Ex-ante risk premia in the US stock market: analysing experts' behaviour at the individual level

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EX-ANTE RISK PREMIA IN THE US STOCK MARKET:

ANALYSING EXPERTS' BEHAVIOUR AT THE INDIVIDUAL LEVEL

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Abstract - Semi-annual surveys carried out by J. Livingston on a panel of experts has enabled us to compute the expected returns on a portfolio made up of US industrial stocks. Having calculated the difference between these expected returns and the risk free rate given by zero coupon bonds, we generated about 3000 individual *ex-ante* risk premia over the 41-year period between 1952 and 1993. Three main conclusions may be drawn from our study. First, these *ex-ante* premia have mean values that seem closer to the predictions derived from the consumption-based asset pricing theory than the ones obtained for the *ex-post* premia. Second, the experts' professional affiliation appears to be a significant criterion in discriminating premia. Third, in accordance with the Arbitrage Pricing Theory, *ex-ante* premia depend on common factors bound up with macroeconomic variables and agents' individual forecasts for inflation and industrial production growth.

Key words: **stock market expectations, risk premium, survey micro data**

JEL classification **: D81 ; D84 ; E44 ; G12 ; G14**

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1 - Introduction

This paper analyses individual and time varying *ex-ante* risk premia worked out for an industrial portfolio in the US stock market, these premia being defined by the difference between the expected returns of this portfolio and the risk-free rate.[1] Unlike *ex-post* premia, *ex-ante* premia are conditional on the information available at time *t* when agents choose the structure of their portfolios. *Ex-ante* premia may be clearly viewed then as premia that necessarily arise out of the actual decision-making process. This approach is groundbreaking in that we use US industrial stock price forecasts based on the Livingston surveys to measure *ex-ante* risk premia. Moreover, we use individual data, whether pooled or not, and this enables us to straightforwardly analyse the factors determining premia.

The paper begins (Part 2) by reviewing the literature that investigates the concept of *ex-ante* risk premium and its empirical analysis. Part 3 deals with measuring and describing the statistical properties of *ex-ante* premia as inferred from stock price forecasts provided by the Livingston surveys over the 41-year period between 1952 and 1993. Based on the conditional APT framework, Part 4 aims to identify which factors determine the dynamics of *ex-ante* premia. Concluding remarks follow in the final section (Part 5).

2 – *Ex-ante* equity risk premia in the literature: concepts and empirical analysis

The first heading deals with the link between the basic concept considered in this paper, namely *individual* risk premia, and the relevant concept in stock valuation models, namely the *market* risk premium. The second heading relates to whether risk premia should be viewed as *ex-ante* or *ex-post* magnitudes. The third heading shows that equity risk premia may be viewed as either long-term or short-term phenomena, which suggests that it is worth analysing the dynamics of risk premia by using semi-annual data, as we do in this paper. The last heading describes the two main approaches to *ex-ante* equity risk premia as defined in the literature.

2.1 – From *individual* risk premia to the *market* risk premium

To clarify the link between *individual* risk premia and the *market* risk premium, let us consider the market of a given equity. At time t, an agent whose required *ex-ante* premium[2] is greater than his market excess return will sell stocks in order to buy the risk-free asset, whereas another agent whose required premium is lower than his market excess return will sell the risk-free asset and buy stocks. If stocks sellers and risk-free asset purchasers are more numerous than agents having opposite positions, then the price of the stock will drop whereas the price of the risk-free asset will rise. This implies both an increasing stock return and a decreasing risk-free rate, resulting in a higher market excess return. Consequently, the number of stocks sellers goes down whereas the number of risk-free asset purchasers increases. Market equilibrium will be reached when supply matches demand for both kinds of assets. This occurs when the weight of agents having required premium greater than the market excess return offsets the weight of the agents whose required premium is lower than the market excess return. At this point, there is no arbitrage opportunity between stocks and the risk-free asset, and prices are such that the average of the individual required *ex-ante* risk premia equals the market excess return, which then represents the *ex-ante* market risk premium.[3] If the market is efficient, the adjustment described above is instantaneous. This shows that, if at any time a survey asked all market participants to disclose their expected stock return, we would be able to measure the *ex-ante* market premium based on the average of the *ex-ante* individual premia and this makes sense to our approach.

2.2 – *Ex-ante* versus *ex-post* equity risk premia

Ex-ante market risk premia differ from *ex-post* risk premia often analysed in the literature. Unlike *ex-ante* premia, *ex-post* premia are calculated not with the return *expected* between *t* and *t+1* but with the return *observed* between t and t+1. This *ex-post* representation generates theoretical and empirical limitations. On the theoretical ground, investors being unable to use *ex-post* premia to make their financial choices at time *t*, this magnitude cannot be regarded as a decision-making concept, unless the perfect foresight hypothesis holds, in which case the returns expected at time *t* for *t+1* do in fact exactly match the returns observed *ex-post* between time *t* and *t+1*. But, of course, there is no such thing as risk premia in such a set-up, so that the *ex-post* excess return cannot be viewed as a risk premium. Considering now the rational expectation hypothesis (REH), the *ex-post* premium appears to be the rational *ex-ante* premium plus a white noise representing the *ex-post* forecasting error. In this instance, because the rational return expectation is unknown, trying to measure *ex-ante* premia is subject to *ad-hoc* assumptions about how rational expectations are modelled. Empirical evidences have shown that *ex-post* premia far too often have excessively large negative values, and this is a somewhat counter-intuitive outcome (among others, see Mpacko-Priso (2001)). Moreover, experts' expected returns derived from Livingston's surveys appear to be biased (Abou and Prat (1997)), and this suggests to consider *ex-ante* premia without assuming the REH.

2.3 – Equity risk premium: *long-term or short-term phenomenon*?

Another aspect to be investigated is the following: should equity risk premium be viewed as a long-term or a short-term phenomenon? Interestingly, Barberis (2000) builds optimal portfolios made up of stocks and bonds quoted on the US market. He shows that, taking into account predictable features of stock returns, the optimum is reached by 40% of stocks for a one-month time horizon and by 100% of stocks for a 10-year time horizon. This result helps to understand why risk premia may be viewed both as a long-term and short-term phenomenon. The long-term view calls to mind the well-known debate about the "*equity premium puzzle*": with reasonable preference parameters values, mainly the risk aversion coefficient, theoretical risk premia inferred from the consumption asset-based general equilibrium model are far too low, about 1% a year, as against observed market premia, which stand about 6% a year on average (Mehra and Prescott (1985)). According to this calibration approach, risk premia are viewed rather as a long-term phenomenon since they are averaged out over many years. After many unsuccessful attempts published in the literature (see the survey made by Kocherlakota (1996)), Benartzi and Thaler (1995) suggest solving the *premium puzzle* by assuming that long-term investors typically adopt myopic behaviour when measuring the returns of their portfolios. They found that long-term investors measure returns over a period of under a year: this "*mental accounting hypothesis"* is shown to be a valuable explanation in solving the *puzzle*. This result suggests that analysing short-term dynamics of premia makes sense even when long-term investors are involved, which further clarifies the numerous studies in the literature that analyse risk premia' short-term movements. For instance, French et al. (1987) have shown that monthly risk premia fluctuations on the US stock market are partly driven by ARCH effects. Again, De Santis and Gerard (1997) analysed the factors explaining the short-term dynamics of these premia by using a conditional multivariate Capital Asset Pricing Model. Moreover, as regards passive and active mutual funds portfolios, Kryzanowski et al. (1997) point out how relevant the Conditional Arbitrage Pricing Theory is to account for monthly premia fluctuations on the Canadian stock market.

As a matter of fact, the literature strongly suggests that studying premia dynamics both in the long-term and short-term is relevant. In this paper, we use the Livingston surveys *semi-annual* data to make econometrical analyses of individual premia.

2.4 – *Ex-ante* market risk premium in the literature: two main approaches

Generally speaking, an *ex-ante* premium is defined by a given representation of the *expected* return at time t for $t+1$. Two ways of measuring *ex-ante* premia follow from the literature. Whether assuming a simple or a complex expectational process, the first approach is backward looking since the expected return depends on the historical values of returns and other observable variables.[4] The second approach is forward looking since it relies on stock prices forecast survey data and does not require any hypothesis on the expectational process.

There are two types of approaches that use historical data: those based on a finite time horizon and those based on an infinite one. For instance, working within a finite time framework, French et al. (1987) assumed that the one period ahead expected return equals the return observed during the last month. They showed that monthly *ex-ante* premium on the US stock market depends on the *ex-ante* conditional variance of returns. Within the infinite time horizon framework, Fama and French (2002) have constructed various *ex-ante* premia inferred from the current value of dividends or earnings on the US stock market (S&P index). The authors assume that at any time t, both the risk-free rate and the expected growth rate of dividends or earnings would remain unchanged no matter the future time span, and these rather restrictive hypotheses led them to use the well-known Gordon formula. Compared with the definition of the *ex-ante* premium given above, this involves replacing the one period ahead expected rate of variation in stock prices by the long-term expected growth rate in dividends or earnings, supposed to prevail for all future periods and inferred from historical mean values. For the period extending from 1951 to 2000, Fama and French (2002) found a mean premium around 2.5% a year, a value close to the one predicted by the consumption-based asset pricing theory. However, this approach is subject to two serious drawbacks. The first one is the rather restrictive hypothesis that both the risk-free rate and the expected growth rate in dividends or earnings remain unchanged over an infinite time horizon. The second limitation is that the dynamics of risk premia are not analysed because premia are averaged out over a long period of time.

The second way of measuring *ex-ante* premia relies on forecast survey data for stock prices and is based on a finite time span approach. In respect of the former approach, a significant improvement consists in getting rid of its two restrictive hypotheses according to which both the risk-free rate and the expected growth rate of dividends or earnings remain unchanged over all future periods. Park (2006) and Prat (1996, 2001) both used forecast survey data to construct *ex-ante* risk premia on the stock market. As far as we know, no other study in the literature adopts such an approach.[5]

With reference to the previous contribution by Cechetti et al. (2000) and using expected stock prices from the Livingston panel, Park (2006) contributed to the debate about the "*equity premium puzzle*". What Cechetti et al. (2000) demonstrated was that, in contrast with what ensues from REH, introducing distorted expectations in the consumption-based asset pricing model (Lucas (1978)) helps solve not only this puzzle, but also the "volatility puzzle" and other well known stylised facts on stock returns or risk premia. Cechetti et al. (2000) justify the distorted expectations hypothesis due to the cost involved in processing information, leading rational agents to sidestep the relevant method for making forecasts, as « *individuals find it too costly to acquire the skills to do maximum-likelihood* ». Accordingly, agents tend to use a less accurate but cheaper predicting method: « *instead, they respond by using rules of thumb* ». Assuming a CRRA utility function with reasonable values for the risk aversion coefficient (<10) and for the discount rate, and using expectations from the Livingston panel, the authors showed that agents are pessimistic during periods of prosperity, i.e. when expected stock returns are lower than their values under REH, and optimistic during periods of recession, i.e. when expected stock returns are greater than their values under REH. Using expected stock returns calculated from the Livingston survey, which showed biases similar to those exhibited by Cechetti et al. (2000), Park (2006) confirmed that distorted expectations solve the *equity premium puzzle.* He showed that the theoretical values of Sharpe's ratios based on the Cechetti et al. (2000) model have the same statistical properties as those worked out from the Livingston panel.[6] Note that it is not the case with the Campbell and Cochrane (1999) model, which integrates habits in the Lucas consumption-based framework. Obviously, all these results have led us to pay special attention to *ex-ante* premia as inferred from Livingston's surveys.

While Park's approach is based on the first and second moments of the distributions**,** Prat (1996, 2001) focused on how to explain mean *ex-ante* premia relating to stock price expectations derived from Livingston's consensus time series. He showed that aggregate premia are influenced by macroeconomic variables such as inflation, production growth and consumer sentiment. In the present study, we aim to broaden this last approach by evaluating the relative impact on risk premia for various levels of explanation, i.e. the macro and micro levels, as well as a mid-level defined by experts' professional affiliation. Such a micro data approach is groundbreaking as regards the literature.

3 – *Ex-ante* individual risk premia in the US stock market using Livingston' surveys

3.1 - Measuring individual *ex-ante* risk premia

In this study, we are examining individual stock market premia for a panel of experts who have answered the surveys managed by Joseph Livingston since 1952 with the support of the Philadelphia Federal Bank.[7] Premia are connected with the Standard and Poor's 400 Industrial stock price index of securities quoted on the US stock market. For a given agent, the expected return of this equity portfolio is inferred from half-year frequency surveys processed in June and December. From 1952 to December 1989, those surveys gave the 1-semester and 2-semesters ahead forecasts for the S&P 400 industrial index.[8] Beginning with the survey dated June 1990, the questions refer to the S&P 500 composite index that includes the 400 industrial securities. As these two indexes are highly correlated with a rather stable ratio over the years 1987-89, it is possible to link up the 500 index values over the period from June 1990 to December 1993 to the 400 index values by using a stable coefficient of proportionality for both observed and expected indexes.

Each sample reports the answers given by 50 to 70 economic and financial experts belonging to five groups defined according to professional affiliation: universities (identified by the letter "U"), commercial banks ("C"), investment banks ("I") and non-financial firms ("N"). A last group ("A") stands for experts belonging to various administrations (US government, Unions, etc.).

Assuming that experts' opinions reflect without bias investors' opinions is presumably a rather restrictive hypothesis. However, various reasons suggest that it is safe to say that their answers provide a proxy for investor's opinions. First, we must only assume that for a given expert, the expected stock returns constructed from the "disclosed opinion"- i.e. the expert's answer - equals the "true opinion", namely the one that would prevail without agency or conflict of interest problems, plus a white noise. This hypothesis is less restrictive than the equality between both magnitudes. Moreover, using pooled data, the biases may be offset since there is a certain degree of independence between individuals over time. Second, the Livingston panel experts represent influential institutions that similarly influence other major operating agents significantly intervening in the volume of transactions in the US stock market (see Lakonishok (1980), p.922). This lessens the problems that may arise from an agency bias. Third, a specific bias may arise from conflicts of interest since any expert should give strategic answers that do not disclose his own opinions. However, interestingly, each individual answer remains confidential, and does not significantly affect the consensus, as the average weight of each expert in the whole sample is less than 2%. Fourth, Abou and Prat (2000) have specified a model combining the traditional extrapolative, regressive and adaptive processes that may represent individual stock price expectations as revealed by Livingston's surveys. Although these expectations do not conform to the rational expectation hypothesis (see Abou and Prat (1997)), they nevertheless appear to be generated by an identifiable process. This result points to consistent behaviour at work behind the experts' opinions.

Using Livingston's data, we consider the *forward ex-ante* risk premium $z_{i,t}^{f}$ defined as the premium relating to an industrial portfolio required by expert i at time t for the future time span [$t+1$, $t+2$].[9] This *forward* specification - noted by exponent f - precludes measurement errors that might occur if premia for the time span [t, $t+1$] were considered. As a matter of fact, this last specification would involve knowing the observed S&P 400 index, i.e. the base index involved when the agents make their forecasts in order to compute the expected return. Unfortunately, the base index used by each expert remains unknown because the June and December survey questionnaires are sent in early May and November. In fact, individual answers coming in dribs and drabs between May-June and November-December, we cannot know for sure when each of them were given, so that individual base indexes remain unidentified. Those loose ends explain why we will consider a forward specification.

Over the 83 semesters during the 41-year period from December 1952 to December 1993, we have computed 2981 individual forward premia implicitly embedded in the stock price expectations held by 262 different experts, using the following formulae:

$$z^{f}_{i,t} = E^{f}_{i,t}(R) - r^{f}_{t} \qquad [1]$$

with:

$$E^{f}_{i,t}(R) = E^{f}_{i,t}(\pi) + 100 \frac{E^{f}_{i,t}(D)}{E^{1}_{i,t}(P)} \qquad [2]$$

where $E^{f}_{i,t}(R)$ is the forward expected stock return, r^{f}_{t} the implicit forward risk-free market interest rate, $E^{f}_{i,t}(\pi)$ the forward expected rate of change π of the industrial portfolio, $E^{f}_{i,t}(D)$ the forward expected dividends (annual basis) given by this portfolio, and $E^{1}_{i,t}(P)$, the price of the portfolio expected at time *t* for *t+1*. Note that: (i) all *rates* prevail at time *t*, (ii) they relate to the future semester time-span [*t+1*, *t+2*] and (iii) they are expressed in percentage per year.

The variables involved in risk premia measurement are calculated on the basis of the following assumptions:

(i) Concerning the expected stock index rate of change at time *t*, $E^{f}_{i,t}(\pi)$, the Livingston surveys give for expert *i* forecasts for the S&P 400 industrial index P, one and two semesters ahead, respectively $E^{1}_{i,t}(P)$ and $E^{2}_{i,t}(P)$. The forward expected industrial portfolio price rate of change at semester *t* for period [*t+1*, *t+2*] is then defined as:

$$E^{f}_{i,t}(\pi) = 200 \ln \frac{E^{2}_{i,t}(P)}{E^{1}_{i,t}(P)} \qquad [3]$$

Note that the logarithm of the ratio between the two expected stock price indexes ($\ln \frac{E^{2}_{i,t}(P)}{E^{1}_{i,t}(P)}$) does not equal the forward expected logarithmic ratio between the two future indices ($E^{f}_{i,t}(\ln \frac{P_2}{P_1})$), whereas only this last magnitude theoretically represents the forward expected rate of change $E^{f}_{i,t}(\pi)$. However, both from a theoretical and an empirical point of view, it seems reasonable to assume that the relevant magnitude for stockholders is the *return* rather than the *price* of equities. Consequently, supposing than experts forecast the stock return and not the price, the *relevant variables* are not $E_{i,t}^{2}(P)$ and $E_{i,t}^{1}(P)$ *but* $E_{i,t}^{2}(\pi)$ and $E_{i,t}^{1}(\pi)$, respectively for 2 semesters and 1 semester ahead time spans.

In this context, when the experts were asked to disclose their forecasts concerning stock prices in *level* (i.e. $E_{i,t}^{2}(P)$ and $E_{i,t}^{1}(P)$), their answers may be viewed as deriving from the following relations for the two time horizons:

$$E_{i,t}^{2}(P) = P_t \exp(E_{i,t}^{2}(\pi)) \quad \Rightarrow \quad \ln E_{i,t}^{2}(P) = \ln P_t + E_{i,t}^{2}(\pi)$$

$$E_{i,t}^{1}(P) = P_t \exp(E_{i,t}^{1}(\pi)) \quad \Rightarrow \quad \ln E_{i,t}^{1}(P) = \ln P_t + E_{i,t}^{1}(\pi)$$

which result in the following equalities:

$$\ln \frac{E_{i,t}^{2}(P)}{E_{i,t}^{1}(P)} = \ln E_{i,t}^{2}(P) - \ln E_{i,t}^{1}(P) = E_{i,t}^{2}(\pi) - E_{i,t}^{1}(\pi) = E_{i,t}^{f}$$

As a result, going on the reasonable assumption that the return represents the variable to be forecasted, the logarithm of the ratio between the two expected stock price indexes ($\ln \frac{E_{i,t}^{2}(P)}{E_{i,t}^{1}(P)}$) accurately measures the forward expected rate of change ($E_{i,t}^{f}(\pi)$).

(ii) As regards the expected dividends, we assume that any expert builds his forecast for the following semester by extrapolating the rate of change observed during the previous semester:

$$E_{i,t}^{f}(D) = D_t \exp(d_t) \quad \text{with} \quad d_t = 1n(D_t / D_{t-1}) \ \forall\, \boldsymbol{i} \qquad [4]$$

where D_t are the dividends per share distributed over the previous year by the 400 industrial firms included in the S&P 400 industrial stock price index. This *ad-hoc* hypothesis is not crucial since, due to the prevailing influence of $E^1_{i,t}(P)$ in the fluctuations of this ratio, the subsequent impact on the ratio $\frac{E^f_{i,t}(D)}{E^1_{i,t}(P)}$, implied by any hypothesis about $E^f_{i,t}(D)$, is rather weak.

(iii) As regards the risk-free interest rate r_t^f, we apply the implicit forward rate inferred from the zero coupon treasury bonds reaching maturity after 1 and 2 semesters, which is in keeping with the stock returns expectations time horizon:

$$r_t^f = \left[\frac{(1+r_t^2)}{(1+r_t^1)} - 1 \right] \cong 2\, r_t^2 - r_t^1 \quad \forall i \qquad [5]$$

Any agent is bound to secure this rate at time *t* for the future time-span [*t+1, t+2*] by simultaneously lending over two semesters and borrowing over one semester.

3.2 - Main empirical features of *ex-ante* premia

Table 1 provides the definitions for all the variables used in this paper. For every survey covering the period from December 1952 to December 1993, ***figure 1*** depicts the central values and the standard deviations across experts of *ex-ante* risk premia. During that period, the median of individual premia is about 4 % a year and the mean about 2.2%; the central values per date range from +15% to –8% a year, with about 20% of negative premia. These values clearly differ from those obtained for *ex-post* market premia that range from -63% to +64% (48% of values are negative) with a 5.3% mean (median: 7.1%). The 2.2% mean we observed during the period from 1952 to 1993 within the finite time horizon approach using survey data compares significantly with the average of 2.5% obtained by Fama and French (2002) during the period from 1951 to 2000 (still with the S&P index) within the Gordon infinite time horizon model. Within the famous *equity premium puzzle* debate, compared to the *ex-post* premia values, both the *ex-ante* premia central values and their variances seem to accord more with the predictions derived from the consumption-based asset pricing model.

Note that the magnitude of the *ex-ante* premia cross-section standard deviations, ranging from 5 to 15 % a year over the period, warrants a micro data approach to explain heterogeneity. Another difference with *ex-post* premia is that, as can be seen on ***figure 2***, none of the three *ex-ante* premia components, namely, the stock prices expected rate of change, the dividends yield and the risk-free rate, [10] are insignificant.

[Insert table 1]

[Insert figure 1]

[Insert figure 2]

Figure 3 and ***table 2*** show that agents' professional affiliation is a significant discriminating criterion for premia. For instance, ***table 2*** shows that over the 42 years covered by the whole sample period, the median value for experts belonging to the “Non-financial firms ” is 3.9 % a year, whereas it is 4.6 % for experts from “Investments banks”. The discriminative power of experts’ professional affiliation is confirmed by ***table 3*** which provides the coefficients of determination r^2 between the mean premia *per date* according to that criterion: the coefficients range from 0.53 (significant at the 5% level) for the pair “University’s experts and Non-financial firms experts” to 0.25 for the pair “Investments banks experts and Non-financial firms experts”. These results indicate that the information used by experts to determine their required premia depends on their skills and concerns according to their professional affiliation.

[Insert figure 3]

[Insert table 2]

[Insert table 3]

4 – Explaining *ex-ante* individual risk premia

4.1 - Theoretical framework

Our approach derives from the Arbitrage Pricing Theory (APT, Ross (1976)), bearing in mind that the APT is based on two general hypotheses. The first one is that at any time, the condition of absence of arbitrage opportunity prevails on the market: with a null initial wealth, any risk-free investment leads to a zero expected return. The second hypothesis is that the return R between *t-1* and *t* of any portfolio includes three elements: (i) the return forecasted at time *t-1* for *t*: $E^{1}_{t-1}[R]$, (ii) the unexpected returns involved in forecast errors associated to *n* independent common factors ${}_{j}F_{t}$: $R_t - E^{1}_{t-1}(R) = \sum_{j=1}^{n} \beta_j \left[{}_{j}F_t - E^{1}_{t-1}(F_j) \right]$, and (iii) the unexpected returns resulting from the unexpected components of specific factors. These hypotheses allows to express the risk premium relating to the portfolio by a linear combination of *n* factors risk premium *j*, each partly providing an explanation for the premium, the weight ${}_{j}\beta$ representing the sensitivity of the portfolio to factor *j*:

$$z^{1}_{t} = E^{1}_{t}(R) - r^{1}_{t} = \sum_{j=1}^{n} {}_{j}\beta \left(E^{1}_{t}({}_{j}R) - r^{1}_{t} \right) \qquad [6]$$

where ${}_{j}R$ is the return on factor *j* mimicking the considered portfolio, and where $(E^{1}_{t}({}_{j}R) - r^{1}_{t})$ represents the factor risk premium *j* for the following period, namely the risk premium of the portfolio if only factor *j* is involved.

According to this approach, the common factors of risk premia will not be identified by the theory, but by empirical analysis. Most studies concerned with APT estimate *unconditional* risk premia and put into evidence the influence of macroeconomic factors such as industrial production growth rate, spread of interest rates and stock market returns (among others, see Roll and Ross (1980), Chen, Roll and Ross (1986) and Elton, Gruber and Mei (1994)). Using a *conditional* APT model implying time-varying risk premia, Kryzanowski, Lalancette and To (1997) confirm that several macro-factors determine the premia for a set of 130 mutual funds equities on the Canadian market: these factors are a US and Canadian composite index of leading indicators, the Canada/US exchange rate, exports, lagged industrial production, shape of the interest rates term structure and the market factor. During the first step in the estimation procedure, they estimate the β_j coefficients by regressing the innovations of returns - i.e. their unexpected values - on the innovations of the macroeconomic factors. The second step consists in regressing time varying excess returns on the values of β_j with time-varying parameters representing risk premia related to each factor. According to this approach, the total risk premium is *endogenously* determined at any date by summing the *n*-independent factors risk premia. Note that these APT empirical tests require the REH to specify expected stock returns, so they jointly test the APT and the REH. Fortunately, the use of exogenous expectations reported by experts' survey data gets round this drawback.

With respect to this approach, one advantage of survey forecasts is that we can *exogenously* determine the total risk premium *per date* values. Consequently, common factors can be directly identified by estimating the relative importance of each one of them for the total risk premium. Supposing each factor risk premium *j* to be proportional to a given variable ${}_jF_t$ by coefficient ${}_ja$, the risk premium z_t^1 may be written as a linear combination of *n* independent variables, each of them weighted by the composite coefficient ${}_jb = {}_j\beta\, {}_ja$. Moreover, at time *t* any agent may refer to two types of "*common factors"*. The first ones express expert' opinions about the future state of the economy through expected macroeconomic variables. From a more standard perspective, the second type of common factors consists in macroeconomic variables observable by all agents. We will call "*idiosyncratic common factors*" (${}_jY_{i,t}$) the first set of common factors consisting in individual forecasts, whereas the other set corresponds to "*macroeconomic common factors*" (${}_jX_t$).

Finally, the equation of the *n*-factors risk premium required by expert *i* is as follows:

$$z^1_{i,t} = \sum_{j=1}^{m} {}_j b \; {}_j X_t + \sum_{j=m+1}^{n} {}_j b \; {}_j Y_{i,t} \qquad [7]$$

4.2 - Lessons from econometric analysis

On the basis of equation [7], the econometric equation used to model forward premia is the following:

$$z^f_{i,t} = \sum_{j=1}^{m} {}_j b \; {}_j X_t + K \; Crash_t + {}_{m+1} b \, \Delta q^1_{i,t} + {}_{m+2} b \, \Delta q^f_{i,t} + {}_{m+3} b \, \Delta I^1_{i,t} + {}_{m+4} b \, \Delta I^f_{i,t} + Cst + \varepsilon_{i,t}$$

[8]

where *j*-indexed exogenous variables stand for macroeconomic common factors ${}_j X_t$ (see *table 1* for notations of variables), whereas *i*-indexed exogenous variables represent idiosyncratic common factors ${}_j Y_{i,t}$ consisting in individual forecasts in production growth and inflation. $Crash_t$ is a dummy variable introduced to capture the specific impact of the October 1987 stock market crash, and K is its associated parameter.

The three-dimensional (agents and variables by date) matrix that reports the answers given by the 262 experts over the 83 semesters during the sample period is quite hollow, with 83% of missing values. This is because that over the 42 years covered by the sample period, there is a natural attrition phenomenon concerning experts since some enter the panel whereas others leave it. Although recent econometric methods would help deal with incomplete panel data, the number of missing values is here far too high to apply them accurately. That is why we have estimated equation [8] using OLS on pooled individual data for each group of experts.

In fact, the OLS method may induce biases due to some correlation between error terms. To address this question, we have attempted to measure this correlation for a subsample of experts observed during the *same* time period. To do so we have selected the longest *full* panel data - i.e. with no missing value - we could set up over the whole sample period. We found that 12 experts with various professional affiliations regularly responded to all the surveys over the 32 semesters covering the period from

December 1952 to December 1968. For each of the 12 files reporting expert's data, we made an OLS estimation of equation [8] and retrieved the 12 residual vectors. We then computed the correlation between the 66 different pairs of these 12 time series. The mean coefficient of correlation is about 0.19 and only 8% of these coefficients appeared to be significantly different from zero at the 5% level. Therefore, controlling for time and individual effects, the correlation between residuals appears to be rather weak. Consequently, to all intents and purposes, there is no serious estimation bias induced by pooling individual data.

For *a given group of experts* selected according to professional affiliation, ***Table 4*** shows that the *forward* risk premia depend both on idiosyncratic and macroeconomic common factors as defined above.[11]

[Insert table 4]

In keeping with experts' personal forecasts, the following four idiosyncratic common factors concern industrial production and inflation:

(i) *Forecasts about the industrial production growth* rate: the one semester ahead growth rate has an intuitive negative sign due to a transitory increase in corporate profits and households' real income. Conversely, the forward expected rate - i.e. for time-span [$t+1$, $t+2$] - appears to have a positive influence on premia. This result suggests that a high and sustained economic growth is understood as seemingly conducive to inducing a rising uncertainty over the duration of this trend so that beyond a certain threshold, a downward turning point is likely.

(ii) *Expectations about the inflation rate*: the forward expected inflation rate has a positive influence on premia. This result may be interpreted according to two mechanisms: a wealth effect and a monetary policy effect. In the first instance, the greater the expected inflation rate, the lower the expected *real* values of assets, inducing higher required risk premia. For the second effect, long-lasting inflation may increase the likelihood of a restrictive monetary policy, which drives up premia. However, contrary to what happens with industrial production, the one semester ahead expected rate has no significant impact on risk premia.

Table 4 shows that heterogeneity across experts is captured in equation [8] through the parameters b_j, which are group-dependent, and through the idiosyncratic common factors that are agent-dependent. As shown later (cf. *table 5*), the coefficients of these macroeconomic and idiosyncratic common factors notably vary among experts themselves, and these results broaden our understanding of the sources behind *ex-ante* premia heterogeneity.

Now, let us turn to the significant macroeconomic common factors:

(i) Indicators expressing uncertainty make up the first set of variables. First, and with an expected negative influence, the Consumer Sentiment Index devised by the Survey Research Centre at the University of Michigan shows how much or how little economic and financial confidence households have. Second, the volatility of stock returns has the expected positive sign. Third, the positive influence of the stock price expectations heterogeneity indicator suggests that for a given agent, the more he/she perceives a high dispersion within other agents' forecasts, the more likely he/she will be to consider his/her own expectations to be uncertain, inducing a higher required value for the risk premium. This last result shows that, at the individual level, experts are influenced by other agents‘ forecasts, suggesting mimetic behaviour.

(ii) A second set of variables is made up of indicators describing *observed* macroeconomic situation, namely, inflation and production growth rate over the previous semester. The negative impact of the industrial production growth rate is in accordance with the influence of one semester ahead individual expectations: the higher the previous semester growth rate, the lower the required premia. The same but weaker effect becomes obvious for inflation: the higher the previous semester inflation rate, the lower the required premia. We also have introduced its squared value in order to represent the optimal inflation rate hypothesis, that is an inflation rate minimizing the risk premium, all other effects being given.[12] At the 10% level, this hypothesis only applies to the whole sample: when inflation exceeds 5.5% a year,[13] the required premia increase. Under that threshold, increasing inflation leads to a decrease in premia.

This may be interpreted in the light of the monetary policy: if expected inflation exceeds the target set by the Central Bank, and if its reaction function is known - e.g. the well-known Taylor rule - investors will anticipate a restrictive policy that will lead to higher required premia.

(iii) Finally, a dummy variable taking the value 1 for the December 1987 survey, and 0 otherwise, captures the major stock market Crash that occurred in October 1987. The negative impact of the crash seems rather intuitive: according to the financial press, with experts stating that stock prices were much above their fundamental value, a crash was likely. After it occurred, experts thought that stock prices had gone back to their fundamental value, which made a future decrease of stock price unlikely, and this finally led them to lower their required risk premia.

Overall, the significant discrepancies between estimates depending on experts' affiliation appositely show that the relevant macroeconomic and idiosyncratic factors join together in accounting for heterogeneity from professional affiliation, as can be seen in *figure 3*. Moreover, the influence of the same set of factors over the different groups explains the correlation between groups' premia shown on *table 3*.

Obviously, the linear combination involving the macroeconomic common factors plus the intercept implicitly gives mean risk premia per date estimations.[14] In fact, going on the assumption that the Livingston panel depicts the market accurately, the comparison between actual and fitted values of the mean risk premia for the full sample (***figure 4***) shows that the macroeconomic common factors adequately represent the dynamics of *ex-ante* market risk premia.

[Insert figure 4]

Finally, in order to assess just how important *ex-ante* premia heterogeneity is between experts, we selected the 26 agents (10% of the total) who uninterruptedly replied to the Livingston survey for *at least* 15 years. After that, we estimated equation [8] on each of the 26 corresponding individual time series data reporting the answers for at least 30 semesters. The results given on ***table 5*** show large discrepancies between estimates. As has been stated before, heterogeneity (see standard errors on *figure 1*) may be partly explained by discrepancies between experts' price and production expectations. Another major source of heterogeneity is that agents vary in their responsiveness to the same given information. An extreme case arises when the responsiveness to variables ${}_jX_t$ or ${}_jY_{i,t}$ is null for one agent but is highly significant for another one: experts, having various skills, use different types of information depending on its respective cost and accessibility. For most of the 26 agents, only a few variables summarise this information, generally two or three indicators selected from the previous set of variables. Among them**,** the prevalent ones are expected production trends - i.e. for semester *t* survey, forward growth rate over the time span [*t+1*, *t+2*] - the Consumer Sentiment Index, and typically, two indicators measuring market risk: stock returns volatility and stock price expectations heterogeneity.

[Insert table 5]

Overall, compared with the previous studies using the APT quoted above, our results confirm the influence of inflation and industrial production growth, represented by "*idiosyncratic common factors*" and "*macroeconomic common factors*". Moreover, the very significant influence of the "Consumer Sentiment Index", which is classified as a leading indicator by the NBER, confirms the influence of the leading indicators composite index that Kryzanowski et al. (1997) put into evidence.[15]

5 – Concluding remarks

The equity *ex-ante* risk premium is defined as the spread between the expected return on a portfolio of industrial stocks and the risk-free rate. The expected return on industrial stocks in the US stock market (S&P400 industrial index) can be inferred from surveys carried out by J. Livingston on a panel of experts for one and two semester's time-horizon, whereas the risk-free rate is given by zero coupon bonds with maturities in step with forecasts' time horizon. We computed about 3000 individual *ex-ante* risk premia over the period from 1952 to 1993. In respect of *ex-post* market premia analysed in the literature, these *ex-ante* premia offer the main advantage of being based on forecasts that use information available when the financial decisions are actually made. Moreover, *ex-ante* premia enable us to analyse risk premia at an individual level.

Three main conclusions may be drawn from our study. First, these *ex-ante* premia values seem closer to the predictions derived from the consumption-based asset pricing theory than the ones obtained for the *ex-post* premia. Second, professional affiliation, which is linked to experts' skills and concerns, appears to be a significant variable in sorting out the information used by forecasters to assess the required risk premia. Third, individual *ex-ante* premia depend both on macroeconomic and idiosyncratic common factors: the former are represented by a set of macroeconomic variables observable by all agents, and the latter by experts' personal forecasts about the future state of the economy, as defined by expected inflation and industrial production growth rate. Each of these factors partly explains heterogeneity due to experts' professional affiliation, and more generally, heterogeneity among agents.

These results shed light on the relevant sources of heterogeneity that must be taken into account to model the interdependence between investors operating on the stock market. Finally, our conclusions call for further investigations, especially in order to identify the dynamic relationship between *ex-ante* and *ex-post* risk premia. This topic will be dealt with at length in a forthcoming study.

Figure 1 - Mean, median, and standard-error of individual ex-ante risk premia

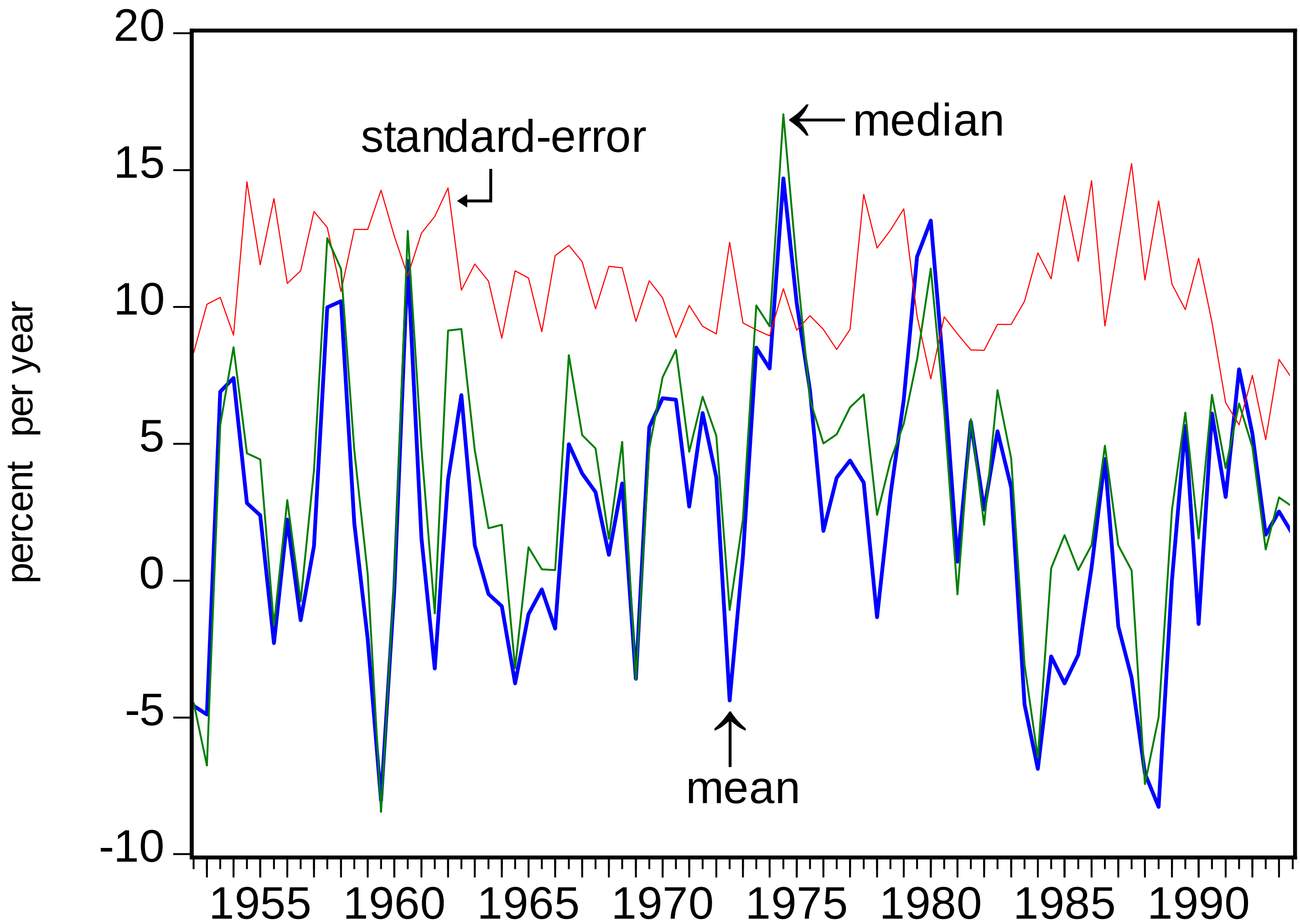

Figure 2 - The three components of individual risk premia mean values

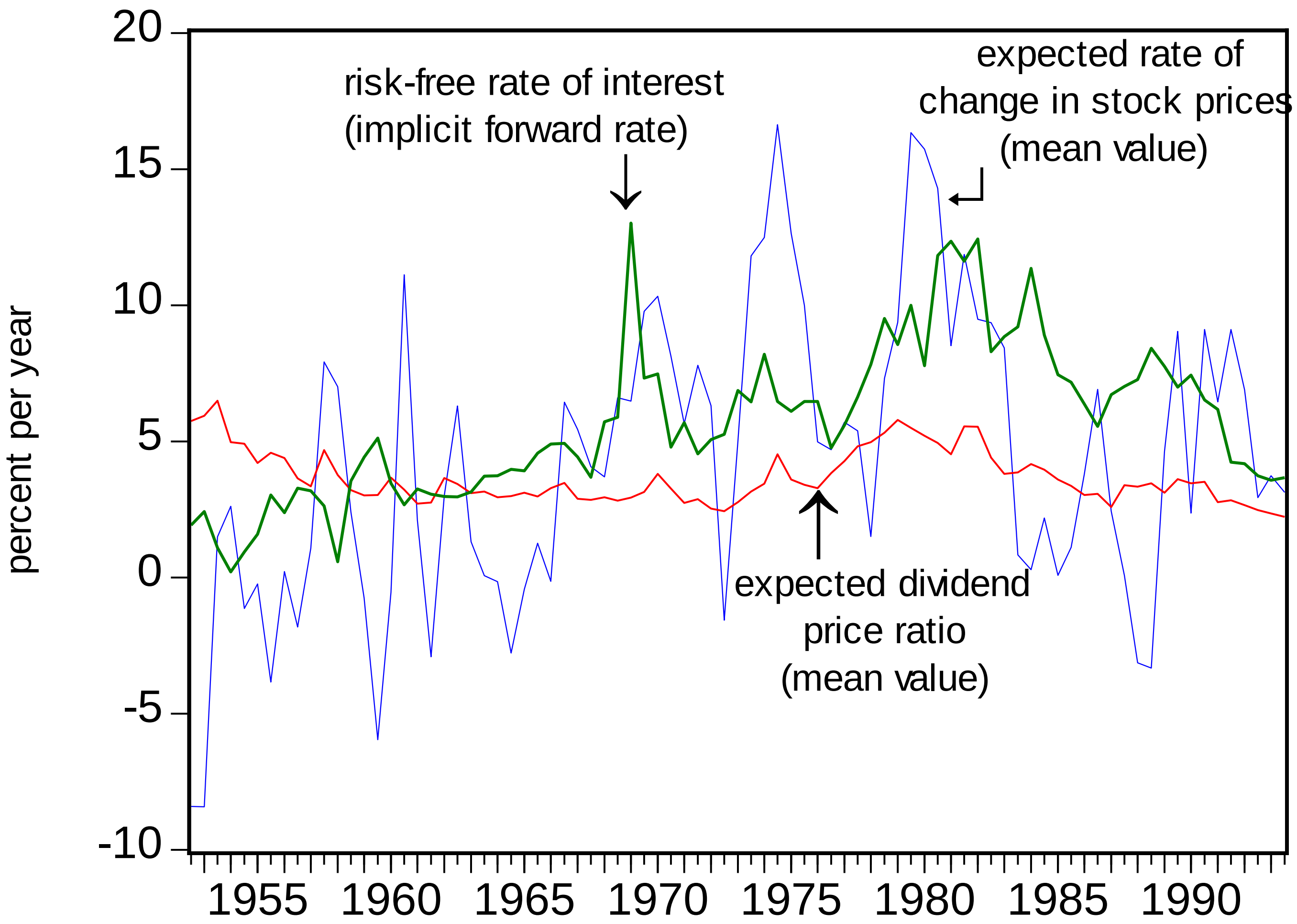

Figure 3 - Individual ex-ante risk premia mean values according to professional affiliation

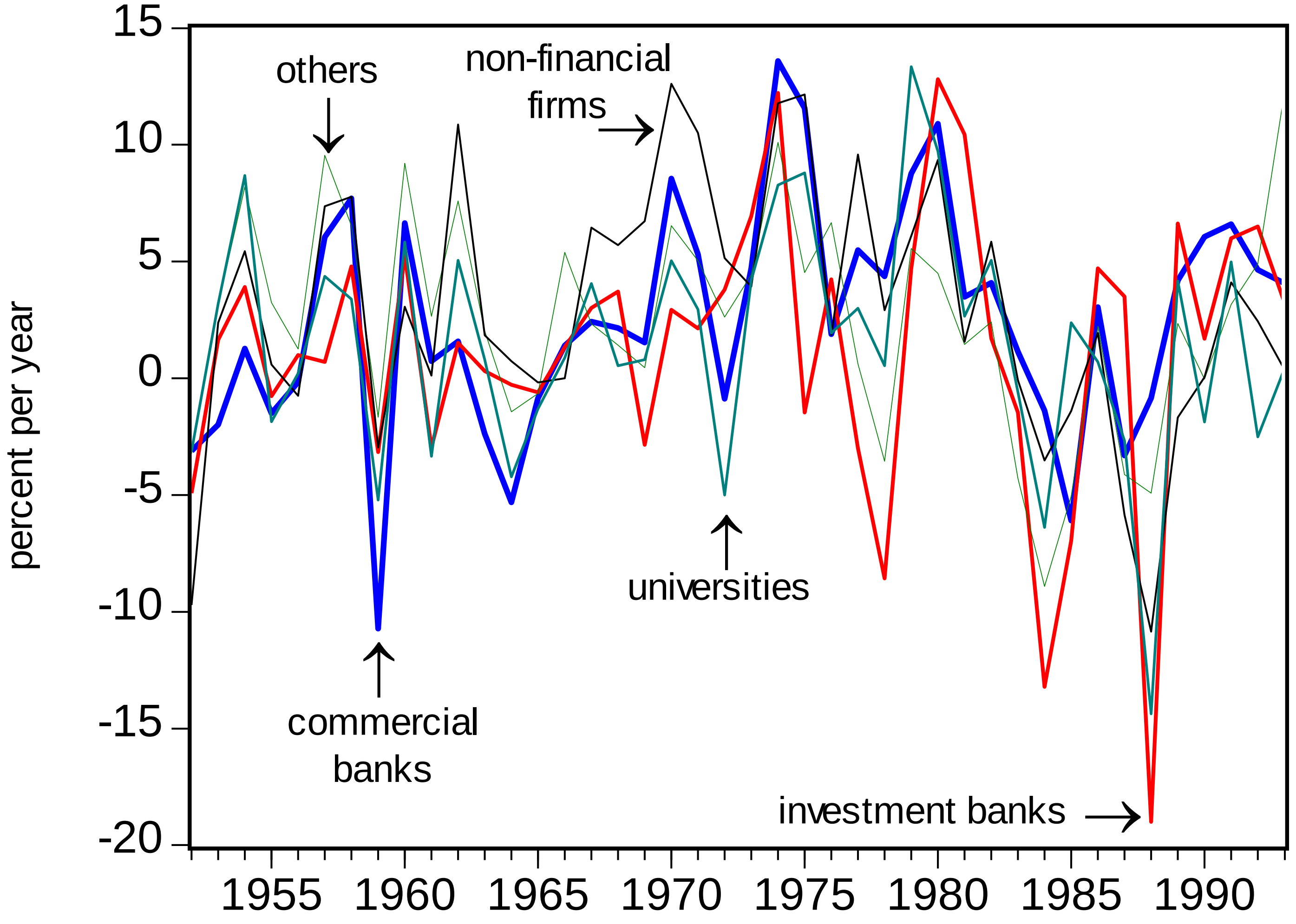

Figure 4 - Actual and fitted values of ex-ante risk premia mean values

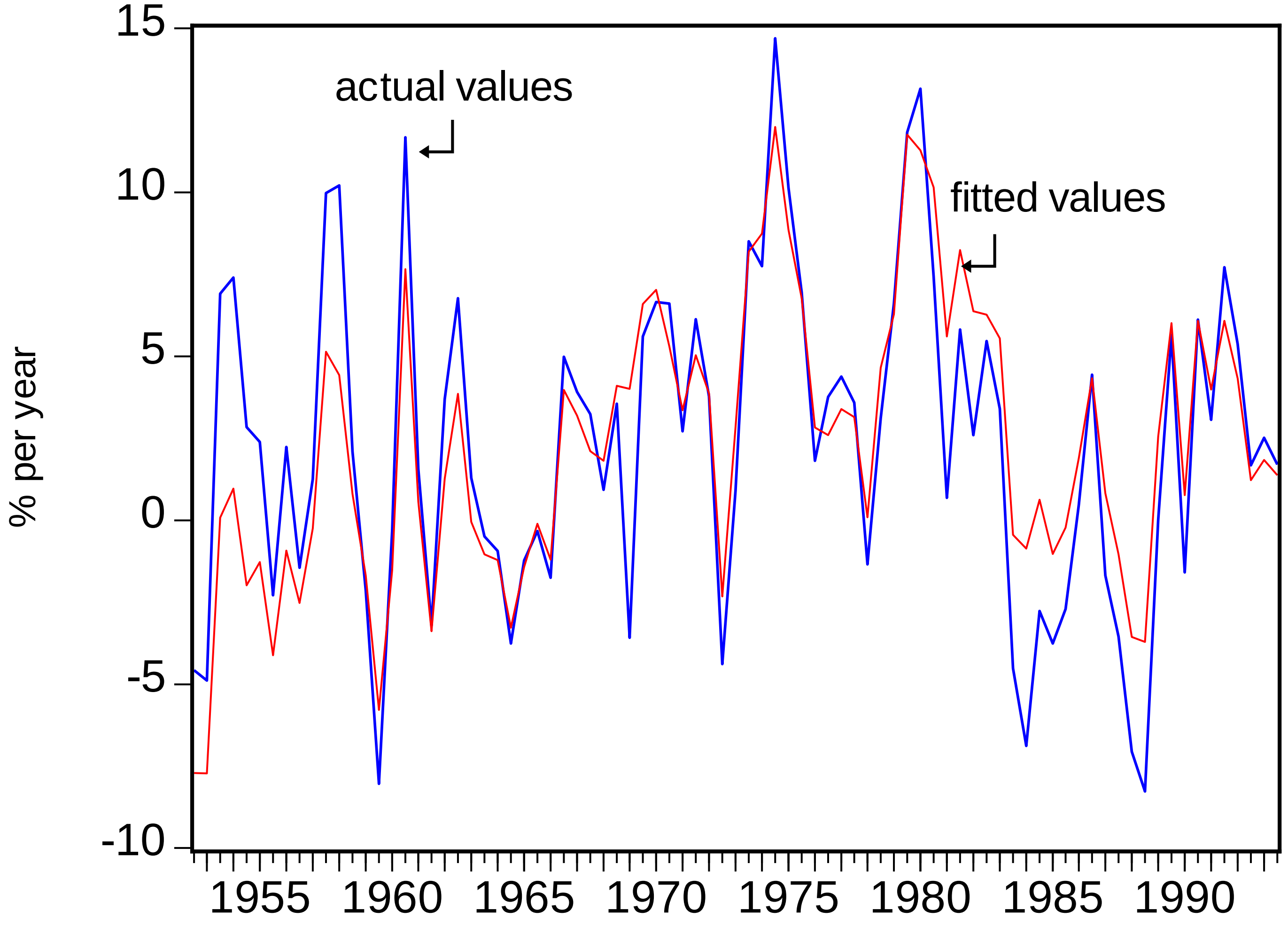

TABLE 1

Notations of variables

Dependant variable

$z^{f}_{i,t}(G)$: Forward *ex-ante* risk premium at time *t* for the semester time span [*t+1*, *t+2*], related to expert *i* pertaining to group *G*.

Exogenous variables

1 - Macroeconomic common factors $_jX_t$

S_t : Consumer Sentiment Index at time *t* (in log).

σ_t : Stock returns volatility: standard error over the four semester period [*t-4*, *t*].

$\Sigma_{t,1}$: Stock prices expectations heterogeneity indicator: at time *t*, ratio between the cross standard deviation and the consensus (mean) of stock price expectations one semester ahead.

q_t : Industrial production's growth rate observed during the previous semester [*t-1*, *t*].

I_t : Inflation Rate observed during the previous semester [*t-1*, *t*].

$Crash_t$: Impact of the October 1987 stock market crash: dummy variable with value 1 for the December 1987 survey, and 0 otherwise.

2 – Idiosyncratic common factors $_jY_{i,t}$

$\Delta q^1_{i,t} = E^1_{i,t}(q) - E^1_{G,t}(q)$: Industrial production's growth rate expected at time t for the time span [*t*, *t+1*] : spread between individual expectation and group *G* mean rate.

$\Delta q^f_{i,t} = E^f_{i,t}(q) - E^f_{G,t}(q)$: Forward industrial production's growth rate, expected at time t for the time span [*t+1*, *t+2*]: spread between individual expectation and group *G* mean rate.

$\Delta I^1_{i,t} = E^1_{i,t}(I) - E^1_{G,t}(I)$: Inflation rate expected at time t for the time span [*t*, *t+1*]: spread between individual expectation and group *G* mean rate.

$\Delta I^f_{i,t} = E^f_{i,t}(I) - E^f_{G,t}(I)$: Forward inflation rate expected at time t for the time span [*t+1*, *t+2*]: spread between individual expectation and group *G* mean rate.

TABLE 2

Individual *ex-ante* risk premia $z_{i,t}^{f}$: mean, median and standard deviation according to expert's professional affiliation

Period: December 1952 - December 1993

% per year

Group	*N*	Frequency (%)	Mean (m)	Median (μ)	Standard-deviation (σ)
Universities	709	23.8	2.03	4.01	12.26
Commercial Banks	772	25.9	2.34	4.03	12.08
Non Financial Firms	598	20.0	2.50	3.88	10.82
Investment Banks	419	14.1	1.55	4.60	13.66
Others	483	16.2	2.85	3.89	10.40
Total	2981	100	2.27	4.04	11.86

TABLE 3

Matrix of coefficients of determination r^2 between mean values of *ex-ante* risk premia according to expert's professional affiliation

Period: December 1952 - December 1993

	$\bar{z}_t^f(U)$	$\bar{z}_t^f(C)$	$\bar{z}_t^f(N)$	$\bar{z}_t^f(I)$	$\bar{z}_t^f(A)$
$\bar{z}_t^f(U)$	1	0.441	0.529	0.415	0.381
$\bar{z}_t^f(C)$		1	0.464	0.254	0.343
$\bar{z}_t^f(N)$			1	0.253	0.380
$\bar{z}_t^f(I)$				1	0.432
$\bar{z}_t^f(A)$					1

$\bar{z}_t^f(G)$: Vector of risk premia mean values for experts affiliated to group *G*, namely:

U: Universities, *C*: Commercial Banks, *N*: Non-financial firms, *I*: Investment Banks, *A*: Others.

TABLE 4

Macroeconomic and idiosyncratic common factors of *ex-ante* risk premia for each group OLS estimation of equation [8] over period December 1953 – December 1993

$$z^{f}_{i,t} = \sum_{j=1}^{m} {}_{j}b \; {}_{j}X_{t} + K \; Crash_{t} + {}_{m+1}b \, \Delta q^{1}_{i,t} + {}_{m+2}b \, \Delta q^{f}_{i,t} + {}_{m+3}b \, \Delta I^{1}_{i,t} + {}_{m+4}b \, \Delta I^{f}_{i,t} + Cst + \varepsilon_{i,t}$$

I – MACROECONOMIC COMMON FACTORS ${}_{j}X_{t}$

	S_t	σ_t	Σ_1	q_t	I_t	I_t^2	$Crash_t$	Cst
U	-11.65	0.05	0.44	-0.21	-0.40	0.04	-12.73	49.11
	(1.9)	(1.3)	(3.1)	(3.8)	(1.2)	(1.4)	(4.0)	(1.8)
C	-14.53	0.06	0.16	-0.21	0.22	0.004	-4.15	64.24
	(2.7)	(1.5)	(1.0)	(3.6)	(0.7)	(0.1)	(1.9)	(2.6)
N	-10.81	0.12	0.38	-0.19	-0.45	0.03	-14.29	46.57
	(2.2)	(3.3)	(2.6)	(3.5)	(1.5)	(1.1)	(6.5)	(2.1)
I	-9.52	0.09	-0.17	-0.10	-0.22	0.06	-13.7	45.46
	(1.1)	(1.4)	(0.8)	(1.1)	(0.5)	(1.3)	(3.0)	(1.1)
A	-14.04	0.05	0.62	-0.11	-0.18	-0.04	-9.80	59.14
	(2.5)	(1.3)	(4.0)	(2.0)	(0.6)	(1.1)	(3.5)	(2.3)
Full sample	-12.58	0.07	0.31	-0.17	-0.22	0.02	-9.56	54.8
	(4.7)	(3.7)	(4.3)	(6.4)	(1.6)	(1.7)	(7.8)	(4.5)

II – IDIOSYNCRATIC COMMON FACTORS ${}_{j}Y_{i,t}$

GROUP	$\Delta q^{1}_{i,t}$	$\Delta q^{f}_{i,t}$	$\Delta I^{1}_{i,t}$	$\Delta I^{f}_{i,t}$	$\overline{R}^{2}$	*RMSE* %	***N***
U	-0.01	0.98	0.03	0.53			
	(0.1)	(9.8)	(0.2)	(2.4)	0.239	10.70	708
C	-0.03	0.57	0.01	0.34			
	(0.3)	(4.7)	(0.0)	(1.0)	0.134	11.25	771
N	-0.02	0.91	0.36	0.43			
	(0.3)	(8.3)	(1.4)	(1.3)	0.230	9.49	597
I	-0.07	0.72	-0.70	1.02			
	(0.5)	(4.7)	(1.9)	(2.7)	0.119	12.84	418
A	-0.31	0.73	-0.08	0.46		9.31	482
	(3.9)	(7.7)	(0.4)	(2.1)	0.199		
Full sample	-0.09	0.79	-0.03	0.31			
	(2.5)	(17.3)	(0.3)	(2.7)	0.101	10.24	2976

(1) *Student* values are reported in brackets under estimates.
(2) Estimation based on the full sample of individual risk premia including dummy variables supposed to capture a specific additive group effect shown to be non significant at the 5% level.

TABLE 5

Factors involved in *ex-ante* risk premia: OLS estimation of equation [8] For each expert in a 26 agents sub-sample

ECON	GROUP	FIRST	NOBS	LCS	VOL4	DISP1	OIP1	OINF1	OINF**2	CRASH	EIP1	EIPF	EINF1	EINFF	CST	RSQ	RMSE
14	A	52.2	59	20.73	0.18	-0.03	-0.09	-0.35	0.10	.	-0.02	0.46	-0.45	-0.41	-92.71	0.52	4.53
			.	2.17	3.65	.	.	.	2.59	.	.	4.52	.	.	2.11	.	.
27	A	52.2	49	-14.28	0.01	0.15	-0.07	-0.34	-0.01	.	-0.25	0.04	0.09	0.21	69.67	0.07	5.85
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	A	54.2	35	-49.18	0.08	1.96	0.15	-2.34	0.06	.	-0.35	2.16	-0.71	-0.23	208.23	0.54	12.50
			.	.	.	2.47	.	.	.	.	.	2.90	.	.	.	.	.
187	A	71.2	40	-4.98	0.07	0.11	0.05	-0.73	0.04	-3.56	-0.79	0.42	0.16	0.14	24.25	0.36	4.37
			.	.	.	.	.	.	.	.	2.92	1.66	.	.	.	.	.
22	C	52.2	34	-1.52	-0.43	1.81	-0.10	-2.10	0.68	.	0.10	-1.36	2.03	-2.47	-15.87	0.33	12.95
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
64	C	52.2	36	-53.69	0.04	-0.01	-0.18	0.81	-0.17	.	0.25	0.74	-0.41	0.65	246.95	0.45	7.56
			.	1.84	.	.	.	.	.	.	.	1.93	.	.	1.83	.	.
72	C	52.2	40	14.61	-0.06	-0.57	-0.46	-0.59	0.17	.	-0.15	0.78	0.72	0.98	-57.96	0.19	15.61
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
87	C	53.2	38	-57.74	0.20	0.62	0.26	-1.69	0.00	.	-0.50	0.15	0.28	0.01	259.04	0.28	10.76
			.	1.65	.	.	.	.	.	.	.	.	.	.	.	.	.
116	C	59.1	45	-14.07	0.11	0.53	-0.27	1.15	-0.08	.	-1.08	1.20	0.47	-1.28	57.93	0.61	6.46
			.	.	.	.	1.90	.	.	.	2.67	2.45	.	.	.	.	.
136	C	62.2	54	-8.80	0.25	0.19	-0.30	-1.04	0.04	-5.32	0.36	1.30	0.32	1.50	40.95	0.46	6.67
			.	.	2.79	.	.	.	.	.	.	1.94	.	.	.	.	.
57	I	52.2	31	-25.38	0.55	-1.06	0.33	1.19	-0.32	.	-0.36	1.14	0.82	0.45	121.43	0.48	11.04
			.	.	2.12	.	.	.	.	.	.	1.90	.	.	.	.	.
97	I	55.2	34	-28.38	0.22	-0.20	-0.16	-0.62	-0.11	.	-0.17	1.61	-1.89	2.94	134.51	0.58	6.93
			.	.	.	.	.	.	.	.	.	3.02	.	2.21	.	.	.
134	I	62.2	34	-6.29	0.09	0.35	0.09	-2.55	0.23	.	0.74	0.06	0.40	0.01	33.66	0.36	6.96
			.	.	.	.	.	.	1.87	.	1.81	.	.	.	.	.	.
28	N	52.2	73	-30.22	0.17	0.31	-0.07	-0.76	0.05	-20.38	0.06	1.65	-0.49	0.38	135.51	0.59	8.81
			.	1.91	1.83	.	.	.	.	3.39	.	6.29	.	.	1.86	.	.
58	N	52.2	30	-54.87	-0.38	0.30	0.21	-0.07	-0.18	.	0.11	-1.27	-4.17	0.13	244.14	0.30	10.39
			.	.	.	.	.	.	.	.	.	1.73	.	.	.	.	.
104	N	57.1	46	-41.74	0.11	-0.75	-0.10	-1.48	0.10	-17.84	0.48	0.25	0.42	-0.57	203.35	0.60	7.78
			.	2.34	.	.	.	.	.	2.27	.	.	.	.	2.41	.	.
51	U	52.2	34	-37.22	0.13	-0.88	-0.07	0.43	-0.13	.	0.04	0.47	-1.33	1.87	181.41	0.31	7.90
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	U	52.2	34	-81.80	-0.93	2.21	0.17	-1.37	-0.10	.	-1.07	1.59	2.30	2.03	344.00	0.62	15.95
			.	.	2.09	.	.	.	.	.	2.04	2.41	.	.	.	.	.
75	U	52.2	58	4.12	0.09	1.55	-0.24	-1.59	0.14	.	-0.60	0.31	-0.31	1.30	-33.86	0.51	8.69
			.	.	.	3.64	.	2.06	.	.	2.15	.	.	.	.	.	.
101	U	55.2	42	-23.22	-0.01	0.28	-0.21	1.49	-0.18	.	-0.24	-0.28	-1.24	-0.39	105.27	0.21	11.03
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
106	U	57.1	41	3.00	0.01	-0.49	-0.47	-3.61	0.09	.	-0.43	0.02	0.08	-1.44	13.43	0.46	8.91
			.	.	.	.	2.58	1.91	.	.	.	.	.	.	.	.	.
118	U	59.1	49	5.06	-0.14	0.43	-0.27	0.75	-0.06	.	-0.10	0.20	0.00	-0.58	-24.85	0.09	8.99
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
126	U	61.1	53	23.65	0.03	0.79	-0.26	0.62	0.02	-6.21	-0.45	0.05	-0.54	1.00	-109.09	0.29	7.80
			.	.	.	1.90	.	.	.	.	1.69	.	.	.	.	.	.
156	U	67.1	33	1.83	0.04	-1.11	-0.23	-1.49	0.21	.	0.15	0.93	-0.54	0.82	10.00	0.45	7.57
			.	.	.	.	.	.	1.66	.	.	1.91	.	.	.	.	.
171	U	70.1	44	-28.92	-0.10	0.11	-0.10	0.48	-0.04	-12.48	0.27	0.86	0.56	0.59	125.86	0.42	8.43
			.	1.73	.	.	.	.	.	1.98	.	2.01	.	.	.	.	.
173	U	70.1	41	-43.96	0.19	0.75	0.18	-3.48	0.26	-12.46	-0.83	0.00	-1.26	-1.73	192.42	0.56	10.67
			.	1.70	.	.	.	.	.	.	1.88	.	.	.	.	.	.

Note: *t* Student values are reported in brackets only under estimates significant at the 10% level.

Legend: ECON: Expert's number; GROUP: Expert's professional group; FIRST: first observation ("year - semester") for expert's survey participation; NOBS: number of observations; LCS = S_t ; VOL4 = σ_t ; DISP1 = $\sum_{t,1}$; OIP1 = q_t ; OINF1 = I_t ; OINF1**2 = I_t^2 ; CRASH = $Crash_t$; EIP1 = $\Delta q_{i,t}^1$; EIPF = $\Delta q_{i,t}^f$; EINF1 = $\Delta I_{i,t}^1$; EINFF = $\Delta I_{i,t}^f$; CST : constant term ; RSQ =R**2 ; RMSE : root of mean square error.

REFERENCES

Abou A. and Prat G. (1997), A propos de la rationalité des anticipations boursières : quel niveau d'agrégation des opinions?, *Revue d'Economie Politique*, 5, 647-69.

Abou A. and Prat G. (2000), Modelling stock price expectations: lessons from micro data, in Price Expectations in Goods and Financial Markets, Gardes and Prat Editors, London: Edward Elgar, 313-46.

Barberis N. (2000), Investing for the long run when returns are predictable, *Journal of Finance, 55, 1, 225-64*.

Benartzi S. and Thaler R. (1995), Myopic loss aversion and the equity premium puzzle, *Quarterly Journal of Economics*, 110, 73-92.

Campbell J.Y. and Cochrane J.H. (1999), By force of habit: a consumption-based explanation of aggregate stock market behaviour, *Journal of Political Economy*, 107, 21, 205-51.

Cechetti S.G., Lam P.S. and Mark N.C. (2000), Asset pricing with distorted beliefs: are equity returns too good to be true?, *American Economic Review*, 80, 787-805.

Chen N.F., Roll R. and Ross S. (1986), Economic forces and the stock market: testing the APT and alternative asset pricing theories, *The Journal of Business*, 59, 383-403.

Croushore D. (1997), The Livingston survey: still useful after all these years, *Federal Reserve Bank of Philadelphia Business Review*, March-April, 1-12.

De Santis G. and Gerard B. (1997), International asset pricing and portfolio diversification with time-varying risk, *Journal of Finance*, 52, 1881-1912.

Elton E.J, M.J Gruber and J Mei (1994), Cost of capital using Arbitrage Pricing Theory: a case study of nine New York Utilities, *Financial Markets, Institutions and Instruments*, 3, 46-73.

Fama E.F. and French K.R. (2002), The equity premium, *Journal of Finance,* 57(2), 637-59.

French K.R., Schwert G.W. and Stambaugh R.F. (1987), Expected returns and volatility, *Journal of Financial Economics,* 19, 3-29.

Kocherlakota N.R. (1996), The equity premium: It's still a puzzle, *Journal of Economic Literature*, Vol 34, 42-71.

Kryzanowski L., Lalancette S. and To M.C. (1997), Performance attribution using an APT with pre-specified macro factors and time-varying risk premia and betas, *Journal of Financial and Quantitative Analysis*, 32, 2, 205-24.

Lakonishok J. (1980), Stock market returns expectations: some general properties, *Journal of Finance*, 35(4), 921-30.

Lintner J. (1973), Inflation and common stock prices in a cyclical context, NBER, Inc. 53 Rd Annual Report, N-Y, 23-36.

Lucas R.E. (1978), Asset prices in an exchange economy, *Econometrica*, 46, pp.1429-45.

Mehra R. (2006), *Equity Risk Premium*, Handbook of Investments, 12 Chapters, R.Mehra Ed., Elsevier.

Mehra R. and E. Prescott (1985), The equity premium: a puzzle, *Journal of Monetary Economics*, 15, 145-61.

Mpacko-Priso A. (2001), *La prime de risque des actions, Théories et Applications*, Dianoïa, Paris.

Park C. (2006), Rational beliefs or distorted beliefs: equity premium puzzle and micro survey data, *Southern Economic Journal*, 72, 677-89.

Prat G. (1996), Le modèle d'évaluation des actions confronté aux anticipations des agents informés, *Revue Economique*, 1, 85-110.

Prat G. (2001), Une analyse de la dynamique des primes de risque des actions suivant l'horizon de placement, *Revue d'Economie Politique*, 2, 291-329.

Roll R. and Ross R.A. (1980), An empirical investigation of the Arbitrage Pricing Theory, *Journal of Finance*, 35, 1073-1103.

Ross S. (1976), The Arbitrage Pricing Theory of capital asset pricing, *Journal of Economic Theory*, 13, 341-60.

NOTES

[1] We wish to thank the two anonymous referees whose comments improved substantially this paper.

[2] For any stockholder, the risk premium required to hold stocks, rather than a risk-free asset, classically depends both on the agent's risk aversion and on his/her appreciation of how uncertain the state of the nature is.

[3] Let, for the investor i, $Q_i\ (s)$ be his/her demand for stocks and $Q_i\ (r)$ his/her demand for the risk-free asset. These magnitudes depend on the spread between his/her required *ex-ante* premium z_i and the market excess return z_m. At any time, $Q_i\ (s)$ and $Q_i\ (r)$ are such that $\frac{dQ_i(s)}{dt} = -\frac{dQ_i(r)}{dt} = \lambda_i\ (z_m - z_i)$, where $\lambda_i > 0$ represents the weight of the agent i : the larger λ_i is, the greater the amount is for the transactions for a given value of $z_m - z_i$. When $z_m > z_i$, agent i sells the risk-free asset and buys stocks ($\frac{dQ_i(s)}{dt} > 0$; $\frac{dQ_i(r)}{dt} < 0$) whereas when $z_m < z_i$, agent i sells stocks and buys the risk-free asset ($\frac{dQ_i(s)}{dt} < 0$; $\frac{dQ_i(r)}{dt} > 0$). If N investors having the same weight intervene on the market, the equilibrium, reached when for the two assets, supply matches demand at the aggregate level, is defined by the condition $\sum_{i=1}^{N} \frac{dQ_i(s)}{dt} = 0$ or, equivalently, $\sum_{i=1}^{N} \lambda_i\ (z_m - z_i) = 0$. This last equation leads to the equality between the market excess return and the weighted average of *ex-ante* individual premia, that is $z_m = \sum_{i=1}^{N} \lambda_i z_i \Big/ \sum_{i=1}^{N} \lambda_i$, which implies that, when the equilibrium is reached, the market excess return equals the *ex-ante* market premium. Note that when all agents have the same weight ($\lambda_i = \lambda\ \forall\ i$), we obtain $z_m = \frac{1}{N} \sum_{i=1}^{N} z_i$: the market *ex-ante* premium is a simple arithmetic average of individual *ex-ante* premia.

[4] For instance, according to the naive process hypothesis, the expected return equals the return observed during the last period. However, as suggested by Abou and Prat (2000), the three traditional expectation processes: extrapolative, adaptive or regressive, may also be assumed in a more general model mixing them.

[5] Note that in his new book, Mehra (2006) does not refer to any approach of risk premia based on survey forecasts. Moreover, the four references given by Park (2006) referring to survey data do not model *ex-ante* premia, but inflation or stock prices expectations.

[6] The Sharpe ratio is defined as the ratio between the mean risk premium over the period and the standard deviation of the expected return of stocks. To check the distorted expectation hypothesis for the Livingston panel data, the observed Sharpe ratio has to be greater than the corresponding theoretical value.

[7] After the death of J. Livingston in 1989, the Philadelphia Federal Bank managed the survey. Croushore (1997) provides a survey of studies using the Livingston panel.

[8] Cf. the online documentation from the Bank of Philadelphia web site, August 1992 page 5, and July 1997 p.2, (variable SPIF). For the 1989-02 and the 1990-01 surveys, observed and expected indexes both relate to the 400 index.

[9] This premium may be viewed as the 1-semester ahead *expected* premium corresponding to a portfolio of industrial stocks held for one semester. The existence of a forward market for such a portfolio increases the relevance of the forward premium since the difference between the expected portfolio price and its forward price also defines the forward risk premium.

[10] For the *ex-post* premium, the variance of the stock prices rates of change is quite high compared to the dispersion of the two other components.

[11] We checked that, at the 10% level, the exogenous variables are not significantly correlated which is a condition for applying the APT.

[12] See Lintner (1973).

[13] We have: 0.22 / (2x 0.02) = 5.5 (% a year).

[14] Previous estimations of an equation explaining group-centred risk premia by only idiosyncratic common factors put into evidence that estimates relating to these variables are not significantly different from those given on table 4. This result indirectly confirms that the macroeconomic common factors taken into account give a valuable representation of the mean premia dynamics.

[15] Among the "*macroeconomic common factors*", we found that the interest rates term structure is not significant at the 5% level. Concerning the stock market returns, our results show that the volatility of returns, rather than the returns themselves, is a relevant factor explaining *ex-ante* premia.