:

\[ \lambda_k = \frac{\sum_{j=1}^{N} \lambda_k^j}{N} \]  

(34)

This equation represents the equilibrium aggregate shadow cost per investor. From relation (21), equation (34) becomes:

\[ \lambda_k = \frac{N - N_k}{N} \Delta_k \]  

(35)

Relation (35) can be written as:

\[ \lambda_k = \left(1 - \frac{N_k}{N}\right) \Delta_k \]  

(36)

From (27), relation (36) becomes:

\[ \lambda_k = (1 - q_k) \Delta_k \]  

(37)

Let \( \tilde{R}_M \) be the return on the market portfolio:

\[ \tilde{R}_M = \sum_{k=1}^{n} x_k \tilde{R}_k \]  

(38)

We assume that the securities \( (n+1) \) and \( (n+2) \) are inside securities so that \( x_{n+1} \) and \( x_{n+2} \) are equal to zero.

From relation (10), we obtain the variance of the market portfolio as follows:

\[ \text{Var}(\tilde{R}_M) = b^2 + \sum_{k=1}^{n} x_k^2 \left(\sigma_k^2 + \sigma_{t_k}^2\right) \]  

(39)

The market portfolio variance shows that there are two types of risk: the common factor risk and the risk related to every asset \( k \). So we define \( \beta_k \) as the beta of the asset \( k \).

\[ \beta_k = \frac{\text{cov}(R_k, \tilde{R}_M)}{\text{Var}(\tilde{R}_M)} \]  

(40)

for: \( k = 1,2,...,n \).

With reference to relation (37), we have:

\[ \Delta_k = \lambda_k + q_k \Delta_k \]  

(41)

Inserting (41) in (31) we obtain:

\[ \overline{R_k} = R + (Q_k + \tau_k) + b_k \delta \beta + \lambda_k + q_k \Delta_k \]  

(42)

The substitution of (32) in (42) gives:

\[ \overline{R_k} = R + (Q_k + \tau_k) + b_k \delta \beta + \lambda_k + x_k \delta \left(\sigma_k^2 + \sigma_{t_k}^2\right) \]  

(43)

From this relation, we try to get the covariance expression:

\[ \overline{R_k} = R + (Q_k + \tau_k) + \delta \left(\lambda_k + x_k \left(\sigma_k^2 + \sigma_{t_k}^2\right)\right) \]  

(44)

If we multiply (44) by \( x_k \) and sum from \( k = 1,2,..,n \), keeping in mind that the securities \( (n+1) \) and \( (n+2) \) are inside securities, then \( x_{n+1} = 0 \) and \( x_{n+2} = 0 \).

Equation (44) becomes:
\[
R_k = R + \sum_{k=1}^{n} x_k (Q_k + \bar{\tau}_k) + \delta \left( \sum_{k=1}^{n} x_k \beta_k \sigma_k^2 \right) + \sum_{k=1}^{n} x_k \lambda_k \nabla R
\]

(45)

Relation (45) can be written as:
\[
R = R + (Q + \bar{\tau}_M) + \delta Var(R_M) + \lambda
\]

(46)

with:

\[\lambda_M\] : the weighted-average shadow cost of incomplete information over all securities;

\[Q_M\] : the weighted-average Views over all securities.

\[\bar{\tau}_M\] : is an unobserved variable normally distributed with

\[E(\bar{\tau}_M) = \bar{\tau}_M \text{ and } Var(\bar{\tau}_M) = \sigma_{\bar{\tau}_M}^2\]. It reflects the confidence level on views over all securities.

Or we know that:

\[Cov(R, R_M) = \beta_k Var(R_M)\]

(47)

From relation (47), we can write (44) as follow:

\[R = R + (Q_k + \bar{\tau}_k) + \delta \beta_k \sigma_k \nabla R + \lambda_k\]

(48)

We replace the portfolio variance by its expression from relation (46) in (48) to obtain:

\[R = R + (Q_k + \bar{\tau}_k) + \lambda_k + \beta_k (R_M \sigma_k \nabla R - R - \lambda_k - (Q_k + \bar{\tau}_M))\]

(49)

Relation (49) shows a capital asset pricing model in presence of views and information costs. If investors do not express any particular views and are indifferent, then \((Q_k + \bar{\tau}_k) = 0\) and \((Q_k + \bar{\tau}_M) = 0\), the model reduces to Merton’s (1987) model.

When all investors have the same information about security \(k\) than \(\lambda_k = 0\) and \(\lambda_M = 0\), the model is reduced to a model where investors integrate their views.

When there are no views and no information costs, the model represents the standard CAPM. This finding shows that in equilibrium the market portfolio will not be efficient in the presence of information costs and views.

Relation (49) can be written as follows:

\[R_k = R + \Psi_k + \beta_k \left(R_M - R\right)\]

(50)

Where:

\[\Psi_k = \lambda_k + (Q_k + \bar{\tau}_k) - \beta_k \left(\lambda_M + (Q_k + \bar{\tau}_M)\right)\]

(51)

The market portfolio is efficient if \(\Psi_k = 0\) for all \(k = 1, 2, ..., n\).

Relation (49) gives the expected rate of return of security \(k\) as a function of the risk-free rate, views, the shadow cost of incomplete information and the risk premium. In this model, investors invest only in assets that they know and can integrate their personal views about future returns. When investors have both the information and pessimistic views about a particular security return they overweight their portfolios with this asset.

**CONCLUSION**

In capital markets, it is well documented that investors accept to invest in assets that they know. For this reason they are willing to pay to get the necessary information about securities. In addition, sometimes investors exhibit personnel attitudes and views that cannot be explained by fundamentals. These factors lead to misvaluations and affect investors’ allocations. In this paper we develop Merton (1987)’s model by integrating investors’ views. When investors manifest optimistic (pessimistic) views, they show their positive (negative) attitude toward a particular asset. These attitudes can cause asset return deviate from the fundamental values and show the preference (reticence) of investors to some particular assets.

**REFERENCES**


