

Chalmeau, Olivier

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Impact of regulation on the risk and returns of French Telecommunication Operators

Olivier Chalmeau

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1 Introduction

Telecommunications networks require large investments in infrastructures, which represent important sunk cost that must be financed. Accordingly, a significant part of costs borne by an operator is due to its cost of capital.

Cost of capital defines the minimum remuneration required by the market taking into account the nature and risks of business activity. It can be seen as a minimum rate below which the investor will refuse to commit funds given the risk associated to a project. If returns are too low, an investor will prefer to turn to other investments offering a higher remuneration, all other things being equal.

Therefore, the proper assessment of this cost within the regulatory process is essential: if the cost is set too low, then it will lead to an underinvestment problem. Numerous studies and discussions have focused on the best practices and difficulties of calculating the cost of capital. The purpose of this study is not to discuss these methodological points, but to shed some light on the interaction between regulation and the cost of capital. The latter can be considered as endogenous to regulatory action. Indeed, by changing market conditions and future cash flow, regulation will impact the profitability and the risk of the projects. However, from a theoretical point of view, the impact of regulation on risk is not clear.

Next, whether regulation increases or decreases the risk is still an unclear issue. This study will

therefore seek to understand how changes in regulation affect systemic risk¹ and returns of a firm. What effect can we observe from different kind of regulatory decision?

A significant number of empirical studies exists, they mostly concern U.S. or U.K.. To our knowledge there is a lack of empirical studies concerning the French market and dealing with the impact of regulation both on risk and returns.

Thus, the present study focus on the impact of regulation on returns and the risk of two french operators : France Telecom and Iliad (Free).² The study includes a relatively long period for an event study (1997-2011). This allows us to see some evolution in the perception and the impact of regulation. We believe it is interesting for a regulator to be aware of the effects of his action on operators' ability to finance investments.

The study is organized as follow: we first proceed to a quick review of the literature on the link between regulation and risk. We then apply the CAPM and Kalman filter techniques to generate abnormal returns and the daily time-varying systemic risk for our two operators. Next, through various tests, we proceed to the identification of events that do have an impact on our previously generated dependent variables. Lastly we discuss results by regulatory themes and conclude.

2 Effects of regulation

Regulation may take various forms which are not exclusive: it may consist in setting price mechanisms, regulating entry, defining rules for investment, or compelling to provide a service in a certain way... All these forms of regulation have in common the fact that they affect the revenue of operators. It may either reduce or increase revenue. If the distribution of income is modified, then risk of the sector will be also affected. Thus, regulation should affect risk and returns. Actually, the question is to know the extent and direction of the effect rather than to know if there is an effect at all.

A significant literature documents the effect of regulation on valuation

Joskow and MacAvoy (1975) argue that due to a “regulatory lag effect”, regulated firms will be subject to more risk. This theory find its justification in the idea that regulation causes a loss of

¹The focus will be on systemic risk which result from the co-variation of the firm with the market. Systemic-risk is problematic because it is a “un-diversifiable” risk.

²The choice of these only two operator is motivated later.

flexibility. The regulated firm will not be able to adjust its price instantly to unexpected shocks.

As opposed to the “regulatory lag effect”, the “buffering effect” implies a decrease of risk when regulation gets more prominent (Peltzman, 1976). It is based on the assumption that a regulator or government will seek political support either from consumers or firms. For Peltzman, as regulation intensifies, the company risk decreases because the regulator buffers shocks from change in cost and demand. Thus, in case of high extra cash flows, the regulators will redistribute a part to consumers. While in case of negative shock, it will for instance allow the price to rise. In other words, regulation absorbs shocks and reduces the risk whether it is systemic or diversifiable. This theoretical result is confirmed empirically by Norton (1985) for the energy sector. He obtained these results by comparing firm subjects to different level of regulation (strongly, weakly and unregulated). Thus the “buffering effect” seems at least valid when comparison is made with unregulated firms.

Another generally accepted result is that some systems of regulation lead to more risk than others. The rate of return (RoR) is generally associated with less risk than incentive regulation (price cap). Indeed, incentive regulation aims at simulating competition, which is associated with more risk. Alexander et al. (1999) show through a cross-sectional analysis that firms under price cap regulation have higher systemic risk. However, the results of this well-known study is not confirmed by Gaggero (2007). These opposite results may come from the difficulty to clearly identify to which type a regulatory system belongs. In fact, there is no pure RoR nor Price cap regulation but mixes of both systems with subtle nuances. Moreover, the regulated lag effect should be stronger in a RoR scheme as there is no downward price flexibility.

However Grout and Zalewska (2006) showed that a change of regulatory scheme does have a substantial impact on risk. The study is developed at a time where the U.K. government considered the possibility to move from a price-cap to a profit sharing regulation. This case offers a clear full size experiment to test the effect on risk of a shift of regulatory scheme. Results are consistent with the theory as they observed a decrease in systemic risk during the period of interest.

Other econometric studies have found that the risk system of “public utilities” was not constant over time (Chen, 1982). Thus, these variations may not result only from a change of the regulatory system but from its constant evolution. In other words, regulation may decrease or increase in intensity without having a complete change of regulatory scheme at the same time. Regulation is also made of small incremental decisions, each one trying to adjust to new market conditions. This is particularly the case for the telecommunication industry where the technological progress is important. Moreover, due to the asymmetry of information, the regulator must adjust its policy

as it is gaining experience. This “learning by regulating” phenomenon explains why usually price caps are initially set too high and thus do not have any visible impact.

A strand of the literature derived from the classical “event study” methodology has studied the impact of regulatory announcements on abnormal returns and on time-varying systemic risk (Antoniou and Pescetto, 1997; Buckland and Fraser, 2001b,a, 2002; Paleari and Redondi, 2005). These articles allow both to study incremental change of regulation and to take into account the time-varying nature of systemic risk.

The study by Antoniou and Pescetto (1997) is of particular interest because it is one of the few studies that focus on the telecommunication sector (British Telecom). The authors distinguish three types of regulatory events: those that affect prices, those related to the intensity of competition and finally those concerning the regulation of services offered by British Telecom (BT). The authors note that subsequent to the announcement of the regulated price, the risk of BT increased. Announcements that aim to enhance or to decrease competitive pressure do not appear to be significant. Antoniou and Pescetto explain this result by the fact that BT’s competitors were not a credible threat to the incumbent during the period. Finally, they found that the risk of BT is reduced when the regulator decides to authorize or otherwise restricts the services offered.

3 Methodology

As mentioned before, the aim of the study is to shed some light on the impact of regulation on systemic risk and on abnormal returns. We proceed by steps. First, we estimate systemic risk and abnormal returns using Kalman filter technique and the capital asset pricing model (CAPM). The second step consists in identifying events that do have a potential impact on our previously generated series. The ultimate step consists in regrouping identified the announcements by type and expected impact.

3.1 Generating systemic risk and returns

Our methodology derives from the classical “Event Study” methodology which is well documented in the empirical financial literature (MacKinlay, 1997; Binder, 1998). It allows to observe the impact of new information on the value of a firm. In our case we will indeed focus on news that are directly linked to the regulation of the French telecommunication sector.

The final aim of these studies is to test the significance of abnormal returns earned by security holders. These excess returns are measured using a normal return-generating model. Many models coexists such as Constant mean model, Market Model, Arbitrage Pricing Theory or Multi-factor models, but we will prefer the Capital Asset Pricing Model (CAPM) (Lintner, 1965; Sharpe, 1964). This choice is based on the fact that CAPM is the most widely used by consultants and regulators to calculate the cost of capital. If the use of this model is not free of shortcomings, it has become a reference and it is easily understandable. The CAPM main equation is :

$$R_{it} = R_{ft} + \beta_i(R_{mt} - R_{ft}) + AR_{it}$$

Where R_{it} is the returns from the risky security, R_{ft} is the returns from a risk free investment commonly known as the risk free rate, R_{mt} is the return from the market portfolios, β_i the systemic risk of the security, and AR_{it} are the abnormal returns. By deducting the R_{ft} from both sides of the equation we get :

$$r_{it} = \beta_i r_{mt} + AR_{it}$$

It is now a well-accepted fact that systemic risk is not constant over time. The classical event study methodology doesn't take into account this fact. To assess the time-varying nature of systemic risk we will estimate the CAPM with a state space model. Parameters are estimated using the Kalman filter for the maximum likelihood estimation (Harvey, 1982). This method has become quite standard when dealing with time-varying beta coefficients (Tsay, 2010). Our state space model is a system with two equations. The signal equation is classical CAPM with time-varying beta:

$$r_{it} = \beta_{it} r_{mt} + \epsilon_{it}$$

The second equation is the "state" or "transition" equation that allows the beta to evolve stochastically:

$$\beta_{it} = \beta_{it-1} + \mu_{it}$$

Thus, beta depends of its past value and of an innovation term μ_{it} which contains variations due to new information. Our estimation does not include a second state equation for an alpha coefficient as in Buckland and Fraser's (2001, 2002). The reason for this difference is twofold: from a theoretical

point of view the CAPM does not have an alpha coefficient because the intercept is the risk free rate. Furthermore, from an empirical point of view, our estimation of a time varying alpha coefficient is not significative. This may indicate that the scale of abnormal returns is not so important in the telecommunication sectors. In our case, the estimate of the beta coefficient does not change whether the alpha coefficient is included or not. In that sense, our methodology comes closer to the one of Peleari and Redondi (2005).

This methodology allows us to get estimated values for abnormal returns and systemic risk. The estimations of β_i are significant for both operators. A simple subtraction gives us the daily abnormal returns :

$$AR_{it} = r_{it} - \beta_{it}r_{mt}$$

Abnormal returns are variation in the value of the firm³ whereas beta is a coefficient. In order to have comparable results, we will thus consider the impact of regulatory announcements on the beta variation:

$$\Delta\beta_{it} = \frac{\beta_{it}}{\beta_{it-1}} - 1$$

3.2 Identifications of events

A very common difficulty of studies on regulation is the proper identification of regulatory events (Binder, 1985). Indeed, one regulatory event does not often imply one unique policy decision but a series of announcements. All announcements may be going in the same way but a turnaround is possible. For instance, regulator may announce that he plans to lower the price cap, which induces an important market reaction. But, when the scope of the decrease is finally announced, investors may find it weaker than anticipated.

The final aim of our study is to aggregate different announcement of the same type to see the average impact of a given policy. Before aggregation, we must verify if events are individually significant and also the sign of their impact. Indeed, aggregation of announcements that go in different directions would have no sense.

We first look at daily beta variation (respectively abnormal returns) on an event window of three days : the day of the event, the previous day and the day after. We cannot extend the window

³Abnormal returns are stochastic variables with average expectation equal to zero.

too much, because it would increase the risk of overlapping with other events.⁴ Indeed, sometimes events are very close. When looking at a single event, a regression with dummies and traditional t-test is of little interest to us because If errors are not normal which is often the case, t-test may reject the null hypothesis too often.

To assess the possible non-normality of errors, we proceed to a Sample Quantil test (SQ test) (Gelbach et al., 2011). Intuitively, this test verifies that the variation of the day of the event is situated in the first or the last quantile⁵ values of the distribution of the empirical distribution of the variable of interest. This test constitutes our criteria to discriminate regulatory events and to identify the day when the announcement was taken into account by investors. Indeed, this can be another day than the day of announcement. For instance, it can be the following day as markets could be already closed when the information was released.

Then we regroup individual significative events⁶ if they have the same expected impact and if they belong to the same regulatory policy. We create a variable for each group. Group variables take the value one each time there is a regulatory announcement. We then regress our groups of events on our variable of interest (daily variations of systemic risk and abnormal returns):

$$AR_{it} = \delta_{i1}D_1 + \delta_{i2}D_2 + \dots + \delta_{in}D_n + \varepsilon_{it}$$

$$\Delta\beta_{it} = \gamma_1D_1 + \gamma_2D_2 + \dots + \gamma_nD_n + \nu_{it}$$

The D_{in} are groups of events. To take into account heteroskedasticity in our data we use white covariance estimator in place of the standard OLS formula. We then perform standard T-test. We also look at the impact of our group of dummies on cumulated beta variation (respectively Abnormal returns) over 4 days⁷. It allows seeing if the effect endured.

⁴Moreover, this event window is very common in traditional event studies.

⁵For instance a 10% symmetric test takes the first and the last 5% values of the empirical distribution.

⁶According to our SQ test.

⁷Day of the event and the three following days

4 Data

4.1 Sample

As said previously, the study focuses specifically on the French telecommunication market. Some may argue that guidelines of the regulation are made at the European level. However, general guidelines may lead to quite different regulation from a country to another. For instance, France was the first country in Europe to regulate the wholesale price for SMS (Reuters, october 24th 2005).

The sample includes only two French operators, France Télécom (FT) and Iliad. Thus, the sample does not consider two important operators (Bouygues and SFR). Indeed, one of the difficulties when studying the impact of regulation on market variables is the fact that publicly traded entity does not operate necessarily in a single industry and in a given territory. The impact of regulatory events on the share price of Bouygues should be limited as telecommunication services are not its main activity. This is also the case of SFR owned by Vivendi (and until recently by Vodafone to 44%). Many operators are established on various sectors. They are therefore subject to different regulatory environments. That is why this study considers only two French operators that should be jointly influenced by French regulatory decisions. Although the French incumbent is present in several markets in Europe and worldwide, the great majority of its revenues and its business are made in France. Iliad, through its brand Free, makes the majority of its business in the French telecommunication sector.

The study of these two operators is particularly instructive insofar as they are competitors and subjected to the same regulation. As the impact of a regulatory decision is not often symmetric for an incumbent and an entrant, we study each operator separately. Furthermore, FT and Iliad are of different sizes, the effects of a decision may change. Nwaeze (2000) showed that the impact of regulation on the risk was even greater when the size of the firm was important. Finally, FT and Iliad face different financing terms.

All financial data comes from the Datastream database. We get return indexes for France Télécom (from 1997 to 2011) and for Iliad (2004 to 2011). For the risk free rate we take the French 10 years OAT. We also tested with the German government bond and results were very close. For market return index we took the SBF120, which includes the 120th first biggest capitalizations in France.

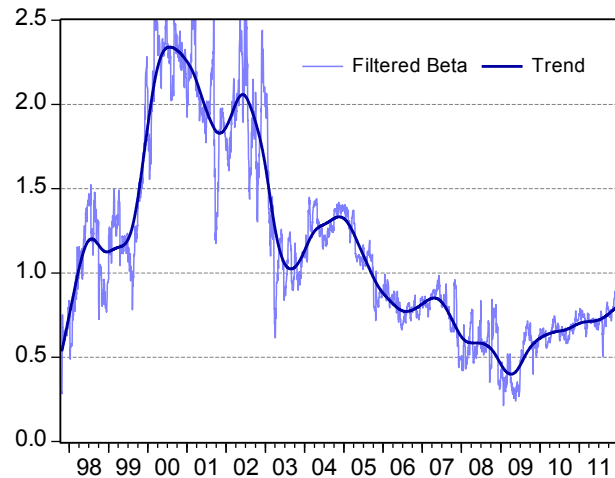


Figure 1: Systemic risk of France Telecom

4.2 Descriptive statistics

The beta of France Télécom (figure 1) has known great evolution since its initial public offering. It has greatly increased over the Internet bubble period and even reached levels higher than 2. This means that for every change in the market France Télécom was co-varying twice as much. The French incumbent was by these times a very risky asset. The important share that technological firms represent within the whole market index may explain, at least in part, these high levels. Lally (2004) shows that industry weights do have a significant impact on the level of beta. High levels of FT debt may explain also a part. Subsequently to these high levels, the systemic risk of France Télécom constantly decreased and reached very low levels in mid-2009. Since then, systemic risk seems to increase again. The recent upward trend coincides with the admission of the fourth mobile operator Free.

The systemic risk of Iliad (figure 2) also shows high levels close to 2. However, these levels are not associated with the Internet bubble⁸. It is difficult to surely explain these high levels. They coincide with the period when Free knew important growth thanks to the lift-off of the unbundling.

We also present the cumulated abnormal returns over the whole sample for both operators (figure 3 and 4). It is outstanding that after more than 10 years of quotation, FT cumulated abnormal

⁸Iliad was not listed by the time of the Internet Bubble

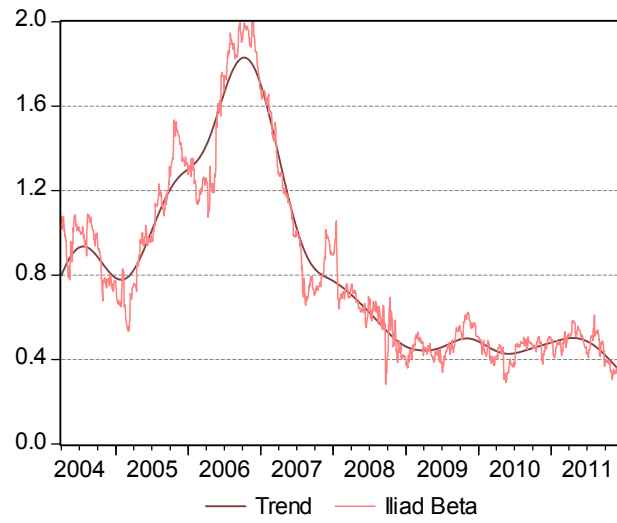


Figure 2: Systemic risk of Iliad

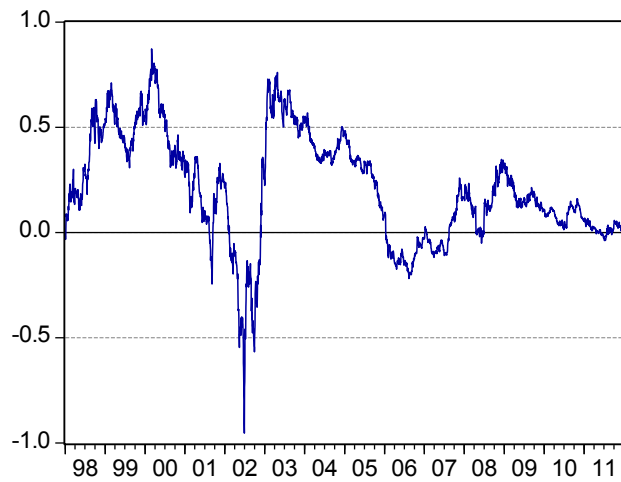


Figure 3: Cumulated abnormal returns of France Telecom

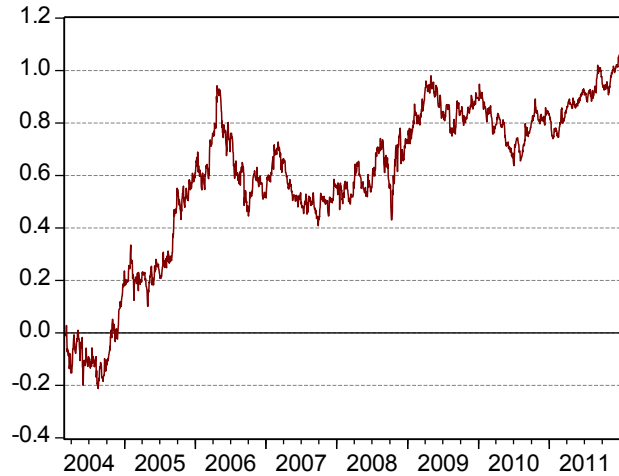


Figure 4: Cumulated abnormal returns of Iliad

returns are very close to zero. This contrasts with Iliad which have known positive and almost constantly increasing abnormal returns.

When comparing both curves, it is interesting to note that their respective risk evolves in opposite directions. As both firms face the same market conditions, regulation, which is often asymmetric, may have had a role in that observation.

4.3 Events categories

Identification of events that may have had an impact on financial variables is done using various sources. The first is the website of the French regulator (ARCEP). The latter records the dates of every important issue concerning the industry regulation. This source has the merit of being exhaustive. It nevertheless has several shortcomings. The first is that a communication by the ARCEP is not always taken into account by the market. Some of these announcements may be too specific, or too vague to provide new information. They may imply unimportant minor changes. For example, the announcement of a consultation does not determinate its outcome. Furthermore, the site of ARCEP does not give us any indication of how an event has been interpreted, which is not the case of our second source of identification for regulatory events.

More classic, the second source is the financial information websites and economic newspapers.

Events identified through specialized press are more likely to have been taken into account by investors. Through the press, an event may be more likely to have a significant impact. Three main sources are selected as their audience include professionals in finance: DjBourse, Reuters, and Les Echos.

Using multiple sources, both from the press and directly from the ARCEP, we can reduce the risk of missing the events of first importance. Some announcements appear together in several sources. This gives an indication of their relative importance and provides a guide to shortlist significant events.

News are extracted from Factiva using keywords like Arcep or ART (former name of ARCEP). After a first shortlisting, we retain around 500 events. We suppress news that do not deal at all with the regulation of the sector and also when there are several news for the same announcement. In order not to forget any important events, we keep all events from the website of Arcep. As mentioned before, a second selection is made via our SQ test.

Selected announcements are classified in four main categories: wholesale mobile price regulation, mobile competition, unbundling, and FTTH investment regulation.⁹ Each category is divided in sub-categories when necessary. The sub-division is done when the expected impact clearly differs for different events of the same category. We sometimes observe a change through time in the effect of regulation. This can be due to a change in the political line of the subject. Also, a given regulatory decision may not have had the same impact in a period of economic growth or during a recession.

4.3.1 Mobile wholesale prices

Our first category is wholesale price regulation in the mobile market. This category concerns notably mobile voice call termination or SMS termination. It refers to the price an operator charges a competitor to terminate calls or SMS on its network. Termination rates are considered as a bottleneck because each operator has monopoly in the access to its customers. Mobile voice call termination and SMS termination are subject to price caps. We also include in this category the regulation of international roaming rates. We speak of international roaming when customers have

⁹These categories do not aim to represent all subjects treated by the french regulation. These groups have emerged naturally because they were largely treated by the press, and then the date of announcement can be identified more clearly.

access to their mobile services through networks in a foreign country. Price caps have been introduced by the European Commission on wholesale international roaming prices. This first category includes thus regulatory events that deal with call termination (Variable TERM), SMS termination (variable SMS) and international roaming (variables ROAMING_1 and ROAMING_2).

In early times, announcements concerning call termination and SMS termination do not seem to have significative impact. This is especially the case for announcements that deals with the decrease of mobile call termination that goes from fixe to mobile. We clearly observe a breaking point in our events. The SMS category begins in 2005 and the mobile call termination category in 2007. International regulation was introduced later. We observe also two phases for this category: 2006 to 2007 and then 2009-2010.

4.3.2 Mobile competition

Mobile competition category refers to regulatory events that aim directly to increase or decrease the intensity of competition. This category has three sub-categories.

The first one concerns mobile virtual network operators (MVNO). As MVNO do not have their own network, they have to pass via an mobile network owner's infrastructure. MVNO is the result of regulatory intervention with the aim at enhancing competition on mobile telecommunication services. For the MVNO sub-category, we are not able to constitute a group of events with individual significant impact as the majority of announcements are not individually significant accordingly to our SQ test. It seems that MVNO do not appear as a great threat to France Télécom.¹⁰

The second sub-category concerns the mobile number portability (MNP) that allows a consumer to change operator without losing its phone number. MNP should enhance competitive pressure as there is fewer barriers to switch from one operator to another. MNP was first introduced in France in July 2003. We do not identify individual significant events until September 2005. This indicates that during this period no important impact of MNP was expected.¹¹ We then do find individual significant events, but the impact seems to be on the day before the announcement (this is true for four of the five events identified in this sub-category). This period corresponds to a time when conditions for the MNP got stricter. Indeed, operators got obliged to treat MNP demands in a delay of maximum of 10 days. Fixed number portability (FNP) was also introduced. Even

¹⁰These events do not concern Iliad either. He was not in the mobile market at this period.

¹¹An analysis from this period confirms this observation (Find in Reuters, July 3rd 2003)

if FNP concerns the fixed market, we introduce these events within the same category as MNP (variable PORTA). This choice has been made because the expected impact is the same for both series of announcements. Moreover, FNP was decided as a complement to MNP.

The third sub-category, and by far one of the most important, is the introduction of the fourth operator Free (Iliad). As the introduction of Free in the mobile market has known many rebounding, we have to create four “sub-sub-categories”. Indeed, there was a first call for tender in 2007 (variable CAND_1) but Iliad candidature was rejected because it didn’t comply with the financial conditions of the fourth mobile license (619 millions euros). A second sub-category regroup announcements that indicate that the project will be abandoned (this category includes for example the rejection of the first candidature : variable CAND_REJECTED). A third category regroups then events that occurred between the first rejection and the final acceptance (CAND_2). It was a period with a lot of uncertainty when the fourth mobile operator became more and more plausible. Finally, we regroup two major events which is the announcement of the license price and the final announcement when Iliad was granted for sure the license(variable CAND_ACCEPTED).

4.3.3 Unbundling

One of the main subjects of regulation of the fixe network is the unbundling of the local loop. As it is very expensive for competitors to replicate the old copper local loop, the regulator warrants access to it through what we call unbundling. ARCEP is in charge of setting the access charge that has to be paid by every competitors of FT wishing to access FT’s copper local loop.

We do observe individual events that seem to have significant impact. Unfortunately we can’t find clear general results as each event seems to have a specific impact. More work is needed on this subject. We do not present aggregated results for this category for this initial working paper.

4.3.4 FTTH Investment

This group of announcements deals with regulation linked to the replacement of the old copper local loop by a fiber local loop. It is commonly known as fiber to the home (FTTH) or very high bandwidth network. As the scope of investment needed is quite important,¹² the regulation of FTTH investment may potentially have huge impact on the cost of capital.

¹²Datar (Délégation interministérielle à l’aménagement du territoire et à l’attractivité régionale) has estimated the total cost of FTTH between 18 to 30 billions euros (February 10th 2010) .

We identified three sub-categories. The first one is the access to the ducts of the French incumbent (variable FTTH_DUCTS). Ducts are the civil engineering infrastructures that initially served for the copper network. It is an essential facility that still pertains to France Télécom. In order to allow competitors to invest and reduce significantly their costs, regulation have primarily focused on the access to France Télécom ducts. A second sub-category regroups all others decisions that design condition to FTTH announcements (variable FTTH_REG). This sub-category includes for instance rules to deploy fiber within private buildings. The third sub-category concerns state aids or subvention for investment¹³ in FTTH (variable FTTH_SUB).

5 Results

Table 1: Results on daily variations (%)

Variable	France Télécom		Iliad		Market
	<i>Beta</i>	<i>Ab returns</i>	<i>Beta</i>	<i>Ab returns</i>	
CANDIDATURE_1	0,01	-0,01	-3,18	-3,16 *	0,51
CANDIDATURE_REJECTED	-5,40 **	0,94	-3,75	2,69 **	-1,02
CANDIDATURE_2	6,25 **	0,48	2,76 *	0,16	0,07
CANDIDATURE_ACCEPTED	-3,51 *	-0,10	-4,79 *	1,41	0,55
PORTA	-12,17 *	-0,61	1,34 **	-0,21	-0,08
FTTH_REG	9,86 *	-1,54 *	5,00 *	-1,09	-2,27
FTTH_DUCTS	6,44 *	-0,02	-2,31 *	-0,78	-0,15
FTTH_SUB	-4,11	-0,33	-3,39 *	-0,18	0,10
ROAMING_1	4,22 *	0,23	X	X	0,12
ROAMING_2	-4,84 *	0,45	X	X	0,17
TERM	-6,43 *	0,32	X	X	-0,09
SMS	-4,21 *	-1,05 *	X	X	2,46

We first present variables that only concern France Télécom. Indeed, mobile regulatory events may not have impacted Iliad at a period when it was still uncertain that Free will enter the market

¹³Mainly in less densely populated.

Table 2: Results on 4 days cumulated variations (%)

Variable	France Télécom		Iliad		Market
	<i>Beta</i>	<i>Ab returns</i>	<i>Beta</i>	<i>Ab returns</i>	
CAND_1	-1,17	0,94	-3,41	-2,84 *	0,13
CAND_REJECTED	-6,25	0,48	-2,32 *	2,99	-0,95
CAND_2	1,25	-0,10	4,24 **	-0,44	-1,77
CAND_ACCEPTED	2,04 *	-0,61	-3,52 *	0,47	-0,18
PORTA	-11,89 *	-1,54 **	1,46	-0,65	-0,57
FTTH_REG	15,08 *	-0,02	0,81	0,52	-1,93
FTTH_DUCTS	5,39 *	-0,33	-3,01 **	-1,82	1,20
FTTH_SUB	-0,05	0,23	-1,88	-0,33	-1,03
ROAMING_1	2,27	0,45	X	X	0,65
ROAMING_2	-6,25 **	0,32	X	X	2,29
TERM	-8,87 *	-1,05	X	X	-1,33
SMS	4,57	0,00 *	X	X	2,62

as the fourth operator.¹⁴

The three sub-categories of mobile wholesale prices show very close results. As we have already noted, termination call didn't have any impact in the early times. Our variables indicate that the lowering of the price cap has participated in the decrease of systemic risk that occurred between 2005 and 2009. The average daily impact is of -6,43% for termination call, -4,21% for SMS termination and -4,84% for roaming in the second phase. In fact, in the early times, our variable ROAMING_1 indicates that the impact on systemic risk was positive. There is no impact on abnormal returns except a negative impact for SMS. These results are robust when looking at four days cumulated abnormal returns. By aggregating the termination call variable with the SMS and ROAMING_2 variables we still observe significant results for systemic risk.

Interestingly these results are the same than Antoniou and Pescetto (1997). They do find a decrease for the systemic risk of British Telecom when the regulator lowers the price cap. Their interpretation is that it becomes more difficult for competitor to enter. One other interpretation is possible. On one hand, lowering prices can prevent an operator to take advantage of a period

¹⁴A regression confirms that there is no impact.

of economic growth. On the other hand, during a economic recession,¹⁵ a decrease of systemic risk may indicate that regulation has not been too strict. The sector benefits from a protection due to regulation. However that may be, the decrease in systemic risk is in line with the “Buffering Effect”.

We now pass to event that had affected both operators. We will begin with our variable number portability (PORTA). As it deals also with fixed number portability, it may have affected also Iliad. This is actually the case. There is an increase in systemic risk for Iliad and a sharp decrease for France Télécom. These results may appear surprising. The most probable interpretation is that portability did not have huge impact on churn and thus participate to a decrease in systemic risk for FT. The regression on cumulated variation confirms this result for FT but not for Iliad as the variable is no more significative. The regression on cumulated abnormal returns shows a negative impact for FT.

Regulation on Fiber investment confirms our expectations. Our variable FTTH_REG does increase systemic risk for both operators and have a negative impact on abnormal returns. This shows that markets see FTTH as a risky investment, given the actual regulation and current market conditions. This result is all the more interesting as operators do not have launched very ambitious investments for the moment. Demand for fiber has not really taken off where investments have already been done. Access to France Télécom ducts (FTTH_DUCTS) also increase its beta and decrease the one of Iliad. This result is coherent because by giving access to ducts the deployment cost for Iliad will decrease. Moreover, this makes more plausible investment by France Télécom rivals. Hence, we have an increase in systemic risk. These results are robust for cumulated variations. Finally the state’s aid variable impact is not surprising: systemic risk decreases.

The entry of Iliad shows interesting results. The first candidature (CAND_1) of Iliad had not affected FT. By these times, the entry of a fourth operator was not a credible threat for the French incumbent. However, the first candidature caused negative (respectively cumulated) abnormal returns for Iliad. Markets may have estimated that the license was too expensive. Not surprisingly our variable CAND_REJECTED impact positively returns of Iliad. It also causes a decrease of systemic risk for both operators.

Announcement that concerns the second candidature (CAND_2) have caused an increase of the beta for both operators. This can be explained by the important uncertainty generated by the process. For a long time, the ending of this second phase was not clear for the market. The final

¹⁵This is partially the case between 2007 and 2009.

outcome of Iliad candidature (CAND_ACCEPTED) may explain the recent trend that we have noted previously for risk and returns of our two operators. CAND_ACCEPTED impacts negatively the beta of Iliad and FT on the day of the event. The impact is significant and reversed for FT when looking at cumulated variations. The entry of the fourth operator may have participated in the recent¹⁶ increase of FT systemic risk. This increase may be the result of the intensification in potential competition pressure, whereas, the decrease of Iliad risk can be explained by potential market share growth. A decrease of the beta is normal if Iliad value increases in dull economic conditions.

6 Conclusion

The purpose of the study was to shed some light on the impact of regulation on systemic risk and abnormal returns of two French operators (France Télécom and Iliad). We have generated our data using Kalman filter technique and the CAPM. We do find that regulation have impacted both systemic risk and abnormal returns. Our results have shown that this impact is not constant over time. Thus, we had to create sub-categories to deal with this phenomenon. Our results on mobile wholesale price regulation do support the theory of Peltzman (1976) that regulation lower risk.

However, we see a trend reversal in the evolution of systemic risk that may have been triggered by the Iliad entry in the mobile market. Since 2009, France Télécom is less seen as a safe investment. To confirm these results, the introduction of announcement on the fourth operator that took place after the acceptance of Free in the mobile market would be interesting.

Further work is needed on unbundling effect, as we are not able for the moment to show aggregated results. Finally, FTTH investment is seen as a risky investment within the current regulatory environment.

Our study has some limits. The sample includes only two operators. This puts a constraint to study events by groups. The sign of the impact on beta may depend on the economic cycle, which is not without interest. Indeed regulation may get stricter during economic recession to please consumers. It would be interesting to find a way to take into account the potential effect of leverage on risk.

¹⁶That we observe since mid 2009 until 2011.

Table 3: Individual significant events

Date	Event	Type
September 27, 2005	Arcep presents expected evolution on number portability : maximum of 10 days to implement and "Simple Guichet" procedure.	PORTA
October 24, 2005	Arcep launches public consultation that suggests a regulation of the SMS termination wholesale price.	SMS
February 9, 2006	European Commission presents a project to regulate international roaming prices.	ROAMING_1
March 27, 2006	European Commission publishes a survey on International roaming prices	ROAMING_2
May 16, 2006	Publication in the Official Journal of implementation rules for mobile number portability.	PORTA
June 16, 2006	Arcep wants a significant decrease of the SMS termination. Proposition to the European Commission.	SMS
August 11, 2006	Arcep thinks that FT must share its ducts as it is an essential infrastructure.	FTTH_DUCTS
November 17, 2006	Iliad interested by the fourth mobile license.	CAND_1
January 4, 2007	Government refuses to smooth the fourth mobile license payment.	CAND_REJECTED
February 15, 2007	Tender for the fourth mobile license to be launched before presidential elections.	CAND_1

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Continuation

Date	Event	Type
March 8, 2007	Arcep launches the fourth mobile license call for candidatures.	CAND_1
May 10, 2007	Analyst says that entry of a fourth operator is plausible.	CAND_1
May 23, 2007	European Parliament adopts regulation on roaming prices.	ROAMING_3
July 24, 2007	Arcep forecasts a decrease of the mobile call termination for 2008 to foster competition.	TERM
July 30, 2007	Iliad applies for the fourth license.	CAND_1
October 9, 2007	Arcep rejects Free candidatures.	CAND_REJECTED
November 28, 2007	Arcep will regulate access to FT ducts.	FTTH_DUCTS
December 6, 2007	Public consultation on the methodology to calculate costs induced by number portability.	PORTA
March 6, 2008	Paul Champsaur gives precisions on the access to FT civil engineering.	FTTH_DUCTS
April 3, 2008	French government may give up its project of a fourth mobile operator.	CAND_REJECTED
April 18, 2008	Government asks for a survey on SMS termination.	SMS
April 24, 2008	Public consultation on the access to FT ducts is published.	FTTH_DUCTS
June 5, 2008	Arcep estimates that an ex-ante regulation is necessary for FTTH investment.	FTTH_REG
June 30, 2008	Arcep in favor of a fourth operator to stimulate competition in the mobile market.	CAND_2

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Continuation

Date	Event	Type
July 16, 2008	Government survey on SMS termination concludes that prices remain too high.	SMS
September 22, 2008	Arcep ready to prepare a new call for tender for the fourth mobile license with the possibility to subdivide it in several lots.	CAND_2
October 10, 2008	Arcep publishes its recommendation on FTTH investment	FTTH_REG
October 15, 2008	Government may be unfavorable to the entry of a fourth operator.	CAND_REJECTED
October 20, 2008	Government says the fourth mobile license stay a plausible option.	CAND_2
November 18, 2008	SFR forecasts a loss of 500 millions euros due to the decrease of the mobile call termination.	TERM
November 27, 2008	European Commission supports Arcep's decision to lower the mobile call termination.	TERM
January 12, 2009	Government reserves one lot of 5 MHz for a new mobile entrant.	CAND_2
February 4, 2009	European Commission publishes its recommendation project on mobile call termination.	TERM
February 6, 2009	Fourth license price is set to 206 million euros.	CAND_ACCEPTED
February 14, 2009	Two decrees are published in the official journal ("Couverture des services" and "Connaissance des réseaux").	FTTH_REG

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Continuation

Date	Event	Type
February 23, 2009	Public consultation on fixed number portability.	PORTA
March 5, 2009	Arcep announces deadline for the fourth license to the end of June.	CAND_2
April 9, 2009	Arcep opens proceedings against fixed operators to comply with their fixed number portability obligation.	PORTA
April 22, 2009	European parliament votes the lowering of international roaming price cap.	ROAMING_4
May 7, 2009	Publication of the European Commission recommendation on mobile call termination.	TERM
May 20, 2009	European Commission publishes a project of guidelines on state aid for very high bandwidth networks.	FTTH_SUB
June 8, 2009	Roaming regulation to concern international SMS.	ROAMING_5
June 22, 2009	Arcep agrees with the mono-fiber solution of Free and SFR.	FTTH_REG
June 22, 2009	Arcep expects two candidatures for the fourth mobile license.	CAND_2
July 10, 2009	Fourth mobile license : call for tender expected for the end of July.	CAND_2
July 28, 2009	Arcep forwards its recommendation project to the French Competition Authority.	FTTH_REG
August 3, 2009	FT contests the fourth mobile license price.	CAND_REJECTED

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Continuation

Date	Event	Type
September 30, 2009	European Commission accepts public subvention for the very high bandwidth network in the French Haut-de-Seine departement.	FTTH_SUB
October 26, 2009	Iliad single applicant for the fourth mobile license.	CAND_2
December 17, 2009	Arcep launches public consultation on the economic conditions of the access to FT civil engineering.	FTTH_DUCTS
December 18, 2009	Arcep grants the fourth mobile license to Iliad.	CAND_ACCEPTED
February 24, 2010	Arcep lowers mobile call termination of Bouygues.	TERM
June 14, 2010	French government launches its program “Très haut débit”.	FTTH_SUB
July 29, 2010	Competition authority supports Arcep’s wish to carry on lowering the mobile call termination.	TERM
December 8, 2010	European Commission launches consultation on review of EU mobile phone roaming rules.	ROAMING_6
March 9, 2011	Competition Authority recommends to lighten regulation in order to foster investment. It proposed to study the eventuality of a functional separation.	FTTH_REG
July 28, 2011	French government puts 900 million euros to co-financed very high bandwidth network in remote zones.	FTTH_SUB

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