Proposal for a Master’s degree in quantitative finance-mention QF
Executive Summary (November 2007)

General outlines of the QF program

For more than 20 years, curricula in finance have been displayed inside the University Paris1 Panthéon–Sorbonne in the different UFR: economics, mathematics and management. The present project proposes a new program named “Quantitative Finance” that is multidisciplinary at the intersection of economics, finance and applied mathematics. It proposes to the students a strengthened and diversified offering in finance.

Thanks to the existing formations whose heads are known to be specialists in a lot of fields in financial economics, microeconomics and banking, decision theory, macroeconomics in money and finance, financial markets, mathematics applied to finance, risk analysis, and corporate finance, we are able to propose a two year master degree formation whose first year is devoted to a basic formation in mathematics, economics, econometrics and finance and the second year devoted to a specialization inside two tracks: Finance-Risk-Insurance (FRI) and Money-banking-Finance (MBF). This formation is not a replication of the existing formations in Paris1. It has its own originality.

The objective of the curriculum Quantitative Finance is clearly the formation of high level researchers and experts inside the domains of banking management, corporate governance, financial markets, mathematical finance, financial engineering, and risk management in insurance and finance. Our objective is both to form specialists who are able to work as professionals inside companies and to form researchers.

The students who follow this formation will get a Master degree from Paris1 Panthéon-Sorbonne at the end of the two years with the Mention “Quantitative Finance” and with the label of PSE.

The pedagogical team who will work inside this master degree is composed mainly of the professors and associated professors of the University Paris1 Panthéon-Sorbonne who have regrouped their competences to propose this program. They will also be assisted by a lot of professionals who mainly work inside banks and insurance companies.

The present proposition could be strengthened later by the association of other partners and researchers coming from PSE or ESCP for instance. Presently researchers of Jourdan do not participate in this project, nevertheless contacts are in progress and we wish, in the end, to make a strong cooperation between the research team in finance in Paris 1 and researchers of Jourdan working in finance and insurance. Furthermore, contacts with ESCP and the persons who are in charge of the finance track inside this school are also in progress in order to develop links between this program and their finance program.

It will be very attractive for the students to have the opportunity to get a finance formation inside PSE. Thanks to this Master degree labelled jointly by Paris1 Pantheon-Sorbonne and PSE, we expect to catch students who normally would go to other well known
institutions. In most foreign universities that display finance formations there exists a Business School. This is not the case in France, and such a project will permit us to better this situation.

The approval by PSE of this formation in finance will also permit us to achieve a better legitimacy with the enterprises from which we expect help and support.

Presently, there exist two master programs inside PSE, and the opening of this new master degree “Quantitative Finance” will increase its curriculum’s supplies. The creation of this new program will also permit the PSE’s growth in international visibility and its attractiveness for foreign students. It will permit the development of specific links with a lot of financial institutions like central banks, private banks, insurance companies and international institutions (World Bank, IMF), etc. Furthermore, the program Quantitative Finance will benefit the existing curricula inside the PSE that concern theoretical economics.

Persons in charge of the QF program.

Christian de Boissieu and Dominique Guégan promote this program. They are both Professors at the University Paris 1 Panthéon –Sorbonne. Christian de Boissieu is now the head of a professional master in Banking and Finance inside Paris 1. Dominique Guégan is just arriving at Paris 1 in September 2007, and she is in charge of the coordination of the different finance programs in the Mathematics UFR. This concerns three master degrees: the professional IRFA master degree, the research MMMEF master degree, and the Erasmus Mundus QEM master degree. Both of these persons have a long experience in training in finance, research, and supervision of theses. Their domains of research are complementary, and this complementary formation is part of the originality of this project.

Stakes of the QF program

There already exist in France several finance programs inside Universities and Grandes Ecoles. This large offering of finance formations is necessary. It permits a natural competition, and it is useful for the students. Inside Paris 1, we have the advantage of having a very large domain of competence in finance, including persons working in financial theory, economic theory, banking management and mathematical finance.

Presently there exist four main programs in finance in Paris 1 Panthéon-Sorbonne, two professional master degrees and two research master degrees. These programs are organized around some researchers belonging to specific domains. The professional and research programs in banking and finance and money and finance (based inside the Economics UFR) are developed with the researchers working mainly in financial and monetary macroeconomics, corporate finance, and finance and banking services. The professional and research programs in insurance and mathematical finance (based inside the mathematics UFR) are developed with the researchers working mainly in financial econometrics, market equilibriums, mathematical and life insurance, and specific financial methods and products (risks, credit derivatives, inflation derivatives, Monte Carlo methods, probabilistic tools).

The present offering (QF master degree) lies on the experience of the researchers of Paris 1 in the different domains previously mentioned and in the training formations included in the
existing masters. We want to associate the competence of these researchers to propose an original offering to the students in order to respond to the demand that we observe inside the entrepreneurial fabric. Thus, we want to develop students with excellent foundations in mathematics, economics, econometrics and finance, and also competences in computing and foreign languages. This is the purpose of the Master 1 degree. Then, during the second year, we offer these students two kinds of specializations, one in Finance-Risk-Insurance (FRI) and the second one in Money-Banking-Finance (MBF). For each track there are scientific and professional courses, corresponding to the foundations of each specialization, which account for 75% of the courses. The remaining 25% of the courses can be chosen from a list consisting of important courses for a professional orientation or a research orientation. It is in that sense that we have retained the courses: they are given by professionals or by researchers with specialization in that domain. These courses correspond also to the offering observed in most finance program abroad. The students can also choose their courses from the other track if they want to deepen their formation in a more technical and complementary way. This is the strength and the originality of this formation.

The experience in Paris 1 useful for this QF formation: research and enterprises.

Besides the actual training in finance in Paris 1 corresponding to the four masters degrees of which we have already spoken, there also exist great competencies in research and strong links with the professionals that we will use in organizing such a program.

Concerning the links with the enterprises, during the second year of the master degree, all the students of the four master degrees in finance make an internship in the firms. This means that more than 200 firms work regularly with these master students. We provide in the main document an indicative list of the firms where the students have done an internship. Notice also that at the end of the internship, a defence is organized in order, for each student in Paris 1, to present his or her work inside the enterprise. It is also an opportunity for the academics and professionals to meet and strengthen links between the academic formation and the professionals.

All the students have been getting a job at the end of their master degree: 4/5 of the students find an operational job and 1/5 of these students begin a PhD thesis, mainly inside the CES Laboratory at Paris 1 Panthéon-Sorbonne.

Concerning the research environment inside the laboratory Centre d’Economie de la Sorbonne (CES) based at the Maison des Sciences Economiques (MSE), their exists a research team in finance grouping researchers coming from Economics or Mathematics. The list is the following:

De Boissieu Christian PR UP1
Bordes Christian PR UP1
Capelle-Blancard Günther PR UP1
Chauveau Thierry PR UP1
Guégan Dominique PR P1
Kempf Hubert PR1 and Banque de France
De Meyer Bernard PR UP1
Bich Philippe MDC P1
Boucher Christophe MdC P1
Chevallier Thérèse MCF UP1
All these persons do research in different fields of the finance. Some have a great deal of experience in their domain. Others are young and start new research in finance. There is also an opportunity to have young researchers motivated by this program. The diversity of their formations and of their domains of research is an important chance for this program and it is also the originality of the program. Other researchers whose principal research domain is not finance “strictu sensu” will participate in this program in order to reinforce specific domains (such as the probability domain) or to open the formation into specific economics orientations. The professionals who give courses inside the formation also give a chance to catch the interest of the enterprises. The list of all these participants is given in the main document.

All these researchers and professionals concerned with this program participate in a monthly seminar that has been organized for two years now in the MSE. Themes presented at this seminar are also given in the main document. Thus, a very important research activity in the different fields of finance supports this QF formation. The senior researchers participating in these formations also will supervise PhD theses. This is a good opportunity for the students who will follow this QF formation to continue their education after the master degree.

All the students need to find financial support for the PhD thesis in finance. Half of them find public grants; the others use private grants via the so-called “Bourse CIFRE”. These latter financial supports are given half by the research minister and half by a firm. The “bourse CIFRE” student has a three year contract with the firm. He or she spends 3 days per week in the firm and two days per week in the laboratory. At the end of the three years, the student defends his or her PhD thesis like the other students, but he or she has greater professional experience. The three years spent inside the firms permit students to find better jobs and to find them more quickly. Generally the PhD theses done inside this kind of environment are very good. If the student is really good and also interested in research, he or she can produce theoretical research and empirical work at the same time. In finance, the banks are really motivated by this kind of profile.

Concerning the QF formation we wish to maintain a very strong link with the enterprises and to develop a professional network based on our experience. We also wish to continue to supervise PhD theses inside the firms because it is a good opportunity to circulate theoretical works inside the firms. The QF program, by its originality, will help us to develop these contacts. This is particularly important in the present situation on financial markets, where we observe that it will be more useful to form students whose ability in risk management, regulation control and mathematical finance is very high.

Notice also that during these last ten years, we have observed a behavioural change inside the firms for these students. At the beginning of the experiment, the firms propose to them a job with an appointment similar to the one proposed to a student with only a master degree. Now, they recognize the interest of such a student who is more mature. If he or she has worked inside the firm, they know him or her well and will have more confidence in the work he or
she can do in the future. Thus the appointment he or she is given is of a more important nature.

Concerning the PhD theses which are supervised in Paris 1 in finance, half of them are done thanks to a “Bourse CIFRE.” This indicates that the links between the researchers in finance at Paris 1 and the professionals are also developed by this way.

There exist a lot of international agreements between the UFR of economics and mathematics in Paris 1 Panthéon-Sorbonne and finance formations in foreign universities. In particular, thanks to the Erasmus Mundus QEM program organized by a consortium of four universities-Barcelona, Bielefeld, Paris 1, and Venezia- there exists a lot of mobility for the students inside this program. The University Paris 1 Panthéon-Sorbonne is also a member of the European Quantitative Economics Doctorate (QED) with the universities of Alicante, Bielefeld, Copenhagen, Lisboa, Venezia, Amsterdam and Vienna. Other networks exist, mainly in finance, with the Universities of Venezia in Italy, the Business School of Brisbane (QUT) in Australia, HEC of Montreal, NUS in Singapore.

Every year a lot of researchers in finance are invited and visit the CES laboratory. These researchers give courses inside the master degree, give seminars for the PhD students, or participate in the PhD thesis defences. During the previous three years we have invited, among others, A. Faure – Grimaud from LSE London, E. Clark from Imperial college, F. Riedel from Bielefeld University, A. Neyman from University of Jerusalem, L. Epstein from Boston University, G. Huberman from the University of California at Los Angeles, R. Schmidt from University of Frankfort, P. Merhling from Columbia University, M. Walker from University of Montreal, R. Wolff from QUT in Brisbane, L. Pelizzon and M. Billio from University of Venezia, E. Ruiz from Carlos III University in Madrid, T. Mikosch from University of Copenhagen and C. Starica from Groningen University.

Organisation of the program

The Quantitative Finance Program is organized during two years. Each year contains mandatory and optional courses. The mandatory courses correspond to 80% of the formation. for the first year and to 75% of the courses for the second year.

For the first year the mandatory courses respond to the objective of developing students with foundations in mathematics, economics, econometrics, and finance. The teachers of these courses are specialists in their domains and most of them have used their techniques for applications which are in finance or close to financial questions:
- Probability and Statistics (A. Millet – D. Guégan)
- Macroeconomics and Monetary Policy (C. Bordes – C. de Boissieu)
- Portfolio choice and asset pricing (T. Chauveau)
- Optimisation (B. de Meyer)
- Econometrics (P. Sevestre)

For the second year, the courses are organized around the two tracks: Finance-Risk-Insurance (FRI) and Money-Banking-Finance (MBF). The choices of the courses correspond to the objective previously developed: to form students able to do applicable research in finance. All the persons who give courses or seminars are specialists in their domain. These include
banking, corporate finance, insurance, financial microeconomics and macroeconomics, and mathematical finance.

For the FRI track the mandatory courses are (5 amongst 7)
- Stochastic Calculus 1 (C. Chorro)
- Financial Econometrics (P. de Peretti)
- Foundations in finance and arbitrage (B. de Meyer – E. Koelher)
- Stochastic Calculus 2 (6) (A. Millet)
- Mathematics of insurance (6) (A. Chateauneuf)
- Life insurance (3) (J. Malet)
- Risk measures on financial markets (3) (D. Guégan)

For the MBF track the mandatory courses are (5 amongst 7)
- Monetary macroeconomics (C. de Boissieu)
- Change (P. Artus)
- Financial Econometrics (P. de Peretti)
- Foundations in finance and arbitrage (6) (B. de Meyer - E. Koelher)
- Banking macroeconomics (6) (C. Bordes)
- Dynamics of banking (3) (T. Chevallier)
- Finance services (3) (J. Couppey)

Christian de Boissieu and Dominique Guégan
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