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TO OUR READERS

This Special Issue addresses some of the major topics in corporate governance (capital structure, investments, portfolio performance, and risk assessment) that are of interest to investors, academics, and policy makers in the USA and around the world. We hope that the readers of this issue find much insight in the topics as we really enjoyed these papers. The Special Issue is based on papers presented at the Second World Finance Conference, held in Rhodes, Greece in the summer of 2011.The research presented in this issue covers evidence on these finance topics from many countries including the USA, Mexico, Chile and a subset of the newly democratic Eastern European countries.

We are slowly emerging from a major global financial crisis where it became evident that some of the tenets that we held to be true and beyond question need to be reconsidered. The crisis has forced us all to re-examine the role of financial institutions, credit availability, trading and market processes for their impacts on market stability, portfolio management and asset valuations.

We were witnesses to some of the most horrific collapses, where institutions that were previously viewed as "rock solid" failed. As market values of assets cratered, the Federal Reserve Bank and other regulatory authorities, both in the USA and around the world, had to step in to rescue both their own domestic corporations as well as international corporations. In many instances they did this by extending credit, providing market liquidity and altering trading practices and margin rules, as market speculators and short sellers were targeted for blame. Some firms emerged unscathed from the financial rubble and it was clear that they owed their survivals to the quality of their management and governance structures.

Fooladi and Rumsey address the issue of how to measure performance in portfolios where returns are reported by asset classes. They separate performance that is attributable to good individual asset selection and weight allocation from that which is merely due to luck and market timing. Wingender, Pettengill and Gondhalekar discuss the role of speculative short sellers, the use of put options and their role in the weekend effect on stocks. They find no evidence to support the hypothesis that short sellers cause the weekend effect in stocks, nor evidence that bearish traders primarily use put options.

McKeon examines the expected return patterns for options that differ across maturities and strike prices. He notes the large negative expected returns of out-of-the-money calls and puts and discusses what needs to be relaxed in the Black-Scholes model's assumptions to have the theoretical relations match the observed empirical evidence. Maqueira, Espinosa and Vieito discuss and present evidence that in Chile operating performance is increasing in the degree of firm diversification, but decreasing in the amount of ownership concentration and in the percentage of fixed assets held by the corporation. Their results are robust across firm size and industry classifications.

Trevino and Alvarado-Rodriguez present evidence on the role of family control on Mexican company performance and find that family controlled firms outperform non-family controlled firms based on comparative evaluations of all analyzed profitability measures. Family firms are by definition examples of concentrated ownership so this research, like that of the work by Maqueira, Espinosa and Vieito, makes a case for concentrated ownership. Mateev and Ivanov in a study of SMEs (Small and Medium Enterprises), utilizing a panel data set covering 3,257 micro, small, and medium sized firms, covering 7 Central and Eastern European countries, find that the capital structures of these firms are determined by the pecking order theory of financing. Available evidence does not support the tradeoff theory of corporate financing. There is the suggestion from the available evidence that shorter term financing is preferred to longer term financing, but this might be simply a case that longer term financing is not available to these firms.

Finally, Montovani separates the basic sources of risk into different categories. Information, firm specific, industry specific and systematic risks are the key components identified and he develops a methodology for assessing these risks whether the markets are efficient or not. Comparisons with traditional risk premium measures are also made.

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The Information Risk Drivers: A Long-Term Analyis to Support a Risk Premia Modeling

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Information risk is an endogenous element of the market dynamics that can be independent from contingent levels of market efficiency. Being structural, it may require remuneration by a specific risk premia or by returns from specific portfolio strategies. Drivers of information risk are detected applying an original model to the case of the European Markets as traced by the Eurostoxx Index and an 18 industry index over 15 years of data. Results show that information risk may effectively affect financial markets' equilibrium both at systematic and industry-specific level, while determinants of the information risk are found to be used by long-term investors, stock pickers and market timers. Evidence from the paper supports financial communication policies for investor relation activities along with some change for Regulators.

Introduction

Risk may be unbundled into payoff risk and information risk (Allen and Gale, 1994), both parts of risk requiring a risk premium depending on risk aversion grade and competences in risk management (Mantovani, 1998). For any level of market efficiency, information risk may arise from: (i) the timing of the information spreading in the market (i.e. risk of information timing); (ii) a bias in risk-return estimations (i.e. risk of information error); and (iii) the ways of information transmission to the market (i.e. risk of financial communication). The three sources of information risk originate both at systematic and idiosyncratic level, defined by six information-risk classes (Bertinetti et al., 2004). A basic model of proxy

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estimation of information risk premia at systematic and idiosyncratic level has been developed (Mantovani, 2004) and tested referring to several firm-specific facts (Bertinetti et al., 2004). Links between information risk and risk aversion have been identified in a behavioural finance framework (Gardenal, 2007).

Investment policies are mainly based on original ways of dealing with asset classes; should information risk be an economic driver, such policies could be affected by the opportunity of profitable alternative investment rules dealing with risk classes and related risk aversions. Is it possible to generate positive performance by managing assets through rules manipulating the information risk premium? The research question in this study is to investigate possible drivers of the information risk to be used to fix an information-risk-premia model.

In section 1 the economics of information risk is compared with the more traditional approach of lack of market efficiency arising from information asymmetries. Section 2 shows a possible theoretical approach for modelling information risk and thus investigating it. Section 3presents an empirical analysis of the level of the information risk in the industries included in the European Stock Exchanges between 1992 and 2010, 1st quarter. In section 4 tests are conducted to discover possible drivers of the information risk by testing their correlation with possible drivers as suggested by section 3's results. Section 5 discusses the empirical evidence and proposes some conclusions about a model for pricing the information risk premia.

Market Efficiency, Information Asymmetries and Information Risk

Market equilibriums are based on expectations. Higher quantity of information generates higher quality of expectations, thus making financial markets a good instrument to allocate capital allowances. In standard financial market models, the inner problem is concerned with the quantity of information that is incorporated in asset prices given a certain set of existing information. Another very important subject is the quantity of traders having information at their disposal, thus defining information asymmetries. Fully efficient markets exist when the entire set of information is considered in price setting, so that information is available for any trader. Several degrees of efficiency can be found empirically according to the kind of information that is actually included in asset prices: weak forms are found when historical-only information is considered; semi-strong forms are found in the case of partial information inclusion; strong forms can be found if the entire information set is included.

From the seminal work of Fama (1970) stating the above framework for market efficiency analysis, several studies try to verify both the levels of efficiency that can be achieved in real markets and the conditions for markets to reach higher efficiency. Studying degrees of efficiency is of interest for regulators aiming to protect market investors, while deeper knowledge of market dynamics between different states of efficiency can help market traders to gain excess-return, both in long and short term.

De Bondt and Thaler (1985) suggest that stock markets tend to have endogenous overreaction so that historical level of excess return may infer future price trends. This being the case, a "contrarian strategy" may generate positive excess returns (alpha) for investors. Joining this approach with Fama's, efficiency is weak as far as the time correlation of excess return is concerned, while efficiency may be higher at a static time.

Fama and French (1988) suggest that stock returns are mean reverting, at least in long term, so that a stable Security Market Line (according to Capital Asset Pricing Model) can be found. Lo and MacKinlay (1988) suggest alternatives to random walk approach in terms of auto-correlated price path that can be used for gaining excess return.

Other authors try to study market efficiency related to specific classes of information getting available for the market. Basu (1977) shows the anomalies that can be generated by the Price-to-Earning ratio: companies with lower P/E tend to generate higher return for investors. Contrarian evidence is shown in Fama and French (1992) that fix the cross-section of the expected stock returns suggest a positive relationship between returns and P/E ratios. Asquith and Mullins (1986) and Masulis and Korwar (1986) investigate equity issues; equity issuing signals to the market information asymmetry so that the market price drops.

Some technical explanation may support the actual degree of market efficiency too. Lakonishok and Smitd (1988) find evidence of the relationship between seasonal effect and excess return that is well known by market timers. De Long, Shleifer, Summers and Waldmann (1990) show evidence that persistence in price gaps versus their fundamental values can be explained in terms of trade-off between costs and profit arising from market transaction.

The latest research focuses more on the availability of the entire information set and on the quality of information that can be available to traders. Efficiency is no more the simple "state of the market" but becomes more and more the "quality of the market". Fama (1991) shows that biases in return estimation due to incorrect (use of a) model may generate market inefficiency in terms of auto correlation of prices and signalling information arising from Price-to-Earning and Price-to-Book value ratios. This seminal Fama work refers to the process by which information is processed inside the markets: the same hypothesis we will start from. Still Fama (1998) tried to find a possible explanation to market inefficiency in terms of behavioural components that are found to be a casualty in the over/under reaction and the biases in estimations. In the same logical framework are Diether, Malloy, Scherbina (2002) stating that wide differences in analyst opinion can source lower return. Betinetti et al. (2004) demonstrate the existence of an information risk in financial markets due to sub-optimal standards in information spreading into the market that may generate over-volatility. They suggest that financial communication may generate contingent state of inefficiency and that governance models adopted may modify the impact of the information risk to market equilibrium.

In the standard Capital Asset Pricing Model, residuals of returns have zero expected value. In our approach we suggest that residuals should be split into two parts, the former having zero expected value (Fama's orthodox-1970 approach to market efficiency) and the latter having expected value that can differ from zero being explained by the drivers of the economic value of information (Fama's new post-1991 approach to efficiency).

We move from the idea that information is a dynamic component of the market that may affect market equilibrium independently from the efficiency status of the market. Extra-volatility can be either an indication of low-efficient market or the suggestion that markets are moving toward a new long-term equilibrium. The framework proposed by Bertinetti et al. (2004a) is the starting point for the analysis because it suggests that the volatility-gap is the best proxie for information risk detection. If the new information takes place in a fully efficient financial market a price jump will take place, as suggested in the following example:

Box 1–The Example

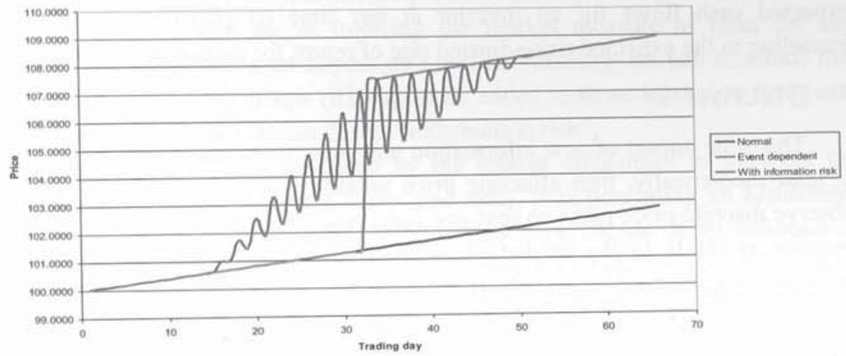
- Security X considered
- Expected yearly return from Security X = 10%
- Time considered = 66 trading days (i.e. three months)
- Expected daily return = 0.042%
- Initial price P_0 = 100.00
- Expected final price P_{66} = 102.7791 (=100x$1.10^{52/365}$)
- New information announced on closing day 33
- New information is firm specific, thus having no impact over expected return
- Abnormal return due to new information = +6%
- Newly expected final price P_{66} = 108.9433

In case of information risk relevance, the final price will be the fair one (i.e. in the long term any information asymmetry disappears) but:

- some traders might have information before the announcement, so that they will start negotiating Security X before others will do the same;
- some traders might undertake arbitrage trading strategies along its price path (e.g. strategies based on technical analysis), so that they will try timing the stock market buying Security X in a minimum and selling it after the expected full price-adjustment has taken place;
- some (even uniformed) traders may undertake market timing strategies, so that they will try to buy Security X at a spot minimum price to sell it at any maximum;
- some traders may act as "late comers", buying after the announcement in anticipation that the price will still go up.

In any case the volatility of Security X computed over a short period (i.e. 66 trading days in the example) will divert from volatility calculated over a (very) longer term, the latter being unaffected by short-term facts, as shown in the following representation. The actual sign (positive or negative) of volatility diversion will depend on the actual composition of traders according to the above mentioned classes. In the example we show the case of a positive gap in volatilities, due to over reactions in market prices and continuous revolving of classes in trading volume composition.

Figure 1–Theoretical vs. Actual Price Path of Security X



Box 2–Figures Resulting for the Example

	No information case (blue path in figure 1)	Information case with fully efficient markets (red path in figure 1)	Information case with Information risk (green path in figure 1)
Daily average return	0.0422%	0.1345%	0.1396%
Abnormal 66-days return (average):	0.0000%	0.0923%	0.0974%
New-information-driven:	0.0000%	0.0923%	0.0923%
Information-risk-driven:	0.0000%	0.0000%	0.0051%
Standard deviation:			
- of daily return over 66 days	0.0000%	0.7385%	1.2463%
- of daily return over 240 days	0.0000%	0.3857%	0.6487%
- of daily return over 480 days	0.0000%	0.2739%	0.4603%
- of daily return over T→∞	0.0000%	0.0000%	0.0000%
Abnormal 66-days volatility:	n.r.	0.7385%	0.7385%
New-information-driven:	n.r.	0.0000%	0.5078%
Information-risk-driven:			

i.e. detecting insights about the relation 0.0051% = f(0.5078%)

Box 2 shows numerical results based on the example hypothesis in box 1, according to price path depicted in figure 1. Bolded figures are the objects of our paper, since our main purpose is to infer the determinants of the information risk in order to support a model for establishing an information risk premium, if any. The next step is to attempt to model the relationship between the abnormal return, the cost of capital and the information risk level, by trying to infer the risk drivers from a very long period of time.

Modeling the Information Risk

In fully efficient financial markets new information is immediately incorporated to security prices. As depicted in equation (1), prices (P) equal the present value of expected cash flows for an investor at any time (t) [$E(CF_t)$], to be computed according to the expected risk-adjusted rate of return for that investment (k).

$$P = \sum E(CF_t)/(1+k)^t \quad (1)$$

The price impact of new information may arise from both items (i.e. CF_t and k), at least theoretically, thus affecting price volatility. At the empirical level we can observe discrete price paths so that any jump reflects new pieces of information that become available to the market. According to the above formula (1) the "new-information-generated-jumps" (IGJ) could be divided into the flow-driven ones (i.e. those arising from information that does impact on the expected level of cash flows) and the risk-driven ones (i.e. those arising from information that does impact the expected level of risk embedded in the cost of capital).

Any jump at time (t) generates an over-(abnormal)return [OrT = (IGJ)/P] for the investors so that the total short-term return (r) from the investment will differ from the equilibrium level (k) estimated in the CAPM or the APT models.

$$r = k + OrT \quad (2)$$

Being

$$k = R_f + \beta \times (ERP) \quad (3)$$

Where:
k = expected return for the investments
R_f = relevant risk free rate
β = beta of the investment
ERP = relevant equity risk premia.

Substituting equation (3) into equation (2) results in equation (4) for the total return at time (t).

$$r_t = R_f + \beta \times (ERP) + OrT \quad (4)$$

Actual level of r_t will be estimated in terms of total return from the investment. In the case of the price (P) being a return index, the equation for the ex-post return at time (t) is

$$r_t = (P_t - P_{t-1})/P_{t-1} \quad (5)$$

In the case of the price not being a return index, equation (5) has to be completed adding the current yield component, being it either a dividend or coupon yield.

Empirical measures of r using formula (5) and its volatility (σ_r) can help us to infer about the total investment risk only if the average impact of OrT is negligible (i.e. σ_{OrT} is next to zero) for the time horizon of the analysis. Should this being the case, covariance between r and the market-portfolio-r will perfectly track the level of β of the investment, thus let us inferring the market measure of risks for any investment. But when OrT does impact on r and its volatility, we can conclude that further drivers of the price jumps (IGJ) must be added to those related to flows and risks as included in (1). We define this as "information risk".

Information risk (IR) is generated by the market difficulties to intercept the correct levels of the expected cash flows and risks, thus generating an adjustment path of prices toward their fair value at stabilized expectations. After information spreading occurs, a price jump will arise each time the market becomes aware of over(under)estimates; but the jump itself is a new piece of information to be used by market traders. When the estimations of information spreading do not immediately adjust prices to fair values a new jump will take place.

The relevance of IR should be time sensitive, since the ratio between the number of jumps driven by IR and the total number of jumps is decreasing while the number of observed OrT is increasing. OrT impact over the average level of observed r_t is then time dependent: the longer is the time horizon "T" of the analysis, the lower is the impact, as reported in (5.5):

$$\lim_{T\to\infty} \frac{\partial \overline{r_t}}{\partial OrT} = 0 \qquad T>t>0 \quad (5.5)$$

where

$$\overline{r_t}$$

is the average return r_t observed in the time length T.

To find out an affordable proxie for IR, a time-length T must be fixed empirically. The wider the time horizon used for the empirical analysis of r, is the lower the information risk is expected to be, because the impact of the IR-driven-IGJ will be reduced. In narrow time horizons, instead, no dilution of the IR-driven-IGJ will take effect and volatility of r will be strongly affected. Volatility gaps between short- and long-term time horizons are the symptoms of IR existence, as they are both positive or negative.

- The case of IR>0 is symptomatic of a market overreacting in terms of jump frequency and absolute dimension, generating a positive gap between the volatilities, just like in the above example. This being the case, we should expect a positive IR-premia since the overreaction pre-announces possible fair levels of prices and risks.
- The case of IR<0 is also possible and shows the case of leakage of information spreading in the markets and agents acting as if lower-than-fair value exists. Jumps have both low frequency dimensions and generate under-reaction in volatilities, along with an increase in the return-to-risk ratio of the investment. In this case we should expect information traders to enter the market to gain excess return-to-risk through driving information to the market itself.

According to this framework we define a proxie of IR by calculating the standard deviation of r (as defined in equation 5) over two time horizon series: LT, the wider range, and ST, the narrower. Here are the equations:

$$\sigma LT = \sqrt{\sum_{t=1}^{1+LT} \frac{\left(r_t - \overline{r_t}\right)^2}{LT}} \tag{6}$$

$$\sigma ST = \sqrt{\sum_{t=1}^{1+ST} \frac{\left(r_t - \overline{r_t}\right)^2}{ST}} \tag{7}$$

Subtracting (6) from (7) we calculate a measure of the comprehensive (total) information risk (TIR),

$$TIR = \sigma ST - \sigma LT \tag{8}$$

Both negative and positive TIR are possible market situations signalling different needs for mechanisms of information spreading, thus our empirical interest will be concentrated on changes of TIR over different trading days.

$$\partial TIR/\partial t \cong TIR_t - TIR_{t-1} = dTIR \tag{9}$$

We have already mentioned the double nature of IR:

- at systematic levels, IR (SIR) is generated by a structural lack of capability of the financial market in processing information, usually generated from a lack of information or lack of spreading mechanism;
- at idiosyncratic levels, IR (DIR) is generated by inefficient standards in the financial communication between specific groups of market actors thus increasing biases in risk-return assessments and useless trading volumes.

To separate (inside dTIR) from the idiosyncratic part (dDIR) we use a proxy measure for the systematic part: or the information risk (dSIR), as shown in the following formula:

$$dDIR = dTIR - dSIR \tag{10}$$

By disposing both time series of dDIR and dSIR we then try to relate them to their possible sources, getting further insights about pricing of Total-IR.

The measure of dSIR can be based on the same scheme used for dTIR, fixing an absolute level of SIR through the same time dependences computed only for the systematic part of the risk for the average r_t. First, we compute the beta (β) of the stream of specific-investment r (as defined in equation 5) against the stream of market return (r_m). Such computation has to be done in two time horizons: LT, the wider range and ST, the narrower.

$$\beta LT = \frac{Cov_{t=LT}(r_t; r_m)}{Var_{t=LT}(r_m)} \tag{11}$$

$$\beta ST = \frac{Cov_{t=ST}(r_t; r_m)}{Var_{t=ST}(r_m)} \tag{12}$$

In order to have a measure expressed in the same unit of TIR, we can use the following formula to split the standard deviation of return r_t. The variance of returns for a specific asset can be divided as follows

$$Var(r_t) = \beta^2 Var(r_m) + \varepsilon^2$$

Similarly, the standard deviation can be split as follows

$$\sigma(r_t) = \beta \times \sigma(r_m) + \delta \tag{13}$$

Using (13) we can identify:

- the systematic part of the risk of r_t as

$$\gamma = \beta \times \sigma(r_m) \tag{14}$$

- the non-systematic part of the risk of r_t can be computed as difference

$$\delta = \sigma(r_t) - \gamma \tag{15}$$

We can compute γ and δ over the longer time horizon (LT)

$$\gamma LT = \beta LT \times \sigma LT(r_m) \tag{16}$$

$$\delta LT = \sigma LT(r_t) - \gamma LT \tag{17}$$

and the shorter one (ST)

$$\gamma ST = \beta ST \times \sigma ST(r_m) \tag{18}$$

$\delta ST = \sigma ST(r_t) - \gamma ST$ (19)

Subtracting (16) from (18) we compute a possible measure of the systematic part of the information risk

$SIR = \gamma ST - \gamma LT$ (20)

According to the previous scheme for TIR, our empirical interest will be concentrated in changes of SIR over time in order to draw inferences about the sources of information risk.

$\partial SIR/\partial t \cong SIR_t - SIR_{t-1} = dSIR$ (21)

Subtracting (17) from (19) we fix a possible measure of the idiosyncratic part of the information risk

$DIR = \delta ST - \delta LT$ (22)

The estimation of changes in DIR over time could be computed using the following alternative equations:

$\partial DIR/\partial t \cong DIR_t - DIR_{t-1} = dDIR$ (23)

$\partial DIR/\partial t \cong dTIR_t - dSIR_t = dDIR$ (24)

The Empirical Evidence

We apply the model in the European Markets (i.e. for the Dow Jones Eurostoxx 50) to measure proxies of IR at total level (dTIR) and also to split the systematic (dSIR) and the idiosyncratic (dDIR) components for the main industries-index composing the market-index. Dynamics of these components in the long-time horizon are further analyzed to define possible sources of information risk in order to define a potential framework of the IR-drivers to be used for both a pricing model of the IR-premia at general level and a financial communication supporting model for companies operating in the industry.

Data Mining and Creation of a Start-Up Database

Extracted data have been taken from the Thompson-Datastream database and refers to the Dow Jones Euro Stoxx index for the period starting on January 1, 1992 ending on October 27, 2010; 4,910 observations for the index were extracted since only the actual trading days were considered (on average: 260 trading days yearly). The same data have been extracted for 18 sectors for which data were fully available in the same period; 93,290 observed data were reported in the same trading days used for the market index. Table 1 reports the full list of sectors along with the code of extraction from the Datastream database.

Table 1–List of Analyzed Indexes

#	INDEX	CODE	CURRENCY
0	Dow Jones Euro Stoxx	SXXE	EUR
1	Oil & Gas	SXEE	EUR
2	Technology	SX8E	EUR
3	Automobiles & Parts	SXAE	EUR
4	Basis Resources	SXPE	EUR
5	Retail	SXRE	EUR
6	Insurance	SXIE	EUR
7	Food & Beverage	SX3E	EUR
8	Travel and Leisure	SXTE	EUR
9	Financial Services	SXFE	EUR
10	Personal & Household Goods	SXQE	EUR
11	Media	SXME	EUR
12	Banks	SX7E	EUR
13	Construction and Materials	SXOE	EUR
14	Industrial Goods and Services	SXNE	EUR
15	Chemicals	SX4E	EUR
16	Health Care	SXDE	EUR
17	Teleccomunications	SXKE	EUR
18	Utilities	SX6E	EUR

Daily returns of the 19 time-series have been computed, as in equation (5).

$r_t = (P_{t+1} - P_t)/P_t$ (5*)

Computations have been done in an ex-ante context supposing rational expectations in the markets. This underlying assumption of a fully efficient market will better proxie the IR using the above explained model.

A similar approach has been used to estimate a long-term (LT=150 observations) and a short-term (ST=5 observations) standard deviation of returns. Referring to equations [6] and [7], these are the analytics actually used:

$$\sigma LT = \sqrt{\sum_{T=t}^{t+150} \frac{\left(r_t - \overline{r_t}\right)^2}{150}} \quad (6^*)$$

$$\sigma ST = \sqrt{\sum_{T=t}^{t+5} \frac{\left(r_t - \overline{r_t}\right)^2}{5}} \quad (7^*)$$

Computations for (6*) have been possible for any trading day having at least 151 observations after T: the last σLT computed is reported for March 30, 2010, thus at the very end of the crisis, at least according to the main analysts. Computational range for (7*) is the same.

The same approach has been used to estimate a long-term (LT=150 observations) and a short-term (ST=5 observations) beta of returns for the 18 sectors. We refer to equations (11) and (12):

$$\beta LT = \frac{Cov_{t=150}(r_t; r_m)}{Var_{t=150}(r_m)} \qquad (11^*)$$

$$\beta ST = \frac{Cov_{t=5}(r_t; r_m)}{Var_{t=5}(r_m)} \qquad (12^*)$$

Computational ranges for (11*) are the same as for (6*) while for (12*) are the same as for (7*): January, 1992, to March 30, 2010 is the time length reported.
Using the above computations, a database was created for the time period of about 18 years: containing 4,760 observations for any of the 18+1 time series computed. Table 2 reports the average level of the usable data.

Table 2–Average Statistics for the Entire Period (4760 Observations)

#	INDEX	CODE	1w-Return	*yearly*	Sigma-LT	*yearly*
0	Dow Jones Euro Stoxx	SXXE	0.029199%	*11.24%*	1.14%	*21.85%*
1	Oil & Gas	SXEE	0.035097%	*13.66%*	1.32%	*25.25%*
2	Technology	SX8E	0.038930%	*15.27%*	1.77%	*33.79%*
3	Automobiles & Parts	SXAE	0.035785%	*13.95%*	1.63%	*31.21%*
4	Basic Resources	SXPE	0.037001%	*14.46%*	1.49%	*28.44%*
5	Retail	SXRE	0.025851%	*9.89%*	1.13%	*21.64%*
6	Insurance	SXIE	0.025664%	*9.82%*	1.52%	*29.04%*
7	Food & Beverage	SX3E	0.029940%	*11.55%*	1.05%	*20.02%*
8	Travel and Leisure	SXTE	0.024364%	*9.30%*	1.41%	*26.94%*
9	Financial Services	SXFE	0.027637%	*10.61%*	1.24%	*23.66%*
10	Personal & Household Goods	SXQE	0.032669%	*12.66%*	1.39%	*26.64%*
11	Media	SXME	0.021002%	*7.97%*	1.33%	*25.47%*
12	Banks	SX7E	0.026990%	*10.35%*	1.35%	*25.75%*
13	Construction and Materials	SXOE	0.030840%	*11.91%*	1.22%	*23.34%*
14	Industrial Goods and Services	SXNE	0.039124%	*15.35%*	1.24%	*23.76%*
15	Chemicals	SX4E	0.045594%	*18.10%*	1.31%	*24.95%*
16	Health Care	SXDE	0.039944%	*15.69%*	1.26%	*24.14%*
17	Telecommunications	SXKE	0.042554%	*16.80%*	1.51%	*28.94%*
18	Utilities	SX6E	0.035287%	*13.74%*	1.12%	*21.33%*

Table 2 (cont.)–Average Statistics for the Entire Period (4760 Observations)

#	INDEX	Sigma-ST	*yearly*	Beta-LT	Beta-ST
0	Dow Jones Euro Stoxx	0.94%	*18.00%*	1.0000	1.0000
1	Oil & Gas	1.10%	*20.98%*	0.8621	0.8538
2	Technology	1.48%	*28.35%*	1.3031	1.3434
3	Automobiles & Parts	1.28%	*24.40%*	1.0757	1.0877
4	Basic Resources	1.20%	*22.91%*	0.9325	0.9093
5	Retail	0.94%	*18.02%*	0.8078	0.8148
6	Insurance	1.23%	*23.53%*	1.1397	1.1142
7	Food & Beverage	0.86%	*16.46%*	0.6573	0.6606
8	Travel and Leisure	1.16%	*22.21%*	0.8550	0.8255
9	Financial Services	1.00%	*19.04%*	0.8685	0.8235
10	Personal & Household Goods	1.18%	*22.59%*	1.0546	1.0966
11	Media	1.11%	*21.13%*	0.9342	0.9321
12	Banks	1.08%	*20.58%*	1.0374	1.0142
13	Construction and Materials	1.00%	*19.05%*	0.9083	0.8892
14	Industrial Goods and Services	1.02%	*19.41%*	0.9520	0.9431
15	Chemicals	1.08%	*20.58%*	0.9378	0.9241
16	Health Care	1.06%	*20.25%*	0.7263	0.7491
17	Telecommunications	1.26%	*24.15%*	1.0941	1.1080
18	Utilities	0.92%	*17.53%*	0.8008	0.8002

IR-Proxies Time Series Defined

We search for the existence of IR using equation (8) to compute TIR as follows:

$$TIR = \sigma_{ST=5} - \sigma_{ST=150} \qquad (8^*)$$

Changes of TIR over time are estimated using (9) as follows:

$$dTIR = TIR_t - TIR_{t-1} \cong \partial TIR/\partial t \quad 1<t<4760 \qquad (9^*)$$

The time series for Total IR contains 4,759 observations, being the first dTIR data computed on January 3, 1992 (i.e. one day after the previous time series), while the last one is still reported for March 30, 2010.

To split data into systematic and idiosyncratic risk equations (20) and (21) are used through the start-up database to fix the systematic level of IR

$$SIR = \gamma_5 - \gamma_{150} \qquad (20^*)$$

and its changes

$$dSIR = SIR_t - SIR_{t-1} \cong \partial SIR/\partial t \quad 1<t<4760 \qquad (21^*)$$

The computation of dSIR is similar to that of dTIR.
Using equation (24) we compute dDIR as follows:

$$dDIR = dTIR_t - dSIR_t \cong \partial DIR/\partial t \quad 1<t<4760 \qquad (24^*)$$

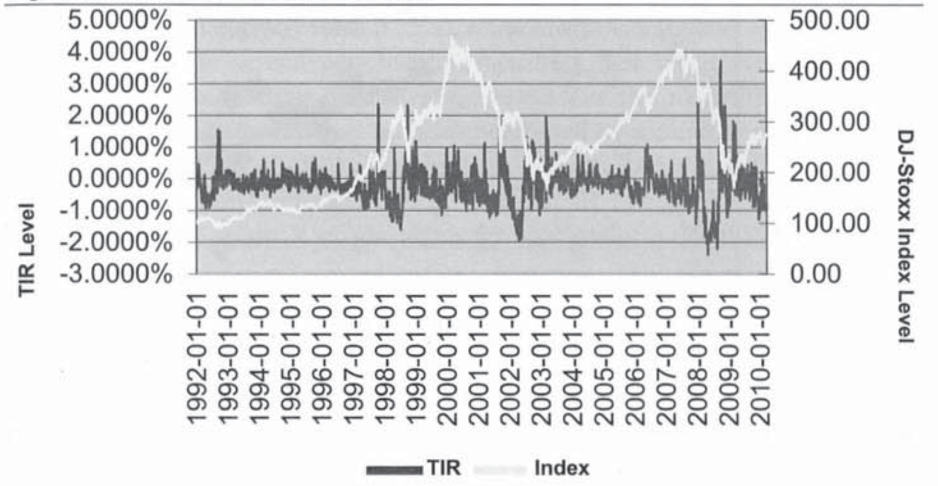
For the Euro Stoxx index any value of SIR equals that of TIR, so that no DIR and no dDIR are computed. Table 3 reports absolute levels of IR indicators for the entire 4,759 periods.

Table 3–Average IR Levels and Composition (4759 Observations)

#	INDEX	CODE	TIR	SIR	DIR	%SIR	%DIR
0	Dow Jones Euro Stoxx	SXXE	-0.2013%	-0.2013%	0.0000%	100.00%	0.00%
1	Oil & Gas	SXEE	-0.2232%	-0.1770%	-0.0462%	79.30%	20.70%
2	Technology	SX8E	-0.2845%	-0.2210%	-0.0635%	77.67%	22.33%
3	Automobiles & Parts	SXAE	-0.3567%	-0.2037%	-0.1530%	57.11%	42.89%
4	Basic Resources	SXPE	-0.2898%	-0.2146%	-0.0752%	74.06%	25.94%
5	Retail	SXRE	-0.1895%	-0.1562%	-0.0333%	82.44%	17.56%
6	Insurance	SXIE	-0.2885%	-0.2558%	-0.0327%	88.67%	11.33%
7	Food & Beverage	SX3E	-0.1868%	-0.1230%	-0.0638%	65.86%	34.14%
8	Travel and Leisure	SXTE	-0.2479%	-0.1922%	-0.0557%	77.53%	22.47%
9	Financial Services	SXFE	-0.2420%	-0.2114%	-0.0306%	87.35%	12.65%
10	Personal & Household Goods	SXQE	-0.2118%	-0.1838%	-0.0280%	86.76%	13.24%
11	Media	SXME	-0.2274%	-0.1875%	-0.0399%	82.44%	17.56%
12	Banks	SX7E	-0.2707%	-0.2424%	-0.0283%	89.55%	10.45%
13	Construction and Materials	SXOE	-0.2248%	-0.1998%	-0.0249%	88.92%	11.08%
14	Industrial Goods and Services	SXNE	-0.2274%	-0.1997%	-0.0276%	87.85%	12.15%
15	Chemicals	SX4E	-0.2287%	-0.1878%	-0.0408%	82.14%	17.86%
16	Health Care	SXDE	-0.2034%	-0.1265%	-0.0769%	62.17%	37.83%
17	Telecomm-unications	SXKE	-0.2508%	-0.1972%	-0.0536%	78.62%	21.38%
18	Utilities	SX6E	-0.1994%	-0.1639%	-0.0355%	82.18%	17.82%

According to results in table 3 we can observe that the absolute level of TIR is usually negative, thus creating an incentive to information traders to enter the market. We have 1,402 observations of a positive TIR level in our database (about 30% of 4,760 obs.) and 3,357 negative TIR level (the remaining 70%). The time evolution of absolute TIR can be better understood if compared with the index dynamics as reported in the following chart.

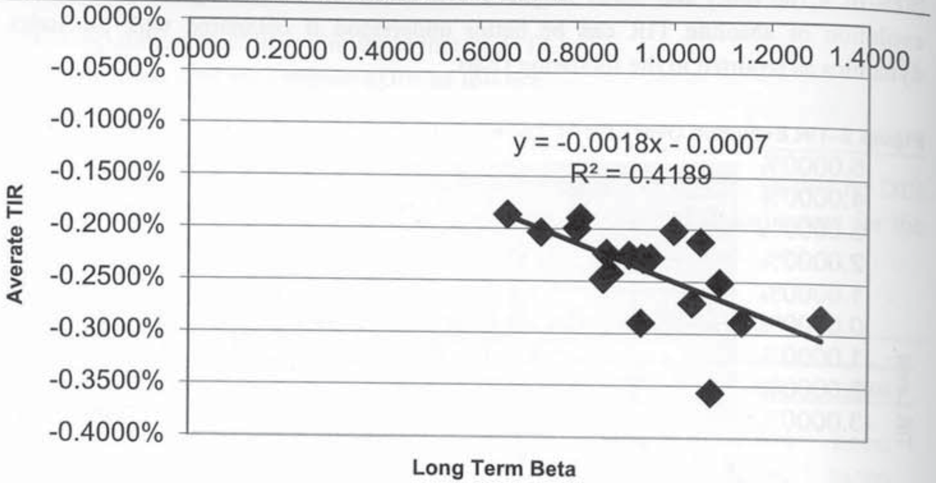
Figure 2–TIR Evolution Over Last 18 Years



The evidence of higher positive IRs next to the bottom of an after-crisis-crash is quite evident. Deep negative IRs are more exploited during a short-term rebound of the index than in a long-term decrease context. The graphic evidence is in agreement with our expectations: in top-uncertainty periods, the absolute IR level is relevant (both negative and positive) because of market difficulties in disclosing and processing the entire set of information.

The time evolution evidence reported in figure 2 is useful but cannot suggest specific drivers; crossing data reported in table 3 with those in table 2 a negative correlation between TIR and long-term betas (i.e. the long-term cost of capital) can be found. The strongest negative gaps in volatility (i.e. TIR) can be easily observed in industries having higher betas (i.e. cost of capital). This suggests that the higher the payoff risk is the higher the probability that a missing information might unfocus the risk-to-return ratio expected by the investors. Figure 3 depicts the empirical evidence showing a very high r^2 (=41.89%) for the regression.

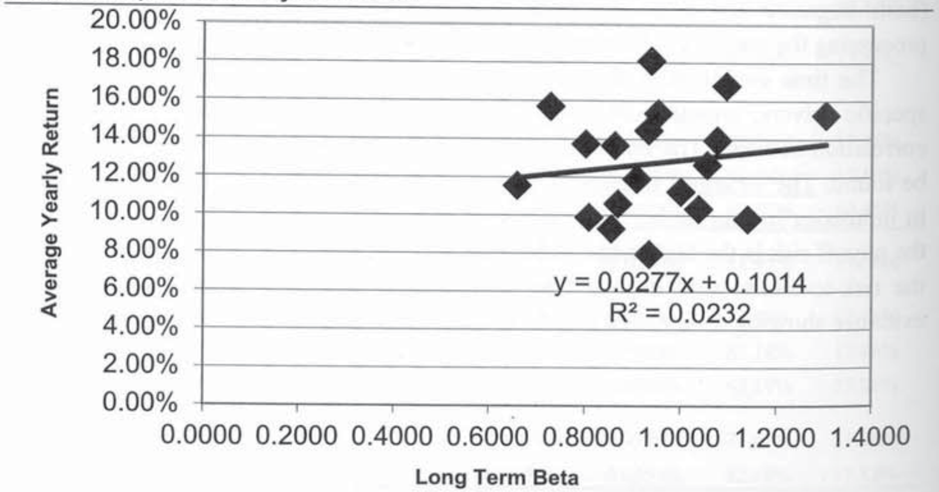
Figure 3–Empirical Relationship Between Beta and TIR



This result must be analyzed according to the affordability of the empirical security market line that can be draw using our database. In fact, carrying on a regression between β-LT and average yearly return as shown in table 2 the estimated security market line as in figure 4 is found, having this regressed formula:

$$r_t = 0.0277\beta + 0.1014 \qquad (25)$$

Figure 4–Empirical Security Market Line



Since r^2=2.32%, gaps between the actual levels of r_t and those estimated according to equation [25] could be quite relevant in explaining IR-sources. Being the gaps enough uncorrelated and widespread, we examine their possible relationship

with the TIR, its components (SIR and DIR) and their time-changes (dTIR, dSIR, dDIR).

Table 4 compares the gaps along with the TIR levels and composition reported in table 3. Looking carefully at table 4 we can observe that Automobiles & Parts along with Basis Resources, Technology, Insurance and Banks have the top negative absolute level of TIR (lower than 0.25%), while Media and Travel-Leisure are on the threshold level. In several non-financial industries, TIR levels seem particularly correlated with the positive residual of the regression; this means that return from investing in these industries may be strongly affected by accurate analysis of IR. By contrast, in the case of Banks and Insurance, residuals are negative so that no specific excess-return can be achieved by riding the IR. In general terms we can state that the higher the residuals are, the higher the opportunity to ride the IR by gaining a higher return.

Table 4–TIR vs. the Estimated Security Market Line

#	INDEX	CODE	Observed-r	Beta-LT	Estimated-r	residual	TIR
0	Dow Jones Euro Stoxx	SXXE	11.24%	1.0000	12.91%	-1.66%	-0.20%
1	Oil & Gas	SXEE	13.66%	0.8621	12.53%	1.14%	-0.22%
2	**Technology**	**SX8E**	**15.27%**	**1.3031**	**13.75%**	**1.52%**	**-0.28%**
3	**Automobiles & Parts**	**SXAE**	**13.95%**	**1.0757**	**13.12%**	**0.83%**	**-0.36%**
4	**Basis Resources**	**SXPE**	**14.46%**	**0.9325**	**12.72%**	**1.74%**	**-0.29%**
5	Retail	SXRE	9.89%	0.8078	12.38%	-2.48%	-0.19%
6	**Insurance**	**SXIE**	**9.82%**	**1.1397**	**13.29%**	**-3.48%**	**-0.29%**
7	Food & Beverage	SX3E	11.55%	0.6573	11.96%	-0.41%	-0.19%
8	Travel and Leisure	SXTE	9.30%	0.8550	12.51%	-3.21%	-0.25%
9	Financial Services	SXFE	10.61%	0.8685	12.54%	-1.93%	-0.24%
10	Personal & Household Goods	SXQE	12.66%	1.0546	13.06%	-0.40%	-0.21%
11	Media	SXME	7.97%	0.9342	12.73%	-4.76%	-0.23%
12	**Banks**	**SX7E**	**10.35%**	**1.0374**	**13.01%**	**-2.66%**	**-0.27%**
13	Construction and Materials	SXOE	11.91%	0.9083	12.65%	-0.74%	-0.22%
14	Industrial Goods and Services	SXNE	15.35%	0.9520	12.77%	2.57%	-0.23%
15	Chemicals	SX4E	18.10%	0.9378	12.74%	5.37%	-0.23%
16	Health Care	SXDE	15.69%	0.7263	12.15%	3.54%	-0.20%
17	Telecommunications	SXKE	16.80%	1.0941	13.17%	3.63%	-0.25%
18	Utilities	SX6E	13.74%	0.8008	12.36%	1.39%	-0.20%

The case for Automobiles and Parts guides us to deepen the analysis of data contained in table 3, looking more carefully at the relative weights of DIR and SIR. Three industry-DIR levels are greater than 25% of the total IR found. They are Health Care, Food and Beverage, Basis Resources, and the Automobiles and Parts (thus explaining the anomalies in residual previously founded).

Figure 5a–Idiosyncratic IR vs. Systematic Risk

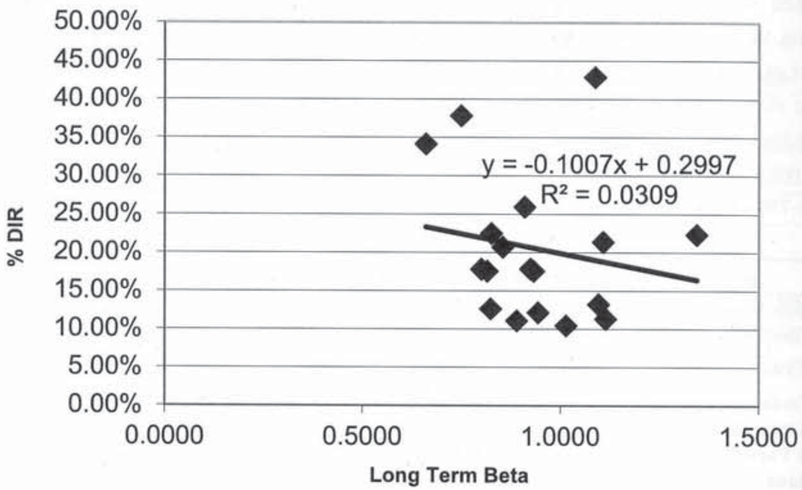


Figure 5b–Idiosyncratic IR vs. Systematic Risk

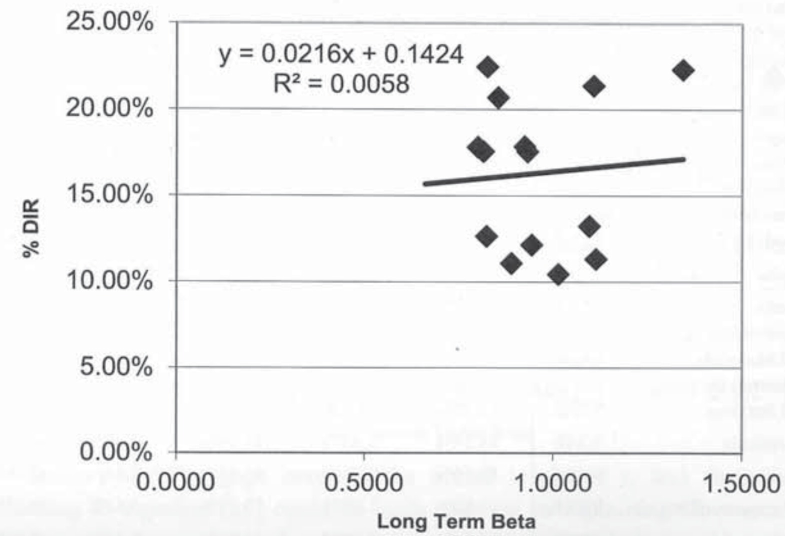


Figure 5 draws the relationship between β and the relative importance of DIR; we can notice the negative trend disappears when excluding the four over-25% industries. By contrast, the opposite relationship, of course with the same r^2, can be found between Beta and the relative importance of SIR. By this evidence, we can state that the financial communication must consider the industry-specific information whenever the industry has a less risky systematic level, while the impact of the rules for higher transparency (to reduce information asymmetries) will be more relevant for cyclical (higher β) industries.

IR-Proxies Dynamics

By computing the standard deviation of the IR-proxies, it is possible to get some insights into their dynamics. In table 5 standard deviations of TIR and SIR are reported in absolute terms and in percentage of the average levels of IR indicators as reported previously. Standard deviations gaps are reported. Table 5 states that the absolute volatility in TIR is generally lower than that in SIR, indicating that DIR can be an important driver of the dynamics of the information risk. Absolute gaps are particularly high in Automobiles and Parts, Media and Banks, i.e. all the industries where previous analysis showed a relevant impact of the industry-specific information risk. Top negative values are reported in Oil&Gas and Health Care Industries.

Table 5–Volatilities in TIR and SIR (4760 Observations)

#	INDEX	CODE	s(TIR)	s(TIR)%	s(SIR)	s(SIR)%	s(TIR) - s(SIR)
0	Dow Jones Euro Stoxx	SXXE	0.56%	-279.07%	0.56%	-279.07%	0.0000%
1	Oil & Gas	SXEE	0.68%	-305.79%	0.74%	-418.24%	-0.0578%
2	Technology	SX8E	0.76%	-267.65%	0.78%	-353.18%	-0.0189%
3	Automobiles & Parts	SXAE	1.35%	-378.10%	0.80%	-391.10%	0.5520%
4	Basic Resources	SXPE	0.77%	-266.32%	0.81%	-377.38%	-0.0382%
5	Retail	SXRE	0.52%	-274.97%	0.54%	-344.83%	-0.0176%
6	Insurance	SXIE	0.81%	-281.89%	0.81%	-317.50%	0.0010%
7	Food & Beverage	SX3E	0.54%	-287.75%	0.54%	-442.72%	-0.0071%
8	Travel and Leisure	SXTE	0.63%	-253.85%	0.67%	-346.37%	-0.0364%
9	Financial Services	SXFE	0.66%	-271.26%	0.67%	-317.27%	-0.0142%
10	Personal & Household Goods	SXQE	0.58%	-273.55%	0.60%	-325.55%	-0.0189%
11	Media	SXME	0.67%	-296.56%	0.66%	-351.06%	0.0162%
12	Banks	SX7E	0.72%	-267.03%	0.71%	-293.42%	0.0116%

Table 5(cont.)–Volatilities in TIR and SIR (4760 Observations)

13	Construction and Materials	SXOE	0.58%	-256.08%	0.59%	-293.72%	-0.0114%
14	Industrial Goods and Services	SXNE	0.61%	-267.69%	0.61%	-304.67%	0.0001%
15	Chemicals	SX4E	0.64%	-280.74%	0.66%	-353.63%	-0.0223%
16	Health Care	SXDE	0.57%	-281.48%	0.61%	-485.43%	-0.0414%
17	Telecomm-unications	SXKE	0.66%	-263.02%	0.70%	-353.26%	-0.0369%
18	Utilities	SX6E	0.61%	-305.34%	0.63%	-382.24%	-0.0175%

Another important observation from Table 5 is the relative level of the IR proxies. As per TIR, the higher level is observed in the Automobile and Parts industry (378%), while as per SIR volatility levels are always higher than TIR. We can conclude from Table 5 that information asymmetries at market levels are very high and that only industry-specific information risk will be able to reduce further the structural IR level in European markets.

A more detailed analysis can arise from Table 6 in which daily changes of the IR-proxies are reported along with their percentage impact during a Quarter. You can notice that both proxies of actual IR (dTIR and dSIR) always have a negative impact. This result is particularly interesting since is the empirical evidence that mandatory increases in minimum standards of financial communications did reduced the IR level (particularly of SIR) in latest 18 years. The Travel & Leisure industry is the only exception to the general rule.

Table 6a–Average Dynamics of IR Proxies (Absolute and Relative to Average Quarterly Levels) (4759 Observations)

#	INDEX	CODE	dTIR	dTIR%	dSIR	dSIR%
0	Dow Jones Euro Stoxx	SXXE	-0.000001997	35.71%	-0.000001997	35.71%
1	Oil & Gas	SXEE	-0.000001149	18.53%	-0.000001177	23.93%
2	Technology	SX8E	-0.000001844	23.33%	-0.000001817	29.60%
3	Automobiles & Parts	SXAE	-0.000001969	19.87%	-0.000001626	28.74%
4	Basis Resources	SXPE	-0.000001476	18.34%	-0.000001555	26.09%
5	Retail	SXRE	-0.000001934	36.75%	-0.000001825	42.06%
6	Insurance	SXIE	-0.000002497	31.17%	-0.000002449	34.46%
7	Food & Beverage	SX3E	-0.000001351	26.05%	-0.000001089	31.88%
8	Travel and Leisure	SXTE	0.000000923	- 13.39%	0.000000614	-11.49%

Table 6a(cont.)–Average Dynamics of IR Proxies (Absolute and Relative to Average Quarterly Levels) (4759 Observations)

9	Financial Services	SXFE	-0.000002298	34.20%	-0.000002419	41.20%
10	Personal & Household Goods	SXQE	-0.000001770	30.07%	-0.000001342	26.28%
11	Media	SXME	-0.000001737	27.49%	-0.000001566	30.06%
12	Banks	SX7E	-0.000003903	51.91%	-0.000003566	52.95%
13	Construction and Materials	SXOE	-0.000003168	50.74%	-0.000002812	50.65%
14	Industrial Goods and Services	SXNE	-0.000001821	28.84%	-0.000001838	33.12%
15	Chemicals	SX4E	-0.000001341	21.11%	-0.000001061	20.33%
16	Health Care	SXDE	-0.000002149	38.03%	-0.000003006	85.57%
17	Telecomm-unications	SXKE	-0.000002204	31.63%	-0.000001606	29.32%
18	Utilities	SX6E	-0.000002322	41.93%	-0.000002035	44.72%

Table 6b–Average Dynamics of IR Proxies (Absolute and Relative to Average Quarterly Levels) (4759 Observations)

#	INDEX	CODE	dDIR	dDIR%
0	Dow Jones Euro Stoxx	SXXE	n.r.	n.r.
1	Oil & Gas	SXEE	-0.000000100	7.79%
2	Technology	SX8E	-0.000000082	4.63%
3	Automobiles & Parts	SXAE	-0.000000140	3.29%
4	Basis Resources	SXPE	-0.000000195	9.36%
5	Retail	SXRE	-0.000000188	20.32%
6	Insurance	SXIE	-0.000000047	5.16%
7	Food & Beverage	SX3E	-0.000000006	0.34%
8	Travel and Leisure	SXTE	0.000000383	-24.73%
9	Financial Services	SXFE	-0.000000014	1.63%
10	Personal & Household Goods	SXQE	-0.000000326	41.86%
11	Media	SXME	-0.000000211	19.04%
12	Banks	SX7E	-0.000000170	21.67%
13	Construction and Materials	SXOE	-0.000000367	53.00%

Table 6b(cont.)–Average Dynamics of IR Proxies (Absolute and Relative to Average Quarterly Levels) (4759 Observations)

14	Industrial Goods and Services	SXNE	0.000000120	-15.69%
15	Chemicals	SX4E	-0.000000337	29.73%
16	Health Care	SXDE	0.000000112	-5.22%
17	Telecomm-unications	SXKE	-0.000000541	36.29%
18	Utilities	SX6E	0.000000377	-38.20%

The same conclusion is not possible as per the dynamics in the industry-specific information risk that shows both positive and negative level over the 18 years analysis. Travel & Leisure, Industrial Goods & Service, Health Care and Utilities show an average increase in DIR. These data let us conclude that the policies aiming at introducing "general" rules about financial communication are not a good solution since only industry-specific standards of communication would decrease IR level; by that way, general-regulating-policies might act as a source of new systematic-IR increase.

Reduction in IR proxies is not uniform during all the 18 years. Table 7 shows the dynamics of TIR for market index. Even if the trend is decreasing, huge increases in information risk are seen in 2010 (first quarter), 2008 (before the most recent crisis), 2004, 2002, 1998, 1995 and 1994.

It is possible to conclude that in years when significant increases in financial markets index are registered immediately before a crisis, the information risk premia is increasing. In the year of a strong crisis, instead, high negative dTIR is observed, maybe because of changes in investor's risk aversion, reducing incentives to enter the market.

Table 7–Average Dynamics of IR Proxies (Absolute and Relative to Average - Yearly Levels, DJ Euro Stoxx)

Year	dTIR	dTIR%
4759 Observations	-0.0719%	0.10%
1992	-0.0681%	0.12%
1993	-0.4466%	0.87%
1994	0.0799%	-0.29%
1995	0.5806%	-2.39%
1996	-0.1415%	0.25%
1997	-0.0605%	0.06%
1998	1.4097%	-1.17%
1999	-0.0028%	0.00%
2000	-1.4480%	3.57%
2001	-0.6244%	0.72%
2002	1.4258%	-0.89%
2003	-0.8654%	-3.34%
2004	0.0598%	-0.66%
2005	-0.7193%	1.27%
2006	0.3617%	-0.71%
2007	-0.7051%	0.47%
2008	0.1614%	-0.09%
2009	-0.2290%	1.02%
2010	0.1317%	-0.05%

In Search of Drivers for IR Dynamics

The previous analysis leads to a search for determinants of the IR proxies dynamics through industry analysis of exogenous determinants. The refined analysis starts with the previous evidence and tries to answer questions by computing statistics for the entire 4,759 observations and for all of the complete years of analysis (i.e. 1992-2010, 1st qr.). Hereafter questions are reported and possible evidence is deployed along with explanation of further indicators computed to find IR drivers.

Q#1. Is idiosyncratic-IR a driver for changes in total-IR in any industry?

To answer this question the computation of a relationship index between dTIR and dDIR is required. R^2 is used for the analysis. Data are reported in table 8 which show that the higher impact is on average in the Insurance industry along with the Travel and Leisure. Between 1998 and 2000 you can observe the higher frequency of industries with relevant correlation between dTIR and dDIR; in the first quarter 2010 the top frequency of high correlation is reached. The higher level of correlation is in

Travel and Leisure in year 1993. The highest persistence of the relationship can be found in the Travel and Leisure industry for the four years beginning in 1992 and ending in 1994. No other industry shows a two-year persistence.

A#1. Idiosyncratic-IR (DIR) is not a diffused determinant of the total-IR. According to the long-term empirical evidence, information asymmetries have been reduced due to regulation in corporate disclosure and information spreading. Industry-specific topics suggest the need for time-sensitive and industry-contingent requirements in regulating information diffusion.

Table 8a–R-Squared between dTIR and dDIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx								
1	Oil & Gas	1.56%	0.50%	0.27%	0.85%	0.04%	11.21%	0.04%	0.96%
2	Technology	0.42%	2.96%	2.02%	7.91%	0.00%	1.82%	0.41%	4.38%
3	Automobiles & Parts	30.17%	3.19%	0.00%	4.17%	1.90%	3.54%	0.20%	0.31%
4	Basic Resources	0.15%	1.55%	0.01%	0.45%	1.36%	0.36%	0.29%	0.78%
5	Retail	0.05%	8.55%	1.99%	1.11%	0.03%	0.29%	6.98%	7.44%
6	Insurance	0.15%	3.90%	0.00%	0.90%	14.59%	0.26%	0.24%	5.90%
7	Food & Beverage	4.26%	2.33%	2.93%	2.82%	0.05%	0.06%	0.22%	21.93%
8	Travel and Leisure	5.89%	28.63%	54.65%	17.39%	0.20%	0.38%	0.06%	0.15%
9	Financial Services	0.84%	3.72%	1.85%	0.42%	0.31%	2.03%	0.28%	3.42%
10	Personal & Household Goods	1.13%	16.41%	0.05%	0.02%	0.00%	0.10%	1.91%	0.38%
11	Media	0.43%	0.15%	0.33%	0.14%	2.84%	0.46%	3.56%	0.36%
12	Banks	0.18%	8.25%	0.86%	1.59%	9.08%	2.07%	0.97%	4.57%
13	Construction and Materials	0.46%	5.23%	2.32%	0.50%	15.87%	2.73%	2.26%	4.81%
14	Industrial Goods and Services	1.64%	4.04%	0.03%	0.80%	0.05%	11.93%	3.67%	11.79%
15	Chemicals	0.31%	1.70%	0.00%	1.34%	0.33%	0.00%	0.52%	0.04%
16	Health Care	2.87%	3.25%	2.12%	2.63%	6.01%	4.29%	10.56%	0.12%
17	Telecomm-unications	0.07%	0.46%	6.79%	0.41%	0.48%	0.30%	0.11%	1.16%
18	Utilities	0.16%	1.34%	1.04%	4.60%	0.78%	1.09%	3.36%	0.15%

Table 8b–R-Squared between dTIR and dDIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004
0	Dow Jones Euro Stoxx							
1	Oil & Gas	1.56%	5.25%	27.35%	6.53%	0.20%	2.96%	0.94%
2	Technology	0.42%	4.81%	3.92%	4.04%	1.71%	0.04%	4.97%
3	Automobiles & Parts	30.17%	0.83%	7.26%	0.94%	3.51%	8.05%	1.25%
4	Basic Resources	0.15%	15.22%	9.15%	0.04%	0.11%	0.03%	0.30%
5	Retail	0.05%	0.46%	3.88%	2.64%	0.27%	9.16%	0.02%
6	Insurance	0.15%	1.96%	11.48%	1.51%	1.18%	20.79%	0.06%
7	Food & Beverage	4.26%	2.03%	32.69%	5.57%	0.04%	6.29%	5.23%
8	Travel and Leisure	5.89%	4.24%	5.14%	0.40%	0.73%	0.76%	24.28%
9	Financial Services	0.84%	1.09%	4.04%	0.25%	5.21%	1.42%	0.15%
10	Personal & Household Goods	1.13%	2.34%	0.06%	6.79%	4.37%	2.57%	2.94%
11	Media	0.43%	0.34%	1.26%	2.22%	0.71%	9.65%	3.11%
12	Banks	0.18%	0.07%	2.74%	0.94%	7.32%	7.64%	0.65%
13	Construction and Materials	0.46%	0.95%	1.49%	0.11%	1.09%	2.74%	4.60%
14	Industrial Goods and Services	1.64%	1.85%	0.36%	5.52%	0.77%	5.38%	1.75%
15	Chemicals	0.31%	11.63%	5.80%	2.68%	2.26%	0.12%	1.21%
16	Health Care	2.87%	7.49%	9.91%	0.18%	0.00%	0.06%	8.61%
17	Telecomm-unications	0.07%	3.23%	1.41%	4.98%	2.06%	3.85%	3.36%
18	Utilities	0.16%	0.44%	3.34%	2.85%	5.63%	1.35%	0.77%

Table 8c–R-Squared between dTIR and dDIR in the Analyzed Industries

#	INDEX	Average	2005	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx							
1	Oil & Gas	1.56%	0.84%	0.84%	1.04%	0.02%	1.07%	12.46%
2	Technology	0.42%	1.23%	0.55%	0.08%	0.49%	1.23%	6.20%
3	Automobiles & Parts	30.17%	1.10%	0.06%	0.87%	50.81%	6.23%	4.55%
4	Basic Resources	0.15%	1.14%	17.91%	2.89%	1.53%	4.08%	0.94%
5	Retail	0.05%	0.35%	0.53%	0.18%	2.35%	0.60%	6.68%
6	Insurance	0.15%	12.76%	6.67%	2.61%	1.77%	0.58%	18.87%
7	Food & Beverage	4.26%	2.11%	0.05%	2.76%	0.09%	4.04%	15.79%
8	Travel and Leisure	5.89%	0.00%	0.79%	0.00%	7.60%	0.92%	1.19%
9	Financial Services	0.84%	0.17%	0.04%	3.96%	7.24%	2.98%	5.06%
10	Personal & Household Goods	1.13%	0.59%	5.14%	4.12%	8.73%	13.46%	1.23%
11	Media	0.43%	1.12%	3.34%	4.15%	4.45%	0.05%	1.22%
12	Banks	0.18%	4.99%	0.79%	0.04%	0.52%	0.00%	8.60%
13	Construction and Materials	0.46%	1.56%	2.67%	7.06%	12.68%	0.07%	4.04%
14	Industrial Goods and Services	1.64%	0.01%	1.14%	0.68%	6.41%	5.86%	19.61%
15	Chemicals	0.31%	6.83%	3.34%	1.70%	1.34%	0.04%	14.41%
16	Health Care	2.87%	23.63%	7.76%	4.38%	1.13%	9.68%	5.73%
17	Telecomm-unications	0.07%	0.42%	10.80%	3.48%	0.00%	0.70%	15.73%
18	Utilities	0.16%	1.26%	0.28%	1.64%	5.09%	0.01%	10.80%

Q#2. Is the price path a driver for systematic-IR dynamics?

Several theoretical approaches suggest that market movements can be self generating for several causes, including: weak form of efficiency (i.e. historical price path can suggest forward movements); rational bubbles (i.e. price path does accelerate because of requirement to pay an additional risk premia for the bubble); and behavioural finance (i.e. investors decide to buy or sell imitating the market sentiment).

To examine the momentum of the relationship between price-path and systematic-IR, an index of price tendency is required. The index has been created with the frequency of positive daily returns in a standard quarter of trading, as indicated in the following equation:

$$\text{Pth} = \frac{\sum_{t=T}^{T+5} if(r_t > 0)}{5} \qquad 1>\text{Pth}>0 \qquad (26)$$

It is computable for any trading days so that we can relate the Pth level with dSIR. Results are exhibited in table 9 that shows the R^2 index resulting from the analysis. No impact is reported on average; the highest level of R^2 is 6.44%.

Table 9a–R-Squared of the Relation between Price-Path Index and dSIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	1.38%	1.78%	0.02%	1.34%	1.55%	3.23%	3.30%	3.05%
1	Oil & Gas	0.35%	0.66%	0.23%	0.35%	0.80%	0.12%	0.08%	0.12%
2	Technology	0.32%	1.39%	0.89%	0.33%	1.58%	1.41%	0.44%	3.43%
3	Automobiles & Parts	0.09%	0.00%	0.03%	0.12%	0.34%	0.07%	2.27%	2.89%
4	Basic Resources	0.15%	0.07%	0.03%	0.03%	0.90%	0.53%	0.23%	0.74%
5	Retail	0.37%	0.80%	0.10%	0.49%	0.02%	0.56%	0.26%	1.03%
6	Insurance	0.43%	0.08%	0.52%	0.57%	0.11%	0.22%	0.12%	0.75%
7	Food & Beverage	0.07%	1.18%	0.42%	0.32%	0.43%	0.13%	0.04%	1.26%
8	Travel and Leisure	0.26%	0.00%	0.02%	0.32%	1.19%	0.93%	2.00%	1.83%
9	Financial Services	0.88%	0.17%	0.00%	0.61%	0.06%	0.91%	0.49%	2.25%
10	Personal & Household Goods	0.44%	0.53%	0.69%	0.08%	1.83%	0.72%	0.88%	3.89%
11	Media	0.39%	0.00%	0.19%	0.08%	0.01%	0.23%	0.25%	4.59%
12	Banks	0.71%	0.02%	0.04%	0.05%	0.74%	2.87%	0.58%	1.24%
13	Construction and Materials	0.75%	0.12%	0.11%	0.01%	0.00%	0.35%	1.72%	0.33%
14	Industrial Goods and Services	0.96%	1.09%	0.13%	0.21%	1.28%	0.35%	2.27%	1.77%
15	Chemicals	0.69%	0.35%	0.09%	0.19%	0.01%	0.21%	0.99%	0.73%
16	Health Care	0.26%	0.52%	0.49%	0.17%	0.14%	0.12%	1.31%	0.66%
17	Telecomm-unications	0.20%	0.54%	0.09%	0.05%	0.18%	0.66%	1.71%	0.45%
18	Utilities	0.51%	0.09%	0.22%	0.01%	0.66%	0.00%	3.92%	3.60%

Table 9b–R-Squared of the Relation between Price-Path Index and dSIR in the Analyzed Industries

#	INDEX	1999	2000	2001	2002	2003	2004	2005	2006
0	Dow Jones Euro Stoxx	3.57%	1.00%	3.02%	0.04%	0.38%	0.48%	2.48%	6.97%
1	Oil & Gas	0.54%	0.37%	1.33%	0.17%	3.34%	0.01%	0.71%	0.02%
2	Technology	1.72%	0.92%	0.07%	0.36%	0.08%	0.01%	0.69%	0.68%
3	Automobiles & Parts	0.09%	0.10%	0.69%	0.27%	0.29%	0.01%	0.08%	1.40%
4	Basic Resources	0.36%	0.23%	0.60%	0.04%	0.45%	0.20%	0.00%	3.52%
5	Retail	0.93%	0.01%	0.81%	0.03%	0.06%	0.00%	0.59%	2.29%
6	Insurance	0.62%	0.02%	2.92%	0.13%	0.00%	0.24%	0.79%	2.59%
7	Food & Beverage	0.00%	1.08%	1.13%	0.32%	0.05%	0.29%	0.01%	0.07%
8	Travel and Leisure	0.19%	0.28%	0.68%	0.04%	0.86%	0.23%	0.55%	1.14%
9	Financial Services	1.50%	0.26%	5.26%	1.94%	1.52%	2.04%	0.00%	0.73%
10	Personal & Household Goods	0.03%	0.30%	1.62%	0.24%	0.95%	0.04%	1.79%	5.50%
11	Media	2.99%	0.18%	1.48%	0.01%	0.83%	0.94%	0.40%	3.12%
12	Banks	1.05%	0.72%	6.44%	0.06%	0.10%	0.95%	1.39%	4.29%
13	Construction and Materials	0.09%	0.97%	4.15%	0.05%	0.74%	0.29%	1.54%	4.07%
14	Industrial Goods and Services	0.03%	1.93%	0.67%	0.01%	0.15%	2.47%	2.86%	8.73%
15	Chemicals	0.10%	0.13%	2.39%	0.76%	0.04%	1.68%	0.40%	3.30%
16	Health Care	0.08%	0.33%	0.95%	0.06%	0.02%	0.01%	1.22%	0.82%
17	Telecommunications	0.68%	0.43%	0.37%	0.04%	0.06%	0.19%	2.62%	2.34%
18	Utilities	1.36%	1.65%	2.39%	0.00%	0.85%	0.21%	0.17%	0.22%

Table 9c–R-Squared of the Relation between Price-Path Index and dSIR in the Analyzed Industries

#	INDEX	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	2.69%	1.34%	3.81%	0.49%
1	Oil & Gas	1.50%	2.12%	0.47%	2.23%
2	Technology	0.39%	0.49%	0.22%	0.43%
3	Automobiles & Parts	1.19%	0.00%	0.50%	0.03%
4	Basic Resources	2.36%	0.67%	0.03%	0.32%
5	Retail	0.87%	0.74%	0.78%	3.10%
6	Insurance	0.49%	0.77%	3.33%	0.99%
7	Food & Beverage	1.87%	0.75%	0.00%	1.23%
8	Travel and Leisure	1.52%	0.21%	0.55%	0.45%
9	Financial Services	2.77%	2.02%	1.64%	0.04%
10	Personal & Household Goods	2.74%	0.00%	1.07%	0.01%
11	Media	1.52%	0.48%	0.14%	0.73%
12	Banks	0.54%	0.48%	3.95%	0.10%
13	Construction and Materials	1.41%	1.25%	5.08%	3.50%
14	Industrial Goods and Services	4.54%	1.64%	1.92%	0.91%
15	Chemicals	3.30%	4.01%	1.56%	0.26%
16	Health Care	1.23%	1.81%	0.06%	0.27%
17	Telecommunications	0.12%	1.17%	0.07%	2.44%
18	Utilities	1.23%	1.73%	1.40%	4.64%

A#2. No specific industries showed significant relationship between Pth and dSIR. No high frequency relationship can be found in specific industries, or a persistence of it.

Q#3. Are excess returns a driver for systematic-IR dynamics?

When excess return is effective and strongly positive, it is possible less relevance will be given to the information system, so that information risk may arise. We have computed daily abnormal return (in terms of excess return of the industry index versus. the market index) and searched for correlations with daily dSIR.

Table 10 shows the results. Quite surprising, the Personal & Households Goods industry shows the maximum average relationship, even though the relationship is very modest. In all of the other industries SIR does not seem to be linked to excess return. The two years after big drops (i.e. 2001 and 2010) show the highest levels of correlations, while the lowest level is reached in 2007.

Table 10a–R-Squared of the Relation between Excess Return and dSIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.00%	1.27%	0.45%	0.32%	1.54%	0.00%	0.38%	0.47%
2	Technology	0.05%	0.23%	0.93%	1.06%	0.76%	0.26%	0.02%	1.45%
3	Automobiles & Parts	0.11%	0.94%	0.00%	0.81%	0.01%	0.33%	0.75%	0.00%
4	Basic Resources	0.00%	0.22%	0.00%	1.29%	0.27%	0.37%	0.49%	1.47%
5	Retail	0.00%	0.54%	0.48%	0.51%	0.36%	0.10%	1.82%	0.45%
6	Insurance	0.11%	0.06%	0.14%	0.26%	0.10%	0.01%	0.50%	0.02%
7	Food & Beverage	0.04%	0.03%	0.14%	1.53%	0.03%	0.20%	0.38%	2.76%
8	Travel and Leisure	0.11%	0.40%	0.08%	0.94%	3.13%	0.00%	1.31%	0.47%
9	Financial Services	0.00%	0.20%	0.00%	0.02%	0.18%	0.51%	2.21%	0.26%
10	Personal & Household Goods	0.03%	1.02%	0.78%	0.04%	0.18%	4.91%	0.00%	0.35%
11	Media	0.01%	0.33%	0.00%	0.24%	0.46%	0.95%	3.21%	0.15%
12	Banks	0.00%	0.26%	0.01%	2.43%	0.50%	1.71%	1.30%	0.02%
13	Construction and Materials	0.02%	0.24%	1.18%	1.96%	0.36%	0.54%	0.48%	0.04%
14	Industrial Goods and Services	0.01%	0.00%	1.11%	0.42%	0.35%	0.12%	0.05%	0.10%
15	Chemicals	0.00%	1.31%	0.39%	0.06%	0.08%	0.02%	0.21%	1.83%
16	Health Care	0.04%	0.54%	2.26%	0.00%	0.32%	0.00%	1.50%	0.06%
17	Telecomm-unications	0.11%	0.26%	0.00%	0.18%	0.88%	0.09%	0.06%	0.02%
18	Utilities	0.00%	0.31%	0.67%	0.40%	1.13%	0.04%	0.01%	0.54%

Table 10b–R-Squared of the Relation between Excess Return and dSIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004	2005
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.00%	0.17%	0.00%	0.11%	0.76%	0.01%	0.60%	0.08%
2	Technology	0.05%	0.89%	0.75%	0.52%	0.18%	0.10%	0.10%	0.86%
3	Automobiles & Parts	0.11%	0.73%	0.29%	0.09%	0.36%	0.87%	0.01%	0.22%
4	Basic Resources	0.00%	0.56%	0.25%	0.79%	0.82%	0.11%	0.23%	0.57%
5	Retail	0.00%	0.38%	0.03%	0.02%	0.00%	0.05%	0.34%	0.52%
6	Insurance	0.11%	0.00%	0.06%	0.07%	3.15%	2.83%	0.51%	0.02%
7	Food & Beverage	0.04%	0.15%	0.26%	0.11%	1.12%	0.66%	1.18%	1.61%
8	Travel and Leisure	0.11%	1.73%	0.43%	0.52%	1.78%	1.26%	0.51%	0.23%
9	Financial Services	0.00%	0.05%	0.48%	1.06%	0.03%	1.39%	0.21%	0.46%
10	Personal & Household Goods	0.03%	0.01%	1.48%	1.26%	0.05%	0.45%	0.01%	0.04%
11	Media	0.01%	0.02%	0.00%	0.17%	0.02%	0.00%	1.38%	0.54%
12	Banks	0.00%	0.42%	0.03%	3.28%	0.03%	0.37%	0.11%	0.00%
13	Construction and Materials	0.02%	0.24%	0.20%	1.66%	0.48%	0.30%	1.22%	0.03%
14	Industrial Goods and Services	0.01%	2.06%	0.52%	1.73%	0.19%	0.00%	1.87%	0.02%
15	Chemicals	0.00%	2.48%	0.95%	0.13%	0.04%	0.31%	0.01%	0.03%
16	Health Care	0.04%	0.07%	0.52%	0.35%	0.55%	0.96%	0.91%	0.19%
17	Telecomm-unications	0.11%	0.26%	0.82%	2.41%	0.14%	0.17%	0.16%	0.01%
18	Utilities	0.00%	0.78%	0.42%	0.01%	0.16%	0.32%	0.82%	0.02%

Table 10c–R-Squared of the Relation between Excess Return and dSIR in the Analyzed Industries

#	INDEX	Average	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	n.r.					
1	Oil & Gas	0.00%	0.19%	0.39%	1.02%	0.27%	0.16%
2	Technology	0.05%	0.10%	0.04%	0.39%	0.74%	2.09%
3	Automobiles & Parts	0.11%	0.01%	0.30%	0.24%	1.52%	5.92%
4	Basic Resources	0.00%	0.17%	0.07%	0.69%	0.04%	4.41%
5	Retail	0.00%	0.82%	0.12%	0.05%	0.02%	0.09%
6	Insurance	0.11%	0.51%	0.36%	0.02%	0.25%	1.43%
7	Food & Beverage	0.04%	0.62%	0.09%	0.67%	0.84%	1.80%
8	Travel and Leisure	0.11%	0.54%	0.00%	0.09%	0.09%	2.57%
9	Financial Services	0.00%	0.02%	0.55%	0.69%	0.11%	2.26%
10	Personal & Household Goods	0.03%	0.30%	0.00%	1.22%	0.21%	0.98%
11	Media	0.01%	0.68%	0.87%	0.33%	0.27%	0.17%
12	Banks	0.00%	0.01%	0.00%	0.17%	0.21%	0.07%
13	Construction and Materials	0.02%	1.43%	0.18%	0.03%	0.86%	0.19%
14	Industrial Goods and Services	0.01%	0.27%	0.33%	1.21%	1.03%	0.60%
15	Chemicals	0.00%	0.27%	0.09%	0.55%	0.02%	0.11%
16	Health Care	0.04%	0.46%	0.04%	1.36%	0.51%	0.90%
17	Telecomm-unications	0.11%	0.22%	0.36%	1.26%	0.22%	0.80%
18	Utilities	0.00%	0.82%	0.23%	0.05%	0.04%	0.47%

The highest frequencies of relationship can be found in the Bank industry followed by Personal and Households Goods, Construction and Materials, and Telecommunications.

The highest persistence of the relationship can be found in the Retail and in the Industrial Goods and Services industries for the two years 1995-96 along with Personal and Households Goods for the two years 2000-01.

A#3. Relationships can be found after big drops in market prices, thus indicating difficulties in spreading information after financial crisis, possibly due to behavioural bias of investors. Banks seems to generate a "portfolio effect" in information risk.

No high frequencies of this relationship can be found in specific industries, nor persistence of it.

Q#4. Is volatility path a driver for systematic-IR dynamics?

Similarly to the price path case we investigate whether volatility path may influence the dynamics of SIR. Several explanations may sustain this hypothesis. Some are the same as the price path discussion in Question #2. Another specific possibility is the increased value of the market timing option. To estimate the relationship between volatility paths and systematic-IR an index of a volatility tendency is computed. The index is similar to the price path one, considering the frequency of increases in daily volatility for a quarter of trading, as indicated in the following equation:

$$\sigma\text{pth} = \frac{\sum_{t=T}^{T+5} if(\sigma_t > \sigma_{t-1})}{5} \qquad 1 > \sigma\text{pth} > 0 \tag{27}$$

Being computable for any trading days we can relate its level with dSIR. Results for R^2 index computations are displayed in table 11. Retail is the most sensible industry even if levels of R^2 are not so high. High levels of correlation are found in the first quarter of 2010 (for the index as a whole and for Utilities, Chemicals and Health Care).

Table 11a–R-Squared of the Relation between Volatility Path and dSIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	1.29%	4.11%	2.44%	0.92%	0.62%	1.84%	1.93%	0.55%
1	Oil & Gas	0.53%	0.50%	1.02%	0.20%	0.47%	1.53%	2.03%	0.31%
2	Technology	0.79%	0.91%	2.07%	1.50%	1.51%	0.40%	1.04%	1.57%
3	Automobiles & Parts	0.29%	1.56%	1.70%	1.25%	0.00%	0.40%	3.95%	1.63%
4	Basic Resources	0.74%	0.72%	3.56%	0.70%	1.92%	1.71%	0.84%	2.86%
5	Retail	0.77%	0.88%	1.90%	0.01%	0.24%	1.00%	0.67%	0.45%
6	Insurance	0.65%	0.06%	0.66%	0.39%	0.80%	2.22%	2.92%	0.46%
7	Food & Beverage	0.28%	1.34%	0.31%	0.65%	0.48%	0.28%	1.73%	0.82%
8	Travel and Leisure	0.58%	0.06%	0.00%	2.99%	1.15%	0.02%	1.67%	0.15%
9	Financial Services	0.68%	0.04%	2.35%	0.84%	3.86%	0.14%	0.89%	0.23%
10	Personal & Household Goods	1.01%	2.29%	1.55%	1.58%	3.90%	0.51%	1.49%	0.23%

Table 11a(cont.)–R-Squared of the Relation between Volatility Path and dSIR in the Analyzed Industries

11	Media	0.74%	1.30%	0.45%	1.29%	2.26%	0.26%	0.10%	3.01%
12	Banks	0.97%	0.65%	1.09%	2.75%	1.16%	1.32%	5.40%	0.37%
13	Construction and Materials	0.68%	0.62%	0.99%	2.25%	0.47%	0.91%	0.36%	1.42%
14	Industrial Goods and Services	0.64%	1.96%	1.77%	0.96%	3.28%	1.26%	0.43%	0.88%
15	Chemicals	1.02%	2.21%	3.04%	0.88%	3.20%	0.47%	1.08%	0.62%
16	Health Care	0.83%	1.09%	0.41%	1.40%	1.52%	1.03%	1.20%	0.69%
17	Telecomm-unications	0.69%	0.29%	0.62%	0.36%	0.03%	2.54%	2.92%	0.26%
18	Utilities	0.95%	0.80%	1.43%	1.09%	1.46%	0.32%	1.33%	1.32%

Table 11b–R-Squared of the Relation between Volatility Path and dSIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004	2005
0	Dow Jones Euro Stoxx	1.29%	1.12%	0.94%	3.24%	0.70%	0.87%	1.27%	1.29%
1	Oil & Gas	0.53%	0.53%	0.01%	0.44%	0.66%	0.61%	0.04%	1.50%
2	Technology	0.79%	0.80%	2.15%	1.23%	0.44%	1.73%	2.42%	0.00%
3	Automobiles & Parts	0.29%	1.95%	0.33%	2.32%	0.93%	0.58%	0.09%	0.62%
4	Basic Resources	0.74%	0.65%	0.11%	0.52%	1.59%	0.49%	0.89%	2.46%
5	Retail	0.77%	1.12%	0.99%	1.40%	3.57%	0.08%	1.17%	1.06%
6	Insurance	0.65%	4.68%	1.55%	0.23%	0.38%	0.21%	0.51%	0.07%
7	Food & Beverage	0.28%	1.42%	0.51%	1.15%	1.81%	0.07%	0.24%	0.16%
8	Travel and Leisure	0.58%	2.96%	0.87%	0.69%	0.63%	0.14%	1.52%	0.25%
9	Financial Services	0.68%	1.08%	0.11%	0.47%	1.36%	1.10%	0.30%	0.45%
10	Personal & Household Goods	1.01%	1.15%	0.55%	1.20%	0.48%	2.27%	1.40%	0.03%
11	Media	0.74%	1.76%	0.17%	0.55%	1.91%	1.33%	2.13%	0.36%
12	Banks	0.97%	1.37%	1.24%	1.05%	1.46%	1.39%	1.08%	0.28%
13	Construction and Materials	0.68%	2.40%	0.63%	1.01%	0.57%	1.08%	2.90%	1.75%
14	Industrial Goods and Services	0.64%	1.96%	0.47%	0.39%	0.36%	0.55%	0.20%	2.20%
15	Chemicals	1.02%	1.14%	0.27%	2.64%	1.81%	0.46%	0.39%	0.55%
16	Health Care	0.83%	1.93%	0.00%	2.93%	0.84%	1.14%	0.27%	0.98%
17	Telecomm-unications	0.69%	0.51%	2.20%	1.78%	1.84%	0.01%	2.12%	0.45%
18	Utilities	0.95%	4.79%	0.91%	1.37%	0.99%	0.58%	1.61%	0.34%

Table 11c–R-Squared of the Relation between Volatility Path and dSIR in the Analyzed Industries

#	INDEX	Average	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	1.29%	0.53%	1.18%	2.41%	3.59%	7.66%
1	Oil & Gas	0.53%	0.93%	1.76%	0.45%	1.55%	0.28%
2	Technology	0.79%	0.05%	2.86%	0.07%	2.47%	3.67%
3	Automobiles & Parts	0.29%	0.23%	1.23%	0.02%	2.26%	0.13%
4	Basic Resources	0.74%	0.13%	0.02%	1.75%	1.19%	0.34%
5	Retail	0.77%	0.62%	1.07%	0.54%	1.10%	13.36%
6	Insurance	0.65%	1.17%	1.78%	0.46%	2.51%	0.61%
7	Food & Beverage	0.28%	0.00%	0.39%	0.46%	0.02%	0.22%
8	Travel and Leisure	0.58%	1.68%	0.90%	0.36%	1.74%	0.09%
9	Financial Services	0.68%	0.43%	1.79%	3.35%	0.07%	0.12%
10	Personal & Household Goods	1.01%	0.09%	0.63%	2.07%	1.96%	3.55%
11	Media	0.74%	0.88%	0.79%	0.46%	1.08%	2.98%
12	Banks	0.97%	1.69%	1.74%	2.17%	0.63%	0.06%
13	Construction and Materials	0.68%	0.40%	0.79%	0.16%	2.20%	1.45%
14	Industrial Goods and Services	0.64%	0.18%	0.81%	1.34%	0.31%	1.21%
15	Chemicals	1.02%	0.55%	0.96%	1.33%	2.06%	6.08%
16	Health Care	0.83%	0.02%	1.35%	1.41%	1.99%	7.55%
17	Telecomm-unications	0.69%	0.63%	0.77%	0.30%	1.74%	0.25%
18	Utilities	0.95%	0.88%	3.44%	1.07%	0.58%	5.51%

No high frequencies can be found in specific industries, while persistence is found in the Automobiles and Parts for the two years 2003-04.

A#4. Higher payoff risk does not generate systematic-IR, even in low risk industries.

Q#5. Is beta path a driver for systematic-IR dynamics?

To test the relationship between the movements in βLT and dSIR you may use an index of trends in beta similar to those adopted for price and volatility analysis. The following equation indicates thecomputation:

$$\beta pth = \frac{\sum_{t=T}^{T+5} if(\beta_t > \beta_{t-1})}{5} \quad 1 > \sigma pth > 0 \tag{28}$$

This indicator is computable for any trading days so that we you can relate its level with dSIR. Again we use the R^2 index to extract the inner correlations that are in table 12. Media is the most sensible industry; still in this case levels of R^2 are not so high. Higher levels of correlation are found in 2000 and 2010; no high frequency is found in any industry. The highest level of correlation is found in Health Care during the first quarter of 2010.

A#5. No significant relation can be found, meaning that no behavioural impact affects IR

Table 12a–R-Squared of the Relation between Beta Path and dSIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.12%	0.93%	1.09%	0.01%	1.24%	0.88%	0.01%	1.54%
2	Technology	1.11%	1.12%	0.94%	0.89%	0.33%	0.42%	1.57%	0.75%
3	Automobiles & Parts	2.74%	0.93%	0.76%	0.52%	0.05%	0.29%	0.17%	0.36%
4	Basic Resources	1.57%	4.33%	2.76%	0.41%	2.94%	0.46%	0.47%	1.75%
5	Retail	1.75%	0.07%	1.21%	0.48%	1.41%	0.06%	0.32%	0.00%
6	Insurance	0.23%	0.02%	1.61%	0.14%	0.00%	0.83%	1.04%	0.02%
7	Food & Beverage	1.28%	0.11%	0.74%	0.71%	0.81%	1.43%	0.10%	0.25%
8	Travel and Leisure	1.27%	0.03%	0.02%	1.40%	1.83%	0.14%	0.91%	1.39%
9	Financial Services	2.12%	0.03%	0.13%	0.12%	1.04%	0.13%	0.97%	0.01%
10	Personal & Household Goods	0.80%	1.16%	2.66%	3.00%	0.81%	1.12%	0.43%	0.46%
11	Media	3.90%	0.11%	0.88%	2.13%	1.53%	0.67%	1.50%	1.53%
12	Banks	2.16%	0.01%	0.10%	0.14%	1.47%	1.16%	0.34%	0.62%
13	Construction and Materials	1.28%	0.89%	0.21%	1.17%	0.00%	2.16%	0.04%	2.18%
14	Industrial Goods and Services	2.40%	0.58%	0.02%	0.63%	1.44%	1.92%	0.43%	0.04%
15	Chemicals	1.26%	0.45%	2.95%	0.84%	1.13%	0.69%	1.45%	0.61%
16	Health Care	3.65%	0.08%	0.73%	0.61%	1.96%	1.73%	0.73%	0.19%
17	Telecommunications	2.27%	0.64%	0.29%	1.14%	0.79%	5.72%	0.77%	0.16%
18	Utilities	2.40%	2.75%	0.50%	2.22%	0.18%	0.33%	1.59%	0.45%

Table 12b–R-Squared of the Relation between Beta Path and dSIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004	2005
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.12%	0.09%	0.98%	0.08%	0.24%	0.62%	1.29%	0.53%
2	Technology	1.11%	0.30%	1.07%	0.98%	0.11%	0.02%	0.10%	0.11%
3	Automobiles & Parts	2.74%	1.10%	1.31%	0.88%	0.86%	0.32%	0.16%	0.45%
4	Basic Resources	1.57%	1.32%	1.08%	0.04%	1.41%	1.17%	5.25%	1.52%
5	Retail	1.75%	0.05%	3.81%	1.84%	1.06%	0.25%	0.83%	0.39%
6	Insurance	0.23%	2.58%	3.66%	1.21%	0.13%	1.24%	0.17%	0.12%
7	Food & Beverage	1.28%	1.24%	5.50%	2.39%	0.63%	0.02%	0.13%	1.16%
8	Travel and Leisure	1.27%	3.11%	1.19%	0.47%	0.41%	1.51%	0.69%	0.01%
9	Financial Services	2.12%	0.28%	1.32%	0.79%	2.13%	1.24%	0.10%	0.39%
10	Personal & Household Goods	0.80%	0.95%	1.62%	0.10%	0.95%	0.83%	0.37%	0.01%
11	Media	3.90%	1.27%	1.19%	0.11%	1.01%	1.47%	0.93%	4.45%
12	Banks	2.16%	0.38%	1.07%	0.32%	1.91%	0.67%	0.02%	0.62%
13	Construction and Materials	1.28%	1.48%	2.64%	0.17%	0.00%	5.33%	1.34%	0.73%
14	Industrial Goods and Services	2.40%	1.99%	0.74%	1.59%	0.29%	0.34%	0.02%	3.08%
15	Chemicals	1.26%	0.55%	0.48%	2.17%	0.36%	0.02%	0.01%	0.00%
16	Health Care	3.65%	1.37%	1.61%	2.66%	0.64%	2.66%	2.10%	2.13%
17	Telecommunications	2.27%	0.14%	2.15%	1.84%	1.21%	0.14%	0.01%	1.11%
18	Utilities	2.40%	3.14%	2.52%	2.66%	0.76%	0.29%	0.47%	0.00%

Table 12c–R-Squared of the Relation between Beta Path and dSIR in the Analyzed Industries

#	INDEX	Average	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.12%	0.17%	0.38%	3.15%	1.03%	0.00%
2	Technology	1.11%	0.17%	0.61%	0.52%	0.53%	0.21%
3	Automobiles & Parts	2.74%	0.98%	0.36%	0.03%	2.20%	2.48%
4	Basic Resources	1.57%	0.01%	0.68%	2.53%	0.03%	7.97%
5	Retail	1.75%	0.04%	1.25%	0.70%	2.90%	0.16%
6	Insurance	0.23%	0.77%	0.69%	0.21%	0.26%	5.22%
7	Food & Beverage	1.28%	0.12%	0.37%	0.37%	0.24%	4.67%
8	Travel and Leisure	1.27%	2.56%	1.06%	0.02%	0.36%	0.77%
9	Financial Services	2.12%	0.01%	1.83%	0.01%	0.08%	0.20%
10	Personal & Household Goods	0.80%	0.31%	1.93%	0.03%	0.38%	5.78%
11	Media	3.90%	1.14%	1.82%	0.45%	1.04%	3.12%
12	Banks	2.16%	0.97%	1.22%	0.02%	0.58%	2.94%
13	Construction and Materials	1.28%	0.20%	0.08%	1.18%	0.03%	0.29%
14	Industrial Goods and Services	2.40%	0.89%	0.23%	0.17%	0.21%	0.19%
15	Chemicals	1.26%	1.08%	0.19%	0.22%	0.37%	3.81%
16	Health Care	3.65%	0.00%	0.63%	5.92%	0.34%	17.10%
17	Telecommunications	2.27%	0.05%	0.00%	0.00%	2.61%	2.66%
18	Utilities	2.40%	0.61%	0.00%	1.27%	0.86%	7.56%

Q#6. Is short-term beta diverting (βST-βLT) a driver for systematic-IR level?

SIR level and its changes could be driven by gaps between short-term and long-term beta. In fact, such a gap could encourage information traders to enter the market in order to gain extra profits. For any considered trading day the beta gap can be computed and the relationship between it and the absolute level of systematic-IR (SIR) can be examined. Interesting results are shown in table 13: (i) this relationship is more relevant than other for all industries; (ii) it is relevant for several years, particularly before a strong drop in the markets takes place; and (iii) it is quite persistent.

Table 13a–R-Squared of the Relation between Beta Gaps and SIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	4.24%	2.27%	4.54%	7.69%	5.42%	6.05%	5.13%	5.82%
2	Technology	2.88%	3.28%	5.87%	6.29%	4.38%	3.17%	2.17%	2.87%
3	Automobiles & Parts	4.45%	3.69%	5.37%	8.27%	7.35%	6.65%	2.22%	1.70%
4	Basic Resources	4.74%	2.50%	7.06%	6.28%	8.62%	6.19%	4.77%	1.09%
5	Retail	4.43%	8.19%	5.96%	8.59%	4.78%	6.21%	3.09%	3.82%
6	Insurance	2.17%	1.49%	4.04%	6.60%	6.79%	7.28%	3.49%	1.04%
7	Food & Beverage	4.88%	4.02%	6.81%	10.47%	7.13%	5.04%	3.93%	0.80%
8	Travel and Leisure	5.49%	11.14%	10.09%	6.74%	9.92%	9.18%	4.64%	6.52%
9	Financial Services	2.85%	2.01%	4.33%	8.80%	1.44%	2.55%	5.69%	1.58%
10	Personal & Household Goods	3.63%	5.13%	6.10%	9.91%	2.95%	9.22%	8.18%	2.42%
11	Media	4.22%	1.62%	4.62%	10.18%	8.80%	9.35%	7.86%	5.89%
12	Banks	1.55%	1.51%	3.71%	3.72%	1.60%	5.48%	3.69%	2.74%
13	Construction and Materials	3.30%	4.13%	4.41%	6.81%	8.70%	7.06%	5.20%	4.07%
14	Industrial Goods and Services	2.77%	2.04%	4.77%	5.24%	3.46%	7.53%	3.69%	4.58%
15	Chemicals	4.01%	1.36%	6.08%	6.94%	1.96%	8.76%	3.77%	1.49%
16	Health Care	5.96%	3.57%	13.86%	8.60%	7.21%	12.17%	5.58%	5.78%
17	Telecommunications	3.81%	1.13%	8.63%	5.95%	10.30%	4.62%	3.51%	4.53%
18	Utilities	3.30%	2.23%	3.61%	6.54%	5.40%	4.65%	5.41%	5.93%

Table 13b–R-Squared of the Relation between Beta Gaps and SIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004	2005
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	4.24%	8.62%	9.54%	5.12%	3.62%	6.05%	9.30%	8.76%
2	Technology	2.88%	8.36%	4.99%	6.76%	0.61%	1.69%	5.03%	3.10%
3	Automobiles & Parts	4.45%	9.78%	8.04%	4.84%	4.61%	2.48%	5.34%	9.39%
4	Basic Resources	4.74%	11.16%	7.98%	4.97%	5.65%	6.69%	9.23%	8.91%
5	Retail	4.43%	10.61%	6.58%	4.07%	3.58%	4.10%	4.60%	10.17%
6	Insurance	2.17%	4.15%	9.22%	2.38%	2.70%	2.24%	2.50%	2.17%
7	Food & Beverage	4.88%	8.57%	10.22%	5.29%	4.01%	2.65%	4.82%	24.54%
8	Travel and Leisure	5.49%	6.00%	8.03%	3.24%	6.74%	5.18%	3.76%	8.86%
9	Financial Services	2.85%	4.10%	8.96%	3.37%	6.19%	3.44%	4.29%	4.56%
10	Personal & Household Goods	3.63%	11.69%	5.80%	4.34%	1.69%	1.60%	1.81%	4.15%
11	Media	4.22%	9.60%	3.25%	4.77%	4.52%	4.21%	8.06%	7.65%
12	Banks	1.55%	1.65%	4.69%	0.89%	0.68%	2.70%	2.94%	0.90%
13	Construction and Materials	3.30%	7.67%	7.64%	4.88%	3.24%	6.93%	7.04%	5.88%
14	Industrial Goods and Services	2.77%	7.75%	4.34%	4.47%	1.38%	3.03%	2.63%	3.97%
15	Chemicals	4.01%	10.71%	8.87%	5.37%	3.57%	4.21%	4.91%	8.77%
16	Health Care	5.96%	11.49%	8.83%	8.49%	4.33%	4.29%	3.64%	8.21%
17	Telecomm-unications	3.81%	1.55%	7.17%	4.25%	2.82%	5.27%	4.11%	6.30%
18	Utilities	3.30%	5.16%	9.38%	5.90%	6.06%	2.38%	5.31%	6.60%

Table 13c–R-Squared of the Relation between Beta Gaps and SIR in the Analyzed Industries

#	INDEX	Average	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	4.24%	5.68%	4.71%	0.51%	4.48%	12.21%
2	Technology	2.88%	1.95%	10.37%	0.98%	2.05%	7.06%
3	Automobiles & Parts	4.45%	7.89%	4.75%	9.37%	5.07%	7.69%
4	Basic Resources	4.74%	8.49%	6.10%	2.74%	5.02%	12.39%
5	Retail	4.43%	5.45%	10.41%	4.01%	4.35%	8.06%
6	Insurance	2.17%	2.20%	1.63%	2.08%	3.48%	1.05%
7	Food & Beverage	4.88%	7.48%	2.17%	4.84%	6.60%	16.64%
8	Travel and Leisure	5.49%	8.80%	6.30%	2.55%	6.66%	2.75%
9	Financial Services	2.85%	4.59%	4.07%	2.23%	4.26%	6.93%
10	Personal & Household Goods	3.63%	2.32%	6.76%	1.17%	5.23%	1.72%
11	Media	4.22%	10.11%	9.63%	4.07%	6.58%	7.93%
12	Banks	1.55%	1.75%	0.72%	1.05%	2.75%	1.50%
13	Construction and Materials	3.30%	2.85%	7.85%	0.40%	2.99%	4.51%
14	Industrial Goods and Services	2.77%	1.37%	6.91%	1.00%	2.17%	8.66%
15	Chemicals	4.01%	7.80%	9.78%	0.23%	5.54%	7.81%
16	Health Care	5.96%	8.51%	10.16%	4.67%	9.12%	12.13%
17	Telecomm-unications	3.81%	7.12%	8.26%	0.97%	7.06%	13.53%
18	Utilities	3.30%	7.65%	5.38%	0.86%	6.61%	3.40%

A#6. Results demonstrate two aspects of financial communication: (i) a massive reduction in systematic risk may reduce the attention paid by the market to information flows, thus increasing market risk tolerance to IR; and (ii) in high systematic risk periods, the intensification of financial communication can attract the information trader and the informed investors seeking abnormal return.

Q#7. Is short-term diversifiable quota of risk (δST) a driver for DIR?

The drivers of the idiosyncratic part of the information risk are analyzed next. Since only the industry level has relevant DIR, this analysis cannot be conducted for the market as a whole. There is a need for a higher quantity of information to be processed each time the idiosyncratic risk of payoff is relevant. In these cases the opportunities to get extra return by the correct market timing relevant to improved stock selection strategies through the higher flow of information. You may expect a positive correlation between the idiosyncratic quota of payoff-risk and that of the information-risk, since increasing the former generates higher quantities of information to be processed. Table 14 shows very strong results. During the entire time horizon, all industries show relevant correlations. Four industries have R^2 over the 50% level: Technology, Retail, Telecommunications, and Utilities.

Table 14a–R-Squared of the Relation between Short-Term Diversifiable Quota of Payoff Risk and DIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	37.61%	73.78%	68.59%	58.98%	54.75%	67.26%	73.56%	49.76%
2	Technology	50.59%	72.45%	65.89%	50.78%	67.37%	53.72%	61.16%	71.38%
3	Automobiles & Parts	5.20%	73.66%	55.77%	46.67%	71.07%	58.04%	71.57%	61.09%
4	Basic Resources	27.49%	51.99%	69.70%	57.51%	63.25%	66.00%	71.39%	10.60%
5	Retail	52.22%	59.92%	86.52%	67.85%	82.90%	67.01%	67.91%	66.37%
6	Insurance	32.75%	63.42%	64.77%	71.77%	83.27%	65.92%	65.51%	80.22%
7	Food & Beverage	28.79%	69.19%	81.70%	70.28%	71.16%	47.28%	58.42%	7.00%
8	Travel and Leisure	37.35%	47.07%	45.60%	63.94%	68.40%	69.26%	64.36%	78.61%
9	Financial Services	36.29%	76.91%	84.19%	83.59%	61.75%	76.15%	75.31%	42.28%
10	Personal & Household Goods	45.23%	72.24%	62.54%	63.20%	62.32%	72.44%	66.89%	55.31%
11	Media	43.42%	50.27%	68.62%	67.41%	62.97%	63.51%	66.46%	72.77%
12	Banks	30.97%	70.02%	80.74%	57.29%	85.31%	54.41%	63.60%	60.98%
13	Construction and Materials	48.32%	76.04%	70.74%	63.68%	71.71%	86.15%	71.14%	63.65%
14	Industrial Goods and Services	39.75%	74.19%	72.57%	60.57%	57.41%	67.88%	81.36%	61.92%
15	Chemicals	35.38%	46.96%	77.79%	44.64%	66.80%	74.01%	61.92%	58.78%
16	Health Care	46.17%	57.98%	41.30%	52.54%	59.44%	68.26%	39.06%	53.31%
17	Telecomm-unications	52.74%	67.00%	68.07%	73.75%	69.77%	71.79%	72.76%	63.43%
18	Utilities	54.06%	51.76%	73.65%	80.57%	59.53%	65.85%	76.19%	54.99%

Table 14b–R-Squared of the Relation between Short-Term Diversifiable Quota of Payoff Risk and DIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004	2005
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	37.61%	60.11%	55.55%	53.33%	75.44%	49.03%	62.51%	69.65%
2	Technology	50.59%	61.16%	65.77%	53.92%	74.05%	56.09%	67.27%	69.42%
3	Automobiles & Parts	5.20%	24.62%	52.52%	58.31%	71.76%	69.08%	76.76%	63.63%
4	Basic Resources	27.49%	39.73%	35.62%	46.08%	50.08%	63.68%	61.23%	46.70%
5	Retail	52.22%	64.27%	69.77%	72.00%	74.17%	33.14%	61.52%	85.87%
6	Insurance	32.75%	5.94%	53.94%	71.65%	67.15%	49.19%	78.63%	72.80%
7	Food & Beverage	28.79%	20.57%	47.26%	59.28%	69.78%	63.74%	72.67%	52.05%
8	Travel and Leisure	37.35%	43.95%	43.72%	32.61%	46.98%	40.17%	58.18%	77.58%
9	Financial Services	36.29%	10.30%	57.14%	57.42%	79.91%	63.76%	54.45%	63.67%
10	Personal & Household Goods	45.23%	59.77%	73.53%	71.12%	69.54%	68.57%	68.50%	83.32%
11	Media	43.42%	53.13%	54.86%	69.72%	30.61%	65.54%	59.60%	71.90%
12	Banks	30.97%	12.54%	50.62%	76.62%	77.07%	61.53%	78.27%	86.49%
13	Construction and Materials	48.32%	72.33%	59.66%	54.49%	26.29%	69.02%	60.04%	82.36%
14	Industrial Goods and Services	39.75%	68.13%	48.24%	52.47%	55.98%	57.42%	59.69%	87.56%
15	Chemicals	35.38%	57.61%	63.85%	43.36%	59.04%	45.29%	76.09%	55.97%
16	Health Care	46.17%	49.39%	66.62%	66.50%	66.11%	64.28%	45.53%	47.17%
17	Telecomm-unications	52.74%	70.90%	64.34%	61.82%	34.95%	44.89%	80.75%	52.98%
18	Utilities	54.06%	74.41%	56.81%	64.73%	52.15%	47.30%	59.78%	53.58%

Table 14c–R-Squared of the Relation between Short-Term Diversifiable Quota of Payoff Risk and DIR in the Analyzed Industries

#	INDEX	Average	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	37.61%	75.96%	56.41%	49.67%	80.48%	87.38%
2	Technology	50.59%	60.73%	70.20%	59.14%	53.84%	76.35%
3	Automobiles & Parts	5.20%	67.15%	65.83%	30.75%	70.20%	45.47%
4	Basic Resources	27.49%	36.66%	68.42%	48.69%	75.38%	91.40%
5	Retail	52.22%	56.24%	59.02%	64.08%	70.46%	66.41%
6	Insurance	32.75%	75.55%	40.75%	40.62%	66.40%	83.55%
7	Food & Beverage	28.79%	61.33%	73.37%	53.42%	69.95%	87.39%
8	Travel and Leisure	37.35%	64.47%	69.58%	68.75%	76.63%	82.76%
9	Financial Services	36.29%	60.66%	62.72%	37.18%	66.22%	89.85%
10	Personal & Household Goods	45.23%	69.23%	62.22%	46.63%	76.57%	82.33%
11	Media	43.42%	75.75%	67.75%	52.07%	71.57%	82.11%
12	Banks	30.97%	55.70%	66.04%	39.29%	68.32%	62.23%
13	Construction and Materials	48.32%	76.33%	61.21%	59.65%	62.54%	73.51%
14	Industrial Goods and Services	39.75%	67.94%	57.85%	42.04%	67.08%	94.23%
15	Chemicals	35.38%	49.25%	66.32%	46.05%	73.67%	64.70%
16	Health Care	46.17%	62.34%	62.77%	66.37%	52.83%	70.04%
17	Telecomm-unications	52.74%	77.60%	64.46%	63.54%	57.98%	94.18%
18	Utilities	54.06%	54.21%	59.17%	63.25%	71.70%	74.49%

Persistence is also very high for all the industries. A negative relationship can be observed only in 1999. However, during that year for 8 industries no negative correlation index is found.

A#7. The results strongly demonstrate higher need of information in industries and/or time-periods having high idiosyncratic-risk levels (i.e. more information is required when complexities increase in business models).

Q#8. Is long-term diversifiable quota of risk (δLT) a driver for DIR?

Strong relations found before can mainly be generated by market timers entering the financial market. Repeating previous analysis using a long-term diversifiable quota of payoff-risk can be useful to get insights about the impact of sector rotation strategies over the idiosyncratic quota of the information risk premia.

Table 15 shows the results are still strong even if very different in quality when compared with those in table 14possibily due to the avoiding of the market-timing activities. High correlations for the entire dataset of observations are on average less frequent. Contrary to previous data, several years show a lower number of industries with relevant R^2. In 1999, 10 industries are fixed; in 2001 and 2008, 6 are fixed; in 1998, 2009 and 2010, 4 are fixed. In our opinion, this evidence shows the years when market timing can be a better strategy than industry picking. As far as persistence inside a specific industry is concerned, no high frequencies can be found. Time persistence is relevant for several industries even if none of them are completely persistent.

Table 15a–R-Squared of the Relation between Long-Term Diversifiable Quota of Payoff Risk and DIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	2.26%	8.98%	13.74%	0.01%	9.79%	0.03%	2.53%	4.53%
2	Technology	0.00%	2.48%	1.45%	0.06%	12.99%	2.79%	1.96%	7.58%
3	Automobiles & Parts	9.12%	9.57%	5.70%	0.21%	0.02%	5.25%	1.80%	2.63%
4	Basis Resources	7.07%	3.44%	4.33%	0.01%	2.01%	0.05%	2.16%	64.32%
5	Retail	0.46%	0.11%	3.30%	0.34%	2.20%	0.01%	17.30%	2.96%
6	Insurance	2.44%	2.62%	0.83%	2.57%	0.38%	2.30%	0.11%	1.75%
7	Food & Beverage	3.81%	0.17%	3.97%	3.37%	1.20%	0.02%	35.92%	8.38%
8	Travel and Leisure	2.72%	1.58%	0.16%	0.03%	5.91%	0.03%	6.80%	2.57%
9	Financial Services	1.99%	0.07%	0.07%	1.16%	1.34%	0.05%	3.44%	2.85%
10	Personal & Household Goods	0.97%	7.86%	5.14%	0.58%	0.07%	0.50%	0.82%	1.38%
11	Media	0.39%	3.58%	1.34%	0.42%	3.47%	2.61%	0.44%	0.03%
12	Banks	3.18%	0.16%	1.05%	0.04%	2.01%	0.03%	4.50%	0.00%
13	Construction and Materials	0.70%	9.27%	0.52%	1.93%	0.69%	0.41%	7.59%	10.89%
14	Industrial Goods and Services	2.53%	6.92%	0.08%	0.10%	0.27%	0.03%	0.18%	0.53%
15	Chemicals	2.52%	2.11%	2.50%	2.53%	16.42%	0.48%	6.71%	10.44%

Table 15a(cont.)–R-Squared of the Relation between Long-Term Diversifiable Quota of Payoff Risk and DIR in the Analyzed Industries

16	Health Care	1.03%	0.58%	6.40%	1.35%	1.43%	1.78%	0.21%	1.69%
17	Telecomm-unications	0.06%	6.29%	7.81%	0.15%	1.84%	0.22%	5.26%	11.84%
18	Utilities	0.23%	8.49%	0.95%	0.33%	0.64%	0.02%	0.10%	0.42%

Table 15b–R-Squared of the Relation between Long-Term Diversifiable Quota of Payoff Risk and DIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	2.26%	12.79%	0.15%	0.90%	2.42%	11.45%	2.69%
2	Technology	0.00%	3.00%	13.08%	14.29%	9.89%	3.94%	1.57%
3	Automobiles & Parts	9.12%	7.85%	2.18%	10.54%	0.04%	2.56%	1.56%
4	Basis Resources	7.07%	7.53%	0.44%	0.00%	2.42%	1.85%	3.87%
5	Retail	0.46%	1.10%	0.44%	6.03%	15.74%	0.19%	7.76%
6	Insurance	2.44%	51.80%	0.62%	17.52%	0.16%	2.74%	0.22%
7	Food & Beverage	3.81%	57.93%	4.49%	11.94%	1.12%	3.38%	0.04%
8	Travel and Leisure	2.72%	18.31%	4.84%	0.82%	1.36%	9.46%	0.02%
9	Financial Services	1.99%	57.92%	0.19%	3.61%	2.02%	0.07%	0.87%
10	Personal & Household Goods	0.97%	10.58%	3.05%	5.80%	0.44%	3.21%	10.90%
11	Media	0.39%	6.18%	10.45%	0.56%	4.51%	0.00%	8.77%
12	Banks	3.18%	62.53%	0.06%	6.73%	0.00%	3.42%	1.89%
13	Construction and Materials	0.70%	10.61%	5.08%	1.09%	1.29%	0.01%	7.47%
14	Industrial Goods and Services	2.53%	10.65%	9.30%	0.13%	0.41%	0.53%	9.58%
15	Chemicals	2.52%	11.92%	1.56%	0.04%	11.20%	4.46%	4.82%
16	Health Care	1.03%	7.71%	3.73%	2.47%	1.05%	4.41%	4.66%
17	Telecomm-unications	0.06%	0.42%	3.78%	13.21%	7.65%	10.54%	6.79%
18	Utilities	0.23%	0.00%	2.01%	10.29%	1.93%	10.94%	16.50%

Table 15c–R-Squared of the Relation between Long-Term Diversifiable Quota of Payoff Risk and DIR in the Analyzed Industries

#	INDEX	Average	2005	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	2.26%	4.48%	0.79%	0.15%	24.72%	2.51%	1.20%
2	Technology	0.00%	2.89%	8.78%	0.73%	0.04%	0.40%	27.15%
3	Automobiles & Parts	9.12%	6.02%	3.29%	10.31%	11.67%	5.51%	0.27%
4	Basis Resources	7.07%	13.84%	1.07%	3.81%	23.08%	0.52%	3.65%
5	Retail	0.46%	0.00%	18.92%	5.94%	2.69%	3.55%	20.66%
6	Insurance	2.44%	18.23%	5.22%	1.05%	4.07%	8.24%	13.33%
7	Food & Beverage	3.81%	5.73%	5.49%	0.63%	12.22%	1.73%	0.49%
8	Travel and Leisure	2.72%	0.14%	7.75%	0.36%	1.14%	0.15%	0.44%
9	Financial Services	1.99%	0.02%	2.95%	0.35%	13.53%	4.27%	5.77%
10	Personal & Household Goods	0.97%	1.01%	15.12%	3.68%	1.75%	18.55%	0.18%
11	Media	0.39%	1.29%	0.17%	0.38%	0.22%	1.30%	4.56%
12	Banks	3.18%	0.18%	17.39%	1.01%	3.24%	13.62%	0.47%
13	Construction and Materials	0.70%	0.69%	3.03%	8.72%	24.68%	0.48%	15.04%
14	Industrial Goods and Services	2.53%	0.72%	2.62%	0.18%	0.56%	11.98%	9.19%
15	Chemicals	2.52%	5.95%	7.50%	0.12%	3.81%	5.14%	6.93%
16	Health Care	1.03%	0.24%	0.62%	4.97%	1.61%	9.87%	2.11%
17	Telecomm-unications	0.06%	17.06%	2.60%	9.72%	0.05%	0.15%	3.29%
18	Utilities	0.23%	1.61%	5.72%	6.01%	1.48%	13.63%	3.67%

A#8. Long-term information spreading is insufficient to resolve asymmetries and the higher need of information in industries and/or time-periods is required (i.e. business model evolution requires flexible disclosure rules).

Q#9. Is excess return a driver for changes in DIR?

Does an information-risk-trader prefer to increase returns from investments or to reduce total volatility impacting her/his portfolio? If the excess return should demonstrate a valid DIR-driver, information risk aversion would be mainly driven by return and vice-versa.

Table 16 offers possible answers. On average no relevant impact of excess return can drive DIR (the highest average level is found in the Travel and Leisure industry). From year to year is possible to find high relevance.

Table 16a–R-Squared of the Relation between Excess-Return and dDIR in the Analyzed Industries

#	INDEX	Average	1992	1993	1994	1995	1996	1997	1998
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.04%	0.04%	0.00%	0.04%	1.05%	0.04%	3.56%	0.08%
2	Technology	0.14%	0.01%	2.31%	4.57%	0.06%	0.34%	0.43%	0.06%
3	Automobiles & Parts	0.01%	0.01%	0.28%	4.52%	0.18%	0.17%	0.39%	0.42%
4	Basic Resources	0.04%	0.39%	0.01%	6.21%	2.56%	0.21%	1.87%	0.18%
5	Retail	0.00%	0.01%	0.64%	0.01%	0.23%	0.44%	0.00%	0.33%
6	Insurance	0.03%	0.01%	0.69%	0.60%	0.17%	0.31%	1.17%	0.52%
7	Food & Beverage	0.00%	0.66%	0.39%	0.54%	0.06%	2.04%	0.02%	4.54%
8	Travel and Leisure	0.02%	1.12%	0.41%	0.00%	1.03%	0.07%	1.04%	0.04%
9	Financial Services	0.16%	0.30%	0.02%	0.05%	0.06%	0.00%	3.57%	0.42%
10	Personal & Household Goods	0.00%	0.03%	0.04%	0.00%	0.09%	1.56%	0.75%	0.15%
11	Media	0.15%	0.02%	0.47%	0.54%	1.29%	0.36%	1.95%	1.11%
12	Banks	0.40%	0.16%	1.40%	3.69%	0.00%	1.30%	4.66%	1.44%
13	Construction and Materials	0.08%	0.15%	1.50%	6.25%	0.00%	1.76%	0.17%	0.07%
14	Industrial Goods and Services	0.18%	0.26%	1.06%	0.91%	0.51%	0.05%	0.14%	0.49%
15	Chemicals	0.01%	0.20%	0.70%	3.36%	0.40%	0.40%	0.27%	0.05%
16	Health Care	0.01%	0.86%	0.33%	0.87%	1.86%	0.23%	0.26%	0.07%
17	Telecomm-unications	0.03%	0.16%	0.03%	0.01%	0.00%	0.01%	0.24%	0.24%
18	Utilities	0.01%	0.00%	0.02%	0.05%	0.07%	0.27%	0.19%	0.03%

Table 16b–R-Squared of the Relation between Excess-Return and dDIR in the Analyzed Industries

#	INDEX	Average	1999	2000	2001	2002	2003	2004	2005
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.04%	0.34%	0.00%	0.23%	0.05%	0.49%	0.03%	0.09%
2	Technology	0.14%	0.15%	0.75%	0.13%	1.77%	0.01%	2.29%	2.07%
3	Automobiles & Parts	0.01%	0.13%	0.20%	0.19%	0.47%	0.14%	0.27%	0.00%
4	Basic Resources	0.04%	0.70%	0.47%	0.00%	0.19%	0.31%	1.57%	0.08%
5	Retail	0.00%	0.71%	0.78%	0.03%	1.26%	0.03%	0.00%	0.31%
6	Insurance	0.03%	0.15%	0.01%	0.93%	0.05%	0.01%	1.82%	0.30%
7	Food & Beverage	0.00%	0.71%	0.03%	0.27%	1.09%	0.05%	0.05%	2.61%
8	Travel and Leisure	0.02%	1.78%	0.31%	0.05%	0.24%	2.40%	1.66%	0.00%
9	Financial Services	0.16%	0.50%	0.15%	0.19%	0.83%	2.16%	0.02%	0.22%
10	Personal & Household Goods	0.00%	0.21%	0.43%	0.76%	0.27%	0.26%	0.00%	0.16%
11	Media	0.15%	0.01%	0.36%	0.90%	0.50%	0.20%	0.72%	0.67%
12	Banks	0.40%	1.03%	0.44%	3.49%	0.16%	0.35%	0.51%	0.01%
13	Construction and Materials	0.08%	1.33%	0.07%	2.13%	0.37%	0.04%	0.53%	2.22%
14	Industrial Goods and Services	0.18%	1.87%	0.12%	0.01%	0.81%	0.67%	0.18%	4.64%
15	Chemicals	0.01%	0.56%	1.83%	0.05%	0.01%	0.63%	0.00%	0.56%
16	Health Care	0.01%	0.58%	0.00%	0.23%	0.08%	0.47%	0.41%	0.00%
17	Telecomm-unications	0.03%	0.94%	0.42%	0.45%	0.31%	0.21%	1.16%	0.25%
18	Utilities	0.01%	0.59%	2.00%	0.18%	0.12%	0.15%	1.12%	1.41%

Table 16c–R-Squared of the Relation between Excess-Return and dDIR in the Analyzed Industries

#	INDEX	Average	2006	2007	2008	2009	2010-1q
0	Dow Jones Euro Stoxx	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
1	Oil & Gas	0.04%	0.09%	0.00%	0.65%	0.84%	4.92%
2	Technology	0.14%	0.13%	1.69%	0.39%	0.15%	1.02%
3	Automobiles & Parts	0.01%	0.20%	0.00%	0.02%	0.20%	14.55%
4	Basic Resources	0.04%	0.08%	0.02%	0.00%	0.03%	3.60%
5	Retail	0.00%	0.00%	0.05%	0.10%	0.19%	4.99%
6	Insurance	0.03%	0.27%	0.26%	3.57%	0.96%	0.74%
7	Food & Beverage	0.00%	0.31%	0.53%	0.41%	0.08%	0.98%
8	Travel and Leisure	0.02%	1.57%	0.34%	0.47%	0.03%	6.58%
9	Financial Services	0.16%	1.13%	1.12%	1.57%	0.97%	4.68%
10	Personal & Household Goods	0.00%	0.17%	0.01%	0.05%	0.43%	0.00%
11	Media	0.15%	0.01%	0.00%	0.44%	0.13%	1.88%
12	Banks	0.40%	0.03%	1.89%	2.87%	4.04%	0.00%
13	Construction and Materials	0.08%	0.22%	0.28%	0.00%	0.01%	0.03%
14	Industrial Goods and Services	0.18%	0.36%	0.28%	3.30%	0.05%	0.30%
15	Chemicals	0.01%	0.05%	0.90%	0.08%	0.11%	0.01%
16	Health Care	0.01%	0.03%	0.36%	0.14%	0.99%	0.48%
17	Telecomm-unications	0.03%	0.03%	0.00%	0.94%	0.29%	0.03%
18	Utilities	0.01%	0.62%	1.84%	0.97%	0.11%	0.36%

A#9. A long-term investment rule is to ride information risk to gain positive alphas. Time contingent rules might be found according to the main information needs existing in the markets

Discussion and Concluding Remarks

This article uses an updated technique for computation of the IR than in the past. We do not use "rolled" average return, preferring one-day returns; we have changed the time horizons for the analysis, being a week (i.e. 5 trading days) the short period and 150 trading days the longer period. Previously we used a three-month short period and a one-year long period. Still, the empirical evidence shows a clear relevance of the information risk inside the European Stock Exchanges.

- On average, IR represents 17.87% of the long-term standard deviation of return of specific industries. Industries do not seem to have specific impact over the relative dimension and variability of the information risk premia (being minimum 15.20% and maximum 21.83%). So, market efficiency seems to be not only a simple problem of quantity of information available but also a problem of: (i) absolute quality of information, (ii) mechanisms that support the information distribution between financial markets operators; and (iii) adoption of industry-specific standards of financial communication. To fix a model to dimension the information risk premia, these three components need to be considered, maybe through correlation of the TIR with proxies of investor behaviour such as the trading volume, not available for industry indexes.
- The systematic quota of the information risk represents 79.48% of the total information risk, while the firm specific information asymmetries represents less than a quarter of the total information risk. Thus, the effort to regulate the financial communication practices is important but can solve only a quarter of the entire problem. The relevance (level and variability) of Systematic-IR is greater than for the Total-IR: industry matters in regulating the IR level in the market. The introduction of general standard of information may be a good policy for the market as a whole, but it may be a bad policy for some specific industries. Increasing the quantity of detailed general information can become a good way to reduce the information disclosure risk about an industry-specific factor. Along with mandatory information, the introduction of compulsory information practices in any industry and rules to fix their flexibility in time could be a regulation policy with high efficacy. Moreover, time-flexible rules are required since changes in IR-drivers may happen. In general terms, higher IR-risk is twinned with higher payoff-risk, meaning that transmission of information to financial operators is more difficult in case of risky situations. Payoff risk is a difficult concept. Similarly, industry-specific information risk seems to be a good driver of changes in the total level of information risk.
- Changes in total level of information risk are negative throughout the last 18 years, signalling a reduction in information risks. This result means that the effort to increase information circulation in European markets has been a success. Information asymmetries and information gaps have reduced but no clear evidence is still available about sources of such a reduction. Along with new regulations and improved financial communication standards, the increase in competition between different national financial markets could be a possible reason to be analyzed in further research. Empirical evidence still suggests the existence of a relevant IR-premia. Significant levels of Total-IR can be found in industries characterized by higher gaps between the actual rate of return and the expected rate of return as estimated by an empirical security market line. The IR-premia is an "opportunity cost" for the investor since its real acquisition is

strictly dependent from an active information analysis to be transformed in active market timing practices. In the case of no IR management the absolute level of volatility of any portfolio will increase at the systematic level. An efficient way to reduce the information risk premia would be to encourage information risk arbitrageur to act in the market and gain money, thus spreading new information.

- The only relevant driver for the Systematic-IR level seems to be short-term gaps in betas. We add a further conclusion in the relationships of information risk and payoff risk. When payoff risk is decreasing, the market gives less attention to information risk because information is less relevant to better understanding of the total risk of the investment. The IR-tolerance increases when the payoff risk decreases and vice-versa, thus indicating that for industries and companies characterized by higher betas financial communication can effectively be more profitable. Diversifiable-IR seems more interesting for traders aiming to conduct market timing and industry picking strategies. The two categories of traders do not show homogeneous activities in time, but both categories seem to manage IR dynamics in order to reduce total risk of the portfolio, instead of gaining specific excess return. The empirical evidence suggests that utility in dealing with IR is achieved through an increase in excess return as far as Systematic-IR is concerned and through volatility reduction as far as Diversifiable-IR is concerned.

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Endnotes

1. Galpin (2004) argues that the fundamental assumption of the pecking order that equity is used as a last resort due to the high issue costs, is not valid. He concludes that the costs of debt issues often exceed the cost of issuing equity. In 1973 debt costs amounted to 50% of equity costs, increasing to 140% in 2002. This might suggest that the pecking order theory was valid at the time it was invented, but that times have changed and it might not hold anymore.

2. Some authors (see e.g., Pettit and Singer, 1985) have pointed out that this fiscal approach cannot be applied in the small firms context, because SMEs are less likely to be profitable or at least to have abundant benefits, and are therefore less likely to use debt in order to get tax shields because they will not need them.
3. According to this theory, there are forces leading firms to less leverage, for instance bankruptcy costs, and forces leading to more leverage, among them the tax benefits of debt and the agency costs of free cash flow. The combination of these forces results in the existence of a target leverage at which the value of firms is maximized).
4. In the agency models of Jensen and Meckling (1976), and Jensen (1986), the interests of managers and shareholders are not aligned and managers tend to waste free cash flow in perquisites and/or bad investments. In such situations, the existence of debt payments helps to reduce agency costs of equity as these payments reduce excess cash in the firm.
5. According to a recent study of Leary and Graham (2011) pecking order theory is originally geared towards mature, low growth, firms. Our analysis includes 1,783 high-growth firms (of which 58 are older than 20 years) and 1,474 low-growth firms (of which 227 are older than 20 years).
6. The relationship between firm age and external leverage is, as with the pecking order theory, initially positive. As firms improve their credit reputation and lending relationships those seeking debt are better able to obtain financing on favourable terms. The relationship subsequently becomes negative as firms accumulate internal funds. Further, a U-shaped relation is observed in the sense that the relationship changes to positive at an age of around 105 years (Pfaffermayr *et al.*, 2008). Bhaird and Lucey (2007) also find a significant negative relation between age and long-term debt, while it is insignificant for short-term debt. Lucey and Bhaird (2006) find the same result in their study of 299 Irish small and medium sized firms and argue that it is consistent with SMEs following a life cycle model of financing.
7. Studies that have provided empirical support for the pecking order theory (POT) in explaining capital structure choice in SMEs include Holmes and Kent (1991), Reid (1996), Zoppa and McMahon (2002), Watson and Wilson (2002), and Berggren *et al.* (2000). The primary explanatory factor for the adherence of SMEs to the POT of financing is the desire of the firm owner to retain control of the firm and maintain independence (Jordan *et al.*, 1998).
8. This definition is mostly used for statistical reasons. In the European definition of SMEs three additional criteria are used: the economic unit to be more or less autonomous, annual turnover to be less than EUR 50 million, and/or balance sheet total to be less than EUR 43 million (Commission Recommendation 2003/361/EC).
9. Alternatively, it would be possible to use a profitability measure, such as earnings before interest and taxes (EBIT) over assets (Michaelas *et al.*, 1999; Fama and French, 2002). The results obtained are similar to those resulting from the cash flow ratio analysis.
10. We include *industry* dummies (INDUSTRY) and *time* dummies (TIME) in order to control for specific industry characteristics and different time periods that might serve as an incentive for an increase (decrease) in firm leverage.
11. The instruments used depend on the assumption made as to whether the variables are endogenous or predetermined, or exogenous. Instrument validity was tested using a Sargan test of overidentifying restrictions. The GMM estimators reported here generally produced more reasonable estimates of the autoregressive dynamics than the basic first-differenced estimators.

12. When we run our model with bank loans and other long-term debt as proxy for long-term leverage we find strong evidence in support of POT – the trade-off between cash flow and long-term debt becomes negative and statistically significant at 1 percent.
13. To check whether our results are related to POT or trade credit theory we run additional tests using trade credits as dependent variable. We find similar result – the relationship between cash flow and trade credits remain negative and statistically significant when control for other firm specific variables. Based on this result we may conclude that if cash flows are available the firm might take advantage of cash discounts, that is, substituting trade credits.
14. To check the supposition that including both tangible variable (as a proxy for bankruptcy costs) and intangible variable (as a proxy for future growth opportunities) might affect the quality of the estimated coefficients we exclude either variable from our regression model. The results show that the magnitude and the signs of the coefficients remain the same.
15. In order to improve our results we run the model with other proxies for future growth opportunities. For example, we use R&D dummy, which takes the value of one whenever a firm records some R&D investment. This variable is taken as a proxy for expected investment opportunities. We find that firms engaging in R&D activities show higher leverage ratios than other comparable firms.
16. Jensen and Uhl (2008) find a negative relation between age and leverage in their sample of Eastern European companies. A potential explanation for this result can be the existence of a similar phenomenon as the U-shaped relation between age and leverage documented in Pfaffermayr *et al.* (2008).
17. The total sample was split into two sub-samples including fast-growing and slow-growing firms. We define high-growth firms as SMEs with on average at least 20% annual growth in assets, over the last three years.