

THE ZACCARIA DEAL *

Contract and options to fund a Genoese shipment of alum to Bruges in 1298

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Abstract : This paper analyses one of the most fascinating late medieval commercial contract. Some have advanced that it is was the first ever written maritime insurance. If any contract is a nexus of options, our inquiry demonstrates that Genoese merchants in XIIIe designed unique option-based provisions in order to match all together: (I) expectations and risk appetite from contracting parties; (ii) the logic of the business model for long distant maritime trade; (iii) the prevailing institutional context. Benedetto Zaccaria (circa 1240-1307), the central figure in this deal, established his leadership in the trading of alum from mines in the East, in today's Turkey, to Western Europe. This leadership was based on his unique business franchise : exclusivity of supply from one of the two biggest alum mines, diplomatic and military connections with many rulers, nautical skills. Zaccaria managed this franchise by numerous contracts with family members, associates, external financiers. These contracts were aimed at both managing his business but also designing original risks management solutions to mitigate, transfer and finance risks attached to his business: price, casualty, currency, liquidity. Contracting had some institutional constraints : the sea loan prohibition (*Naviganti*, 1334), the absence of a stock-exchange and insurance underwriters, the lack of Genoese sedentary agents and public institutions in Low Countries. However, the Genoese merchants could also build on numerous institutional tools : a range of standard forms of investment contracts, the familial clan (*albergo*) and network of prominent families, the law organising trade and enforcing contracts.

Key words :

Risk Management, Capital Markets, Corporate Finance, Institutions, Insurance, Contracts, Options.

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INTRODUCTION

On October 29th, 1298, a rich Genoese merchant, but also a prominent nobleman, diplomat and admiral, Benedetto Zaccaria, and his son, organized a venture focusing on the shipment of 650 *cantari*, about 35 tons, of alum from Aigues-Mortes to Bruges. Through a remarkable three page notarial contract, the Zaccarias raised capital and transferred some risks to two external investors : Enrico Suppa and Baliano Grillo. This transaction is one of the most fascinating example of original forms of contracting developed during late middle age, and in particular in Genoa. This contract is said to be, among other things, one of the first ever insurance contract ever underwritten.

This paper shows how the reading of this medieval contract delivers insightful information for historians, economists, modern financiers about economic exchange. It also shows that combining History (medieval Genoa), Economics (Contract Theory) and Finance (Option Pricing Theory) provides powerful lens to decipher economic history. We take the opportunity of the 2006 International Economic History Conference to discuss the following topic introducing its session 110 ("Tools of Trade"): *"Maritime trade [...] flourished and replaced to a large extent transcontinental routes. City governments and urban elites, the rising states, but also the merchants and financiers themselves created new or adapted existing institutions and commercial tools in order to adjust to changing circumstances. This surprisingly complex mix of innovation and continuity stimulated trade in this difficult period, but laid also the foundations of growth in the beginning of the Early Modern Period. This session [...] wants to measure and compare the organisation and infrastructure of gateway trade in cities like Bruges and Venice [...] and the ways in which merchants and financiers found new possibilities or changed existing ones in this organisational framework (accountancy, financial techniques, transport, firms, network trade) "*

Our historical inquiry, (i) adds medieval Genoa to the list of cities (Bruges, Venice) where institutions and merchants fuelled maritime trade; (ii) provides insights about Benedetto Zaccaria who is precisely the one who initiated direct maritime shipments from Mediterranean to Low countries; (iii) analyses a fascinating "innovative" financial technique. However, we do not believe it is possible to *explain* the foundations of economic growth by analysing the historical development of institutions as well as the emergence of contractual innovations. Institutions, markets and trust are the backbone of exchange, but broad causal explanation is impossible in History. Our investigation is a context-specific inquiry that does not tell the *why*, but shows the *how* one remarkable outcome, a three page contract, emerged in 1298 in Genoa. Economists and financiers view any venture as a nexus of contracts. Modern Option Theory approaches contract as a package of options. Options are aimed at fulfilling economic functions for contracting parties. These functions take place within a context-specific market and institutional framework, and this paper analyses the one existing in 1298 Genoa.

Part I deals with the methodology and the existing literature. It discuss why historians, economists and financiers have not succeeded so far to explain neither the medieval rise of the Western Europe, and Genoa in particular in XII-XIIIe, nor the medieval origin of "insurance" or "firms". We develop our descriptive approach. Part II puts this contract into its historical context and further details the business model for alum trade as well as the historical market and institutional settings. Part III goes through an extensive reading of the contract, which is modelled analytically, in order to show how it addresses both the business objectives and the institutional and market framework. We provide our conclusion.

PART I : On Medieval History, Economics and Finance

“It is men who write History, but they don’t know the History they write »

Raymond Aron

“The world of human beings is a permanent improvisation”

Robert Musil, *Man without quality*

Before starting our historical inquiry into the details of this remarkable contract, it is important to explain first our objectives and methodology. We first review the existing economic history literature from historians, economists and modern financiers. All of them provide useful inputs, although often each of them often ignored advanced made by the others, but they have in common a problem. They want to explain the past by finding a causal origin of an historical phenomenon, being the medieval rise of Western economies and Genoa in particular around XI-XIIIe, or the emergence of innovative form of contracting like risk insurance. The alternative we develop is that research should not focus on causal explanations but on descriptions of context-specific solutions designed by economic agents. These solutions are game of options that support economic exchange.

Writing economic history after Kant

One of the most important idea about science and knowledge has been captured by I. Kant in his *“Kritik der reinen Vernunft”* :

“If the receptivity of our mind, its power of receiving representations in so far as it is in any wise affected, is to be entitled sensibility, then the mind’s power of producing representations from itself, the spontaneity of knowledge, should be called the understanding. Our nature is so constituted that our intuition can never be other than sensible; that is, it contains only the mode in which we are affected by objects. The faculty, on the other hand, which enables us to think the object of sensible intuition is the understanding. To neither of these powers may a preference be given over the other. Without sensibility no object would be given to us, without understanding no object would be thought. Thoughts without content are empty, intuitions without concepts are blind.”¹

In modern wording, a science based on a logical deduction of universal rules without empirical facts provided by *experiment* is “empty”, but a knowledge based only on induction from facts without a set of a priori logical deductive rules to subsume the particular under a universal is “blind”. The problem is that, for Kant, and even if it was the objective of his original project, there is no *a priori* onto-logical foundation, or the *transcendental synthesis a priori*, binding together the analytical and the empirical. There is no onto-logical foundation of the deduction (*rationalism*) and induction (*empirism*). A first consequence of Kant’s diagnosis is that the very foundation of “experimental science” is methodological rather than substantial. But this Kantian distinction between logic of models and intuition of experiment is precisely what made “modern sciences” going forward. Modern sciences, and leaving aside here the question of

¹ Kant (1781, 1st ed. [1929] :)

formal scientific languages (mathematics), are based on experimental procedures enabling scientists to test *probabilistically* the ability of their hypothetico-deductive models to explain facts better than randomness. Without entering into a long discussion about modern sciences, the crucial elements articulating what modern sciences is all about are twofold:

(i) the go-between hypothesis and testing, and therefore the refutability (Popper), to solve the circular problem of *induction* (from particular facts to universal theory) and *deduction* (from universal theory to particular facts);

(ii) the ability of experimental sciences to heuristically isolate the object of the scientific law from the totality of the reality in which this law takes place, and which makes sciences something that deal not with the “ultimate origin” of a phenomenon.

Social “sciences” are neither experimental nor scientific, in the narrow sense of the expression. In particular, history, the mother of social sciences in many ways, offers no way of isolating variables and then defining precisely one or several causal (universal) principles that can probabilistically explain events. History is made of singularities and historians have no laboratories to replicate the past because of the Heraclitean *panta rheim*. The clear conclusion addressed to historians has been made by Raymond Aron (1938) :

“The Critique of Pure Reason prohibited any hope to have access to the essence of things: hence the philosophical critique of history renounces to reach the ultimate meaning of evolution”²

Aron did not mean that writing history was futile, but that historians should not forget, and try to go beyond, the limits of their field of research. History should be no more than context-specific conjecture about the past. It cannot pretend to be a science, in its narrow sense, it is a form of knowledge. It does not explain the *why* through universal rules, but build up a plausible scenario describing how one singularity, instead of others, took place somewhere in the past. The methodology is backward, (weakly) probabilistic and partial. Backward because it starts with the singularity and then goes back to antecedent “states of nature”. It is probabilistic because it develops a plausible “case story” from the antecedents to the singularity, but unfortunately this “case story” is not fully statistically (econometrically) testable hypothesis because such a procedure suppose attributes (e.g. isolation of variables, reproduction of causal mechanism, ...) that historians cannot entirely provide, by definition. Historians cannot neither explain particular cases from universal rules, nor they can infer the reason why singular events happened from general law of evolution. The metaphor of the historian as an judiciary investigator or a judge here applies³: historians renounce to explain the *why*, they only collect evidences to build a plausible case about something that happened somewhere in the past. The context-specific “story line” developed by historians is therefore partial because it does not pretend to describe History in its totality, which is by essence the trap of all historical

² Aron, R. (1938 [2nd ed. 1969 : 15]).

³ The metaphor of the judge or the policeman has a long history, and among them of course, Carlo Ginzburg. His central argument that history is a evidence-based “context-specific” rethoric “juges and historiens ont en commun la preoccupation de prouver les faits [...] Juges and historiens on donc en commun la recherche de preuve”, Ginzburg (2000, French. Trad. 2003) provided the following quotation from Momigliano (1981). Readers will better understand at the end of this paper why we like it very much : “L’un [policeman] et l’autre [historian] doivent donner un sens à certain événements après s’être assuré qu’ils ont bien eu lieu. Mais leur activité est limité à un petit nombre d’événements inscrits dans les limites chronologiques définies. On attend pas des policiers qu’ils comprennent, et encore moins qu’ils publient des bulles médiévales. Même les juges, aujourd’hui, ont très rarement affaires à elles, et quand cela se produit, ils sont bien venu à la table des historiens”.

genealogy, but it circumscribes, heuristically, the inquiry around a set of specific historical outcomes.

Three perspectives : the historian, the economists and the financier

P. Veyne, the great historian of Antique Rome, wrote about the foundation of History as a “science”:

*“Its methodology made no progress since Herodotus and Thucidide, as surprising that such an affirmation might seem ”.*⁴

As far as a epistemological scheme founding History as a science, Veyne is certainly correct. However historians, and in particular medieval economic historians, made lots of progress in the way they build up cases. For the last one hundred years or so, they have produced an immense literature that help a lot to decipher the past. This particularly applies to the theme providing the background of our historical inquiry : the rise of Western economies during late middle age. In particular, this theme converges towards the key question of the emergence of Italian maritime Communes as the major centres that fuelled the rise of European modern economies, or what will be called from XVIIIe, modern “capitalism” . Among these centres, and in many sense first among them, was Genoa.

This recent progress of economic history has been achieved in three ways. First historians have collected an impressive amount of archives from late medieval and early modern economies. Official annals from cities, customs and tax documents, notarial records of contracts, private letters of merchants and agents, and many more archives, these are some of sources of information that better tell us how people did exchange, what kind of contractual and institutional instruments were used to trade, and how Europe developed a unique set of legal, technological and commercial practices that fuelled growth from late Middle Age. Genoa, and his unique wealth of medieval notarial archives, has been at the forefront of investigations of economic historians. Second historians have been able to rely on more structured and refined analytical tools to frame their historical research road map. This is the important contribution of economists. They first provided crucial tools, being theories and techniques such as notably econometrics, to analyse macroeconomics and microeconomics drivers of economic exchange. This was of a certain help in the French “quantitative history” of Ecole des Annales, but it really spread with the so called Cliometrics in the US.

More recently, economists developed models and analytical instruments, notably game theory, helping to understand how institutional and contractual constraints, evolving through times, affects, positively or negatively, the way economic agents can exchange. This is the great contribution of New Institutional Economics (NIE, hereafter), and the more broader area of research labelled under the generic field of Contract Theory (CT, hereafter) which helped historians to go beyond the standard “perfect market” settings of neoclassics. When analysing highly incomplete markets such as medieval feudal economies, or understanding the transition from feudal market structures to modern economies, this input proved to be crucial. A third and more recent set of research is modern finance. Modern finance, being market finance and corporate finance, has been one of the most successful discipline of the last 50 years. In particular, option pricing theory (OPT, hereafter) has made radical breakthroughs in the way we view contracts (e.g. credit, shares, insurance) as options fulfilling functions. What matters is not the institutional silos, but the functional way agents and markets manage create new instruments to better exchange value. Value of any assets (and liabilities) is made of the three dimensional aspects : the return, the risks (or volatility) and the timing. Unfortunately, except

⁴ Veyne (1971 [2nd ed. 1996 : 148]) .

few exceptions, this last input has not yet spread within historian scholars, and we will explain why.

In this paper we will combine these three perspectives : History, Economics, Finance. However these three disciplines are facing some serious epistemological dead-ends because, as we will show, in spite of the Kantian prevention about causal explanation in historical knowledge, they more than often do try to *explain* history. Our combined approach is aimed at going beyond these problems by articulating a new framework we developed in this introduction. Indeed modern economic history is not escaping some fundamental traps described here above precisely because it asks questions which are, although interesting, well beyond achievable objectives : Why medieval Europe, and going further, why Europe and not China for instance, as the theatre of some extraordinary changes in medieval business and finance practices ? Why a spectacular growth in business exchange in XII-XIIIe in a region going from the East end of Mediterranean to regions located in today's Scandinavia ? What were the institutional or contractual tools that suddenly enabled economic growth ? And as far as our Zaccaria contract is concerned, why Genoa ? We will review some of the laudable attempts to answer these questions, as they will provide us with lots of useful inputs. However we will see that many questions remained unanswered.

First we focus on Historians and the way they have listed causes of the emergence of Genoa. In particular, in the quest of the origin of "capitalism", historians used genealogy : if capitalism is made of institutions, being for instance "limited liability companies", "banks", "equity", "insurance underwriters", the task of historians is to trace back the *where* and *when* of the birth of such institutions. We will see that "insurance" is a good candidate for such methodology, and many medieval historians have tried to locate the birth of insurance in medieval Italian Communes. This is of course a trap, because the search for origin is endless (Bloch).⁵

Then we analyse the contribution of NIE either under the original input of *New Institutional History*, with authors like North, or more recently with *Comparative and Historical Institutional Analysis* of A. Greif. Reviewing the latter will enable to better discuss some background about Genoa, but also understand the evolution loop between institutions and capital structure. In particular we discuss the role that sea loan and commenda played in boosting medieval maritime trade. Then we will study OPT. We will first explain what OPT is about. Then we will discuss some recent historical considerations, laudable but somehow unsatisfactory, proposed by OPT scholars. From these three inputs (history, economics, finance), we will combine a methodology that will be used in this paper.

The quest of Genoa as the "cradle of capitalism"

The history of Genoa has been the subject of many studies since the first modern account of Michel-Giuseppe Canale in his *Nuova istoria della repubblica di Genova* (1858).⁶ It is true the

⁵ Bloch, M. (1949). We read somewhere, but so far we have not find the trace of this reading, that Marc Bloch came across the article Roberto Sabatino Lopez "Aux origines du Capitalisme Gênois" (1937) when he wrote this cautious note.

⁶ At the risks of oversimplifying by grouping scholars by countries, and sorry if we are missing names, there are 5 main historical schools. First the local historians of the "Genoese" school" including, in alphabetic order, Bensa (+), Belgrano (+), Canale (+), Costamagna (+), De Negri (+), Manfroni (+), Pistanero (+), Puncuh (+), Vitale (+), and today, among many others, Airaldi, Cardini, Petti-Balbi, Poggi. Second there is the American school with Byrne (+), Krueger (+), Reynolds (+), who contributed a lot to the gathering of notarial materials during the first half of XIXe, and more recently S. Epstein. Then there is the "French school" starting with Renouard (+), Sayous (+) and culminating with authors such as Balard, Heers, Jehel. There was also a

Commune left an impressive set of archives, being either from official annalists of the Commune (Carfaro, Voragine, Doria, the Stella brothers), but from notarial records. Most of them that can be found today in the Archivio di Stato di Genoa. Among these records, one should mention the first known notarial medieval cartulary, the one of Genoese Giovanni Scriba.

Genoa had two great moments in its history. The first one was in XIIe and XIIIe, with some short eclipses, and culminating with its victory against Pisa (Meloria, 1284) and Venice (Curzola, 1298), and its trade dominance in Mediterranean up to the turn between XIIIe and the XIVe centuries. Then the Genoese economy went through a sharp depression in XIVe and early XVe. However the City managed to come back again, and some described it as the “Genoese century”, between mix XVI to miXVIIe, notably thanks its pivotal trading and financing role in the expansion that followed the discovery of the “New World”. The sarcastic Francisco de Quevedo y Villegas (1580-1645)⁷ wrote:

*“Nace en las Indias honrado,
Donde el mundo le acompaña,
Viene a morir en España,
Y es en Génova enterrado,
Y pues quien le trae al lado,
Es hermoso, aunque sea fiero,
Poderoso caballero,
Es don Dinero”⁸*

Now the question is why did Genoa emerged as the centre of European expansion in XII-XIIIe? Why did Genoa was at the centre of the first “Economies-Monde” (Braudel) which then migrates, according to the same Braudel to Venice and Bruges, to Antwerp and then back to Genoa, and then ended up in Amsterdam and London ?⁹ The Feudal model, based almost exclusively on agriculture, was step-by-step integrated within a wider economic exchange network. Among the list of causes of economic growth of Genoa, and other Italian cities, there is, first, the Pirenne thesis.¹⁰ It says first the military conquest of the Mediterranean basin by the “Christians” against the Saracens enabling to establish a triangular trade route between Eastern and Western markets, and at the centre what will be called later the Italian “*Repubblica marinera*” and their nearby colonies all over the Mediterranean basin and further East in the Black sea Trading, and notably trading of high value commodities lowering marginal cost of transport, and this is one of the central thesis of Cippola¹¹, is what made Italian Communes so successful.

“Belgian school” of specialists of medieval Genoa with De Roover (†), Doehaerd (†), Keeremans (†), Liagre (†). Others individuals who were often precursors in their research are : Bratianu (†), Sieveking (†), Schaubé (†) and more recently Bach (†), and of course Benjamin Kedar from Israel.

⁷ Quevedo, portrayed as we know by Velasquez, was sometimes very witty and humorous, but he also wrote pathetic anti-Semitic comments that certainly did not help Jewish communities in an already turbulent time of religious intolerance.

⁸ *Born in the honest Indies/Where all the world accompanies him/It comes back to pass away in Spain/And is then buried in Genoa/ And then who brings to him alongside/Is beautiful, although he is proud/What a powerful*

Knight/ Is such a sir Money. (our translation)

⁹ Braudel (1973). The Braudelian Wallerstein (1980) contested this genealogy and argued that the first “World-Economy” emerged in XVe in Portugal.

¹⁰ Pirenne, H. (1925) even if Pirenne gave priority to Venice over Genoa.

¹¹ Cippola (e.g. 1974). Alum is an interesting “counter example” : it was a commodity of high value commodities but requiring large loading capacities (see under)

We now Genoese were traders at heart : the proverbial diction son many times quoted in studies about says "*Januensis ergo mercator*" (Genoese therefore merchants).

Some medieval historians preferred the explanation the other way around : the improvement in Western agriculture productivity, notably through technical progress (tri-annual rotation, water mill, manure, plough, open field), generates surplus which imposed a review of the direct auto-subsistence of Feudal land-based economies. For many, and Lopez is the most convincing advocate of such a thesis, Genoa emerged as the centre of medieval trade, in XI-XIIe, thanks to the investment of land-based assets, owned by wealthy aristocratic (*bonitas*) families residing first in the country-side (*contado*), into profitable maritime venture.¹² The ignition of this transfer process has been the "*privateering*" and expedition against the Saracens that provided Genoese merchants-pirates with large and short-term return for their maritime ventures. There are official traces of aggressive expeditions against the Saracens in Sardinia, *al-Andalus* (South Spain) and *Ifriqiya* (Africa) as early as XIe.

Maritime technology is another element mentioned by historians. If timing of transport did not evolved a lot between antique Rome and XIIIe, as it took about the same 4 to 6 weeks to cross the Mediterranean from East to West during these two periods, a whole set of innovations (or imports from other "civilization") dramatically increased productivity of maritime transport in Europe between XI and XIVe (e.g. boussole à pivot, compass, advanced rudder, *portulans*, squared rig, triremes, *martelojo* or table of shipping). Some traced the main elements of the "nautical technological revolution" in early XIVe(Lane)¹³, especially in Venice, many others, and again among them R.S. Lopez'input has been again crucial¹⁴, have shown that crucial aspects were developed in XIIIe-XIIIe : the Genoese were at the roots of maritime maps (*portulans*), they developed the *cocha* notably to trade alum, they developed the *terzarolo*, and in XIVe the navigation tables (*martelojo*). This enabled traders to circumvent the inefficient land-based transportation where shipping commodities was time-consuming and expansive, notably because of the succession of tax raised by each and every local rulers. In particular, maritime technology enabled the Genoese, to change the patterns of economic exchange. The latter evolved from seasonal fairs, and among them especially the "Fairs of Champagne", which were great tools but also big time and space constraints for business(see under) to a more efficient and continuous flow of goods and capital based on regular shipment closer to end markets in cities and their nearby.

Several authors have also noted that a key feature essential was the collective political co-ordination organisation provided gradually by the members of the "Oath" to the Emperor (late Xe), then in mid Xie the "Compagna" then the "Commune" (1099). There are numerous studies showing how the Commune supported trade expansion by establishing diplomatic and military presence all over the Mediterranean basin and the Black Sea.¹⁵ The Commune as a co-ordination tool supporting co-operation among economic agents is, as we will see, an important input from economists, and notably A. Greif (see under). These are all the Genoese political and legal framework (laws about contracts or transport), their foreign policy tools like bilateral treaties, public finance (e.g. gold coinage in 1251, public debt *compera*) supporting infrastructures and expansion abroad, representatives in distant places(consuls, judges, arbiters, notaries), trade and maritime practices like *mude*. This has been well described, and some historians believe that Genoa growth started to stagnate because from XIVe, it could not sustain political leadership abroad.

¹² Lopez (e.g. 1936, 1938, 1984)

¹³ among others F. Lane (1963, 1974)

¹⁴ Lopez (1936 : chap. 2)

¹⁵ The list of studies is long. Balard, in the re-edition of Lopez (1936 [2004, 3rd ed.]) provides a superb bibliography, broken down by key geographical areas.

Public institutions were essential, but many studies do show how Genoese private contracting and business institutions were at the forefront of other cities in Europe. The Genoese revived deposit banking, they were at the roots of bill of exchange (and before *instrumentum ex causa cambi*), they refined complex tool to finance venture (*societatis*, *commenda*) and transfer risk (maritime “insurance”).¹⁶

To these factors, geography is also often added. First Genoa was ideally located between markets (South/North, East/West), but also because its limited cultivable land and its *opening* on the sea – that is the etymological origin of “*Genua*”- provided local inhabitants with an incentive to expand elsewhere. It is quite interesting to note, as mentioned by Jehel (1993) that even during its “gold age” Genoa managed to control large amount of long-distant territories but almost never kept under full control the small region of Liguria, in the country side : weak at land, strong at sea. Others ¹⁷developed the same theme of a shift between agricultural to broader maritime trade, but argued that the causal explanation is to be found in the intrinsic geographical limit of the direct land-based expansion of Genoa.

Urbanisation is also a common theme which allegedly explained the rise of Genoa. Economists tell us cities, or “megacities”, are the cradle of economic exchange because of the concentration of assets and the economies of scale, the matching between the supply and the demand, the continuous flow of business ideas and knowledge a city provides in comparison with rural era, and the lower the extend of the arbitrary control local rulers over men and economic exchange.¹⁸ These are the Paris, the London, the Bruges, the Milan, the Florence, The Genoa between XIe and XIve grew by about 5 times. An educated guess ¹⁹ is about 20,000 inhabitants in XIe, then 40,000 end XIIe and about 100,000 end XIIIe. In this case geography and urbanisation is then linked to a third theme : demographics.

Many historians rely more on psycho-sociological type of argumentation. “Entrepreneurship”, “individualism”, “risk-taking” mentality are qualitative concepts used in many studies focusing on medieval Genoa or on other places. This theme of individual entrepreneurs is widespread among historians, focusing on Venice, Florence or Pisa. Many studies (Lopez, 1936, 1965; Renouard, 1949), but the same is also true about the merchant from Venice or Florence (Sapori, Luzzato, Melis), do focus on the assumed “profile” of the Genoese merchants-entrepreneurs, either the aristocrat (Sayous, 1937) leading from XIIIe an important *albergo*, the family clan gathering descendants from some Marquis or Visconti, or the self-made entrepreneur from one of a rising *alberghi popolo*.

Why did Genoa failed to maintain its leadership in XIV. We end up with the same list of miscellaneous explanation. The failure of political institutions, and notably the failure of the communal executive structure because of clan rivalries, imposing the appointment of external *podestà* and then the dodges in XIve . A shift in the entrepreneurship and risk-taking mentality has also been mentioned. A Sapori explained the relative decline of Florence because its merchants were like F. Datini, who was “insignificant, in spite of his great wealth, by lack of

¹⁶ The list of studies covering this question is long. Numerous description of standard Genoese contracts in XII-XIIIe can be found in Byrne (1916, 1920), Krueger (1933) Sayous (1929), Lopez (1933, 1936, 1938), Doehaerd (1938, 1941), Renouard (1949), Lopez & Raimond (1955), Heers (1961), Ballard (1978), Jehel (1993). On *commenda* (see under).

¹⁷ Epstein (1996 : chap. 2)

¹⁸ Pirenne (1929) for the first discussion about shift provoked by medieval urbanisation. For mainly post-1500, more recently, De Vries (1984), and Bairoch (1988) which correlated acceleration of post-1800 urbanization to the rise of modern industrial economies.

¹⁹ Epstein (1996 :)

heroism".²⁰ Along this type of explanation, some (Kedar) attributed the decline of Genoa as a shift from risk-taking entrepreneurship into a more prudent, religious and introvert mentality of merchants.

Lane has advanced that, in the field of maritime technologies so crucial for its maritime expansion, Genoa did not catch up with Venice in XIVe, the leading city in terms of organisation of shipment and technologies to boost labour productivity. Lopez (1984) found in particular that the Genoese did invest too much in too large *cocha* which did not offer the physical and financial flexibility required.²¹

To be correct most historians (Lopez 1936, 1938; Balard, 1978; Jehel, 1993; Airaldi, 1986; Epstein, 1996) proposed a mix of explanation, with an emphasis one or several factors against others : individualism and entrepreneurship, migration of people and assets from country-side to urban areas, contractual innovations, institutional support for external trade, geography. They showed in particular the two-sided impacts of the aforesaid factors. For instance, the Genoese geography was a unique opportunity for future development, but it also somehow constraint its development in the countryside. Individualism provided entrepreneurial assertiveness for merchants but it also led to internal political and social instability. The familial structure help to build networks on trust but also impeded the development of an advanced State co-ordination as in Venice .

But one factor or a collection of factor does not give us the answer. What do we know then ? A lot, and the material gathered during the last 150 years is immense. But if one is looking for a coherent explanation about the why Genoa's economic growth and decline, in XIVe, this question remains a puzzling problem.

The origin of medieval insurance and the Zaccaria contract

As we have said, another way to trace the origin of the rise of Europe, and to explain the rise of given geographical areas, is to trace the origins of the most successful way of exchanging : capitalism. This is, in a sense, why so many historians want to describe late middle ages in modern terms. "Company", or even "Super-Companies" (Hunt, 1994), existed in XIIIe, "limited liability partnership" existed in Florence from early 1408 and drove the evolution towards our modern holding structure splitting the role of ownership and management control (Sapori, 1956), a Datini is often described by Melis (e.g. 1962) as a medieval "businessman", De Roover traced the first books with modern "double-entry accounting" as early as XIII-XIV in Genoa, and insurance has been invented in early XIVe (Bensa, 1884) . What historians want to prove is that institutions that forged capitalism were already present, even if at an early stage in some places, between XIIIe and XIVe .

But M. Bloch was again correct (see above). Origin is a trap There is always an antecedent. Nothing emerged from nowhere, and if we like to speak about "innovation", historical "rupture", "change" of paradigm, "shift", "birth" and "origin", this is a reality we construct *ex post*. Because, again, History is like the Heraclitean river where *panta rheim*. Defining origins produces only subjective, and more often than not, inadequate modern representations of the past.

This comment applies to this Zaccaria contract, as it has been analysed by many through the following central question: did the parties involved in this deal crafted the first ever written insurance policy. The contract has been discussed by Lopez (1933) who provided in annexe the

²⁰ Sapori (1958 :)

²¹ Lopez, R. S. (1984). The argument has been criticised by Lane (1984) in the same publication.

first latin transcription, Doehaerd (1938, 1941), Renouard (1949), Liagre (1955), De Roover (1963) Boiteux (1968), Balard (1978), Favier (1987).

Starting with the aforementioned Bensa (1884), the literature on medieval insurance has blossomed, and the consensus among historians is that late medieval merchants established risk-transfer mechanism that can be called “maritime” insurance.²² Starting first with the sea loan, or a loan which repayment is contingent of safe arrival of the goods at destination, it culminated with the payment of a premium paid upfront by the merchant and an indemnity paid by the financier in case of casualty during the transport on sea. Several alternative forms existed and we will come back on this in our study.

We do not intend to answer this question at this stage already. But let us mention that many (Lopez, Doehaerd, Liagre, Renouard, De Roover) argued that, if the format of the transaction is not exactly an insurance as such, and in many sense it is much more complex, the principle of “insurance” is clearly laid out in the agreement between the parties. On the other hand, others (Boiteux, Favier) claimed that this type of “Genoese insurance” is not really an insurance as the payment cycle does not correspond to standard insurance, making impossible to debundle the financing side of the contract from its risk-transfer mechanism. This will happen latter, and this was the thesis of Bensa, in Florence (insurance “*ad florentinam*”), but we know that several historians found such type of contract in other Italian communes.

In a first brief and simplified narrative “option-based” approach, developed by Briys & Varenne (1999, 2000), it has been show that “institutional” approaches to define what is an insurance or not is of limited interest. In today’s market there are lots of products articulating multiple functions, and insurance, banks, stock exchange, are no longer “silos”. In a sense, as we will see, this deal is similar to an highly structured derivative .²³ At the time, Briys & Varenne did not have access to the full document and they were relying on secondary sources (Favier, 1987). Furthermore the overall historical context of the contract has not been investigated, as this historical example was aimed at showing to modern financiers that derivatives had an history and the convergence of financial service industry is not a new theme. However when analysing further this deal, we came out with striking facts and amazing evidences that enable us to go well beyond this interpretation, and this is what we will develop in the following paper.

By the way, the sea loan was a formula somehow used in ancient Rome (*foenus nauticum*), under different format (Andreau, 1999) and that some of them, the maritime loan, were in use in ancient Greece (Bogaert, 1965). If we go back to the Code of Hamurabi there are specific traces of payment (e.g. debt, rent) that can be either cancelled or deferred because of adverse conditions. Furthermore, caravans of merchants were institutions to mutualise risks when traversing the desert. As far as maritime trade was concerned we know that the so-called *Lex Rhodus* (circa VIIe) ninclude provisions about risks and loss sharing in case of the casualty (Ashburner, 1905). An outdated book of the British Trenerly (1925) overviewed some of these aspects, going back to the earliest ages of our civilisation. It is full of mistakes and gaps, notably missing completely medieval Italy, but we don’t agree with Edler-De Roover (1945) was simply denied in her first footnote any interest in this study, certainly because Trenerly failed both to capture the role of medieval Italy and to define precisely what insurance is about. We think this outdated book is interesting. The fact that Trenerly ended up with an endless collection of anecdotal analogies, starting from the beginning our civilization, says, between the lines and involuntarily, that everything depends on the (pre)definition what historians are looking for.

²² Among many studies about medieval and early modern maritime insurance (XIII-XVII) : Bensa (1884, 1925), Barbour (1929), Edler-De Roover (1945), Heers (1961), Boiteux (1968), Gioffre (1969), Melis (1975), Balard (1978), Daveggia (1985), Tenenti & Tenenti (1985)

Risk transfer is as old as civilization, insurance is a technique that emerge when and wherever we want, depending on what we call “insurance”. This is a circular loop of any investigation about historical origins.

When economists write Medieval history: from Econometrics to Institutions

We will now turn to more deductive historical methods of economists : they start with general rules about markets, institutions and economic agents and then deploy and test these universal rules within defined historical contexts.

It is only recently that economics really started to focus on History, if we except grand historical scheme deployed by a Karl Marx or more recently K. Polanyi. The first modern attempt has been made by the so called Cliometrics, starting mid 1950ies. The major input of cliometrics is methodological : econometrics. The idea was the following. Instead of discussing the roles of such or such factor in the evolution of (economic) history, historians should first define a set of formal hypothesis about the impact of, says, the development railway infrastructure (Fogel, 1960, 1964) or the abandonment of slavery on the US economic growth (Conrad & Meyer, 1958; Fogel & Engerman, 1976). When formal definition of variables and causal link between variables are modelled, data will be gathered to test the validity of assumptions. As far as medieval history is concerned, the most important set of studies was produced by D. Mc Closkey (e.g; 1972, 1976), and his co-author J. Nash (1982), who tried to explain the persistence of open fields in rural England. Why did peasants continue to scatter lands when such a technique was inefficient (loss of about 10% ouput) ? The answer lies in the diversification of lands within a portfolio in order to reduce risks caused by harvest failures. When insurance had emerge, this technique gradually disappeared (XIXe). We do not discuss here the long debate about these seminal articles, even if the discussion addresses several relevant aspects for our study²⁴

Most of early cliometrics were neoclassics. In the neoclassics paradigm, starts with the assumption that commodities are similar, market is perfectly liquid and instantaneous, buyers and sellers do not face asymmetry of information or cognitive load about assets and prices. As a result, market equilibrium, through prices, displays the optimal allocation across all “states of Nature”. In this setting institutions, organisations, information, budget and time constraints are not addressed because in efficient markets, grouping wide number of participant, agents are rational and exchange assets at equilibrium. Institutional or informational issues, as well as culture or education, are irrelevant.

The paradox is that cliometrics soon ended up with an-historical modelling of History. In a well-known critical article, D. Mc Closkey (1976) wrote :

Smith, Marx, Mill, Marshall, Keynes, Heckscher, Schumpeter and Viner, to name a few were nourished by historical study and nourished it in turn. Gazing down from Valhalla it would seem bizarre that their heirs would study economics with the history left out, stopping their desultory search for facts in time series at the 1st 25 years and in cross sections at the latest tape from the Bureau of the Census, passing by the experiments of history with little regard for their

²³ The Briys and de Varenne interpretation has been extensively used by Giraud (2001) in a brief “management” book.

²⁴ For instance Fenoaltea (1976, 1988), Bekar & Reed (2002). An interesting question (see under) is the fact that (i) historians should be very cautious with medieval statistics (ii) statistics often hide many different plausible explanations and there is no singular but multiplicity of factors that can explain one historical event or trend.

place in a non-experimental science, distrusting old facts as error-ridden intrusions from another structure, abandoning historical perspectives on their political economy'

For now about several decades, scholars have developed an alternative view of economic exchange, and recently it has been relabelled under the name of Contract Theory (CT)²⁵ One cannot talk of a single and coherent string of researches *per se*. Common themes emerge and it deals with economic exchange in presence of market "frictions" and CT builds on the following assumptions.

- Firms (ruled by authority) exist because markets (ruled by price mechanism) do produce some *transaction costs* (Coase, 1929, 1960);
- stakeholders need to manage *agency* problems about *property rights* over residual value of assets (Berle and Means, 1932) or on *residual rights of control* (Grossman & Hart, 1986)
- agents are guided by a *bounded rationality* (Simon, 1959) and rational cost-benefit analysis failed to describe decision-making process (Khaneman & Tversky, 1971);
- choices under uncertainty, described in game-theoretic model (von Neumann & Morgenstern, 1944), can lead to non-cooperative individual decision departing from Pareto-optimal equilibrium for the totality of players (e.g. Nash, 1950-1953)
- exchange takes place within a defined *institutional* and *organisational* (hierarchies) context creating constraints (Chandler, 1962, 1977; Williamson, 1967),
- contracting parties can face selection issues because of asymmetry of information, being *ex ante* adverse selection (Akerlof, 1971) or *ex post* moral hazard;
- if exchange is made of contracts, all contracts are necessarily *incomplete* as they cannot deal with all potential outcomes (Hart and Moore, 1988, 1990).

Some have proposed broader theory capturing these different aspects, notably Williamson's *Transaction Cost Economic, or New Institutional Economics* (NIE hereafter) (1975, 1985) liasing bounded rationality, informational problems and agency between parties, and therefore the roles of incentives, the specificity of assets of agents and firms entailing market's mechanism as well as the role of organisations and institutions.

Douglas North has been one of the most prominent figure who drove the spread of NIE within the Historical arena, under the label Historical NIE or New Institutional History (NIH hereafter).²⁶NIH starts with the following

"Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. In consequence the structure incentives in human exchange, whether political, social, or economic. Institutional change shapes the way societies evolve. [...]That the differential performance of economies overtime is fundamentally influenced by the way institutions evolve is [...] not controversial".²⁷

²⁵ An excellent overview is the recent textbook of Bolton & Dewatripont (2005), on CT and corporate finance, Tirole (2005).

²⁶ Even if Williamson and North had some strong methodological divergences.

²⁷ North (1991 : 3)

Transacting is costly, and diminishing cost of transacting is what good business is all about. For NIH, efficient institutions are those which enable players to diminish cost of transacting, by supporting contracting between agents, securing property rights, diminish informational problems and overall diminishing uncertainty of economic exchange. How does institutions evolve ? The shape of institutions is governed by agents who search continuously for a better exchange environment, lower transaction costs and therefore create new contracts, new institutions, or support new rulers that make transacting more efficient. Obviously, the world is full of frictions, inefficient institutions : why do we need to believe that the quest for more efficient institutions is inevitably everywhere at work ? Initially North, like many NIE, was convinced that the “invisible hand” was at work. Step-by-step, he introduced some amendments recognising :

*“Even the most casual inspection of political and economic choices, throughout history and today, makes clear the wide gap between intentions and outcomes. However the increasing returns characteristics of the institutional matrix and the complementary subjective models of players suggest the specific short-run paths are unforeseeable, the overall direction in the long-run is both more predictable and more difficult to reverse”*²⁸

In other words, history is a step-by-step tale about the way people co-operate through institutions to make exchange less uncertain and more profitable, even if in the short-run it might not be the case. The central theme of history is incentive, and it acts in two converging ways. On the one hand, efficient institutions deliver fair market-based incentives to those who cooperate and sustain returns at lower costs and risks. And, on the other hand, efficient agents support and further improve efficiency contracting institutions and reduce cost of transacting because they can capture monetary returns from efficient institutions. This can be institutions dealing with efficiency and cost of dispute settlement, those aimed at reducing asymmetry of information between contracting parties, those punishing “cheaters” and informing others about them, those creating better risks sharing solutions among agents, or those guarantying property rights of financiers and merchants, and impeding polity or corruption from rulers, or cartel and oligo/monopolies from some economic agents.

NIH’s research provides us, of course, with many very useful ideas, but there are also many answered questions. Let us list a few of them. First, the timing element of the transition to institutions fostering coordination and minimizing transaction cost is not explained. In other words, there is an undefined short and long-run, something the sarcastic Lord Maynard Keynes would have certainly commented by his well-known “*in the long run, we are all death*”. Second North does not explain precisely what is an “institution” : “*Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction*”. If anything that is “*humanly devised constraints*” is an institution, then everything can be institution. The corollary question is about the *why* and the *when* something becomes institutionalized. For instance, day after day, people do invent “new” contractual arrangements. Why and when a specific ad hoc contract become a common institutional solution reused by others ? The other way around, why some contracts become obsolete and others don’t, and, furthermore, even if they are only marginally used by economic agents ? This leads to another problem : what institutions really matters in economic history ? Institutions and functions are equivocal concepts, and North and his co-authors should first explain the specific impact of institutions according to their nature and functions (protection of property rights, efficient contracting, ...).²⁹ Another fourth problematic aspect is that institution-based history *à la* North

²⁸ North(1991 : 104)

²⁹ This is a topical question about economists focusing on development. Some economists that property rights institutions (protection against abusing rulers, corruption, ...), and not contracting institutions (Williamson, North), is the relevant factors explaining growth and

leaves no place for the interface between culture (social institution) and nature (e.g. climate, geography, geology). We know that societies evolve in a way to adapt at the interface of the two sides, the natural and the social environment.³⁰ Why should we look at one side of the coin (culture) to explain evolution of societies and in particular their path to economic growth, and why natural resources and constraints can be treated as neutral factors even though we know they are not ?

The problem is the following. North's approach is mainly deductive, and it works as follow. It starts with NIE which provides general rules about the efficient institutional framework (protecting property rights, lowering information asymmetry, ...) minimizing transaction cost. Societies providing such an incentive-based framework are the one who "wins", in the long run, the quest for growth and development. As a matter of fact, Western Europe has emerged around late middle age as the centre of growth, therefore institutions should have provide such an incentives for agents to work and coordinate to sustain such a growth. NIH has only to pick up "new" and successful public and business institutions at that time, and show, with some game-theoretic modelling, how they develop an efficient institutional environment for trade and business.

Because of its theoretical and deductive survey of history, NIH ends up either with general themes nobody will dispute a priori, but that does not explain specifically the why, the when and the where. Or, whenever NIH starts to dig into the specific historical cases to test its institutional hypothesis and substantiate its claims, then more "traditional" and specialised historians can easily demonstrate that facts are much more complex than NIH suggests and that it failed to explain singularities. Let's us take two examples : first the overall explanation of the Rise of Western economies late Middle Age; second the emergence and the decline of the Fairs of Champagne which played a key role in the latter.

The medieval rise of Western Europe , the Fairs of Champagne and NIH (North *et alii*)

North (North & Thomas, 1973; North, 1991) focuses on the why Europe has been the center of economic development for several centuries and on the why this process emerged in late middle age ?

"The history of long distance trade in early modern Europe was the story of sequentially more complex organisation that eventually led to the rise of the Western world. Innovations that lowered transaction cost [...] occurred at three cost margins : (1) those that increased mobility of capital (2) those that lowered information costs, and (3) those that spread risks; [...] Among innovations that affected the mobility of capital were the techniques and methods evolved to evade usury law. [...] As usury law gradually broke down, the costs of writing contracts and the cost of enforcing them declined. In addition to the economies of scale necessary for the development of the bills of exchange, improved enforceability of contract was critical, and the interrelationship between development of accounting and auditing methods [...] was this important improvement. A third innovations affecting the mobility of capital arose from problems associated with maintaining control of agents involved in long-distant trade. The major developments that

(Açemoglu et alii, 2001; Açemoglu & Robinson, 2005a, 2005b;). Others (e.g. Glaeszer et alii, 2004) show that dictatorships than "honest" democracies. (see under) because the initial roots of economic growth is human capital and not institutions. However, how econometrics can seriously pretend to isolate and test separately contracting (often private) and property rights institutions, and how institutions can be isolated from knowledge and behaviours that supported institutions ?

³⁰A beautiful ethnological study investigating this "ecology" between nature and culture in traditional society has been recently provided Descola (2006).

lowered information costs were the printing of prices of various commodities as well as the printing of manuals that provided information on weights, measures, customs, brokerage fees. The final innovation was the transformation of uncertainty into risk, I mean here a condition wherein one cannot ascertain the probability of an event and therefore cannot arrive at a way of insuring against such occurrence. For example, marine insurance evolved from sporadic individual contracts covering partial payments for losses to contracts issued by specialised firms. Marine insurance was one example of the development of actuarial, ascertainable risk".³¹

North clearly deploys a broad causal explanation of the medieval Western economic growth based on the evolution of institutions. However because his research agenda is over ambitious, North ends up within big epistemological and empirical traps. First, why suddenly late medieval merchants started to invent efficient institutions, and why not before ? Second, many examples given are not chronologically correct. Contracts aimed to circumventing "usury prohibition", or interdiction of loan with (excessive) interest, has been used throughout all times, by Hebrews, later Muslims, as we will discuss later. The other way around, assuming the medieval merchants were able to make precise "actuarial" assessment of risks ignores that a bit less than 400 hundred years passed on between early "marine insurance" and the emergence "probability" with Chevalier de Mere, Pascal, Bernoulli (Hacking, 1975). Underwriters started to rely on systematic "actuarial" assessment of casualty risks not really before XVIIIe. But it is certainly correct to believe, as we will argue in this paper, that people, in medicine, law or business, did "approximate" risks before the formalisation of statistics, starting mid XVIIe. ³² But then, what so fundamental changed between the "*foenus nauticum*" as practiced by Romans and the maritime sea loan of the medieval merchant. Of course, there were successive changes. However North does not explain why and how they led to the revival and the transformation of the ancient *foenus nauticum* in circa XIIIe, the development of premium in XIve, and the actuarial-based "modern insurance". If one wants to circumscribe a period, which is already misleading, these took place between circa XIIIe and XVIIIe. The same problem applies with institutions dealing with information : between the spread of private letters between financiers, merchants and agents, books of merchants such as *La Praticca della mercatura* and the spread public institutions such as *Gazetta* and newspapers, the time length is long, again a few centuries.

We can now turn to a more specific institution that fuelled medieval trade : the Fairs of Champagne, with his co-authors (Milgrom, North & Weingast, 1990). We know the 7 Fairs of Champagne, located in 4 key location (Bar-Sur-Aube, Lagny, Provins, Troyes) indeed played a key role in the rise of Western Europe from XII up to early XIve. Milgrom et alii view the rise of the Fairs of champagne as a consequence of the emergence of contract-enforcement institution supported by local Count of Champagnes : the law of merchants (*Lex Mercatoria*). On the Fairs of Champagne, cheaters who breached their promises faced punishment from the court and, because sentences were public (reputation), they were banned from trading with other merchants. The local rulers improved the efficiency of such institutions by supporting training and skills of judges, insuring proper enforcement of judgements and organising local representations of the miscellaneous communities of foreign merchants. In a virtuous-circle, the more merchants were trading on the Fairs the lower was the marginal cost of the institutions by unit traded on the Fairs. North et alii further explain that the Fairs declined because the rising European States institution provided more efficient State-based courts able to better insure property rights by confiscation of goods and imprisonment, saving additional transaction cost for merchants.

³¹ North(1991 : 125-127)

³² Franklin (2001) on pre-XVIIe "statistics".

The problem is that this thesis ignores a vast literature showing the multidimensional aspect of the rise and the decline of Fairs.³³ First, historians have provided many reasons for the rise of the Fairs: their central geographical position, the relative neutrality of their territory and the pro-business attitude of the Counts, “the first mover advantage” providing Fairs of Champagne with economies of scale and more competitive advantages by succeeding in gathering lots of buyers and sellers at the same time and the same place, the geographical matching between merchants needs for short-term credit and availability of financiers, and so on and so forth. Milgrom et alii highlight one aspect, but not the full picture. Secondly, the decline of the Fairs is also a complex phenomenon, and explaining the decline of the Fairs the rise of European institutions (States) better enforcing “property rights” is among the less convincing one. Maritime trade, going around the classical continental routes, from end XIII and beginning XIVe, is the most often quoted cause of the decline of Champagne.³⁴ This phenomenon has been said to be driven by the rise of the industrialisation of Italian communes and their demand for bigger input of English textiles imported by galleys and *cocha*.³⁵ Others developed the theory that local branches of financiers and merchant houses in key market locations along with the development of bills of exchange, and later letters of change, made gradually the Fairs of Champagne a redundant institution.³⁶ Munro (2001), adds the theme of the late XIIIe European industrial crisis, notably the one affecting the textile industry so crucial for the Fairs. The central element was the devastating warfare that spread all over Europe from end XIIIe and throughout XIVe century, and culminating with the war of hundred years. The associated costs and risks of transport during wars made suddenly a whole range of products not worth being traded in long-distant places. And the list of explanation does not end up here, but it shows that geography, politics and war, contractual innovations and business organisations, and of course legal and institutional settings form a complex historical conundrum. Again there is no univocal possible explanation.

Beyond static institutions : Comparative and Institutional Economic History (Greif)

Avner Greif has recently proposed a laudable attempt to overcome some basic problems of NIE and NIH. Under the broad name of Comparative and Historical Institutional Analysis (CHIA hereafter), he developed, for the last twenty years, a coherent theoretical framework.³⁷

In a sense, there are two Greifs. The first one has well studied problems of existing narrative history and more recent contribution of NIH literature. Greif convincingly argued that econometrics, and notably the one correlating the emergence of property rights institutions and the rise of Western Europe³⁸, is useful but not sufficient because robust statistical correlation cannot be found in History: we compare different things, many variables are unobserved. Worst, because long range historical-econometrical series do not focus on individual “micro-foundations”, we end up with correlation but nothing really substantiates the “story” behind numbers, which in a sense what D. Mc Closkey (1976, see above) also criticised. On the other hand, for traditional institutionalism, or “institutions-as-rule” models, and NIE using classic static game theory, Greif shows that we are still left in the dark, notably about (i) the behavioural conditions of success or failures of institutions, (ii) in particular, the way agent

³³ J. Munro (2001) does not only discuss NIH thesis about the Fairs, but also provides a useful summary of other theories from “traditional” historians.

³⁴ e.g. Lopez (); Van Der Wee, 1970.

³⁵ e.g. Bautier 1953; Verlinden, 1973.

³⁶ De Roover (1948, 1953, 1963)

³⁷ Greif, (2006) which gathers many previous papers and expands some epistemological considerations.

³⁸ Among others, De Long & Shleifer, 1993; Acemoglu & Robinson, 2005a, 2005b; Acemoglu et alii 2001, 2005.

endogenously adapt; (ii) notably with private-order contracting. Greif, and we subscribe with his view, wants to understand the way agents endogenously adapt. Even better, Greif shows that evolution and adaptation can produce different outcomes, in game-theoretic jargon *equilibria* in dynamic (repeated) game, and that in some case this converges towards more efficiency and optimal solutions for each participants, sometimes not (Nash equilibria which are Pareto-inferior). Exchange is about a cooperation between economic players and , in our wording, efficient cooperation is supported by formal or informal institutions aimed exchanging information (e.g. reputation, verification) and enforcing incentive/reward/punishment fostering trust. A key aspect supporting this is the organizational design, based on “cultural beliefs”, for instance more horizontal (collective network) or vertical (individual hierarchy), enabling or limiting this collective cooperative exchange among economic players.

We are also closed to many theme developed by Greif, but instead of using game-theory, we rather use the modelling provided by OPT.³⁹ The way people design organizational and institutional solutions is, for us, through contracts, and these contracts are package of options. Second, we share the idea that history is a context-specific conjecture⁴⁰ and that the historical methodology is based on backward “valuation”. This is interesting because it is a common technique used in game theory and OPT. To understand games or options, one need start with the end of the games, or end of the options tree, and then to go backward from the end to the starting point, the decision to contract, to solve the game or the contract in a specific institutional or contractual setting.

But there is a second Greif who develops the following ambitious project :

“It [CHIA] provides a unifying concept of the term institution to integrate many, seemingly alternative tha prevail in the literature. Second it studies institutions on the level of interacting individuals while considering how institutionalised rules of behaviour are followed even in the absence of external enforcement. Third it advances a unified conceptual and analytical framework for studying the persistence of institutions, their endogenous change, and the impact of past institutions on the subsequent institutional development. Finally it argues that institutional analysis going beyond the traditional empirical methods in the social sciences that rely on deductive theory and statistical analysis. It then elaborates on a complementary method based on interactive, context-specific analysis. [...] This new perspective makes explicit what institutions are how they come about, how they can be studied empirically, and what forces affect their stability and change. It explains why and how institutions are influenced by the past, why they sometimes change, why they differ so much from one society to another, and why it is hard to devise policies aimed at altering them[...] This analysis leads to a conjecture regarding the institutional origin of the subsequent economic and political ascendancy [from late Middle Age]”⁴¹

We cannot, of course, agree with this kind of research agenda. Again, and again, history is only a partial plausible reconstruction of a limited set of events of the past. It certainly cannot encompass a causal explanation about why and how things change, why institutions and economies diverge and how. In some pages of his work, Greif also demonstrated he is cautious about the way it would be possible to provide a unified theoretical explanation about historical political and economic evolution : “institutional development is not deterministic, there is no

³⁹ But model (PART III) could be easily be explicitly translated into game theoretic equations capturing the game of options between contracting parties

⁴⁰ Greif (2006: chap. 11).

⁴¹ Greif (2006: 3-4).

unique history of institutions"⁴², as an infinite set of equilibria can prevail. But in many other specific articles he goes beyond his prevention and articulates what we have called the trap of origins and causal explanations.

The first problem we want to discuss is rather methodological , the second will focus on a particular case of the emergence of an institutional tool that supported long-distance maritime trade : the *commenda*.

Limits of CHIA (1) : methodology

Epistemologically, Greif' comparative analysis is supported by what economists used to say when they claim "everything being equal". Greif analyses different societies. For instance, he claims that Genoese vs Maghrebi traders ⁴³evolved in different direction according to their cultural beliefs and institutions (collectivist horizontal network for the Maghribi traders vs individualistic vertical *albergi* structure for the Genoese). To support his claim, he advances that they had both initially the same skills, same access to markets, same technological assets (e.g. nautical). ⁴⁴ This is of course not correct. The same applies with the distinction between Venice and Genoa ⁴⁵, or Genoa vs Pisa. ⁴⁶ To make pseudo-casual explanation working, Greif needs to isolate institutions and contracts, and their founding micro-behavioural substrate, from other factors (geography, science, and so on), in order to assess comparatively the relative impact on historical events. This is of course not possible, and this is circular. Greif's demonstration says that, if things evolved differently in different regions and societies, and if everything were equal in both societies except institutions, then institutions are the cause of the difference in the evolution path. As mentioned in our introduction, history offers no "laboratory" (isolation of variables, reproduction of experiment, ...) to make such a kind of causal explanation.

Moreover, because all historical and institutional settings cannot be explained, some elements become exogenous factors in the model, some others not, some mechanism are exhaustively described in CHIA terms, but others are taken as evidences. For instance, the emergence of the Commune is described as an easy way to coordinate because of the high profits to be made from trade and retaliation against Saracens. "It implied that interval rivalry did not hinder interclan cooperation". ⁴⁷ The first question is why the XIe Genoese aristocratic families, and why the Genoese among the first, devised that, instead of maintaining the exclusive land-based economic systems, assets should be pooled, notably through public institutions (e.g. infrastructure, public spending for warfare and foreign policies,) which created quick returns ? Is it the coordination that created the business opportunities, or is it the business opportunities that fostered the coordination ? As Bloom used to ask Dedalus somewhere in the *Ulysse* of J.

⁴² Greif (2006: 405).

⁴³ Jewish Sephardim traders originally based in Baghdad and then in Cairo where large amount of private letters have been found(Geniza), and analysed notably by Gotein (e.g. 1973).

⁴⁴ "The Maghribi and the Genoese were constrained by the same technology and environment, and they faced the same organizational problems" Greif (2006: chap. 3, 9) based on Greif (1992, 1989, 1994)

⁴⁵ "How can we account for these different trajectories[between Genoa and Venice] in cities that faced similar initial conditions, outside opportunities, and basic politic structures". Greif (2006: 171) based on Greif & Latin (2004)

⁴⁶ "The difference [between Genoa's and Pisa's economic growth in XII-XIIIe] cannot be attributed to exogenous factors, such as opportunity, geography, or endowments. [...]Whereas Genoa's commercial expansion was curtailed by interclan mutual deterrence, this was not the case in Pisa" see Greif (2006: 227-228) based on Greif (1998). Greif talked here about the development of Pisa early XIIIe.

⁴⁷ Greif (2006: 172)

Joyce : is it the road that created the traffic, or is the traffic that caused the road ? The same apply to the resistance against the potential attack of Frederick I Barbarossa (exogenous factor), who was already threatening the Piemont, that allegedly fostered provisionally (1250-1261) the collaboration of rival familial clans in Genoa. Why suddenly this external threat, at that time, polarized coordination ? Genoa used to be ruled by about a dozen of civilisation before Xe, and after it led wars against, and was attacked by, the Saracens, Venice and Pisa : why in some case, like mid-XIe, the Genoese resisted “shoulders against shoulders”, and why, in some other cases, an external treat did not prevent their coordination to fall apart ? ⁴⁸

Because Greif wants to describe evolution within a finite (dynamic) game setting capturing a *causal origin* as the emergence of a (sub)equilibrium, or the why a combination emerged among others possible, he needs to (i) artificially isolate the chain of events he describes and therefore cutting the endless list of antecedents by presenting some facts as self explanatory (ii) distinguish facts that can be explained by the (repeated) game-theoretic models from others variables being either irrelevant (“everything being equals” : same geography, technology, skills, ...) or exogenous (not to be explained by the model).

Limits of CHIA (2) : capital structure, kinship and principal-agent in sea trade

There is eventually several CHIA themes that are of great help when we will read this Zaccaria contract : capital structure and institutional context for medieval long-distance maritime trade. But here again we need to be prudent and here the reason why.

Greif says organizational tools such as guilds in long distance market place fuelled growth of Europe because it enabled merchants who obtained trading privileges and rights abroad, to prevent “hold up” from local rulers and inhabitants, and cheating agents, and to build a “Community Responsibility System” (CRS). CRS is the name Greif gives to trust-fostering institution such as a community of merchants (e.g. Guilds) and any collective formal or informal mechanism enabling *information verification* and *contract enforcement* (reward/punishment) among a given community of economic agents and their unknown counterparts abroad. Furthermore, Greif views *commenda* as a consequence of the “individualistic” Western CRS, and according to him, and following many authors *commenda*, or *accomendacio*, or the Venitian equivalent *collegenza* is a crucial element explaining the rise of Western trade.

Compared with collectivist cultural settings prevailing for instance among Maghribi traders, the Genoese as explained relied on individualistic entrepreneurs coming mainly from aristocratic families. Initially investment were made through *societatis* or joint partnership among these wealthy families. According to Greif, sustaining trade abroad imposed them to use agents, often coming from non-aristocratic families, not belonging to the familial structure and often coming from outside Genoa. Because they did not relied on horizontal trust-based contract enforcement à la Maghribi traders, but on vertical organisation shaped by individualism, the Genoese developed, or more precisely refined, the *commenda*. The Genoese *commenda* was based on different historical contractual inputs (Babylon, Greece, Rome, Jewish and Arabic traders) as

⁴⁸ It did not take a Frederik for several dozens cities all over Europe to build city walls between XII and XIIIe. With or without Frederik, one can imagine that the Genoese 1150 (circa) walls would have been built anyway, simply because of the speed of urbanization increased the demand for technologies increasing protection assets and people within the city, like in many other places in XII-XIIIe. Or because urbanisation provided tax revenues to achieve such a technology. Again, explanation is a difficult ex post exercise in history.

well described by Pryor (1973) and many others.⁴⁹ For Greif, the commenda became the predominant tools that changed the landscape of the Genoese trade expansion. Notarial records, according to Greif, showed the correlated decline of other forms of contracts and the rise of non-aristocratic commoners as well as foreigners among contracting parties.⁵⁰

At this stage two comments can be made. First, Greif's views CRS as "black and white" institution : with CRS trade is possible, without no trade. For instance, it says that merchants did not trade in Bruges before circa mid XIVe, because no representatives and collective institutional settings supported Genoese merchants (distinctive privileges, consuls, loggia).⁵¹ Factually, it is not correct (see under), and we will see that Zaccaria was trading with Bruges since 1278 and that this deal shows us that in spite of the lack of presence of sedentary Genoese representatives in Bruges, Genoese were active on this market. There are many reason why this happened (nautical technological innovation, quasi-monopoly of supply of alum and then mastic, diplomatic and military connexions, and so on and so forth).

Second, the *commenda* as principal-agent structure in XIIIe is also questionable : in many case rich aristocrats were issuing capital from several less wealthy agents. They were *tractor* and *tractans*. Very often, in XIIIe, the travelling merchant was still the wealthy entrepreneur who leveraged his investment by pooling funds from smaller investors : craftsmen, shop keepers, widows, abbeys, public servants, notaries. It is not before end XIIIe and XIVe that entrepreneurs evolve from "Poop to desk" to use Kedar's expression. In other words, in XIIIe, the commenda was not a vertical relation between the wealthy financiers and the hard working agents : it was a flexible tool, where agents where exchanging roles, one time travelling "manager", one time investor. That is the key : under the broad name of *commenda* or *collegenza*, agent had a adaptable tool to find adhoc solutions to find different combinations to share capital and labour, large and small investments, fixed and variables payoffs, and, this is an important point, acceptable from an institutional view point : at Usury prohibition developed a lot in XIIe and even much more in XIIIe. But the solution will soon be replaced (see under), and the "golden years of commenda" last only for about 100 to 150 years.

In addition, the slight decline of key families from aristocracy and the corresponding the rise of non-aristocratic agents is also certainly not entirely accurate for XII-XIVe Genoa. Many records show that, on the contrary, long-distance trade became more and more concentrated in the hand of fewer families. Many commoners became involved in Genoa's economic expansion, but key families controlled most transaction : this impact is even more exacerbated if one looks at volume of investment, and not only numbers of contract.⁵² Numbers speak from themselves : In 2,747 contracts dealing with trade with "Romania", the Eastern trade in the Black sea and Byzantium, between 1261 and 1315 , as reviewed by Balard,⁵³ we find the following. About 29

⁴⁹ The literature on *commenda*, *accomendacio* or *collegenza* is immense, and it is simply impossible to be exhaustive. Fvor the founding role of commenda in XIIIe : Lopez (), Byrne (), Krueger ()

⁵⁰ Greif relies mainly on secondary sources from Krueger (1962) data from notary Giovanni Scriba (1154-1264) and Obertus Scriba (1186), and then on Kedar (1976) for the data covering only 1376.

⁵¹ Greif (2006 : 100) quotes De Roover (1948, 1965) but De Roover did not wrote that Italian merchants were *not* active in Bruges before the XIVe privileges and consular representations. He simply noted that branches of large banking institutions financing long-distance trade started to spread in Bruges when the city, step by step, accepted to establish privileged bi-lateral trade relationship with Florence, Venice, Genoa, and of course the specific case of the Hansa.

⁵² Greif (2006 : 287) himself quote a decline from 70% to 64% of aristocratic families between (1154-1264) and 1376, which hardly proves a decline of the aristocrats because of the new contractual and institutional settings.

⁵³ Balard (1978: 524)

families were concentrating about 51% of all investments. First among them the Zaccarias with about 8% of all funds. More, prominent families were both fund issuers and investors. Another set of records, 2,755 contracts between 1155 and 1289 but in the Western Mediterranean basin, analysed by Jehel, found the same trends (but not size) : if 81 families were controlling a big bulk of the aristocratic involvement in overseas business, 26 were controlling 76% of the “aristocratic trade”.⁵⁴

To be honest, Jehel is also more supportive of a smaller role of core aristocratic families in XIIIe, who are involved only in 14,5% of contracts when they involved only aristocrats, and from 20 to 27 % when they involved at least one aristocrat. Does it confirm CHIA ? Quite the contrary, Jehel shows that aristocrat-only contracts represented only 4,9%, between 1155-1199 and 21% for 1200-1249, and then it only decreased a bit to about 15% later in XIIIe. Contracts involving at least one representative captured 20%, 1155-1199 and rose to 27% between 1200-1249. Discrepancies in numbers, but not trends, between Jehel and Balard are possibly explainable by the fact that Eastern trade was indeed more controlled by fewer wealthy families (Zaccaria, Di Negro, Lomellini, Spinola). Jehel goes further and conjectures that Aristocrats were controlling only about 5% of trade early XIIIe, and then the aristocratic oligarchy emerged. We are more cautious about this more extreme thesis, even if Jehel’s insights about “popolare” investments in early days is certainly valid. Of course one might say that new popolo emerged and were not part of the initial aristocracy. Indeed a Di Negro or a Zaccaria came from a popolo, but considering them not as part of the Genoese aristocracy in XIIIe is impossible : they are the quintessence of the Genoese aristocracy and, end XIIIe, their genealogical trees did not went beyond a circle of a very small numbers of aristocratic families.⁵⁵ This is by definition the process of long term oligarchic structure : they maintain themselves by replacing some branches, lacking of descendants or failing to maintain within top ranks, by few new comers.

Eventually, data from Balard and Jehel show both that if commoners’ involvement in trade declined after commenda, the inclusion of foreigners is even more questionable. Genoese itself account for 85% : 7,2% of Jehel’s contracts between 1220 and 1260⁵⁶; and for Balard, 86% of both – and this prove the consistency - investors and merchants came from Genoa and up to 91% if we include the nearby Riviera regions.⁵⁷

Therefore (i) Genoese trade abroad was mainly done among Genoese (ii) kinships and aristocratic oligarchy did play a critical role; (iii) this role did not decreased but on the contrary increased between XII and XIIIe, notably with the rise of the albergo structure end from XIIIe and this has not evolved for a long time; (iv) aristocrats and “commoners” were both “principals” or “agents, especially in the XII and XIIIe period described by Greif.⁵⁸

⁵⁴ Jehel (1993 : 180-185)

⁵⁵ Zaccaria’s genealogical tree is provided in annexe in Lopez (1933) : marital links with the Spinola, Grillo, Doria, Fieschi, Grimaldi and many more prove this assertion (Exhibit 2). We discuss this theme in Part II and III.

⁵⁶ Jehel (1993 : 223)

⁵⁷ Balard (1978: 508-513)

⁵⁸ Interestingly, Gonzales de Lara (2006) recently analysed comparatively the reason(s) of the success of Venice compared with the relative drawback of its rival Genoa. Let us discuss a few points. Based exclusively on Greif, for Genoa, and we know Greif’s based his account of commenda almost exclusively on Krueger and Kedar, she advances that :

(i) the Genoese relied more on foreigners in overseas trade (p. 21): data from Krueger, but even more Balard or Jehel, indicate that the vast majority of XII-XIIIe contracts took place between the Genoese themselves (see above);

But we need to go further. Gonzales de Lara (2004) has expanded this theory. Based on Notarial archive from Venice about late XIIe and early XIIIe trade with Alexandria, she developed a model, combining Greif's CHIA with modern theory of "optimal contract design" (Townsend, 1979). It showed how merchants (agent) and financiers (principal) *did contract*, and that is a useful step beyond Greif, in presence of high asymmetry of information : poor monitoring and verifiability of payoff at destination, casualty at sea or abroad, potential agency and cheating from agents). Without entering into the details of the discussion, it says that debt-type (sea loan) of contract were used in such a case because of unverifiable variable payoff. This is in line with classic CT literature, indeed notably developed by Townsend as far as verification was concerned. When institutional trade tools were put in place by the State of Venice, which is the kind of CHIA's endogenous institutional adaptation by economic players, in order to

(ii) families and aristocrats however were central in Genoa: Gonzales is certainly correct (see above) but Greif says the opposite showing that commenda were open to "commoners"(2006 : 286-287).;

(iii) the inability of Genoese courts to verify payoffs (notably abroad) made them regulating sea loan and loan (often double amount penalty) but not commenda and furthermore impose control over assets to verify accounts (pp. 23-24) : many penalties were explicitly, often in a very legalistic way cases, included in Genoese commenda, the law (Part II) dealt with agency problem in commenda and societatis, and the Genoese were keen to keep assets before settlement not only to verify outcome of a venture but too make sure cheaters would not disappear with assets;

(iv) Genoese did not raised capital from many different investors (p. 9) : notarial records (too numerous to be quoted) show that, in XIIIe, ventures involved dozens of small investors, providing sometimes only a few £. They accounted for a minority of the total trade amount, but, in XII-XIIIe, everybody could invest in loca, compera, commenda and so on and so forth. Having said that Venice maybe pooled more assets that Genoa, but this needs to be proved.

There are other points we cannot comment here because of space constraints. But one should not forget that in XIIIe, Genoa surpassed in many ways (commercially, militarily) its Venetian rival, and there is some sort of timing mismatch in the paper. Having said that, Gonzales de Lara ends up with some very good ideas but these apply more to XIVE. Indeed, Genoa has not catch up with Venice from early XIVE and we like very much the idea, again here going beyond Greif, of a mix, more efficient in Venice, between efficient public coordination and private reputation-based mechanism. This mix was indeed missing in XIV Genoa. In a sense Genoa failed to structure the integration individuals within *both* the family structure and the State. For instance, otherwise everybody could apply for Genoese citizenship (Lopez) and the law imposing foreigners a 3-year residence before acces to citizenship was short-lived in early XVe (1404), and not the normal rules as in Greif and Gonzales (2006 : 16). This fact demonstrated not only the individualism and how open was the Genoese society (Lopez), but, for us, it also translated that the low added value of the Genoese citizenship and in a sense how "closed" was the Genoese society. Citizenship did not provide a lot compared with the public services offered by Venice : Genoa's Commune's facilities and services to its citizens were limited, and the inclusion in the society and financial benefits came from trust and networking among successful *alberghi*, not from a piece of paper granted by public authorities When one non-aristocratic *popolo albergo* emerged (e.g. a Zaccaria in XIIIe, a Giustiniani in XIVE), in just one or two generation, it is almost like if its objective was to create some long-term rents only accessible to his members and associates. the risk-mentality decreased in XIVE . This was maybe because of the family-based social structure no longer rewarded risks (something Kedar would have approved). Wealth has been accumulated by a few in two or three generations, and the descendants, who were benefiting from rents, locked the system. Of course, this is a partial analysis of the decline of Genoa, but it fits to some aspect of Gonzales'paper. However many other factors (Byzantium, nautical technologies, plague) also played their role.

collectively organise and monitor shipments to Alexandria, merchants and financiers switched to equity-type of funding, or the *collegenza* in Venice or the *commenda* in Genoa. Because of verifiability of information about payoff and casualty, investors were ready to invest in equity and take more predictable/verifiable risks, and the issuer had access to alternative form of financing at lower cost.⁵⁹

These are very important input that will be used when analysing our Zaccaria contract. However there are several problems. Most contracts are not “black and white” but in-between grey solutions. We urge reader to read what Jehel wrote about contracting in medieval Genoa and of course many comments apply to medieval Venice.⁶⁰ It says that :

- many notarial contracts did only capture one piece of a much complex jigsaw, and in particular they were summary (*imbreviatura*) of a full-version, spelling more details or even hidden provisions, that each parties kept in hands (“*grosse*”) (see under)
- Genoese amalgamated different standard contracts within one single transaction, making contract on multiple assets, multiple parties multiple contracts of contracts;
- contractual provisions often differed from the “official” name used by Notary (equity as debt, debt as equity and insurance, ...);⁶¹
- in particular, the flexibility *commenda* create contractual provisions often similar to other contracts (societatis, sea loan, debt, sales/purchase)
- in consequence, institutional and theoretic predefined “silos”, as well as statistics treatment, are often misleading.

Eventually CHIA literature ignores an important aspect : it is not *commenda* but the cambium (*instrumentum ex causa cambii*) , the bill and then the letter of change that emerged as the main contractual vehicle supporting distant trade of Italian merchants (see under). *Commenda* was a first important step, and it is correct to say that overall it dominates end XIIe until late XIIIe, because it was flexible and also because of usury prohibition, a fact that CHIA ignores.

In a sense, Greif and Gonzales de Lara are also victim of the origin syndrome. From a modern perspective, the *commenda* or *collegenza* looks extremely important if one considered this type of contract as the predecessor of our modern firm.

⁵⁹ Based on a set of 760 commercial contracts of XIVE gathered from the State Archive of Venice, D. Williamson (2002) tried provided more empirical foundations for this kind of statement. He looks at contract the other way around : instead of looking internally the optimal way to design contracts, he simply established a simple econometrical model to test how economic agents chose contracts in medieval times. His analysis focuses on trade between the Venitian Crete and the rest of the Mediterranean world between 1303-1351. Williamson has tried to categorize contracts according to several type of instruments : equity (*collegenza* in Venice), sea loan and sea exchange, and eventually pooling among merchants. He selected several factors explaining the choice of contracts according to the risks, the potential profits and the agency problems. These were for instance additional risks caused by the Black Death, long-distant trade in risky areas (Turkish territories), ventures in “inner zone” with lower risks and better information (e.g. Rhodes). The less risks and the more information, people will finance venture through equity. The more risks and the less information, debt with attached insurance (sea loan) was used. When informational problems make the latter problematic, pooling was preferred, as monitoring and incentives prevented moral hazard.

⁶⁰ Jehel (1993 : 140-141) : “quote”.

⁶¹ Genoa was not alone in hiding loan under the appearance of equity-type of contracts. Luzzato () on cases of *collegenza* as debt.

But it is more complex. A mix of several factors emerged and the commenda almost disappeared from notarial records from mid XIVe because medieval business and capital organization needed to go beyond commenda to sustain long-distant trade. The letter of change, developed in Tuscany and not in Genoa, showed it was possible to save cost, time and risks of public contracting in front of notary. The notarial contract was replaced them with private contracting written down in a few short sentences : this was the *apodexia* in Genoa (from circa XVe). Contractual techniques and the rise of States, notably counterbalancing the power of Rome, made merchants much more comfortable in circumventing usury prohibition. In parallel, the rise of Tuscany *compagna* in late XIIIe and early XIVe almost, or the Genoese partnership *maona* (Ceuta, 1235 ; Chios, 1362) and the traditional Genoese “firm” with capital divided 24 “*caratti*,”⁶² made much more stable solution for long-term business relationship.

The commenda became diluted within other more specific forms of contracting fulfilling more specific functions : decentralized employee-employer and suppliers-buyers contracts, long-term but participation within limited-liability firm’s capital, through equity or debt, insurance with premium paid upfront debundling of funding and risk transfer. In XII and XIIIe, the commenda emerged as the central contractual tool because of its flexibility, simplicity and acceptability for the Church. But this short-lived institution cannot be viewed as the focal contractual point of the rise of Western Europe.

Again Ballard’s figures are definitive, even if the caveat about medieval statistics here also applies, and bearing in mind that these ignores the place of Chios partnership (the *mahona* of the *Giustanini*), and then the *Draperio* “empire”) that controlled a vast amount of trade from mid XIVe :

[Insert about here Exhibit 1]

This is what a critical aspect we will develop in this paper, based notably on De Roover’s seminal studies showing that contracting forms evolved in successive steps. The *commenda* was certainly a first provisional phase, developed somehow in all Italian cities in XII and XIIIe. However such a contract only succeeded for a brief time because of its flexibility, , and therefore was gradually replaced. In a sense, Greif’s analysis could be here useful, but *a contrario*. Instead of showing how the Genoese economy, in XIIe, emerged thanks to the vertical capital and business structure of the commenda, Greif could show that Genoa failed to sustain business *notably* because it maintained the ascendant of the too restrictive familial structure instead of developing tools that enabled (i) a better principal-agent relationship abroad, with “strangers”, notably in key markets in Western Europe; (ii) a more open capital market enabling more agents to fuel business expansion; (iii) non-family agents, in both case (firm, capital), to be integrated within the economic circuit.

This exactly what a Cipolla ⁶³ but also a Saporì⁶⁴ demonstrated : From XIVe, in Florence, and Venice, commenda was adapted to establish long-term relationship within a firm with branches all over Europe, to establish contract with non-family agents, to pool funds from more investors within one business vehicles, to limit liability of investors (law of 1404). In parallel, debt-like contract, and linked to transfer and exchange functions, became also much more common vehicles and simple through the letter of exchange. This is what Genoa failed to achieved in XIV and early XVe. Maybe it is because it kept family and albergo as the spinal column of trade organization, for instance with the maona of Chios. Genoa also made “too late and too little” in promoting public infrastructure abroad to support local settings of agents in Western markets. The Genoese investors were too much from the same too few families. And instead of using

⁶² For economic and financial institutions XV, but also earlier in XIVe (Heers, 1961),

⁶³ Cippola (1974 [1994] : 186-188)

⁶⁴ Saporì (1956)

their initial contract design creativity to invent new tools to develop business, the Genoese became somehow too legalistic, writing down each and everything thing by fear of being cheated by partners, and informal agreement and the entrepreneurial spirit started to be diluted within notarial contracts which, for some unexplained reason, were still to be drafted in Latin. It will take time for Genoa to come back as a leader in the Western business scene, about two centuries, but it will last again a brief period of time.

We will see that the Zaccaria contract is precisely at the junction of all these events. In a sense, this contract is somehow the ultimate achievement of what was possible for the Genoese contracting creativity in a defined market and institutional context. However, somehow it combined all these old contracting institutions, with advantages and disadvantages, in an original way. It creates something new with many old materials. In this sense, the “Zaccaria deal” paved the way, with some other innovative merchants and financiers, for what will become the contracting and institutional settings through which we still approach organisation and capital structure : the firm, the manager and the investor, the debt, the equity, the insurance. But these are names, and what is important is what lies behind the name, their functions, and what these institutions are : options. To understand this, we need to review the recent contribution of modern finance and OPT in particular.

Modern finance and economic exchange : options

After medieval historians, economists, we need to talk about our third input : modern finance. We need to explain why options is so essential in our approach ? OPT develops a way to value options. If someone buy the option to call an asset at a given price, what is the value of the option ? Someone holds an option to buy (long call), in one year time (t), an underlying asset (S). Imagine this asset is worth 85 today, and that its value could be either 85 (no increase) and 120 (up) in one year time. The option can be exercised at a future price of 100, or the strike price (K), as we have said in one year. If the price underlying asset does not move, the option holder does not exercise. If the asset is worth 100, the option holder exercise and cash in a profit on 20, or $\text{Max}(S - K)$. Integrate the time value of money of the 100 which is worth less tomorrow than today, or the risk-free rate (r) of says a default-free bond, we end en with the analytical expression of a call option, or $C = \text{Max}(S - K e^{-rT}, 0)$.⁶⁵

Black & Scholes (1973), and Merton (1973) found the seminal OPT formulas when assets returns follows a “random walk” : the return evolves randomly within a normal distribution, a Gaussian curve, defined by a standard-deviation σ from the mean. We don’t go into the detail of the analytics in this paper. However, we must note that the way options were priced in Black-Scholes-Merton is by a replicating portfolio of shares and bonds. This is what said the previous formula : if $C = \text{Max}(S - K e^{-rT})$, this means that I can mimic C with a corresponding risky asset S and a risk-free r borrowing of K during a period of time t .

Since 1973, OPT has spread all over the world of finance and economics. 4 ideas are central and they are going to help us a lot for reading the Zaccaria contract.

A first area of breakthroughs has been the spread of the OPT methodology as a tool to create *new products* linked to a whole range of asset classes : credit, currency, miscellaneous commodities or even outside natural events (weather). Updating a previous estimated, Peter Tufano (1989, 2002) estimates that every year about 1,836 “new” corporate “securities”, excluding over-the-counter (OTC) derivatives, insurance structures and fund management (e.g. FolioFN) introduced between 1980 and 2001, even though a lot of them differ only slightly from

⁶⁵ e^{-rT} with being simply the same discount factor, $1/(1+r)^t$, not in discrete but in continuous time : replace numbers, it yields (about) the same result.

existing ones. A quick look at this wave of new financial products shows that OPT has been the crucial driving force supporting them. According to the Bank of International Settlement the notional amount of OTC traded in 2006 is just below 300 Trillion US\$. What we will show is option-based “innovations” are not recent phenomenon.

An important idea of option is that many contracts, in our view all contracts, are options. For instance, a firm, or a venture such as Zaccaria’s, is a game of options. If the firm is a limited liability vehicle, the equities (V_E) of a firm (V) can be viewed as a long call option on debtholders (V_D) contingent of the residual value assets : $(V_E) = \text{Max}(V - V_D, 0)$. Or, if we write down the equation the other way around, $(V_E) = (V) - (V_D) \text{Max}(V_D - V, 0)$. This expression says that equityholders are long the asset minus the debt, plus a long put on the debt whenever the value of future liabilities exceeds the residual value of assets. The same applies for unlimited liabilities : contracts between different stakeholders are games of options .⁶⁶ In many case these options are implicit, as when one subscribes to a newly issued bond, the prospectus does not say that bond holder is short a put option. However in some case options are explicit : in the case of the Zaccaria deal, many options are clearly negotiated by parties .

A third successful area of research has been concerned with “*Risk Management*”. It has developed a broad methodology, step-by-step adopted by regulators when dealing with capital requirements of financial institutions. This now encompasses a much wider research field, and notably business management and corporate finance (e.g. Culp, 2001). Risk Management develop a taxonomy of risks (business, market, credit, operational), a way to measure it and then develops a methodology to manage these risks (retain, mitigate, transfer, finance). The spinal column of risk management, both in the way it describe firms and design best tools to manage risks, is OPT. Contractual options are solutions to exchange returns and risks between different stakeholders. For instance, one can borrow and buy an insurance on underlying assets, or alternatively sell a put option on the debt : payoff might be exactly the same. The Zaccaria contract is indeed a solution to manage both the business risks and the institutional risks of such a venture to Low Countries.

The fourth area of research is *real options*. The so-called real options literature, starting with Myers (1977) argues that the Net Present Value (NPV) rule, or the discounting of future free cashflows at the cost of capital, fails to capture and value the managerial flexibility a manager

⁶⁶ In unlimited liability, like in XIIIe Genoa, equityholders (V_E) raising debt (V_D) were long asset minus the debt, plus a long put on the debt if they default (cheating) on a fraction $\alpha E (0,1)$, or $\text{Max}(\alpha V_E, 0)$. However refusing to payback debt holders, cheaters faced the call option from debtholders : the latter could sue equityholders. In Genoa, they could often expect a total indemnity corresponding to the double amount of initial funding. According to the outcome of the trial and the ability of the judge to enforce judgement (e.g. solvability of cheater), the debtholders could recoup a β of debt that might exceed > 1 , and up to 2 in case of double amount to be paid by cheaters. $I(\text{default})$ and $I(\text{sue})$, denote two conditional probabilities, and $I(\text{sue})$ is always conditional of $I(\text{default})$: debtholders can only sue if equityholders have defaulted. We can write from the perspective of equity holders:

$$V_E = V - V_D - \text{Max}(\{[(\beta V_D)I(\text{sue}) - \text{Max}(\alpha V_E, 0)]I(\text{default}), 0\})$$

Equityholders are long the asset, short the debt, plus short a call (a potential penalty) from debtholders whenever equityholders decide to put (default) on the debt. Again, the short call apply with two conditions : efficient legal system to enforce the contract and solvability of equityholders to pay the amount as decided by the Court.

has to invest based on information gathered through time.⁶⁷ If a net present value of a venture can be 100 or 150 in 2 years, and if the investment required is 125 today, I should not invest because my payoff, on average, is 0. If I can wait and launch the investment later for a certain payoff of 150, waiting and collecting information is worth something (50 everything being equal). These options are for instance option to defer, to abandon, to switch or to expand investments according to information and flexibility to adapt in front future states of nature. In addition, an important idea is that real options can be financed, and that there is an interaction between real and financial options, dealing with all sort hybrid structure (e.g. : convertible, staged financing, ratchet) to capture flexibility and make sure investors and managers interest are aligned. This Zaccaria contract is about financing options dealing with real options.

Creating tailored instruments to solve risks/return conundrums, risk management, firm as call/put options between equity and debtholders, real options (and link between real and financial options), these are four areas which changed the way we look at economic exchange. They also changed the way we should look at economic history because options are the backbone of economic exchange.

There is one caveat, however. In practice modern finance, such as OPT, and CT are somehow, theoretically, irreconcilable. We have seen that OPT starts with the assumption that markets are perfect (law of one price), or immediately correct inefficiencies (arbitrage). CT starts with imperfect markets, being instance asymmetry of information or transaction cost. In this theoretical framework, OPT cannot price options. However, an important idea for our inquiry develops the idea that options are there precisely to manage market imperfections. This is where the link between OPT and CT is of relevance, and this field of research focusing notably on capital structure in case of frictions is of great interest for this paper. These frictions are the limited cognitive load of parties, control and asymmetry of information between “agent” (managers) by “principal” (investors), and investors between them (equity and debt holders being *ex ante* adverse selection and *ex post* moral hazard, and so on and so forth.⁶⁸ Too much debt (“debt overhang”) provides incentives for equityholders to start risky projects (“asset shifting”) : in case of a possible bankruptcy, equityholders have nothing to loose and take additional risks. Capital issues (equity rationing) can be difficult because it can be interpreted , from outside investors”, as a signal of risk of adverse selection : decision to go for outside financing has maybe be driven by the high risks of assets. The same applies to debt because it sends the signal that the firm is maybe prone to default (“credit rationing”).

CT has shown how hybrid financing structures can help dealing with such a problem.⁶⁹ OPT-based literature focusing on venture-capital investments in early stage companies develops the link between hybrid financing structure and real options embedded in the business models of early-stage companies.⁷⁰ We will see that, in medieval maritime ventures, merchants and financiers also articulated a link between financial and real options.

Limits of OPT : history and the functional innovation loop

⁶⁷ This literature has blossomed. Pioneers were Kester (1984), Dixit & Pyndick (1984), Mason & Merton (1985), Brennan & Schwartz (1985). Good text books are Trigeoris (1997), Amran & Kulatilaka (1999).

⁶⁸ References for financing issues in imperfect markets are : Jensen & Meckling (1976), Leyland & Pyle (1977), Myers & Majluf(1984), Stiglitz & Weiss (1981, 1983), Townsend (1992).

⁶⁹ e.g. Aghion & Bolton (1992), Aghion, *et alli* (1992).

⁷⁰ Green (1984), Sahlman (1990), Stein (1992), Schultz (1993), Trigeoris (1993), Mauer & Triantis (1994), Kaplan et alii, Kogut & Kulatilaka (1994), Cossin et alli (2002)

Modern finance is clearly neo-classic. For instance, most corporate finance textbooks explain that, according to the so-called Modigliani-Miller theorem, capital structure does not matter because investors correctly price the relative risks and return of debt and equity. A firm is like a pie : what count is the size, and it does matter in how many pieces you cut it. The same applies with the insurance strategy of firm. No matters if the risks remain in firm's balance sheet in-house or transferred to third parties : in one case there is less risks but less cashflow for investors, in the other more risks and more cashflow. Insurance strategy are simply way of "cutting the pies" differently, but it does no add or diminish the value of the firm.

OPT is no exception as it starts with the assumption that markets are perfectly efficient. OPT needs efficient markets because it holds on its risk-neutral replication argument : the price of a (call) option on an underlying asset has been derived in Black and Scholes (1973), and Merton (1973), from its replicating portfolio of risky (share) and risk-free (bond) assets. This works only if markets price correctly assets (law of one price), or, and that is the same principle but the other way around, if there is no arbitrage possible. Other assumptions are important : it requires that markets encounter no liquidity issues, no transaction cost , no information asymmetry. Technically, it requires that assets return are randomly distributed around a drift, and that this distribution can be calculated in a Gaussian lognormal mean-variance.

Larry Summers (1985) metaphorically describes financiers and economists as people who want to understand the economics of ketchup. Financiers only focus on the transaction price, and are cautious about hypothesis produced by economist to explain market prices . But financiers, when assuming that "everything is in the price", should be able to first explain why there is such a pricing equilibrium. In Summer's words, modern finance theories are brilliant discoveries saying that 2 small $\frac{1}{2}$ bottles of ketchup cost the same price that a big 1, leaving taxes and transaction cost aside. Before Summers, Hakansson (1979) demonstrated that "catch 22" of no-arbitrage OPT. One can price options because one knows how to mimic their payoff with a replicating (dynamically adjusted) portfolio of existing assets (Black-Scholes, 1973; Merton, 1973). But then, why do we need options in the first place if one can easily reproduce them? Yet, if one cannot replicate them, it means that options are useful but that one cannot price them. OPT is either inaccurate or redundant.

Robert C. Merton (1995), and Zvi Bodie and Robert C. Merton (2005) tried to answer this critics. They introduce the metaphor of the financial innovation spiral. Efficient economic agents are every day looking for better solutions to manage frictions and market imperfections (transaction cost, lack of information, discontinuous trading, illiquidity) and therefore are keen to find products to fulfil 6 functions : fund pooling fund transfer, risk management, reduce asymmetry of information, regulatory/tax arbitrage.

In response, intermediaries, for instance investment banks, design new products matching individual agents appetite. For instance, if firms want to be covered against currency risks, intermediaries will manufacture all sort of specific "currency swaps" enabling firms to hedge exposure. Such a solution then migrates to markets and become standardised products that can be bought "over-the-counter" . Markets put (marginal) transaction cost close to zero, forcing intermediaries to invent new solutions if they want to keep making money. Best agents, bests intermediaries are therefore a loop generating greater and greater efficiency. In the Merton-Bodie world, because of OPT, IT platform and market exchanges, ⁷¹like the CBOE, we have reached a point where markets have become efficient and where frictions are immediately take

⁷¹These are unexplained "exogenous factors" in Merton & Bodie (2005). As such, they provide the "outside the model" solution to the sudden jump to modern efficient markets: why suddenly the converging revolution of OPT theories and information technology applied to the field of finance ?

out of markets by arbitrageurs. In other words, the close combination of finance theory and finance practice has fostered the development of numerous financial products, institutions and market that create *de facto* an frictionless market. This theme of an invisible hand that corrects instantaneously inefficiencies has been use by other to justify ex post the neoclassics methodology that describe market “*as if*” (Friedman) they were efficient because agents.⁷² This Darwinist view if history is of course a bit naïve, and we end up with an-historical and paradoxical history :

- (i) before modern institutions and OPT, markets were full of frictions and efficient exchange was impossible : therefore evolution or change between, for instance, XIVe and XIXe industrial economics did not change fundamentally the way people exchanged;
- (ii) after the creation of modern trading platforms (with options), imperfections are taken out almost instantaneously by the continuous pressure of economic agents : therefore historically-defined institutional constraints are no more relevant.

In this paper, we will show first that options are not new and that they are at the roots of economic adaptation through times. Secondly, today’s market are not efficient. There only a limited cases (highly liquid public exchanges) where they are, but even there, from time to time, large volatility indicate the traditional measures of risks are inadequate in extreme conditions. In any case, continuous and liquid stock exchange represents only a very small fractions of assets traded every day. Third, if products, and first among them options, are there to correct inefficiencies, then we are still in Hankanson’catch 22, and we still need to know a long it takes to correct inefficiencies.

However, there is something interesting in Merton and Bodie : functions and the way agents innovate to achieve functions. To go back to Kant, we need some rules to subsume particular cases under some general reading framework enabling us to analogically compare and understand facts. Economics and finance have one advantages over many other social sciences, is that the basic objectives of economic exchange can be captured in a very simple way and that assumptions about utility-maximising economic agents is not terribly biasing reality. When parties do contract, they do contract about assets, risks and return. Economic agents want “the more for the less” : more return from assets, more quickly, and for less risks. Merton and Bodie describes well what efficient contracting is all about : pooling fund and then transfer to allocate it optimally to economic exchange, management risk according to preference of each parties(finance/insurance), solving and controlling asymmetry of information issues , taking advantage regulatory/tax arbitrage.

We owe a lot to these ideas. However, and that is the big difference : these functions are to be “contextualised”. There is no pre and post modern financial markets, but a continuously evolving environment. Accordingly, functions evolve according to each and every historical economic exchange context : their principles are somehow universal This is the reason why we will adapt them when talking about contracts in medieval XIIIe. For instance, because kinship and networks of trustful agents was so important top deal with agency problems and asymmetry of information, contracts designed in XIIIe had to include this aspect too.

Investigating the Zaccaria contract : 6 key messages

⁷² For instance, Alchian (1950), Friedman (1953).

The great historian Luzzato once acknowledged that he was not convinced historians would be ever able to explain the economic rise of medieval Europe.⁷³ Of course, as we have seen this wise advice applies to the history of Genoa. In this paper, we approach the question from the other way around. We found a contract which is one of the most emblematic *trace* of what made the Genoese successful in long-distant maritime venture. It also tells us a lot about issues and constraints Genoese entrepreneurs and financiers were facing when contracting for a shipment in Low Countries. In retrospect, as in mirror, this contract will enable us to elucidate lots of questions about medieval business and finance or the role of public institutions.

History is not about explaining, it is about solving a question : how did this event happen ? Many different outcomes could happen but specific combination combinations. However economic agents do have universal objectives when transacting : better returns for less risks. But the transacting context, the return and risks attached to the transaction and its institutional context, is continuously changing and there are therefore an infinite number of possible combinations to adapt. Among an infinite number of possible outcomes, one singularity or one particular combination emerged. In our case, the singularity is this contract as one singular outcome that happened more than 700 years ago in Genoa. Then an historian can start investigating why one outcome instead of another actually happened. This is building a “plausible” scenario. The task is very similar to what Carlos Ginzburg (1998, 1999) describes as a backward investigation aimed at building *evidences* around a fact, or *traces* of a fact, by a step-by-step process of hypothesis and refutation. This approach has also lots in common with the road map assigned to social sciences by Claude Levi-Strauss. The task of “social sciences’ according to Levi-Strauss is not about explaining singular events, but about showing that singularities are in a sense a unique combination take place in context offering potentially an infinite number of combinations, but which, in fact, converge towards one.⁷⁴ The research is not about explaining why this combination, and not another, happen, but how this combination was possible or, in our wording context-compatible. For Levi-Strauss (1955), this is where formal analytical tools are useful : they help to structure the context made of possible combinations. Therefore as discussed, our approach shares also some views with A. Greif’s idea of “context-specific” conjectures, the way combination are both exogenously constrained and endogenously created.

The following inquiry, combining historical evidences with OPT and CT will enable us to advanced the following six basic messages.

(i) Financial and real options were explicitly contracted in Late Middle-Age, and before. As mentioned, Briys & de Varenne (2001) has already described this contract as a puttable (long put) loan (long cash + short debt) contingent on a casualty at sea. Or alternatively, as a sale (long cash) plus a long call option on the underlying asset (alum) exercised if no casualty happened at

⁷³ Luzzato (1954 : 125-126)

⁷⁴ “ Structural analysis does not contradict history. Quite the contrary, it provides it with a first-rank place: the one owned, by rights, by the irreducible contingency without which we could not even conceive necessity. If structural analysis intends to trace back the fundamental and common properties below the diversity of human societies, it renounces to explain, not the particular differences that can be described by showing their ethnological context [...], but the fact that these virtual differences, which are pre-determined potentials, are not all becoming actual in reality, and that just a few will become actual. To become viable, any research project focusing on structural patterns should first begin with a bow down in front of the power and the meaninglessness of the event” (Levi-Strauss, 1966 :). (our translation). But without discussing here this topic, we don’t share Levi-Strauss’ idea of holistic institutions *à la* Mauss and Durkheim, his distinction between an-historical traditional societies and historical modern societies as well as his conjecture about “mental structure” supporting institutions.

sea. The contract can then either be viewed as a buyback option, or a hidden loan (usury prohibition) with an embedded insurance. Knoll (2001, 2004) shows that throughout history, this mechanism of “put-call parity” (Stoll (1969) has been used to circumvent “usury prohibition”. We certainly build on these ideas but we will see that option addresses a wider range of issue, and not only regulatory arbitrage. This contract should be integrated within its much wider context-specific historical, business and contractual framework.

(ii) Options were “bricolage” in Late Middle-Age. A potential anachronism, namely applying OPT discovered by modern mathematicians and “financial engineers”, to Middle-Age, is to be explained. Let us make a parallel. Many ethnologists ⁷⁵have found that if distant, not historically but culturally, traditional societies find pragmatic and sometimes amazingly complex solutions to deal with their environment. This pragmatic mental and organisational process has been often called by Levi-Strauss *bricolage* ⁷⁶. Pragmatic bricolage of traditional societies can produce amazingly complex and astute solutions to universal problems facing men and women to adapt (e.g. taxonomy, medicine), and these solutions suppose complex scientific models to be applied if a modern Western observer was to explain “how it works”. For us, the same apply to options. They can be mathematically extremely complex, but their logic is, as we will show, intuitive. Bricolating them is somehow a universal way to deal with economic exchange. Furthermore, we know that medieval merchants were not that ignorant of some tools used in modern finance and economics. They were familiar with non trivial mathematics for optimising routes during maritime venture, for discounting time-value of money, or for establishing complex profit sharing rules among investors. The model we are going to develop (Part IV) can seem to be complex, but its logic is simple. Calculating when options exchanged by Suppa & Grillo and Zaccaria are approximately in or out-of-the-money can be made with just a few calculations. If we want to be fully value such a contract, we will argue that not even our modern OPT models would be able to price it because many assumptions simply do not apply. Suppa & Grillo and Zaccaria did not negotiate something they did not understand : they simply made an estimation about something that made sense for them to negotiate.

(iii) Even today “scientific” options are bricolage in the real world. We have seen there are some logical and empirical problems with OPT. In fact, once one wants to use them in reality, they are bricolage. Interestingly enough a link between bricolage and OPT has been brought to light by a sociologist of science who has shown that the discovery of OPT was some sort of step-by-step bricolage (MacKenzie, 2002). Ederman & Taleb (2005) approach to the problem of dynamic hedging in an incomplete market was also instrumental : an analogy to prices of static products makes the Black & Scholes equation “more or less” applicable for dynamic hedging.

(iv) Contracts are bricolage of options. Following many scholars, we know that financial or business vehicles are a “nexus of contracts” ⁷⁷It boils down to managing *property rights* on the residual value of, or control over, assets. Our idea, following the application of OPT to corporate finance and insurance, is that all contracts are a package of options: An employment contract, a supplier agreement, a bond, a share, a car insurance policy, a public healthcare protection system. Why any contract is an option. Contracts spell out (incompletely) rights and

⁷⁵ For instance, Levi-Strauss in miscellaneous publications, Evans-Pritchard, 1972 about propositional logic, Dole & Scribner, 1974 about inference rules. For the references and a discussion about this topic, see Boudon (2003: chap. 2), even if we don't fully agree some postulates of “Rational Choice Theory” which fails to capture the interaction between individuals and societies, rationality and institutional constraints, and so on and so forth.

⁷⁶e.g. Levi-Strauss (). Levi-Strauss interestingly also links bricolage to themes such as “combinations”, “games” .

⁷⁷ e.g. Alchian & Demetz, 1972; Jensen & Meckling, 1976; Hart & Moore (1990); and many others.

duties according to future states of nature which are contingent. The most basic form of option starts with the possibility for one party to breach certain terms and covenants. Sometimes these options are explicit or, most of the time, implicit. In most case, for instance, the contract details penalty in case if one default on her promise. Alternatively, contract give contingent rights according to future states of nature. Contracts more than often blend complex options (options on options, options with multiple assets, ...). However, complexity is not always a panacea (cognitive load, information, cost, enforceability). So contracts are about simplification too: Too much detail may make poor contracts as explained by lawyers (e.g. Eggleston et alii, 2000). However, as we will see in this contract, complexity might help parties because there is an obvious need to hide information to third parties be they competitors or legal authorities (State, Church).

(v) Contracts are bricolage of options to foster exchange within an imperfect real world.

Going a step further, we take the problem upside-down. If options are not redundant, this is not just that markets are incomplete, but precisely *because* agents perceive this incompleteness and deal with it. In that respect, Merton and Bodie (2005) paper is useful. However, one has to take from this paper the Darwinist view that, in the end, thanks to information technology, OPT and derivatives exchanges, we build a frictionless market that fulfils functions of high priority to economic agents. In a sense, Merton (2004) has something in common with his father R.K. Merton's (1957) and his distinction between *manifest* and *latent* function : The first one is explicit while the second one is implicit (e.g. Rain dance of Hopi Indians). There is information in options. We have seen earlier this literature telling that hybrid structure are aimed at dealing with lots of problems notably when investing in early-stage venture : illiquidity, lack of information about and high volatility of future payoffs, agency. Another study (Franke et alii, 1998) shows that when facing incomplete markets with background risks – risks that cannot be traded and therefore non-hedgeable -, agents buy and sells options. We are cautious about assumptions behind such a model, but the idea is spot on.

(vi) There is no universal theory that can explain how contractual bricolage evolves throughout History.

Recent stories modern finance builds on institutional constraints or on the universal ability of markets and agents to reduce frictions and cost of transacting. The Zaccaria contract shows that, in reality, we need to take both sides into account : the market full of astute agents and the frictions of exchange, including institutions. Institutions sometimes promote efficient exchange sometimes not. In any case, this transaction delivers a vivid example about how agents creates bricolage enabling them, sometimes, to deal with and circumventing institutional constraints. Sometimes not. Markets and institutions are two angles to look at this contract. However, there is no grand historical scheme linking the *why* of History to the market "invisible hand" or to institutional or other constraints (e.g. usury prohibition, lack of stock exchange or underwriters). We can at best provide ex post limited insights about the context of contract innovations or limitations. Hence, our option-based approach, linking the historical logic and the functions of the contract to its historical context, provides an imperfect reconstruction of events that we were not part of. History simply tells us that, even if we still don't know how to conciliate our model based on perfect market settings and the reality of frictions in economic exchange, the "proof is in the pudding".

As Ludwig Wittgenstein used to write somewhere : we always wrongly wait for an explanation , hence it is a description which provides the solution to the problem.

* * *

PART II.

“Like all other arts, the science of deduction and analysis is one which can only be acquired by long and patient study, nor is life long enough to allow any mortal to attain the highest possible perfection in it. Before turning to those moral and mental aspects of the matter which present the greatest difficulties, let the inquirer begin by mastering more elementary problems. Let him, on meeting a fellow-mortal, learn at a glance to distinguish the history of man, and the trade or profession to which he belongs. Puerile as such an exercise may seem, it sharpens the faculties of observation, and teaches one where to look and what to look for”.

C. Doyle, *A Study in Scarlet*

In this section, we provide the historical context of the transaction between the Zaccarias and Suppa & Grillo. This will enable to understand, before going into the details of the contract (PART III), the overall background of the transaction. In particular, we give some facts about how Genoa emerged as the centre of long-distance trade of alum to the Low Countries, and how Benedetto Zaccaria, the key figure of this contract, managed to become the central agent of this trade. We then show what this trading business was all about, insisting both on the business model for long-distance maritime trade and the contractual and institutional context of such a business.

Medieval Genoa ⁷⁸

The etymological origin of “Genoa” is still debated, but the name of the city probably comes from *Genua*, or “mouth” or “opening”. This name tells a lot about the central role that sea played throughout Genoa’s history. At the roots of any community, being a Commune or a State, there are historical facts, like the geography or a language, but more importantly there is always a founding myth. This legend provides a sort of collective glue for the common-living of members within the community, and makes them internalise a sense of a collective belonging able to sustain through times supra-individual institutions. This legend defines the supra-individual identity by opposition to something external, which most of the time is represented by the violence and the disorder of something other, being the foreigners or the adverse nature. Genoa’s Commune emerged at the end of the first Millennium, and the founding myth was the collective resistance against the invasion off the *affricani* (Saracens), around 931-935. ⁷⁹ This myth was reactivated by “professional” historians-annalists from XIIe to XIVE - Carfaro (XIIe), the archbishop de Voragine (XIIIe), Jacopa Doria (XIVe) or the Stella brothers (XVe) - who were not only recording factual evidences about their times, but also writing legends prolonging the mythical origin of the City.

There is no point discussing the plausibility of events described in a myth because, by definition, this is something that resists to any rational inquiry, by mixing plausible facts and falsified addendum about these facts, factual description of empirical evidences and unverifiable events often transmitted through oral tradition. In the case of Genoa, it is unlikely that the Commune emerged only as a response to the horrible massacres and pillages

⁷⁸ Recent monographs on medieval Genoa: Bianchi & Poleggi (1980), Airdi (1986), Petti-Balbi (1991), Pistaniro (1992), Epstein (1996).

⁷⁹ Jehel (1993: 13-16) has well captured this aspect, and its associated both marvellous and horrible images aimed at striking the collective spirit (e.g. the blood in the fountains).

committed in Liguria by the Saracens and the following retaliation of the brave Genoese citizens. The legend says that together, and this collective aspect is essential, the brave and honest Genoese followed the galleys of the Saracens, defeated them in the Businarie islands, and brought back to the homeland all goods, women and infants that the Saracens had kidnapped.

The lineaments of the emergence of the Genoese Commune is not at sea but on earth. Before maritime expansion, it was the alliance of the two sides that controlled the feudal economic and social life : on the one hand the *mansiones* (farms) owned by the aristocrats, being the *marshesi* and then the *visconti* and, on the other, the land of the abbeyes and monasteries belonging to the Church.⁸⁰ The aristocratic group emerged first through a sort of common umbrella institution that will be transformed later into the Commune : the charter of 958 binding some citizens of Genoa to the Kings Berengar II and his son Adalbert. The charted named Genoese as "*omnes fideles et in civitate Ianuensi*" who could count on the protection from the Kings. These *omnes fideles* were *bonitas* of Genoa : *aristocrats* but not *nobles*. This distinction is not without importance because up to XVIIIe there was a legislation prohibiting nobility and there was only few exceptions : Andrea Doria received the title of prince, his adopted son was prince of Melfi, and some Cibo became *marshese* or princes of Massa de Carrara..⁸¹ It is also important because it made the Genoese oligarchy both a relatively closed society, but, in the meantime, open to generation of new aristocrats as the Genoese wanted to maintain the priority of meritocracy over titles coming from consanguinity.

In 1056 emerged the second step: the *compagnia*. Under a single umbrella structure, the *compagnia* grouped several local villages: Castello, Borgo, Soziglia, Porta, San Lorenzo, Maccagni, Piazzalunga. From this *compagnia* will emerge latter the medieval Commune of Genoa who formally appeared in 1099. In addition to the prominent role of aristocrats, and in particular the *marshesi* family Obertenghi, both institutions clearly mentioned the role of the Church, absent of the 958 charter. The *Compagnia*, and later the Commune, appointed consuls (1098-1190) that ruled the city, and their meetings took place in churches of the City : San Siro, the oldest one, San Lorenzo and Santa Maria di Castello.

Numbers of Consuls and years in office varied a lot. For instance, they were four consuls in offices for 4 years, or later two leaders working together during a one-year mandate. Below the Consuls was a Council whom voting majority was necessary for collecting tax or setting up an army. Later Genoa institutionalised another type of control of the executive through the *Anzianiani*, a council of wise elders, established from 1161. In 1138, Genoa established its monetary independence by minting its own money. The first official set of rules established by the Commune has been drafted in 1143, and there is another document, a formal oath to the *Compagnia*, that list precisely all rights and duties of members of the *Compagnia*, or what was in fact the nature of the Genoese citizenship. Later, first experienced in 1190-1191 (Manegoldo of Brescia), the Commune was governed by an independent ruler from another city called *podestà*, a typical medieval Italian institutions and not exclusive to Genoa, and during a peaceful time end XIIIe, two leading clans of the Commune, the Doria and the Spinola, shared the power in a two-headed executive. But from 1300, internal tensions precipitated Genoa into chaos and, after a brief period of external control by Henri VII and then the King of Naples, Genoa implemented the Dodges executive structure (1339-1528).

⁸⁰ Renouard, (1969 : 231-238) and Epstein (1996 : 14-28) convincingly elaborates on the crucial alliance between aristocrats and the Church.

⁸¹ Sayous (1937) about the X-XIe origin and role "aristocracy" in Genoa.

“The Grande Espansione” 82

Medieval Genoa is a unique case of commercial expansion and economic growth in about just two centuries. Before Xe, it merely existed and in XIIIe, it became one of the, or maybe the first, central political and economic place of the Western world. What R. S. Lopez called “*La grande espansione*” started with the Mediterranean Basin and has been achieved, notably, by a shift from the land-based feudal economy into the broader economic exchange with distant market places. This shift has been made possible by a systematic entry strategy into key (resources, logistic, end-markets) commercial and trade location. It is correct that initially privateering (course) and attacks against Saracens (Sardegna, 1016; Tunisia, 1086; Spain (1092-1993) certainly helped Genoa and its merchants-warriors to build up a “war chest”, but it soon went well beyond this scope.

Institutionally, to support this expansion, the Compagna, and after the Commune, did provide a common vehicle to structure, finance and co-ordinate the individual interest of the recent Genoese citizens, and in particular the aristocrats. A crucial factor is that the Genoese compagna established a long list of treaties and alliances with many foreign parties (Rome, Sicily, Pisa, Barcelona, Provence, Montpellier) in order to establish a military and commercial presence throughout the Mediterranean sea. One of the fundamental political motive justifying this foreign policy was the protection of the Christians against the Muslims. Indeed Genoa, in spite of some sort of love-hate relationship with Rome, always kept strong links with the Popes, notably when business was concerned.⁸³ Behind this pro-Christian attitude was of course the huge commercial returns that military expeditions did provide. We know for instance that most of Crusades, in which the Genoese where significantly involved, were linking military plans with business investments by people who did fund the projects. Between 1250 and 1253, the Genoese invested about 100,000 Tournois for St Louis’ expedition in Syria, and the later paid enormous dividend to the people from the Commune. Later, the Genoese again provided men, funds and galleys for St Louis’ crusade of 1270. Among galleys, was one of the biggest ever mentioned for the XIIIe: the nave Paradisus, equipped with the first known maritime map (see under).

But local rulers were also keen to acquire warfare skills, men and fleets that the Genoese did provide. In exchange, the later obtained some monetary returns or long-term commercial privileges, being territorial and trade concession, rights of anchorage in crucial ports of call, tax exemption (e.g. port duties), ability to set up a colony with dedicated local infrastructure (dedicated quarter, *loggia*, *fondaco*) and its own legal and political representatives like a consul and other public servants This could be within the constituency of the ruler or abroad, in the conquered territories. In some case, this could go further and involved the full ownership of a city or an island. In a famous text, quoted in each proper book about Medieval Genoa, written in XIIIe by “The Anonymous”, the unknown author likely to be from an important Genoese family, it is said :

*E Tanti sun li Zenoexi
E per lo mondo si distexi,
Che und’eli van o stan*

⁸² The long list of studies focusing of Genoa’s expansion XI-XIIIe is listed almost exhaustively in Balard’s superb 12-pages bibliography, broke down by geographic area, introducing Lopez (1938 [3rd ed, 1996]).

⁸³ Epstein (1996 : 40-41), based on Caffaro’s records and what can be found in the *Codice Diplomatico*, gave the account of this delicious story about a bribe given to Rome by the Genoese in order to keep control of Corsica in 1120. The whole deal was the following :

*Un'atra Zenoa ge fan*⁸⁴

At its best, the Genoese Commune did managed to provide a way to co-ordinate efforts and to pool resources to fund this expansion and to co-ordinate actions among its individual members or family clans. The first obvious way was tax and the Commune raised tax in several ways. For instance, there was a *denariis maris* or a percentage of the total value of goods traded by merchants involved in maritime trade or the *compera salis*, a tax on salt. The later expression is interesting because *compera* will become the term used to name Genoese public debt. More adhoc transaction were used, and this showed precisely how the Commune was used as a vehicle for co-ordinating the private interest of wealthy leading families. For instance, when the Genoese did financed the re-conquest of Almeria for the Kingdom of Castilla, the Commune, through complex a vehicle, raised debt from main families, and collected special maritime trade taxes. In exchange, merchants received some dividends plus some rights in case of the success of the venture. Another type of deal was public asset-backed "securitization" : in exchange of funding, investors received rights attached to specific public assets being tax collection, for instance *loca* in *compera salis*, or simply revenues from the management of public coinage. This is a very special feature the Genoese Commune: it was a merchant-driven institution acting as a political and business vehicle.

In other words, the Commune enabled the most prominent families to pool and invests assets which in turn enabled them to protect and expand their common business objectives, notably by organising and supporting Genoa's interests in maritime trade. When problems emerged the Commune set up *devetum* (embargo) which could go from interdiction to travel to specific destination or even to trade, directly or indirectly, with a given ruler or a city. Eventually, the medieval economic and political rise of Genoa cannot be isolated from one distinctive feature : the unique nautical expertise of the Genoese in late middle age. The Commune, and its citizens, developed, organised and made extensive use of this important asset. In official records of the Commune, the first trace of an organised Genoese fleet sent abroad can be dated back in 1097, during the siege of Antioch.⁸⁵ However sources from other cities (e.g. Pisa) provide evidences of a pooling of ships under a single command as early as 1004 when Genoa attacked Pisa.

Instability : individuals and families before the Commune

If one is to believe into some sort of collective memory and culture surviving ages, business skills is probably one aspect applying to men and women from Liguria, but also from Lombardia and Piemonte. Another key aspect of the medieval Genoese is a mix of individualism, a note of caution, if not rejection, for any form of delegation of power to public institutions and their representatives. For the funding of what is considered as "public expenditures" (road, bridges, schools), in many case, and in Genoa the phenomenon was systematic, donations of wealthy individuals replaced the formal use of public budget. This was precisely because it was difficult to justify taxes for such collective infrastructure. Compared with other Italian Commune, the Genoese refused to allow public institutions to spend large sums of public money to build official buildings. If *Firenze* or *Venezia* built numerous magnificent public edifices during middle age, there are only a few in Genoa (see under). Individualistic mindset was not only about controlling and limiting the sphere of influence of rulers. Soon, it became the structural impediment, sometimes violently, to any form of sustainable legal and political institutions. Medieval Genoa's politics was a mess, and inhabitants within the City were rarely, and only for a short period of time, enjoying a peaceful social and political climate.

⁸⁴ "And many are the Genoese/And going all over the world/In any place he goes and stays/Another Genoa he makes there".

⁸⁵ Epstein (1996 : 22).

Individualism certainly supported entrepreneurship and risk-taking mentality of Genoese merchants. However individualism became problematic, in medieval Genoa, because it was coupled with the key role of the familial structure. The latter, and the network of marital, political and business links between families, shaped the organisation of the Genoese society and institutions. In a sense, before accepting or supporting supra-individual collective institutions, the Genoese was belonging to a family clan, from the *nucleus* (parents, sons and daughters) to distant relatives and life-long trustful business agents. Families were the first level of collective integration of the individualistic Genoese. They were the backbone of medieval Genoa from its origin. Genoa's political history is made of the continuously changing alliances and conflicts between key families. It is almost like if the only stable institutions were the genealogical trees of families, and as if institutions were provisional short-term arrangements aimed at translating new balance of powers. Struggle between families were caused by three distinct themes.

The first cause of tension was the rivalry between factions within the old aristocracy which was made of two branches : the marchesi Obertenghi and the visconti. Visconti descendants gradually splited into three branches : the Carmadino (Avvocato, Lusio, Pevere, de Mari, Serra, Usodimare, ...), the Manesseno (Castello, Embriaco, Spinola, Bruscus), and the single de Insulis family.⁸⁶ Both clans tried to obtain most of public roles in order to make sure it could benefit from commercial or tax advantages. A second problem, who at some stage overlapped with the first, was the tension between old families who were controlling most of assets in XIe and the rising merchant class (*popolo*). From these *alberghi popolare* some key families will step by step join the Genoese aristocratic "oligarchy". A third and last vivid source of tension that turned into violent conflicts was the split between the pro-Pope (*pontifici*) Guelfes (*Guelfi*) and the pro-Emperor (*imperiali*) Ghibelins (*Ghibellini*) that started in XIIe. Genoa was mainly *Guelfi* in XIIe, but then emerged in XIIIe as *Ghibellini*. This translated both the political independence of the rising Genoa against Rome's expansion strategy throughout "Italy", and, the changing balance of power between "old" and "new" aristocratic families. The Grimaldi and Fieschi⁸⁷ lost powers in Genoa, and Spinola and Doria, two prominent Ghibelins were elected as Consuls. Of course, these three conflicts were interrelated.

As a consequence, there were only few period of quite prosperity between early XIe and the middle of XIVe when Genoa had to face an important drawback of the economic and political scene in Europe. Peaceful times were first half of XIe, and between the second half of XIIIe. Historical archives tell us that authorities have never been able to fully control import, manufacture and use weaponry inside the city walls. As we will see, protection, retaliation or simply first-strike capability made factions to design fortified and high houses with towers and an impressive range of weapons inside. In his account of Genoa, the rabbi Benjamin de Tulede (1172) wrote : "*everybody has a house with a tower and every time there is a war between them, the*

⁸⁶ List from Epstein (1996 : 75) based on Belgrano (1875) . Greif, (2006 : chap. 8. Table 8.1.) based on Olivieri (1861), but quoting also the same Belgrano (1875), but also Byrne (1920: 200-201), Day (1988 : 74) used other names differing from Epstein : Maneciano (Rustico, Platealonga, Rufus, Roza, Pedicula), Carmadino (della Volta, Caschifellone, Mallonus, Gontardus, Bellamurus). The list of Belgrano includes much more prominent families, except della Volta and Mallone. Does it mean that consuls came from less important families ? At this stage, we had not the opportunity to go through the original books of Olivieri and Belgrano to cross-check names.

⁸⁷ Only descendant of the *marchese* Lavagna, the Fieschi gave birth to two Popes : Sinibaldo Fieschi, who became Innocent IV in 1243, Ottobuono Fieschi who became Adrian V for about 32 days (!) only in 1276.

*balconies of these towers become war fields*⁸⁸. The familial clan was grouped in a same location and buildings were aggregating in such a way that the layout of houses, open courts and warehouses, provided some sort of closed area, not easily accessible from outside and easier to defend. When factional wars emerged it just spread all over the city, from houses to houses, from quarters to quarters, and then even from land to sea. Crew members from different factions, travelling on a same galley, could start a fight in the middle of a venture or in long distant colony. Servants with ties to one family could be ordered to murder the head of a rival faction who was travelling.⁸⁹ Late XIIIe was “a provisional enjoyable period”, according to Lopez : it is true only four violent civil wars salvaged the city between 1250 et 1300 !⁹⁰

All this theme are important to understand the contract we are going to talk about. The Zaccaria family was popolo but it was well part of the leading members of the aristocracy end XIIIe. They were certainly pro-Doria and pro-Spinola (Ghibelins), and we will see Doria and Spinola were linked to the Zaccaria by business and familial ties. A Spinola is named as Zaccaria's partner in the contract. But Benedetto Zaccaria had also members of the Fieschi in his family. Above all, Zaccaria was an individualistic figure who sometimes helped the Commune, but often refused to obey orders from his native city. When his business interests were at stake. He was a genuine Genoese, as we will further show it. Before this, in order to better understand who were the Zaccarias as well as Suppa & Grillo, our “fellow mortals” to use C. Doyle's expression, it might be interesting to describe their day-to-day life in the Genoa of 1298.

Genoa in XIIIe⁹¹

In XIIIe, Genoa was populous. The medieval growth of Genoa translated into fast increased of its number of inhabitants. Estimates for XIe are around 10,000 inhabitants, close to 20,000 for early XIIe, and about 40,000 for mid XIIIe, and late XIIIe, Genoa could count on about 100,000 citizens in the inner city and about half a million in the territory of the State.⁹² This made Genoa in the top-5 cities of Europe : the first ones were Paris and Granada, had with about 150,000 to 200,000 inhabitants at that time.

Who were the people leaving in medieval Genoa ? We have talked about the aristocrats and their families, and it is an important aspect because some of them (Zaccaria, Grillo or Spinola) played a key role in the contract. From XIIe, these prominent families owning lands in the countryside started to migrate within the city, even if most of them kept a presence in the *contado*. But aristocrats, and we will come back to them, were a minority. As an harbour, Genoa hosted many individuals involved in the shipping industry : being *naucilirius* (captain), *marinariii* (sailor) and *galeoti* (oarsmen), or *balistari* (“arbaletiers”) used to protect galleys. Near the harbour and its mole, was the Piazza Banchi were one could find people called *banchiarium* who became “bankers” : these were initially the changers sitting on a *banco* behind the table where they were counting money. This is there that the local *borsa* (stock exchange) will be located a few centuries later. There were also a wide numbers of small craftsmen.⁹³ These were the *lanerii* (tisserand), *batitores lane* (“batteurs”), *accimotores* (shearers), the *tinctoris* (dyiers), the *calligatores* (shoemakers), the *batifoli* (the jewellery-makers) or the *osbergerii* (armours). They were the public servants working on public finance for the debt management (*compera*) and tax

⁸⁸ Likely to be quoted first by Lopez (1958 : 513), and now mentioned in many studies.

⁸⁹ Source :from Epstein

⁹⁰ Lopez ()

⁹¹ Description of the city can be found in numerous book. The most extensive account in Poggi (1982) and Heers (1990) The following is mainly based on their accounts.

⁹² Some estimates for the city can be found in Lopez (1964 : 448), Epstein (1996 : 29), Bairoch (1988). None of these estimates are fully reliable.

⁹³ List of professions can be found in notarial records, notably Doehaerd (1941 : 98-99)

collection. Eventually, some inhabitants were belonging to the legal profession. Some were official judges and others appointed arbiters to solve commercial conflicts, but by far the first legal profession was notary. There was about 500 to 1000 notaries in Genoa around 1298, or 1 for 100 to 200 inhabitants, is a range that most modern historians believe to be probably about right.

Eventually, one category of inhabitants symbolised the dark side of medieval Genoa : the slave (*schiaivo*).⁹⁴ They were coming from all over the Black sea and the Mediterranean. All non-Catholics, according to the law, these slaves had virtually nothing : man from Crimea, woman from Egypt or young children from Morocco. An expensive young male slave was costing between 5 and 10 £, sometimes up to 20 £, end XIIIe. To give an order of magnitude, 5 £ represents about two ox, the annual rent for two storerooms, 200 linen napkin, 40 bushels of grain, 20 “mine” (105 litre) of wheat or ...1/140 of the salary of the *podesta* of the Commune !⁹⁵ There are documents showing some slaves worth not more than 2 or 3 £ .

The design of a city reflects a society, and medieval Genoa was no exception. The shape of medieval Genoa has been structured by several themes : the central function of the harbour as the tool of trade and commercial expansion, the role of the Church, the predominance of family clans, the low key profile of public institutions. As of today, Genoa gave the impression to be clutched within the hills. Streets were cascading from top of the city, nearby the *castrum* to, a few hundreds meters downside, the harbour and its *ripa* . Many writers have been struck by the impression that the location of the city with the Alpine mountains in the back, make the Genoese somehow “thrown into the sea”. The city was surrounded by walls. Some have conjectured that they have been built, circa 1155-1161, because of the fear of an attack of the Holy Roman Emperor Fredrik I Barberossa (1222-1290) who was conducting military expedition against Italian cities at that time (Tortona, 1155; Milan, 1161). This played a role, but city walls were built all over Europe between early XIIe and end XIIIe.

These walls were about 2,5 km and covering an *intra muros* city of about 52 hectares. The figures provide an indication of the tiny size of the core city. Around these walls there were large gates and some of them are still there today : the Porta dei Vacca – Vaca was the name of a family who used to leave there in XIVE – and the Porta Soprana. With few exceptions, like the *Nova strada* in the North, and the network of public *carrugi*, going from the port to the gates, city's streets were a maze of the narrower streets, the *calle*, converging to the *ripa*, and then a secondary road network made of very thin streets, sometimes no more than 1 or 2 meters large, the *viccoli*. On both side of this web of small streets, there was high walls of houses and buildings with only a few doors, windows or tiny entrance, to private spaces of inhabitants and merchants. Because of the lack of space in the countryside to expand Genoa much beyond outside the original inner city, occupation of all space available went fast, and in 1298 it was uncommon to find a free place to build a new house or a church. As a consequence, buildings were high, with usually 3 or 4 floors. As we said, many houses of key families had an adjacent tower. Around 1300, there were circa 60 towers in the city. Around Piazza San Giorgio, on the *ripa*, there were no less than a dozen of them in just a few dozen square meters.

The role of Church is a second important aspect to understand Genoa's configuration and the day-to-day life of the Genoese. We have seen that initial meetings of consuls took place in Churches. Most quarters have been step-by-step (XI-XIIIe) built around Churches and

⁹⁴ On slavery in medieval Genoa, Verlinden (1976, 1978), Balard () and more recently Epstein (2001) who developed a broader thesis about this topic.

⁹⁵ Lopez (1951 : 1169-1171), Epstein (1996 : 190-191), Jehel (1993 : 462). By the way, this gives us some comparison to evaluate what 3,000 £, the amount invested by Suppa & Grillo in Zaccaria's venture (see PART III), was worth at that time

monasteries. The network of Churches provided structured the laid out of city's quarters, and their names were defining who belonged to where. First among all other church was, on the west side, San Siro, which was originally built up in IVe. On the east side, there was the Santa Maria de Castello. On the top, there was Santa Caterina, and in the middle the San Lorenzo. The social life of Genoa was rythmed by many catholic events, and the cult of Santa Maria was particularly popular at that time.

A third theme of urbanisation in XIIIe Genoa, was the impact of kinship and in particular the role of *alberghi*.⁹⁶ Prominent alberghi were owning large farms in the country-side but gradually, from XI-XIIe, used to take control of a whole block of buildings inside the city. In fact if Churches played an important role, families of merchants were deeper foot prints on the city, and it was often them who built churches around their residences. For instance, San Marco was established in 1173 by the Stregiaporco, a wealthy albergo, who set up its own *contrada* (quarter) around. Later, from XIIIe, the *alberghi popolare* followed. Every big family, with all their associates, servants and "supporters", were step-by-step aggregating around this *contrada*. Business but also politics were key in determining location of clans in the city. Everybody wanted to have a space closed to the harbour, but political affinities made alberghi welcomed in one place instead of another.

Most Gibelins were located in a *contrada* near the harbour (Doria, Spinola, de Negri). Around the San Lorenzo, the Guelfe family Fieschi was the owner of a large block of buildings around their Palazzo, and not that far were the Grimaldi. Unfortunately for the Fieschi, this was no longer the case in 1298 : the Gibelins expropriated them and transformed the place into something that will become the *Palazzo del Capitano del Popolo*, later and still today called *Palazzo Ducale*, hosting first, in 1270, Oberto Spinola, a Gibein of course. At the centre of the *contrada* was indeed sometimes a Palazzo but most of the time a *loggia*. This was some sort of public space for were people used to conduct business, exchange conversation or simply looking children playing. Alberghi were sometimes building joint loggia as it will be the case throughout XIII-XIVe, with the Lercari and the Camilla (*Scurreria*), or the Grillo, de Di Negro and the Vivaldi (*Piazza delle Vigne*). In the middle of the loggia was the *corte* (inside court) with a well and baths, and a beautiful garden with orange trees or colourful flowers. Behind or on the side was the *fondaco* (warehouse). In many cases, there were, adjacent to the streets, small shops. In some case, when the albergo had the chance to be on the *ripa*, it could have a *ponte* providing a direct access to the sea.

A fourth theme was the weakness of public institutions and the reluctance of the Genoese to transfer funds into public assets. Never ever a Genoese would have accepted lavish public spending for public institutions and administration like it was the case in Venice, Pisa or even Florence. In 1298, there were few significant public buidings. We have mentioned, the Porta dei Vacca, and the Porta Soprana. As also mentioned, from 1260-70ies the Commune has also established, from a place owned by the Fieschi, its *Palazzo del Commune*, near the San Lorenzo Cathedral. It was completed in 1307 and in will become the *Palazzo Ducale* later, under the Dodge regime. Close to the harbours there was a recent public building set up by podestà Guillemo Bocanegra, the grandfather of the Dodge Simone well known because of Verdi's opera : the Palazzo San Giorgio (1260), also called *palatium maris* at that time. This will become, later, the headquarter of the Casa di St Giorgio (founded circa 1408). This was there Marco Polo has been jailed by the Commune following the defeat of the Venetian in Curzola (1298) According to the legend, it was in this unfortunate circumstances that he drafted his account of his trip to Asia in his "*Book of Marvels*". There was also the Malapaga prison on the harbour. This is the jail where notably bad payers and cheaters where waiting for judgement.

⁹⁶ On the specific link between urbanisation and kinship in medieval Genoa (Owen Hugues, 1975, 1977)

In summary, the design and the life in the city show that, in XIIIe, few key aristocratic families, about less than one hundred, controlled the city. Some successful families of merchants (*popolare*) integrated this oligarchy, but the process was gradual. The abundance of churches, abbeys, monasteries, in the small core city perimeter, demonstrated the Genoese were also devoted Christians, but again, they were merchants first. In the same vein, public institutions were low-key because the Genoese were reluctant to transfer too much authority and wealth to a central and collective authority. The role of the Commune was however more visible as far as business practices were concerned, as we will show later. For now, we can now turn to the more specific profile of Benedetto Zaccaria, the central figure of the contract.

Zaccaria : warrior, diplomat, merchant and pirate⁹⁷

Benedetto Zaccaria is likely to have been born around 1240 in Genoa. He is the son of Fulcone Zaccaria (1229-1280), a prominent figure of Genoa, and his wife Guliette.⁹⁸

[Insert about here Exhibit 2]

His father Fulcone played some key role in the political life of Genoa, and has been involved, as a signatory, in the Treaty of Numphaeum (1261), between Michele VIII Paleologus and Genoa. Zaccaria was often written *Iaccaria* or *Jaccaria*, and a “noble” predicative *de Castro* - or *de Castello* – was often added to the name of his family. Castro was the place where Zaccaria I, Benedetto’s grandfather, came from, and he also owned a *porticus* in *Castello* or *Castelleto* which is a key quarter of the old city near the mole, and Fulcone also lived nearby San Giorgio. The Zaccarias will become, generation after generation, one of the most prestigious Genoese families with the Doria, the Grimaldi, the Lercari, the Negri, the Spinola, the Grillo.

The first official trace of Benedetto Zaccaria in records is his involvement, in the name of the Commune, in a transaction aimed at establishing a permanent Genoese presence in the strategic business location of Santa Igia (Sardinia) (17 November 1256).⁹⁹ Benedetto Zaccaria was first a military. According to a record from the Templars of Tyre, he has been jailed by the Venetians after the battle of Tyre, between 20 Genoese galleys against a fleet of 24 Venetian galleys which is the first trace of a battle where he has been involved. His most well-known “*fait de guerre*” is his decisive involvement in the maritime battle and victory against the Pisans in front of Meloria’s island in 1284.¹⁰⁰ According to the legend there was, on one side, a massive amount of men and galleys from Pisa, with three squads commanded by Alberto Morsini, Andreotta Saracino and Ugolino della Gherardesca. On the Genoese side, the main part of the fleet was under the command of Oberto Doria, Conrado Spinola leading a second part of the fleet, and then Zaccaria in charge of a third one. This third column of galleys were apparently invisible from Morsini and his troops, because of the sun. This tactic is said to be learned by Zaccaria

⁹⁷ The most extensive studies focusing on Zaccaria is Lopez (1933, 1962). Another previous study was Miller (1911). Basso (1994) does not add much to Lopez, but he provides information about the post-Benedetto period. Balard (1978) on the trade and diplomatic relationship with Romania provides plenty of additional details.

⁹⁸ The family tree of the Zaccarias in Lopez (1933 : annexe)

⁹⁹ This means that either Zaccaria’s date of birth proposed initially by Belgrano (1248) or the data of the Treatise are not correct. Many things were possible for a Benedetto Zaccaria but not a diplomatic venture overseas at the age of 8.

¹⁰⁰ Lopez () found that some people in Tuscany continued to use a sarcastic expression against Pisa echoing the humiliating Meloria’s defeat: “*se si voleva vedere qualche Pisano bisognava andare a Genova*” (If some wanted to find a Pisan, he should go to Genoa).

from Byzantium's naval strategy, and according to many, this tactic has also been successfully used by Genoese against the *Serenissima* of Venice in Curzola (1298).

Throughout the years, he has also acquired a unique skill in setting up maritime embargo of key harbours: he used, or planned, this tactic in many places like Pisa, Tunis and, as we will see later, in cities of the Low Countries like Bruges. His brother Manuele, also mastered the technique as an account showed him blocking Egypt, with Tedisio Doria, in 1292.¹⁰¹ Benedetto Zaccaria received the title of Admiral of Genoa. But he offered his military service to many others. Basileus Michel made him megaduke of Byzantium. Sanchez IV made him also Admiral of Castile after his victory against the Moors in 1291, culminating a year after in the conquest of Tarifa in 1292. Sancho gave him the harbour of Puerto Santa Maria (near Cadiz), but gradually their military relationship fall apart. Around 1297, Philippe the Fair made him also admiral of his fleet, built from 1295 by the Genoese in the "clos des gallées" in Rouen¹⁰² in order to defeat the English. This is the first French Royal Arsenal in the History. In addition to military services for Sanchez IV of Castile or Philip IV of France, Benedetto Zaccaria negotiated commercial or political treaties with Henry II of Cyprus or Leo II and Hetuna II of Armenia, and apparently the Pope Boniface VIII (1294-1303) considered him as an "old, familiar friend". It is true that in 1301 some Genoese women have tried to launch a crusade, and that according to plans that never turned into reality, Bendetto Zaccaria was supposed to command the fleet.¹⁰³ Zaccaria was not a unique case of individual or merchant closed diplomatic links with foreign rulers at that time. A Ghisolfi acted as external "advisor" for the Mongal Ī-Khāns of Persia (1289-1303), and played the role of a "go-between" with France or England. A Segurano Salvaygo, known as "Sakrān, the Frankish merchant", worked for the Mameluke sultans.¹⁰⁴ But the position and the influence of Benedetto among key rulers at that time was well beyond these two case stories.

Zaccaria was not just a warrior, but also someone who thought about naval strategy and technologies. Some historians¹⁰⁵ believed that Zaccaria is at the roots of the so-called "Genoese school" of maritime *portulans* (maps). We know that the first known portulans is the so-called "Carte Pisane", discovered late XIXe. As the map clearly put a cross on Saint Jean d'Acre, historians have concluded that this map was likely to have been drawn before 1291, when Christians lost the city. But if the map has been found in Pisa, it is more than likely that it has been drawn elsewhere, and Genoa is certainly the most probable source. One of the ship transporting crusaders from Aigues-Mortes, in 1269-1270, was, according to the chronicle, the *Paradisus*. This was a huge Genoese galley of able to ship about 8,000 cantaria of materials and goods, and apparently there was a map on board, enabling Genoese mariners to assess that they

¹⁰¹ This event is interesting because the Zaccarias, as often ignored the law of the Commune, and on the contrary obtained the support from Rome which interceded in favour of the Zaccarias (Kedar, 1973 : 10). In particular, Zaccaria who was closed to Byzantium always managed to stay close to Rome. At the end of his life, Benedetto used to mandate Tedisio, a young relative from another Zaccaria's branches (Lopez, 1936 annex X), to manage ventures in Phoecea/Chios : Tedisio was the son of Clarissa Fieschi, the Guelfe family who gave birth to several Popes (see above).

¹⁰² The original XIIIe "Clos" was on the North side of the Seine and has been unfortunately destroyed. The remaining traces on the Southern side, which are sometimes reproduced in books, come from an extension built later..

¹⁰³ There are numerous reference of this story. But the original source is *Les Registres de Boniface VIII*, ed. Georges Alfred Laurent Digard and others (Paris: E. de Boccard, 1906/21), III, 290-294; see. Lopez, (1933 :217-221, 235-236)

¹⁰⁴ Kedar (1976 : 21).

¹⁰⁵ The original idea comes from (de la Roncière (1925) and has been supported by Lopez (1933)

were close to Cagliari (Sardegna).¹⁰⁶ So some speculate that the Genoese did use them earlier. However, it makes no doubt that the Pisan map does not cover the French and Flemish coast along the Atlantic. In the first known portulans from Genoa, the portulans of Pietro Vesconte (1311), most of the places missing from the "Pisan map" are now included: the French coast including the Gironde (Sainte-Marie de Soulac, Blaye, Bordeaux, Cuzac, Rocamadour) and the Seine (Criqueboeuf, Rouen, Paris), and Zwyn and even the British coast, from Berwick to Bristol. This is almost precisely all the places described by Zaccaria when preparing his attack against England in 1297 (see under), so it is quite likely that Vesconte was actually working for Zaccaria, or that his 1311 portulans is based on information or previous map drawn by the Zaccarias and their associates.

Among those links with foreign rulers, his strong ties with Byzantium should be first mentioned. Some have said that Benedetto Zaccaria had married the own daughter of Michele Paleologus, but, according to Lopez, this is unlikely to be correct and if there was some family link between the two families it happened more than a century after when a Cattarina Zaccaria is said to have married a far relative from the last Emperor of Constantinople (Lopez 1933: p. 52).¹⁰⁷ However the fact is that he decided to name his own son, Paleologo (1280-1314) or *Paleologus* in the Latin version. Benedetto eventually became "megaduke" of Byzantium. The Emperor gave it as a reward for his military and diplomatic support to preserve the independence of Byzantium and Michele's power. When problems occurred, and notably when Michele expelled the Genoese from Constantinople, it is Zaccaria who was sent by the Commune, in 1264, to negotiate with the Emperor. We know that, at the end, the Genoese succeeded and that they will be back in Pera-Galata in 1268. To our knowledge, this the first trace of relationship between Benedetto Zaccaria and Byzantium. Benedetto was just about 24 years old! Later, in 1281, he played again a key role in defeating the ambition of the alliance between Charles of Anjou and the Venetians in their joint attempt of restoring Philippe de Courtenay in Constantinople. The Genoese, who had been approached by Charles of Anjou to join him, informed Michele. The latter made a diversion by fuelling a dispute between Aragon and Anjou about Sicily. Benedetto Zaccaria was on the front line of an assault from Aragon against Sicily which kept Anjou's military forces absorbed in this conflict for a long time. There are evidences that Benedetto played the role as an intermediary to provide gold from Byzantium to the Catalans.¹⁰⁸

Zaccaria's financial and business interest

There are several distinctive themes defining what Zaccaria's professional career was about. First he was a genuine long distance navigator, and his diplomatic and business ventures made him covering a zone going from the end of the Black Sea up to England. Second, Zaccaria was not a businessman doing a bit of diplomacy, or simply a political and military figure doing, on the side, some trading business and also investing in miscellaneous financial vehicles. Zaccaria was all of that. Third, Zaccaria was a military, and, up to a few years before his death, he never managed to stay completely away from naval military campaigns either for the Commune or, more and more lately, for other rulers. Fourth, his main source of wealth came from the alum business. But, and this is a fifth theme, he used his galleys to trade any kind of commodities

¹⁰⁶ This reference has been found by *Roncière* (1925 : 39) in Guillaume de Nangis, *Gesta Sancti Ludovici*, in *Recueil des Historiens de la Gaule et de la France*, t. XX 1840, p. 44. The actual quotation is: "allata mappamundi, regi situm terrae prope Callarici et vicinatem propinqui littoris ostenderunt".

¹⁰⁷ However marital relationship did exist. In 1284 (or 1285), the Genoese sent three galleys to Constantinople with on board Yolande de Montferrat (1274-1317), the daughter of Guillaume de Montferrat and Béatrice de Castille who was the promised wife of Andronic II Paleologo (Balard, 1973, p.56).

¹⁰⁸ Lopez (1938 :) Balard, (1978 : 54).

from East to West, back and forth. Eventually, the this the sixth aspect of his activities, Zaccaria and his family reinvested some of profits into several type of assets, being real estates, public bonds or even ventures from other traders. We can now review these different aspects of his career.

First, Zaccaria was not a sedentary investor that managed a network of employees and partners in dedicated location. Sure he managed many people and had agents in many strategic location, but Zaccaria was himself all over the places. He was a “a man who amply demonstrated he delighted in moving swiftly from one place to another”.¹⁰⁹ His business horizon went from the channel in the West, in England and the Low countries. It is certainly correct to assess that Zaccaria’s main business focus was trading from and to Byzantium.¹¹⁰ His trade ventures went further East, in the Genoese colonies existing at that time. In the Azov Sea there was a place named “Zacaria” on some portulans¹¹¹. He was involved in trading Caffa, the Genoese colony located in today’s Crimea. His galleys went to all main harbors in North (Italian communes, Corsica, Sardeigna, Aigues-Mortes) and South (Alexandria, Tunies, Ceuta) Mediterranean. In the West, his galleys were unloaded goods and commodities in Southampton and Bruges. In particular, he is the one who developed regular shipments in the Low Countries, and there is a record of shipment of alum to Bruges by the Zaccarias as early as 1278, or just one year after the first Genoese, a Spinola, crossing of the “*Pillars of Hercules*” to establish a merchant ventures in England and Low Countries.¹¹²

The modern American historian, Robert Reynolds left a beautiful description of the day to day live of a typical Genoese merchant in the XIIIth century:

¹⁰⁹ Kedar (1976 : 122).

¹¹⁰ Ballard (1978 : 524-525) found, from notarial contracts written between 1061 and 1315 (see PART I), that the Zaccarias had either invested or received from investors 36,503 £. If the absolute value of this number of course underestimated their involvement, because only a portion of contracts have been recovered. However the percentage is indicative : his number accounts for 8,1% of all Genoese trade in that region during that period. Furthermore Benedetto has invested 22,455 £ by himself, with his brother Manuelle has provided 7,191 £.

¹¹¹ This information comes from Kretschner (: 645), quoted in Bratianu (1929 : 153), while Lopez (1933 : 87) based his discussion on C. de la Roncière, *Découverte de l’Afrique au Moyen-Âge*. Lopez rejected the plausibility of a Genoese colony led by the Zaccarias over there. The question remains : why a place called Zaccaria over there at that time ?

¹¹² Doehaerd (1938). There are several evidences that the Genoese crossed the Detroit of Gibraltar before 1277. For instance, in 1161 a Genoese ship reached Salhed in the Atlantic coast of Morocco, and in 1253 there were regular shipments further South to Safi (Lopez, 1951 : 1164). Lopez hypothesis is that it was neither technology nor skills that prevented Genoese to establish shipments to England and Flanders before 1277-1278. What was needed was, first, available calls in Castilla (e.g. Sevilla) or Portugal, enabling merchants to make further buy-and-sell transaction along their routes. Second, they had to have access to commodities for which there was a strong demand in England and Flanders. The other way around, these pot of calls in Low Countries needed to make available goods and commodities in high demand in Mediterranean harbours. Both factors emerged gradually in late XIIIe, as Seville and Portugal became places of regular stays of Genoise merchants, and that Genoese alum and then mastic, from the East, and wools, draperies and clothes, for the England and Low countries, provided the ground for a lucrative bilateral trading relationship. This historical *causal* explanation sounds plausible, but why it was Genoese and not Venetians or Pisans. Venetian galleys, before Phocaea, already transported alum, as well as other valuable commodities throughout the Black, the Eagan, the Mediterranean sea, and their naval technology and skills were as comparable with those of the Genoese merchants in XIIIe, and gradually surpassed them in XIVE.

“A noble leaves fortified houses in the city, large rural holdings with extensive farm equipment, oil presses, and the like. He leaves hereditary shares right to ancient feudal taxes, centrally administered on behalf of the “vicecomital families”. He leaves a good lot of arms and armour – sometimes enough for several squads of men. He also leaves a good name as a son of officeholders and men of State, as member of the Consulate, perhaps been a podestat in some other city, negotiated treaties, captain corsairs, commanded fleets, attacked or held castles as castellanus, been involved in vendettas and faction wars inside the city walls. There are often some law books and other volumes in his library; he has schoolmasters who teach his sons to read and write; near kinsmen are Bologna-trained judices, and others are important members of the local church hierarchies.

He himself is a patron in life and death of hospitals, orphanages, bridge-repair foundations, local public works (the city breakwater, the walls and gates, the lighthouse), and charities for the pilgrims, captives of the Infidel, the city poor, the friars, and marriageable maidens in need of dowries. But he has also, since youth, served the family trading interests at home and abroad, put out goods with others, carried big lots of goods on ventures overseas, lent to rulers and to other merchants, borrowed and traded shares in city debts, bought and rented city shops, sold grain and timber from his properties on land, taken or given cambio on the Fairs of Champagne.

He owns varying interests in a number of big ships and his continuously shifting his investments in shipping operations. His palazzo is a fort, a barrack, headquarters of a political party, a hostel for a host of visiting kinsmen and their families, home for his family and for his sons and their families, a municipal show place where prominent visitors are dazzled and entertained, his counting-house, and his warehouse. The shop fronts at street level he rents to artisans and dealers in retail. He is at once so much more than a businessman, and so much less than a full-time businessman would be today, that he is difficult to classify”.¹¹³

Referring to many other examples such as the Lercarri or Fieschi cases, Reynolds thought that “a Zaccaria was outstanding in the magnitude of his successes, not in the variety of his interests”.¹¹⁴ All prominent alberghi were involved in many different activities. Reynolds is correct : applying our modern institutional boxes, such as “businessman”, limits our understanding of the past. Successful leaders of a Genoese *albergo* were involved in politics, business ventures, diplomacy, charity, like Zaccaria. But we can go further, with Reynolds, as far as business activities are concerned, it is hard to classify what Zaccaria was doing : manufacturer of alum, ship-owner, trader, merchant banker, lease or renting service provider. This is non-specialization of merchant is not something specific to Zaccarias. In medieval times, profits made merchants, whatever the form they could take, and if a profit was to be made in transport, or in a financial investment or in retailing activities, then the merchant was to become either a shipowner, or a fund provider in all forms of contracts, or a trader. However, what was distinctive with Zaccaria was not only his successes but also, in our view, his ability to create success from synergies between this “simultaneity of careers” (Reynolds) or in other words his ability to produce some successful “functional” combination between different type of assets, presence in different locations and speaking-partnership with many different rulers.

However Zaccaria was first a military. Sometimes, he served officially for Genoa’s Commune, sometimes he rented his service to external rulers. As mentioned, he has been made Megaduc of Byzance, Admiral of Philip the Fair and Admiral of Castilla. This military support to rulers were never *gratis e amoris* service. His military skills were expensive. It might be paid in cash, through debt, like for Philip The Fair or in exchange of some real estates, being for instance the *Puerto Santa Maria* in Castille. Zaccaria sometimes used his military skills to commit some acts of piracy, causing problems to Genoa. This happened in Tripoli, when several Egyptians galleys

¹¹³ Reynolds (1945 : 12-13),

¹¹⁴ Reynolds, (1945 : 11).

have been attacked by Zaccaria while he was supposed to focus only on the defence of Tripoli, a city he conquered for Genoa a few years before.¹¹⁵

Among Zaccaria's direct business activities was his alum business. He owned the mine and the harbour of Phocea - today's Foça in Turkey, near Izmir - thanks to a land concession given by King. Phocea's business employed about 3,000 men to extracting 14,000 cantarii of alum per year, or 25 times the amount involved in this transaction.¹¹⁶ We will discuss further this alum business hereunder. Just before his death in 1307, he also managed to obtain the concession of Chios (1304), in front of Phocea : the island was not only a strategic logistic place to trade alum, it was also a place where large quantity of mastic. mastic was produced became a second commodity for which the Genoese, even after Zaccaria, will maintain some trading monopoly, in Western Europe, for about two centuries. In addition, numerous notarial records show him trading all sort of other commodities : grain from today's Bugaria and Ukraine¹¹⁷, salt from Corsica, fish and "peau" from Russia, all sort of armours from many Italian cities, coats, draperies and clothes from Low Countries, velvets and furs from the East, but also miscellaneous type of spices, corals, and also, unfortunately, slaves.

To conduct this trading business, Zaccaria owned many ships, being galleys or nave¹¹⁸ These were the famous *Divitia* (wealth), a huge ship with about 140 oarsmen : the *Alegrancia*, the *Benedicta*, the *Bonaventura*, the *Ricia*, the *Rosa*, the *Tartaria*, the *Stella*. According to Kedar's analysis (1976)¹¹⁹, galleys, during XIIIe, were given mostly secular names, in reference to the name of the owner (*Benedicta*), the geography of his business, his business mindset (*Divitia*) and his faith in the future (*Bonaventura*). From XIV onwards, Genoese will shift towards religious acronyms like *Santa Maria*, *Corpus Christi* or *Santa Croce*. These fleets were often leased to other merchants, or alternatively they could be used for Zaccaria's own trading activities. These ships were buld in Genoa, for instance in Sampierdarena, the major location for shipbuilding, or abroad. For instance, there are traces of contract where one of his business partner, Guideto Di Negro, recruited carpenters to build a ship in Pera.¹²⁰ Trading abroad required logistic

¹¹⁵ This event is quite often mentioned, and, on its way, Zaccaria is supposed to have rallied by some other Genoese galleys to help him. If fact what is interesting is that it is Paolino Doria, the gender of Benedetto, and the consul in Crimea at that time, who managed to convinced merchants to invest 6,000 Aspres in the "political" venture and sent 3 galleys to help his father-in-law (Brataniu, 1927: p. 221). Politics, business and family interest all at once !

¹¹⁶ The number of people in Phocea is based on the account of the Spanish Ramon Munater *L'expedicio dels Catalans a Orient* (1307), and Balducci Pegolotti *Praticca della Mercatura* (circa 1330-1340) is the source for the number of cantaria produced in Phocea. Except few other limited traces (Pachymere), these are the only factual records of the city in late XIIIe and early XIVE (see chapter 4).

¹¹⁷ A particular mention has to be make regarding wheat. On 28 January 1276, the Zaccarias committed to deliver to Genoa the huge amount of wheat from Romania. At that time, Genoa faced a huge famine. We have found the information in Brataniu (1929, p. 140) and Lopez (1933,) but the first trace of the transaction is in the study we have not consulted : Sieveking, *Finanze Genovesis*, Atti Liguria, XXXV, 1 : 85. Lopez claims that the Zaccarias actually made a huge profit on the transaction, combining again patriotism and business interests.

¹¹⁸ Lope (1933 :), Ballard (1973 : 535).

¹¹⁹ Kedar's "psycho-sociological" view is that, between end of the XIIIe and mid XIVE, gradually the Genoese have changed the way they *represent* the future. Up to late XIIIe, risks and uncertainties were mainly viewed as a potential for a good "*fortuna*". Merchants were prudent but not afraid of risks. There was no need to have galleys with Christian's names to be protected from contingent events. For instance, Louis IV left Aigues-Mortes, for his 1270 crusade, in a ship provided by the Genoese called *Divitia* which means money or wealth !

¹²⁰ Balard (1978 , vol. 2 : 544)

capabilities in from off real estate assets in distance. Contracts mention houses or *foundouks*, in miscellaneous places in or around Genoa, in Pera, in Caffa, in Galatta, in Phocea, in Cadix. The contract we will study mentioned a stock of alum in Aigues-Mortes, implying that maybe he had a *fondaco* also overthere . His strategy was always the same : buy for a low prices, and sale on a distant market for a higher price. That is the basis of any business strategy and, several years after, Pegolotti' *Praticca* urged medieval merchants never to forget it: buy low, sell high.

Zaccaria was also an investor. There are traces of his holdings in public debt issued by Genoa. As mentioned, from XIIIe, Genoa "securitized" many debt issues (*compera*) by providing investors with fixed revenues from specific tax-based assets, being tax on salt or on maritime trade. Debt owners were mainly wealthy families who could then yield a return of 6 to 10% in late XIIIe. There is a document showing Zaccaria's brothers reselling to other investors, *loca* they had in *compera salis* in 1281.¹²¹ The Zaccarias had also acquired a vast real estate portfolio, and notarial records and other documents give us evidence of a dozen properties in Genova and abroad (e.g. Lopez 1933, p. 57). It could be a *logia*, a *porticus*, a *palazzo*, a *fondaco* or even a whole *contrata* (a quarter), as we now that some descendants of the Zaccarias have set up, around 1335, a *contrata Jachariorum*. Among these assets, it should be mentioned that Benedetto acquired an apparantly magnificent Palazzo in Bissagno where Marguerite III of Luxembourg spent sometimes in 1308, when Zaccaria has just passed away. Eventually, Zaccaria invested a lot in other business ventures, either on land (for instance he owned a dying company in Bissagno,¹²² and owned some shares of the cloth manufacturer in Florence) or on sea.

These miscellaneous business or political interests were not "stand alone" entities. What Zaccaria was doing is to create synergies both within these three areas and across them.

1298-1299 : Philip The Fair, the Zaccarias and the war in Low countries¹²³

Zaccaria knew the Low countries, and Bruges in particular. We have mentioned that he was behind first direct shipments from Phocea and genoa direct to Bruges and England. He also increased the size of galleys and adopted the round ship called *cocha*. However, as we will see later, Zaccaria and other Genoese did not manage to obtain privileges in the city, and they were no permanent agent or representatives of the Zaccarias nor Genoese financiers investing in long distance commerce in Bruges in 1298. But another crucial element has to be mentioned. During the late 1290ies, Philippe le Bel (*Philip The Fair*) was fighting to maintain his supremacy in the Low countries. One of the main city in the Low Countries was Bruges or *Brugge*. Bruges emerged as a central market place, enjoying a particular growth notably thanks to its drapery industry. One legend says that the wife of Philip The Fair, Jeanne de Navarre, said when visiting Bruges, in early XIVE, and seeing many women wearing beautiful cloths : " *I thought I was the only Queen here, but I see hundreds around me*".

However Bruges, as many other cities at that time, gradually became keen to obtain more independence from France, and the city itself was the theatre of rising tensions between rich

¹²¹ Lopez & Raimond (1955 : 227-228) This fact is interesting because it shows the existence and the liquidity asecondary market for public debt in Genoa in XIIIe.

¹²² The art of dying was quite well-known in Genoa. On the anecdotic side, the legend is that the " *blu di Genova*", made with indigo, is the true origin of Levi-Strauss' "Blue Jean" (created in 1873). This color is said to be used in Genoa to produce the blue trousers of mariners. Levi-Strauss' jeans "Denim" are said to have be named in reference to "Nîmes", a major place for the production of "toile" since the early XIth, where the "serge" de Nîmes was used for making sails of galleys.

¹²³ On Philip the Fair in General, the highly readable Favier (1978), or belgian historiaans andd Van Houtte (1982), Pirenne (...)

local bourgeois and popular class of citizens. In 1280ies, several insurrections against the French emerged in the region : for instance, in Bruges, Ypres and Douai. A cause of trouble later emerged during the conflict between Philip the Fair and his vassal Guy Dampierre, the Count of Flanders. Guy established his power and his increasing independence from Paris by building alliances locally and externally. Guy facilitated the local set up of English in Bruges, in 1294, who managed to control the trading and prices of wool from England. Some local merchants resisted and Edward I then launched an embargo on all trade from England in 1296.¹²⁴ Philip the Fair had to intervene in the North. He deployed his army in Flanders, starting with the battle of Lille (1297) and Furnes (1297). In this context of tensions and instability, Bruges, in the year of the contract we are going to analyse, in 1298, was in the middle of the building of an extension of his city walls, previously first built in XIIe, and the project was completed in 1300. In 1299, Phillip and Edward signed the Treaty of Montreuil. Flanders was not the only object of the conflict. First, Edward had control over Guyenne (except Bordeaux) but on 19 May 1294 Philippe IV has expelled Edward's troops.

The Treaty of Montreuil, 19 June 1299, therefore after the signature of the transaction we are going to analyse, is a typical medieval political compromise . Philip did not gave back Guyenne to Edward, but gave it to his daughter Isabel, who was to marry the Edward's son. Philip imposed that however the county was to remain under his leadership. Guyenne is not the we know that throughout the 1290ies Philippe IV has not only expand his control over Flanders but has planned to invade England. To achieve both objectives he decided to build up a considerable maritime power which started by the creation, in 1293-1294, of the first Royal Arsenal, "le Clos aux Galées" in Rouen (Normandy). At the centre of this naval power were the Genoese, and Benedetto Zaccaria in particular, as we will see. Interestingly enough, the galleys were built by the Genoese in Aigues-Mortes and then delivered to Normandy.

There is the trace of letter from Zaccaria detailing his recommended plan to defeat England: "*la meilleur manière de guerrier [is to] offendre les Anglais*"¹²⁵ Zaccaria is said to have drafted himself in French the plan for the invasion of Englan. Furthermore, Zaccaria advised Philippe the Fair to block the Gironde (Bordeaux) and the Seine (Rouen), while building a massive fleet around the Zwyn in front Bruges. What he was aiming at was to set up a continental embargo of England, a strategy that a R.S. Lopez once compared to the one that Napoleon tried to apply five centuries later, and then launched a large attack against the coast England. Zaccaria's own son, Paleologo is known to have been leading galleys along the coast of Britany and Picardy in 1297 and 1298. Traces of significant benefits for the Zaccarias appeared in several records, including several annuities granted by Philip IV. Eventually the plan was never fully implemented and instead Philip IV and Edward signed a peace treaty (1299).

All this event proved two things. First there was lots of instability around Bruges when the parties signed this contract about shipment of alum. Second, Zaccaria was one of the best informed player of the political and military scene. We certainly knew if he was in position to take advantage of the situation, what kind of risks the galleys could face on their trading route, or if possibility to find a settlement to the conflict was possible. Or, and this point is not without importance, maybe he knew that some important news or decision about the conflict were due to emerge. Before analysing the way the contract address this issue (PART III), we should now try to define more precisely what this business of alum was all about.

¹²⁴ In fact the embargo was never total, and goods were simply send further North near Antwerp.

¹²⁵ Roncière, (1925) ("the best way to conduct the war is to attack directly the English").

Long distant maritime trade of alum end XIIIe: from East to West ¹²⁶

The commercial contract we are going to analyse focuses on a shipment of alum from the mines of Phocea, near Izmir in today's Turkey, to be shipped in Aigues-Mortes, in the South of France, and then further transported to Bruges, a rising market place in what was called at that time the "Low Countries". Alum was a key commodity. The main sort of alum is potassium sulphate, or potassium alum or potash alum, $[K_2SO_4, Al_2(SO_4)_2, 24 H_2O]$, also known as kalinite. Since the XIVth century, there are miscellaneous description of alum production techniques. ¹²⁷ Excluding the introduction of explosive to extract rocks, these similar descriptions demonstrate that the overall process, from extraction to shipment, did not changed a lot until between XIIIe and XVIIIe. Alum has a wide range of properties, but its main use was as a mordant, fixing colours to cotton and other materials, making them better resisting light, water and use. Consequently, the biggest end market for alum was the dying and the drapery industry.

End of XIIIth century, the drapery centres located in the North of France (e.g; Lille, Douai, Cambrai), but also in the South (e.g. Nimes) or in Paris, in England and the Low Countries. In the latter, key markets were Ypres (*Ypre*), Gand (*Ghent*), Diskmude and the rising economic centre at that time, Bruges (*Brugge*). These places provided the largest shares of the demand for alum. There are traces of transaction of imported alum in Bruges as early as 1163. ¹²⁸ End XIIIe, Alum was still often traded on one of the seven seasonal Fairs of Champagne, before being carried to the drapery centres. But from 1277-1278, notably by the Zaccaria's fleet (see above), alum was directly shipped through "Hercule's Pillars" (Gibraltar Straits) to the French Atlantic coast and then the Channel.

As far as supply was concerned, there were several sources of low quality alum, being alum *minuto* or *di piuma*. The mines of this sort of alum in North Africa, in Italy, in Syria, in Bulgaria, in Castilla. Some have conjecture that alul from Castilla probably designed alum from Sedjelmese (Morroco) or Bougie (Algeria) that was traded in Castilla. But the main production sites, in terms of quantity and quality (alum *di rocca*), were located in the geographical area covered by today's Turkey. We know that, at that time, some part of this region, and especially the critical Constantinople, were under the leadership of the Byzantium empire. Buyers in Low Countries were looking for a regular flow of quality alum, and in Bruges the Guild (the merchant association) of the "drapiers" drapery-makers imposed rigorous quality standards. In the Low Countries, alum *minuto*, *di piuma* were of low value compared to to alum *di rocca*. There were 2 big mines¹²⁹ were : Karahissar, also called Collonia by Pegolotti, today's *Sebinkarahissar*, in the Central North of the region; and Phocea, today's *Foça*, and *Yeni Foça*. We have already mentioned that according Pegolotti, Phocea's mines did produced about 14,000

¹²⁶ Specific information on alum can be found in Cahen (1963), Liagre (1955), M.L Heers (1954), Brantaniu (1929), Lopez (1933) and Balard (1978), Singer (1948), and for Tolfa's mine Delumeau (1963), recently Colak (M.), et alii (forthcoming) provide some useful geographical and archaeological insights.

¹²⁷ From Delumeau (1963) : Pegolotti circa 1330-1340; Biringuccio, 1530; Agricola, 1556; Boconne, 1667; de Bondaroy, 1765).

¹²⁸ Liagre (1955 : 180-181).

¹²⁹ Other mines were (i) Lupai or Lupajo (*Lake of Ulubad*) : the alum of Ulubad, was of lower quality and but did produced, again according to Pegolotti 10,000 cantaria of alum. However Ulubad is a lake, and it is likely that the mines were further South from which alum was transport to the harbor of *Triglia* (Tirilye); (ii) Cottai (*Kütahya*) : In fact this mine was certainly not located in precisely in Kütahya, where geological data show no presence of alumnit, but possibly further South-West in Saphane. For Pegolotti, Kütahya produced 10,000 cantaria of alum; (iii) Iconium (*Konya*). (see under)

cantarii per year, and the Spaniard Ramon Mutaner visiting the place wrote that, in 1307, that about 3,000 men and women were working in Phocea.

Phocea's alum is central in this deal, as we will see. In 1264, or around as this date is debated by historians, Michele Paoleogo, the Emperor of Byzantium, gave to Benedetto Zaccaria, and his brother Manuelle, the concession of the harbour and, more importantly, the mine of alum, on the mountains on the North East in Phocea.. There is a transaction recording Zaccaria's import of alum from Phocea, through an agent, in 1268 (see under) This is likely to be alum from Phocea. We don't know exactly the terms of the contract between Zaccaria and Michele, but this was likely to be some sort of land-lease given *ad personam*, with an annual rent to be paid, and later this lease had been converted into a full ownership by the Zaccarias. We don't know for sure either alum has been discovered or even extracted from Phocea before the Zaccarias, the most plausible assumption, or after. What we do know, for sure, is that Phocea's alum soon became a huge business.

Between this supply and demand, the East and the West, many Genoese, on not only the Zaccarias, played a key role as traders. It started well before the ownership of Phocea's mine. In a notarial record acting the death, on 17 June 1164, and detailing the will made by the wealthy merchant Guglielmo Scarsaria to his daughter and his two sons: an inventory of his house listed "alum from Castile".¹³⁰ Later, in 1225, a transaction involved a stock of alum located in Genoa and sent to Bruges by two merchants from Arras,¹³¹ and eventually another document showed Genoese traders importing alum to Bruges through the continental route, as early as 1244¹³² and eventually another document showed Genoese traders importing alum to Bruges through the continental route, as early as 1244. The first known land-based shipment of alum from Genoese traders was in 1244, through France probably with carts and mules, The travelling Franciscan monk "William de Rubruck" - in fact a citizen from Flanders called *Willem Van Ruisbroeck* - wrote around 1255 :

*"I found several Franks in Iconium, and a Genoese trader from Acon, Nicholas by name, from Santo Siro, who with his partner, a Venetian called Benefatius de Molendino, had monopolized all the alum in Turkey, so that the Soldan could sell none of it to any save these two; and they resold it so dear that what used to be sold for fifteen besants is sold for fifty".*¹³³

In XIVE , through the Giustaniani of the *mahona* of Chios and later the business empire of Draperio, the Genoese controlled *de facto* alum supply from East. With the fall of Byzantium and Constantinople (1453), and the discovery of Tolfa's mines near Rome (1462),¹³⁴ initially jointly owned by the Church with an exclusive partnership with the Medici of Florence, the Genoese temporarily lost their supremacy, but soon they managed to become the key intermediary for trading Tolfa's alum.

In terms of logistics, when bringing back alum from East, and making often a call in their native city, the Genoese traders had different options to ship the commodity further North West, in what was called the *ottramontani* (literally *beyond the mountains*, or "*l'Outrelmont*" in French), in "*Flandare*" (Flanders) or on the French Fairs. First, there was the classical land-based transportation, with horses and mullets through the "*Alpina*" mountain chain. Usually it started, from Asti, to Novara, to Vercelli, walking through the Aoste valley, and then was the difficult crossing of the St Bernard. An alternative, less used end XIIIe, was to go to Turin, then

¹³⁰ Epstein (1996 : 60-61)

¹³¹ Liagre (1955 : 180-181) : check.

¹³² Doehaerd (1938 : 18).

¹³³ Rubruck (G. de), (1255)

¹³⁴ But discovered notably by a Genoese, Giovanni de Castro (Delumeau, 1963 :)

Testona, then Monginevra and eventually go through the Savoy. For Genoese traders, a second alternative was to send ships to Aigues-Mortes. Aigues-Morte's role as a sort of logistic "hub" at that time, and notably for Zaccaria. There is a contract showing Benedetto mandating, in an *accomendatio* (or commenda) his agents and messenger Daniele de Mari to sell sacks of alum and mastic.¹³⁵ Part of the commodities were kept in a storage, called in XIIIe Genoa *fondaco* (from Arabic, funduk) in Genoa and the rest is in Aigues-Mortes. Aigues-Mortes was an important location at least for two reasons. First, there were strong ties between the French harbour and the Commune of Genoa and the Genoese have been there from the beginning of the XIIIe.¹³⁶ They have helped to build the harbour and have also been the main providers of galleys and people for IV crusade launched from there by the King St Louis. Secondly, Aigues-Mortes was ideally located.

From there, alum could be transported directly on the 4 fairs of Champagne through the Rhone Valley, and after on the Saône, and further North to Low countries. However, from the 1277 Genoese established a third route: direct shipments from Mediterranean to England, Normandy and the Low Countries. The man behind this innovation is Benedetto Zaccaria, and notarial records show that alum was the key commodity that was traded by Genoese merchants sailing into along the Atlantic coast of Portugal, Spain and France. For direct Atlantic journey, Aigues-Mortes, between Communes of Italy and Spain, not far away from Majorca and Barcelona, was an important place for calls. Aigues-Mortes' location, at the cross of different trading routes, made this place a strategic call for alum traders as we will discuss in more detail later.

Alum's value chain and integration

The business model developed by medieval traders, and Zaccaria in particular, was about playing the link between the supply (East), the demand (West) and, in-between, the logistic of alum. This overall logistic of alum was a vertical value chain, starting from production to ending with final customers. In this business value chain, Zaccaria had several business options: either he could focus on one or several key segments of the value chain, or he could go for a full integration. Clearly Zaccaria decided that the critical segment was production. Zaccaria could decide to keep his focus on alum production only and to sell his stock on the spot at market price, in Phocaea, to other traders. Alternatively, he could decide to go further downstream and to ship it, himself or through the leasing of galleys, to closer to Western markets, for instance to a logistic "hub" such as Aigues-Mortes. In this location of Aigues-Mortes, Zaccaria can decide not to go further, as he might consider to liquidate his stock on the spot in Aigues-Mortes if there is if alum price in that place was such that a trip further abroad is not worthwhile. Alternatively, Zaccaria might want to keep a stock in Aigues-Mortes because local demand had already absorbed previous supply of alum, and that he anticipates a future demand and price increase in Aigues-Mortes. Another alternative is to ship this alum from Aigues-Mortes closer to big drapery centres and then to sell it. As we have seen, from Aigues-Mortes, Zaccaria could transport the alum through the Rhone Valley, straight to the Fairs of Champagne or going further to North, in Low Countries. Alternatively, he could ship it directly by sea to Low Countries, for instance to Bruges or in Normandy. This value chain could go further and Zaccaria could decide to own a dyer business, and we know this is what he did in Bisagno (near Genoa).

This is in a nutshell the vertical integration of the alum supply chain. But we have to extend this value chain. Utilisation of shipment capacity was an important issue. The worst for a merchant paying the transport for a venture was to come back from destination unloaded. Genoese

¹³⁵ Lopez & Raimond (1955 : 219-220)

¹³⁶ Jehel (1985)

merchants going to Low Countries were keen to bring back the best goods to be exchanged in crucial markets in Italy, or even further East in Pera or even Caffa. Among these was the "*panno* [drapery] *ottramontano*". For Zaccaria, good venture was about selling alum at the best price, then, with the sale proceeds buying back lots of draperies, from Bruges or Ypres, or even the most expensive one from England, and then shipping back the goods, in Genoa or even further East in Caffa, and then resell them.

In all these different business segments, from production to sales to end customers, Zaccaria had a strategic decision to take: does he want to be involved in this segment or not? Does he want to have a stake in the production of alum, does he want to be in storage and transport business? Does he want to sell to other merchants going to Fairs of Champagne or Low countries, or does he want to trade the alum himself? This "do" or "don't do" options are, in essence, strategic decision depending on basic factors. Where is the value in the supply chain? What are the segments where Zaccaria could add value and make money by his unique franchise (knowledge, management or transportation skills, political connection)? What are those segments where it simply does not make sense to be in, for instance because of the lack of specific expertise or the competition from other suppliers? Is there a way to bundle segments together in order to set up barriers to entry for new entrants or cascading control into different segments of the value chain?

Zaccaria's business model was simple: he went for full vertical integration. From production in the East to transport and then trading in big markets in the West.

This vertical value chain can now be linked to the second side of business model: the horizontal integration of business segments. The horizontal integration of a business segment is achieved by direct or indirect control of this segment (e.g; production, transport, trading). Control can take the form of acquisition of assets, informal price-fixing agreement with competitors or regulatory-based monopoly. This is precisely what Zaccaria did. The most obvious one was the control of production. According to Pacchymere,¹³⁷ the Zaccarias successfully lobbied the Emperor to have an exclusivity of imports for all the alum shipped from the Black Sea, therefore including imports alum from Karahissar. Indeed this alum was shipped through the harbour of Trezibonde (*Trabzon*), or sometimes from Cezaronde (*Giresun*), after a land-based transport of about 7 days. From there the alum was shipped through only maritime route: the Bosphorus, and then the thin "mouth of Abydos" (*bocham aveidi*, or *avei*), the straits around today's Canakkale, providing only access to Aegean then the Mediterranean and Western markets.

But the Genoese merchants and the Commune implemented some sort of embargo (*devetum*) in their trade relationship with the Empire, and Michele Paleologus stopped Zaccaria's monopoly rights in around 1281, according to a contract of Pera-Caffa mentioning Alum's import from Trezibonde and which does not mention the Zaccaria brothers. Take another way to control production. First, Zaccaria married his daughter to Paolino Doria, who held the position of Consul for the Commune of Genoa in Caffa and in Trezibonde, from which, as we have seen, alum from Colonna was shipped abroad. Paolino Doria but also other Zaccaria's gendres, like Andreolo Cattanei Della Volta, played a crucial role as far as export from the Black sea was concerned. In addition, the Zaccarias have established strong business relationship with the De Negro, who appear extensively as "principal" or "agent" for alum shipment from Trezibonde in notarial records (e.g. Caffa 1289-1290).¹³⁸ Eventually, there are several dozens of contracts (mandate, nolis, commenda, societatis, sales), and this is of course just a tip of a huge of a certainly thousands of such contract, referring to the Zaccarias. This shows that they were indirectly controlling or trying to control the alum trade. Transport capabilities were of course

¹³⁷ The English translation of the part of the document is included in Lopez & Raimond (1955:)

¹³⁸ Balard (1973, 1978)

crucial. Zaccaria and the Genoese manage to keep monopoly on shipment on sea to the Low Countries, and it is not until 1314 that the Venetian Commune sent galleys to Flanders .

After production, we can look at the control of transport from East to Mediterranean and from Genoa or Aigues-Mortes to West. There are numerous evidences that the Zaccarias were also leaders, and indirectly controlling lots of long-distance shipment of alum to Low countries either directly or indirectly through collaborations with other merchants and financiers. The Zaccarias owned a large fleet, and Benedetto emerged as the driving forces behind the establishment of a regular shipping route direct to the North sea. Zaccaria also introducing several technological innovation.

In other words, late XIIIe, Zaccaria was involved in most segments of the trading of alum (vertical integration). Furthermore, he controlled most segment (horizontal integration), from production to trading in end-markets, a large part of the alum business from East to the West. But and this is a third important aspect, Zaccaria was not necessarily obliged to do it himself. He could “make or buy”. He could buy on the spot more alum from another mines, as he did from Collonia, buy more transport as many contracts show he did indeed, or even buy storage capabilities. Alternatively, he could “make” in-house : investing in assets (production, galleys) , and recruiting employees and agents. The other way around, when he faced a bit over-capacity, stock or empty galleys, he could sell some of them to other traders. The “make or buy” (and sell) decision was driven by many reason : matching his own internal capacity to supply-demand cycles, adjusting his risks profile and diversifying investments, but also collecting information from other traders and eventually insuring loyalty from key partners by sharing with them some business opportunities.

The following exhibit captures these different dimension of the alum trading : the “make or buy” and the decision to be involved in a business segment, vertical and horizontal integration.

[Insert about here Exhibit 3]

What ultimately supported Zaccaria business model (vertical and horizontal) was contract. But we need to understand first how this business model was about managing risks and return of ventures

Risks, “cash and carry”, operational leverage, options

Trading alum between Phoea and Aigues-Mortes, and then from Aigues-Mortes to Bruges implied some risks. We have mentioned the political instability in the Flanders at that time, and the tension with Philip the Fair. We will further investigate the specific issue of trading in distant places for medieval merchant. At this stage, let us focus on the business risks, being the price or market risks, the casualty risks at sea and then the currency risks.¹³⁹

The first uncertainty was about the overall supply and demand of alum in dedicated location, and consequently expected price of alum in distant markets. The major problem for traders was to make sure there were not heading for a market with large inventories of alum. If a shipment was to be made to a given market just after large quantities of alum were unloaded to the same market, no buyers were ready to pay full price for such a commodity. Long-term, the issue was of course the cyclical economic and political conditions. A recession of the drapery industry was not good news from alum traders. However, possibly because the Genoese controlled a significant part of the supply, nominal real price remained stable from XIIIe to end XIVE, with

¹³⁹ We provide more extensive information on data (price, casualty, currency) in Part III, when we will model the contract.

exceptions such as sudden rise and fall caused by “Black death” mid XIVe, and the Seldjuks conquest in the East end XIVe. In Genoa, alum costs about 40 soldi ¹⁴⁰ per cantaro. However, in real terms, alum price decreased, and one could explain that by progress in shipment productivity and/or by the overall crisis of the textile industry in XIVe.

Casualty risks were another factor. Weather, contrary to what common knowledge used to think was not the principal issue. First it was piracy. There were pirates who were all over the seas : near Gibraltar Straits, in the Gulf of Gascogne, but also in the Channel where galleys making trip to Southampton and Bruges regularly attacked. ¹⁴¹ Another problem was manoeuvres in harbour, notably during calls. This is when most “Act of God” casualty happened, and where bad weather, notably lack of visibility, could make things worse. In records from Italian merchant Datini, in late XIVe, there is an estimate of 2% loss for Genoese galleys going to Flanders. For early XVIe, there are more and better data about casualty rates, notably from the *Verenidigde Oostindische Compagnie* (VOC) books and its French rival : it says that about 5,8% of Dutch shipment were lost every year, and for the French the rate was remarkably similar about 6%. It is of course difficult to compare figures. This contract involves someone who is viewed as a “master of sea”, Benedetto Zaccaria, with unique military and navigation skills. Second, the shipment, or part of the route, was possibly made along a convoy of other armoured galleys as Zaccaria was commanding Philip the Fair’s fleet. Having said that the conflict between Flanders and France, and the tension with England, was a factor increasing casualty risks or the perception of those risks.

A third problem was currency risks.¹⁴² Transaction involving international trade bear some currency risks related to the exchange rates fluctuation. For instance, Zaccaria produced alum in Phocaea, and he had to pay most of his employees in Hyperper – the Byzantium money. Then when he shipped some alum to be sold in Genoa, or in case of capital issue in Genoa, he was to be paid in cash in Genoese £. If the destination of one of his ventures was Northern Africa, for instance Tunis or Ceuta, local currency was Bezants. In the North, in France or in Flanders, he will be paid in Tournois.¹⁴³ The French Tournois or “Gros Tournois”, mentioned in the contract, has been first emitted in 1269, and is the “official” currency used in Flanders since its introduction by Margaret of Constantinople, and Guy Dampierre, Margarete’s son, went beyond by duplicating exactly the weight and appearance of French Tournois. The Genoese soon understood that exchange rates were problematic in long-distant trade. The best way to remain immune from volatility was for Genoese merchants to become holder of a strong currency. Genoa, in the middle of its commercial expansion, produced the first European gold coinage in 1252. However, because of its size, competition from other cities and lack of political stability, Genoa had never been able to produce “the dollar of middle age” (Balard). Currency risk was something merchants and bankers soon tried to manage to deal with well before Zaccaria. In late XIIIe, there are traces of specific covenants aimed at protecting fund providers from a sudden rise or fall of currency exchange.¹⁴⁴ Late medieval financiers involved in international finance soon understood that they could go beyond hedging : they made speculation and arbitrage of foreign exchange rates, notably based on the seasonality of trade. ¹⁴⁵

¹⁴⁰ Medieval monetary convention : 1 Lira (£) = 20 Soldi (S.) = 240 Denari (D.)

¹⁴¹ Gelderborm (2005 :)

¹⁴² On medieval currencies and exchange rates (Spufford, 1988).

¹⁴³ We simplify because we know that in Flanders many currencies were in use, and that the most common exchange currency was English Sterling (Munro, 2005).

¹⁴⁴ For instance in the cartularii of the notary Guglielmo Cassinese (1190-1192, n° 275, 425, 588, 617).

¹⁴⁵ Example of triangular currency arbitrage (Day, 1994 :)

There was an additional risks specific to medieval market we have to better capture. Most commercial transaction, but not financial as we will discussed, were done “cash-and-carry”.¹⁴⁶ In this type of transaction, the seller transported the goods and then settled a sales agreement by which the buyer paid cash the agreed spot price and carried away the goods or the commodities. The actual transaction was said to be closed, according to the explicit French commercial expression, “*sur la place*” (on the physical spot market) on a Fair, on a city market down town, in a hall in or closed to the Befroi or nearby the harbour where shipments were unloaded. There was small delay between the sales and the payment, but usually they were not very long, a few hours or a few days. It is still difficult to assess why medieval markets for goods and commodities did not institutionalised forward sales agreement. In such a case, the order takes place before the delivery, at a fixed forward price, and merchant and buyer can even agree on possible an up-front partial pre-payment. Instead of this system, medieval economics of the fairs and local markets maintained, in the vast majority, cash-and-carry system: cost of transacting were not reduce by securing transaction in advance but, alternatively, by gathering a wide number of buyers and sellers in the same place and at the same time.

This is not the topic of the present study but this cash-and-carry is a puzzling problem because medieval investors in financial vehicles did contract for the long-term. Changers involved in long-distance trade will soon establish long-term forward exchange rates, fixed a few months or up to 1 or 2 years in advance. Investors in long-term *commenda* or *societatis* could wait 2 or 3 years before contemplating some returns from their initial investments. From XIVe, the *compagnia* in Florence became a long-term business vehicle. Why it was not possible for merchants trading goods and commodities to elaborate a substitute to the traditional markets-and fairs-based cash-and-carry ? It is only in XVI-XVIIe that sales based on samples became more and more common practice. Seasonal cash-and-carry markets started to make place to an alternative logistic model : a continuous flow of goods following a supply chain based on large shipments, then large buyers central warehouses in cities (wholesalers), reselling to a network of smaller shops and boutiques. These retailers were storing some items in their shops but some sales were closed before the actual delivery, notably thanks to samples. In this setting, customers and retailers could order goods at agreed on a forward prices. Along with warehouses and retail boutiques, with decentralised inventories and samples, also emerged central city exchanges for commodities, for instance the “English exchange” of *Merchants Adventurers* in Antwerp (1558).¹⁴⁷ These exchange were critical in enabling market participants to buy and sell stock of commodities, for instance grains, throughout the year, independent of cycle of local Fairs and markets. At the same time, in XVe-XVIe, merchants also started to rely more and more on account receivables : the successful Flemish merchant, Jacob Della Faille, had in his books (1589-1594) more than 75% of his revenues waiting for future payment by customers.¹⁴⁸ But, even then we need to be cautious because like many other “businessmen”, a modern concept that does not apply at that time, Della Faille was a merchant, a financier and many other things also.

The alum market was still cash-and-carry did in 1298. Of course, cash-and-carry was not only a sort of irrational and inefficient pre-modern market setting. There were strong reasons why cash-and-carry was common practice at that time. For instance, in long-distance (time, geography) trade, buyers and sellers were not able to properly anticipate the scale of price or currency volatility. In addition, there was a high risks of delay or default on delivery. Therefore, it was difficult to agree on a forward/future price at maturity, and market participants had

¹⁴⁶ Many insights on cash and carry, and some other themes developed hereunder in Kohn (2006)

¹⁴⁷ Van Der Wee (1992), Materné (1992)

¹⁴⁸ Aerts (1992)

incorporated the costs this uncertainty into the forward transaction price. In addition, parties did not necessarily knew each others and it was difficult to litigate if one party breached one aspect of the pre-agreed contract (e.g. quality, quantity, price, timing). Maybe a fourth one was the medieval culture of “time” so well described by J. le Goff.¹⁴⁹ In the feudal world, time was not something one could mastered by individuals. Usury was about this moral interdiction. However, the rise of the “time of merchants” introduced a more long-term and rational, business-driven projection into a distant future. Making money was about anticipating the future, and the wave of time-focused innovations (e.g. individual hand-clocks) from circa XIV to XVII is not coincidence. All these is certainly correct, but again these list of explanations are no clear cut solution and the length of the transition remains a question : why did it took so long to establish, in addition to the cash-and-carry markets, a forward-based supply chain between producers and end-customers ?¹⁵⁰

For a Zaccaria transporting alum to Western markets, there was certainly a direct negative impact of this cash-and-carry spot market : working capital. As far as working capital is concerned it means that account payables and receivables were of limited business use in trading activities. The merchant pays cash his suppliers upfront, he receives cash later when delivering the goods to customers. Even for internal contracts regarding venture management, a merchant could not delay payment to match outflow and inflow. Many payroll and other items were to be paid upfront or during transport. A big sum was to be paid cash first. For instance, there are many contractual examples showing captains or scriba (the “accountant”) receiving a significant part of their salary before leaving abroad. It was not uncommon for mariners, who had received a substantial part of their salary, to disappear during a call to come back home or to join another galley. This problem was further exacerbated by its link to other business and technological constraints. In particular, the space and the timing distance, imposing merchants to hold assets for a long-time increasing working capital requirements and exposure to risks (price, casualty, currency) affecting assets value before sales.

This is where the cost structure of business, or the operating leverage, mattered. Operating leverage captures the ability by a firm to adjust its expenditures according to changing (positive or negative) market conditions. The more the cost structure is variable, the more a business can better and faster react to its economic business and environment : downsizing when demand is slowing, expanding when market is buoyant. Zaccaria’s ventures, like any long-distant and cash-and-carry maritime trade, had extremely low operating leverage. This can be represented on the following chart.

[Insert about here Exhibit 4]

At the end of the production cycle in location A, Phocaea , Zaccaria could sell on the spot or decided to transfer alum to a location B. Before starting a venture, he would therefore have to invest both the lot that could be sold otherwise (opportunity cost), and to transport, Zaccaria had to pay the lease for a galley, or invest one of his galley with the attached operational expenses (salary, food, repair and maintenance, tax) . In Location B, for instance in Aigues-Mortes, he will have to make the same decision : sell on the spot or transport forward to location C, for instance Bruges.

The problem is of course that because of the aforementioned risks (market, casualty, ...) the expected revenues in Aigues-Mortes or in Bruges were impossible to predict, with precision, at

¹⁴⁹ Le Goff (1999: 403).

¹⁵⁰ We often don’t agree with long-range historical theories à la Braudel but he (e.g. 1973, vol. 2 : chap. 1), notably based on some thesis of Sombart, has well pinpointed the crucial role played by commodity exchanges, central warehouses, network of shops with decentralised inventories and samples.

the start of the venture in Phocea, and later in Aigues-Mortes. The lower was the operational leverage, and the higher is the volatility of future revenues, the riskier was the business.

A lesson of modern finance is that, paradoxically, the higher the volatility, or the risks, the higher the value of option, enabling options-holders to adapt to volatility. In his business, Zaccaria had two essential tools to add more flexibility and more options in his business model : storage and transport capability. Storage is a natural way to lubricate economic exchange. The existence of inventories is first based on technical considerations. Because of time and process, it takes to produce and then move goods from supply to demand. Secondly, storage acts as a buffer enabling producers to adapt to market cycles, when market is full of frictions being time and cost to adapt the production capability, uncertainty about existing and future inventories in the market and so on and so forth. An inventory is more than this : it is an option. Instead of selling immediately on spot, in a cash-and-carry fashion, a merchant could wait and see if market conditions were provisionally bad because of competition, for instance a shipment of similar goods that has been just unloaded, or external macroeconomic factors. Ability to transport is also an option. If market turns out to be exceptionally good in another distant location, a trader with a stock of alum will not sell on the spot, or maybe even buy more stock, and then will transfer the stock in the aforesaid market and short the asset. Inventory and transport capability is precisely what provides some management flexibility within the alum value chain. Throughout a venture, in each call, if a merchant had storage and further transport capability he could decide to liquidate his stock, or to defer the decision or to expand his venture to another location, with or without more stock, to switch to another projects.

Transport and stock were adding flexibility or real options, in modern jargon, in Zaccaria's business. For instance, if an alum trader, without storage capacity and leasing his galley for a fixed period reaching maturity, faced poor market condition in at destination, he had not other choice than shorting assets. Zaccaria, on the contrary, with his storage facilities in many places and his fleets of armoured and fully equipped galleys, could instead to wait and see or organised another venture to go elsewhere. He had more flexibility than the merchant without options. However this had a cost : expenditures to fund storage and transport capabilities. Furthermore this flexibility was valuable only if merchants could have access to information to decide how and when to adapt, and therefore to unlock their "option" value . Before deciding whether or not investing in working capital or shorting assets, stop the venture or expanding in distant market, the medieval merchant was to gather data and process them. In addition to information. A second element was the ability to finance and transfer some risks/return attached to these options. But let us first focus on information first.

Informational economics and finance in XIII

There is an increasing number of studies focusing on the rise of knowledge and information in late middle age. A common theme is that it is not the Church or the States, but the medieval merchant that fuelled the demand for more information-related tools and institutions. Merchant was looking for solutions lowering the cost of information and improving the ability to collect, transmit and process of all factors affecting business and trade. In order to make this section a bit more specific, let us introduce two particular aspects : mathematics used for business and maritime application; business correspondence between distant market places.

Mathematics and business were interrelated in late middle age. Fibonacci, or Leonard de Pise (1170-1240) is a good example of this interaction¹⁵¹ He grew up in Pisa, an important commercial rival of Genova at that time. With his father, he spent a few years in Bougie (on the coast of today's Algeria), a place where alum, as we said, was also exported in late Middle Age. This is where he learnt Arabic, a language he had plenty of time to improve during his further

¹⁵¹ A recent good economic and financial perspective about Fibonacci in Goetzman (2003)

travels in Egypt and Syria. He also went to Greece. In 1202 he published the famous *Liber Abaci*. In 1220, he will complete his works with the *Pratica Geometria* how will widespread Arab and Greek mathematics. His books contained several practical example of mathematics applied to business, as learnt from Arabs' traders. His theoretical sources are mainly the *Elements* of Euclid, Heron of Alexandria, the books of Savasorda, Al-Khwarizmi, and it is highly likely that he knew the Al-Fakhiri written by the the Persian mathematician Al Karagi who lived sometimes in between end Xe and beginning XI.

Liber Abaci, for instance, explained to merchants how to use diagram in order to make "rule of three" currency exchanges or profit sharing calculation. As far as exchanged rates were concerned, Fibonacci gave the following graph enabling merchants to calculate quickly that if 12 Imperial deniers (D.) are worth 31 Pisan D., then a merchant is due to received 11 Imperial D. in Pisan D., then he should collect 12 5/12 28 :

<i>Pisan deniers</i>	<i>Imperial deniers</i>
31	12
5/12 28	11

For profit sharing rules, Fibonacci gave the following problem. If a Partner A put 18 £ in a *societas*, and another 25 £, and that the profit was 7 £. How much each partners should received. Fibonacci, with some minor mistakes in the original document, applied the same rule and found out that :

<i>Partner A</i>	<i>Partner B</i>
25 £	18£
7 £	
4 £ 32/43 7 D	2 £ 18 S 11/43 7 D

Business mathematics spread within commercial manuals precisely what Balducci Pegolotti, again not a mathematician but a business agent of the famous Bardi's bank, managed to describe in his *Praticca de la Mercatura* (circa 1334), a book we have mentioned several times earlier. This book provides tables listing compound interest rates. More than a century later, Treviso's arithmetic (1478), the first known western mathematic manual, is illustrated again with many business examples. This time the complex profit sharing are linked to the timing element.

Treviso gave the following example :¹⁵²

"Two merchants, Sebastino and Jacomo, have invested their money for gain in partnership. Sebastino put in 359 Ducats on the first day of January, 1472, and Jacomo 500 Ducats, 14 grossi on the first day of July, 1472; and on the first day of January, 1474 they found that they have gained 622 ducats. Required is the share of each [man so that no one shall be cheated]"

According to the following convention for the Venitian money, 1 Ducat = 24 Grossi = 768 Pizoli, or 1 Ducat = 32 Pizoli, the mathematics are straightforward, having in mind our previous equations extrapolated from Fibonacci or tables provided by Peglotti. Treviso quite rightly

¹⁵² For the following and the translation, Poitras (2000, chap7) and Swetz (),

convert everything in Grossi, plug the difference in both amount invested a (8,000 Grossi for Sebastino and 12,014 for Sebastino, and then the timing of investment (6 months more for Sebastino), from which he concludes that Sebastino should get 300 Ducats, 2 Grossi and 8 Pizzoli, and Jacomo should get the remainder, or 321 Ducats, 21 Grossi and 13 Pizzoli. The logic is correct but the result is wrong. Indeed, if we write the following equation, where we compute first the total cash at the end of the venture, which is equal to Sebastino's investment with a return on 4 period of time (semi-annual, or 6 months) and Jacomo's investments for 3 semi-annual return period, we obtain :

$$=850\left(\frac{14}{24}\right)+622=350\left(1+\frac{r}{2}\right)^4+500\left(\frac{14}{24}\right)\left(1+\frac{r}{2}\right)^3$$

Therefore solving equation leads to $r=34,6\%$. Replacing this r into the equation, we obtain a payoff of 300 Ducats, 12 Grossi and 10 Pizzoli for Sebastino, and the rest for Jacomino.

The spread of arithmetic was crucial in another area: accounting. The first real treaty of accounting, with double-entry book keeping, is said to have been produced by Luca Pacioli in 1494. The Belgian historian De Roover showed that earlier many key double-entry accounting rules were in place.¹⁵³ The double-entry technique was known from the Genoese for sometimes, and scriba (book keeps) were central economic figures in the Commune (see under). Around 1340, The Commune imposed its own accountants to record *massari*, the public finance, in such a way. But the Commune referred to this technique as something already used by bankers, therefore we can assume that before it was common practice among private merchants and financiers. In other books, not Genoese this time, there are examples of "modern" accounting rules such as deferred expenses (Farolfi, 1299-1300), depreciation on investment (1324).

Mathematics was not only used for calculating profit and loss, estimate impact of interest rates, it also helped a lot for interpreting data during navigation. We have said that the Genoese, along with Florence and Venice, did invent in XIIIe many new naval technologies, including maritime maps or portulans. What is also known is that the Genoese used the so-called *toleta de martelojo*, or *martelagio*, a medieval computation table, enabling them to obtain, in four columns, for every rumb of wind, the sinus, cosinus, tangent and secant. Thanks to the toleta, it was possible to calculate for every 100 miles, for a given destination and speed, "ses écarts de ligne directe (allagare), its progression (*avanzare*) the distance to come back to its route after a deviation (*ritornare*) as well as the distance to reach the point of destination (*avanzare di ritorno*). This knowledge does not only involve some good knowledge of trigonometry tables, but also supposes the use of logarithms. There is as early as 1390 a Genoese document where *martelagio* is mentioned, but, according to Balard,¹⁵⁴ it would be surprising if it was not in use before.

Merchants also developed processes and skills enabling them to collect and transmit information abroad. A critical practice to support information flow was business correspondence. A business manual published in 1622 explained to merchants: "a factor is created by merchant letters".¹⁵⁵ Distant trade required networks of travelling and then more sedentary agents and factors in key markets. Unfortunately, if it proved to be an outstanding source of notarial records, Genoa did not left many of records of letters, and there is no Genoese equivalent to Datini's correspondence,¹⁵⁶ and now may others.¹⁵⁷ This practice was crucial for merchants, and few numbers support this assertion: in XIVe, Datini from Prato, received about 126,000 letters from 285 localities, and he exchanged about 11,000 letters with his wife; Simon Ruiz of Medina del Campo received 50,000 letters between 1558-1598); another two centuries

¹⁵³ De Roover ()

¹⁵⁴ Balard on coastal shipment (2000) to be checked.

¹⁵⁵ Trivellato (2004).

¹⁵⁶ On Datini, of course the exhaustive Melis (1962). Good summary information and business in general, Favier (1987, chap. 3)

¹⁵⁷ More recent researches on primary sources include Dahl (1998).

after, the Sepharadim merchants Ergas and Silvera from Tuscany wrote about 14,000 letters between 1704 and 1746. In France, the successive generation of merchants from the Roux in Marseilles had to go through 80,000 letters (1728-1843).¹⁵⁸ We know that Italian merchants did rely on messengers, sometimes private and sometimes public, who were travelling back and forth between Italian cities, Champagne's Fairs and Flanders. Information about market data, from Low Countries to southern Italy, was often available in about 4 weeks, and for instance, about 2 weeks between Florence and Avignon, Don't forget that, if we except messengers-like predecessors used in the Roman and the Charlemagne empire, most of European postal services emerged with late medieval and Renaissance long-distance trade, in France, England or Germany. Most postal services were located nearby markets and fairs, and these public postal services emerged when local rulers established secure and faster communication to attract merchants, or when cities and guilds abroad organised collectively transfer of information from their home town to several markets abroad. These services were often promoted by Guilds of merchants. In some case, large banks (Bardi, Peruzzi, ...) managed to have their own network of cavaliers-messengers.

There is now a vast literature of European business correspondence from circa end XIV up to XVIIIe. Here is an example of a letter written in 1262. The sender is an agent based on the Fairs of Troyes (France) and informing his corresponding merchant based in Italy:

*"[...] Andrea sends you greetings. And you ought to know that the Sienese people who are here have dispatched [their letters] through a common messenger after the last fair of Saint-Ayoul, as usual. And so I sent you a bundle of letters through Balza, a carrier from Siena. If you did not receive them, try to get them. The messenger of the merchant guild has not yet come[...] When he is there I shall see the letters which you send us through him [...] I believe the said King [Charles of Anjou] will have the good deal of that money [from special tax raised to finance Charles' crusade against King Manfred] sold in order to have that money in Rome and in Lombardy. I believe they are now in Lombardy, and they have with them huge stock of money and letters of exchange. And I believe [...] they will spend there a good proportion of it, so Tournois and letters of exchange ought to be a great bargain there. And if you see a way to draw profit from this, do try to do it right away [...] Here commodities sell badly [...] There is plenty of them. Wax of Venice, d23 per round. Wax of Tunis, d. 21 ½. The partner Scotto has a lot of commodities and cannot turn them into cash; and he is negotiating to send them to sell in England[...] Sterling, letter of exchange, S. 59 per mark. Good Freiburg Silver, S. 57 d. 6 per mark. Gold dust depending on quality. Agostari, s. 11 each[...]"*¹⁵⁹

This letter illustrates several aspects of business correspondence. It shows its logistic based on messengers going from one market to another. Correspondences were pooled and sent through a collective shipment organised by a group of merchants and guilds. But merchants and large Italian financial institutions used their owned couriers. We know that gradually local rulers will set up official "postal" services notably, and the fact that these services were most of the time located near trading and market in the city is no coincidence. Second, this letter demonstrated how business and politics were interrelated, and how crucial it was for merchant to understand the prevailing political environment abroad. In addition, but it is not the case in this letter, but there are numerous example, in England but also in France or Italy, where merchants were in fact spying and passing critical intelligence from abroad through such a kind of correspondence.

In this document, the central issue is the potential impact of public finance (public debt, tax) on markets : Charles of Anjou needed to raise finance for his military expansion. Such a kind of information was not only critical to protect assets and anticipate future market volatility, but it also enable merchants to make some profitable from arbitrage or speculation. The most classical

¹⁵⁸ Trivellato (2004).

¹⁵⁹ Lopez & Raymond (1955: 392-394).

way, in this is what is at stake, was to make short-term arbitrages based on discrepancies in exchange and financing interest rates between different markets.¹⁶⁰ The letter also focused on factual information about inventory level, expected changes in market demand and supply. The correspondence also updated data tables of merchants with recent prices for a range of commodities, based on different unit of measures, and currency.

Again, the Genose did not left an impressive amount of private business correspondence. And we found nothing from the Zaccaria. But we know Zaccaria had more than correspondences. He was the main supplier of alum and central to the supply chain of alum from East to West. Because he sold alum every day to other merchants and because his logistic network between the East and West, he had crucial information about latest buy and sales prices, inventory levels, timing and destination of future shipments. Second, as a key admiral of Philip the Fair, he certainly had access to crucial information about political situation in Flanders and expected outcome of the discussion with Edward to find a peaceful compromise over Guyenne. In any case, and this is also an important aspect of the contract, if Zaccaria was not able to say in 1298 how things will turn in France and the Low Countries, he was certainly able to have access to any future critical information about the situation.

Contracts and risk management

Benedetto Zaccaria's ventures were nexus of contracts. On the one hand, we have the business contracts: purchase contracts (suppliers), sales contracts (customers), employment contracts (employees), and so on and so forth. Attached to these contracts there are some potential returns and some risks : no risks, no returns. But the latter is the option value, and their cost, provided by the storage and transport capabilities, linked the ability to collect market information and adapt accordingly (wait, leave now, expand, and so on).

Zaccaria could manage these risks in-house and remained fully exposed to volatilities in order to make more profits. An alternative, when Zaccaria wanted some hedging, was to mitigate these business risks. In XIIIe, there were typically two mitigation techniques. The first solution was diversification, and it could take different forms. Notarial records give evidences that Zaccaria trading all sort of commodities : of course alum from Phocea and other mines, grain from today's Bugaria and Ukraine, salt from Corsica, fish and "peau" from Russia, all sort of armours from many Italian cities, coats, draperies, clothes or velvets and furs, but also miscellaneous type of spices, corals, but also unfortunately slaves. The first reason, as we have said, is that if they were transporting alum from East to West, on the way back from Low countries or from central Mediterranean harbours to Pera or Caffa, ships were bring back other commodities. Asset diversification was therefore a necessity. In our case, the Zaccarias sold alum in Bruges and brought back probably some wool or draperies. However, asset diversification was also very much a standard practice in medieval maritime trade both ways to and from destination. By diversifying assets of a maritime venture, merchants were reducing their exposure to sudden market downfalls that could affect one specific type of commodities. Similarly, merchants as mentioned above, often could leased some space in their galley. The objective was not only to make full use of loading capacity, but also to have some safety net in case of poor markets condition thanks to fixed nolis revenue stream. Eventually, merchants could diversify their investment into several shipments instead of one large one. A shipment could be spliced into several galleys at the same time, or a merchant could "tranche" his investment overtime. The trade-off was obvious, loss of economies of scale vs benefits of risk diversification, but these risk management decisions were standard practices in medieval business.

¹⁶⁰ Example of triangular arbitrage from Day (1994 :) :

The second form was operational mutualisation through caravan or convoy. The institution of caravan was used by merchants since the early days of civilization. Caravans of galleys were first a passive risks-loss sharing technique, but they also acted as a proactive way of preventing or controlling casualty risks. It could take the form of mutual assistance in case of a wreckage or a joint defence and retaliation capability when facing an assault from pirates. We know this was a standard and regulated practice (*mude*) for maritime trade in Venice from XIVe. We also know that Venice went beyond this practice of *mude* by imposing merchants to some sort of State monopoly of transport to certain destination. Convoys of galleys from the Serrenissima, the Venetian public fleet, was the only public transport available for merchants.¹⁶¹ Another approach was to impose merchants leaving for a given destination a specific departure time according to a pre-established calendar. This was a public service paid partly by merchants on a per use basis and by other tax payers. Earlier, there are evidences contracts and regulation did focus quite early on this form of insurance-like provision. In Genoa, merchants used the practice of convoy before it was actually practiced and then formally institutionalised by the Commune Genoa, notably through the *Officium Gazarie* of 1330. Interestingly, the Genoese convoys of XIVe included risk transfer (insurance) provisions, such as a loss-sharing rule that diversify the risks among all merchants, in Genoa, following the wording of Tabula Amalfi's (XIe), this is the *conserva* principle.

But convoys of galleys were not always formal or informal contracts with others, being legally-binding rules established by States or specific provisions of fund providers. They could be simple informal agreements between merchants stipulating that they will leave together and establish joint forces during a trip. In fact, the Zaccarias were owning directly or jointly a big fleet, and many contracts, like this one, show that they did make sure that for a long venture two or more galleys were leaving together for a venture. However, in many cases, they decided to cooperate, within convoys, with other merchants. For instance in 1308, on 15 March, Manuel and Benedetto explicitly committed to leave Genoa with *caravana galearum que iture sunt de presenti ad partes Romanie*.¹⁶² Shipment of alum to Flanders in XIIIe were often made through convoy of 2 or 3 galleys. This is again an interesting example where economic agents did put into practice institutions that the law will integrate many years after.

Alternatively, instead of retaining risks or mitigating them through techniques such as diversification or operational mutualisation, he might simply want to transfer some of the risks to a counter-party, in exchange of some value. This is when a counter-party accepted to bear the specific "sea risks" of the shipment. Or the risks might be funded with external finance through standard contracts or a whole range of hybrid instrument. Third parties provide cash to finance the venture, and they obtain a more or less fixed or variable payoff. Eventually, contracts with third parties can mix into a unique basket different risk management objectives.

[Insert about here Exhibit 5]

In other words, Zaccaria had business risks and also real options (storage, transport) to adapt to these risks. On the other hand, he could finance and transfer the business risks, and the cost of storage and transport options, to external parties. Financing and transferring risks (see Part I) create financial options, as equity-like, debt-like, or insurance-like provisions are all games of calls and puts between buyers and sellers. We end up with an interaction between two sorts of options, the real and the financial ones. Zaccaria could sustain his business options, or his unique capability to take advantage of information, by contracting finance options with external fund providers.

Institutionalised contracts

¹⁶¹ Lane

¹⁶² Balard (1978, vol. 2 : 581)

In 1298, there were a lot of standard risk transfer and risk finance instrument. When drafting a contract, a notary referred to many existing traditional format of economic exchange. Sometimes the Genoese used these standard forms of contracting as such but most of the time they amended and combined them, leading to an infinite number of different contracts. A facet of this Zaccaria deal is precisely about that : going beyond the existing institutional contracts by combining them in a new way. Here is a non exhaustive list of some standard Genoese contracts in XIIIe : ¹⁶³

- a *venditio* (:the first technique was to sell part of the goods to other merchants and financiers;
- a *debtuum* or *crediti* : this was a external funding with a fixed payment at maturity including a premium, or a debt.
- *loca* : this is where multiple investors take some shares (*loca*) in a galley, usually first to fund its building, and then extract variable profits, for instance by leasing it to third parties, accordingly.
- a *commenda* or *accomendatio* ¹⁶⁴: this is an equity-type of investment similar to the Venitian *colleganza*. The passive investor (*commendator*) injected some capital and the merchant (*tractator*) provided the labour. The merchant was often given about 1/3 of profit, and the financier 2/. Sometimes the latter was fully liable in case of losses, sometimes losses were also shared accordingly (1/3, 2/3). Sometimes the merchant also invest in the venture (for instance 1/3, with profit of 1/2), and this was a so called bilateral commenda. Of course number of investors, (fixed/variable) payoff rules and capital/labour split were mixed to produce an infinite number of contracts.
- a *societatis* : this is some sort of joint partnership with merchants investing both in assets, according to an infinite number of profit sharing rules, but often 50/50; a multilateral commenda and a *societatis* were sometimes equivalent to commenda, as one partner was also managing the venture, or the other way around some commenda relying on external suppliers, and not asset holders, were in effect a *societatis*.
- a *foenus nauticum* (sea loan) : this is a mix of debt and insurance, as the borrower can default on the debt, or part of the debt, in case of casualty, and loss of goods and potentially the galleys;
- a *pignus* loan : this is a debt with a collateral, being the goods or even the galley, as a guarantee (*pro pignore et securitate*) provided by the borrower to the lender;
- an *instrumentum ex causa cambii* : which is a debt fulfilling exchange and transfer functions, by which the borrower raised cash in one currency and pays back later and elsewhere in another currency;

¹⁶³ Numerous description of standard Genoese contracts in XII-XIIIe can be found in specialised studies or books including dedicated chapters on the topic : Kruger (), Byrne (1915, 1916), Sayous (1929), Lopez (1933, 1936, 1938), Doehaerd (1938, 1941) , Renouard (1949), Lopez & Raimond (1955), Ballard (1978), Jehel (1993). On maritime insurance in particular Barbour (1929), Bensa (1884), Boiteux (1968), Edler-De Roover (1945), Heers (1961), Daveggia (1985), Gioffre (1969). For a less specialised approach but a good overview of commercial and “risk management “ techniques from secondary sources : Kohn (2006).

¹⁶⁴). On *commenda*, Pryor’s discussion (1977) is still up to date. However Pryor’s conjecture about the *origin* of such a contract (Babylon, Greece, Rome, Arab or Hebrew traders) is not relevant (see Part I).

- a dry exchange : which is the same principle except that in this case the borrower pays on the way back, and that exchange is then re-exchanged on the way back, so currency risks in is no longer present.

Three aspects are crucial. First, institutional names are often misleading, and the key issue was for merchant to find a solution. We have said a commenda and a societatis might yield the same payoff for investor. Accordingly a debt and a dry exchange were in essence equivalent, depending only on the implied interest rates and premium involved in both transactions. So, data are required to understand what is really at stake in transactions. Medieval merchants often drafted contracting omitting one or several data, or mixing different type of contracts, to make sure States (tax) or Church (usury prohibition) could not easily capture the logic of the contract. We will see that the Zaccaria deal is using both techniques.

Second, these contracts are all game of options between parties. In a commenda, for instance, the merchant can default (put option) when liabilities exceed the value of assets. Alternatively, he is long a call on part of the assets when the latter exceed the initial amount of cash provided by the financier. A sea loan, is a long put provided to the merchant, and the merchant will exercise this put in case of an adverse event at sea. The same function is achieved with a pignus transfer *rixicum* to debtholders, because when holding a collateral during transport, debt holder are exposed to the casualty risks. If we link this aspect to the first one we have just mentioned , we understand that all these contracts are package of functions, and the parties can make them strictly equivalent by mixing them, adding call/put options and adapting payoffs for each stakeholders according to “future states of nature”. Furthermore, we see that if business venture was about managing options (e.g. transport, storage), and these risk management financial contracts are game of options, there is an interaction between these two kind of options. Zaccaria could better manage his business options through financial options. In other words, he could design adhoc business model, by funding and transferring with options some risks attached to its inventory and transport of alum, which are real options.

However we need to discuss one aspect : the critical role of the *instrumentum ex causa cambii* , and its evolution into then bill and then the letter of change. These contracts that will become essential for the development of medieval economics are to be put into the perspective of the peculiar situation of the Genoese in Bruges in 1298. We will see that in fact this Zaccaria deal is in the middle of an important change that occurred at the turn of the XIIIe and XIVe.

Institutional and market constraints for trading Genoa-Bruges-Genoa in 1298¹⁶⁵

There were resident Italian money lenders in Bruges as early as late XII or early XIII. The first formal document 1244 involving some of them has been recently mentioned by the historian J. Murray, and it somehow, invalidates De Roover’s thesis that made them appearing in Bruges much later.¹⁶⁶ These local Italian bankers were first Caorsini (Cahorsins). However, and here De Roover’s is correct, these early “bankers” were not from large international bank, that another historian called the “super-companies” (Hunt). These were the Bardi, the Feruzzi, or the Medici; Incidentally, there were Flemish merchants in Genoa early XIIIe,¹⁶⁷ who became less and less present with the rise of the seasonal Fairs of Champagne (Troyes, Lagny-sur-Marne, Provins, Bar-sur-Aube), supported by many factors (Part I)

¹⁶⁵ On medieval Bruges Van Houtte (1982), de Roover (), Vermeersch (), Blockmas (), Murray (2005). On Genoese in Bruges, Doehaerd (1939, 1941, 1949), Vandewalle (2002), Petti-Balbi (1996) , Liagre (1945,1965), Mauri (1973)

¹⁶⁶ Murray (2005 :) and De Roover ().

¹⁶⁷ Doehard (1941), Petti Balbi (2003)

We have shown how most medieval business ventures were based on “cash-and-carry” and how the fairs were the seminal institution that fostered such a type of transaction. In XIIIe, large financing institutions, with network abroad, emerged to fulfil several business issues of long distant merchants. ¹⁶⁸ The pattern of mediaval trade was cash and carry, long timing and distance for trade.

- funding the required investment fixed and working capital expenditures at departure and on markets (payables and receivables between buyers and sellers);
- transfer funds more quickly, at lower cost, and less risks between distant places;
- managing exchange rates between different markets during a venture;
- circumventing of usury prohibition, the other big problem for merchant’s balance-sheet : interest were disguised in exchange rates, or presented as acceptable penalties for late payment/arrival at destination. ¹⁶⁹

To achieve both objective, the credit, the exchange and the transfer, traditional money changers have evolved into the role of deposit bankers and then lenders, and then, and this is the fundamental innovation, appeared networks of financial institutions supporting the introduction of a successive waves of techniques aimed at long distance trade : the “*instrumentum ex causa caambi*”, the bill or contract of exchange”, the “letter of Fair” (lettre de foires), the “letter of change”, “change of London”.

In this paper, we do not analysed them in detail and De Roover, even if some authors have developed his thesis, has well described the history and the role of such instruments. It should be noted that the basic roots of these instruments came from Genoa, even though it does not means that Genoese bankers were from Genoa : many of them came from Pisa, Florence or Milan. Without entering into the details of this type of contracts, let us remained the basic of the system, using a classical letter of exchange.

[Insert about here Exhibit 6]

The letter enabled a merchant to raise fund in one destination and his agent (or himself) could payback the fund provider in another place. This initially involved a notary who drafted the contract, or the bill, and copies were provided to the contracting parties, including the travelling agent. In other cities (e.g. Florence) developed a much simpler technique : a straight letter which was simply a private-order recognition of “debt” between the contracting parties to be handled at maturity. When payment has been made, the contract was then crossed, with often a simple mention at the bottom confirming that the termination of the transaction. Gradually, the same instrument will be then exchanged in a secondary market : there were buyers and sellers of letter of exchange.

Initially, such instruments were first drafted for the seasonal Fairs. On fairs, there were a large number of financiers supporting exchange between merchants. Typically such instruments were mimicking the cycle of fairs and the continuous back and forth travels of merchants. Gradually large institutions set up full-time sedentary branches in key market places. For instance, many of them were in main Italian Communes (Genoa, Pisa, Firenze or Milan), in South France or in Paris from mid-XIIIe. For Genoa, such agents, rather than branches, were present in some places, notably in the East, and there are many bill of exchange showing a merchant to raise fund in Genoa and paying back later, usually from 3 to 6 months in Perra.

¹⁶⁸ On medieval “banking”, and the raise of financial institutions and specific instruments de Roover (1948, 1953, 1974) , Van der Wee (1977, 1992). On large Italian banks. Hunt (1994)

¹⁶⁹ We analyse the usury prohibition in a following section.

However, and this aspect is crucial for our contract, this was not the case in Bruges in 1298. However a critical element, is the first direct shipment to England and Bruges in 1277-1278 through "Hercules Pillars" (Gibraltar Straits). We have said the Benedetto Zaccaria was the key leader in this new trading route. The problem is that it is only from circa 1330-1340, and sometimes even later, that numerous records show agents of large banks Bardi, Acciaiuoli, Medici, or less prominent institutions. One of the first Genoese family, the Adornes, who became completely integrated within the merchant elite of Bruges and then Ghent, was there around 1340.¹⁷⁰ The Genoese obtained their first list of privileges from Bruges mid XIVe, They had a Consul only in 1397, their Loggia was established in 1399,¹⁷¹ near the hotel Ter Beurse,¹⁷² and the house of the Genoese Consul has not been built before 1440, at a time where Bruges, the "Venice of the North", was a declining city.

This incomplete market, with no sedentary representatives at destination and no financial institution to support trade Genoa-Bruges-Genoa caused several problems. First there was a big problem of asymmetry of information between merchants and financiers, but also between a merchant-principal and his agents : it was difficult to verify what was the actual or actual casualty attached to a venture. We know that the classical literature tells us that such a condition are not ideal for equity-type instruments, where payoff is variable. It also required quite a lot of trust between parties when contracting "insurance-type" of agreement. The second problem was of course the lack of refinancing tool for the way back. In other words, the merchant was to issue money for venture up front with no flexibility to "stage", or expand his (re)financing. Last but not the least, property rights were a serious issues because merchants and financiers could not rely on public Genoese infrastructure (e.g. the Consul) to support them when improperly taxed or penalized by the local ruler and his administration, or even if his goods stolen by local inhabitants.

We can conclude this section by a broad summary expanding what we have just discussed, to the wider review of the factors that what made particularly difficult to contract when trading between Genoa/Aigues-Mortes/Bruges/Genoa in 1298

- Limited cognitive load about the future : because of time and distance, and because of the lack of proper advanced statistical data/tools, merchants and financiers did faced a large problem of limited knowledge about future "States of Nature".
- Lack of efficient institutions and markets: many modern institutions did no existed at that time. There was no stock exchange, no market futures and derivatives, no « insurance » with premium paid upfront, and ventures were not "limited liability" vehicles. All these institutions have been created from XIVe and XVIe
- Agency risks ; in long-distance maritime trade, there was always a risk that employees, "equity" or "debt" issuer would cheat because it was difficult to monitor and then verify actual outcomes of a venture during the long-distant call.
- Property rights in Bruges : in relatively new destination, merchants were always facing a risk with local rulers and inhabitants. It was therefore key for merchants to be cover all

¹⁷⁰ The story of the step-by-step rise of the Adornes family, has been described in Geinaert (1987).

¹⁷¹ Vermeerch et alii (1983) for some historical and archaeological background of the building. Do note that the top of the building is not the original.

¹⁷² The likely etymological origin of Bourse (stock exchange) : the *auberge* hosting merchants and financiers was owned by the family Van Ter Buerse, and the location were financial products and commodity were daily exchanged.

operational risks and for financiers to “beg on the right horse” who could rely on physical or political protection to secure assets

- Trade-off between contract complexity and simplicity, benefits and costs of complete contracting. Eventually, there was a problem of cost and time it took to set up contracts (screening, drafting, monitoring, auditing) and even if Genoese were very good at contracting, too much details that good prevent some problems were costly (e.g. the Notary, see under) and sometimes impossible to enforce. Worst, they could prevent the proper interpretation of the contract judges in case of litigation, and even a correct assessment of the situation by parties because of the aforementioned cognitive load problem

Of course, sometimes it was however good to draft complex contract and to appear legalistic in each and every detail. This was because a last constraint we have to talk about : usury prohibition (see under)

Public institutions to foster trust and contracting ¹⁷³

We have said that early that medieval Genoa was a weak State because individuals and families never allowed the development of sustainable collective institutions above them (Part I). However, we have seen that Genoese public institutions were business-driven and, in a sense, a sort of contractual agreement between key families to pool forces, organize long distance trade and defend their interests aboard or against other rival cities . The Genoese did promote public institutions and regulatory framework that facilitated the accumulation of wealth through business contracts. We address this topic by investigation there type of institutions : the agents of the law, and here we focus on the notary and the *scriba*; the source of law itself in late XIII,

Notary emerged as a fundamental legal and business institution in late Middle Age, and, but not only, in particular in Genoa. At that time, there were much more Notaries than Lawyers, for instance in most Italian Communes, and an educated estimate of 1 notary for about 100 to 200 inhabitants in Genoa is likely to be about right. Appointed by the Emperor, notaries had to follow a standard education including law and philology. In Genoa, there is an evident influence of the University of Bologna, through several treaties about notarial “art”. Each and every contract was kept in a cartulary and this act was called an *imbreviatura*. A copy of the contract was the *instrumentum* (or the *carta*). The act was to be made in front of witnesses who should not be slaves, minors, heretics or insane, and who could not argue ex post that they did not know what the contract was all about.¹⁷⁴ Until *Ius Mercatorum* gradually recognised informal contracts, all transactions had to be written down by a notary. Until late XV^e, in Genoa, many contracts such as “sea insurance” still required notaries, while these transactions were often in late XIV^e and XV^e privately handled by brokers, in Pisa or Florence, who were acting as underwriter, being a sort of intermediaries between policyholders and fund providers. The same is true for Bill of exchange, for long drafted by Notaries, but that will gradually be replaced by simple papers with very concise terms and covenants about the sum involved, the exchange rates, the place and the different parties involved. This type of private transaction, not requiring notaries were called, in Genoa, *apodixia*.

Another formal institution aimed at regulating merchants was the *scriba*. The *scriba* is an old institution but his role has been revived late middle age, and Genoa was at the forefront of this.

¹⁷³ The overall topic of law in XIII^e is unfortunately not well captured, except some specific aspect like notaries, in Costamagna (1961, 1970). General studies on Genoa, especially Lopez (1936, 1938) or Epstein (1984, 1994, 1996), provide useful legal insights.

¹⁷⁴ Epstein (1994 : 320)

A *scriba* was in charge of writing down all financial operations in a book. He could work for public institutions or for the merchants or bankers. When travelling abroad merchants and financiers needed to appoint a scriba on board and make him counting all assets and liabilities movement, being all expenses for the crew, the goods sold as well as the cash collected from customers. Everything was pencilled down in the *cartularium navis*. It seems now more or less a consensus among economic historians that the first evidences of double-entry book keeping was found in Genoa. There is a legislative document explaining how public scriba was to use this technique for recording Genoa's public finance, and the document refers to it as a something already in use among banker. Books from scriba were used by judges to enforce contracts or to solve litigation. In case of bankruptcy of a bank, trace of depositors were found in the books, and the bankers were to stay in prison until the overall claim process was settled. Genoa was quite tough about this kind of situation. There was the case of the Bank of Guglielmo Leccacorvo, in 1259, which went bankrupt : all partners went in jail and before the case was closed Guglielmo Leccacorvo, in prison, passed away.

When a notary drafted a contract, when a scriba keep records of commercial transaction in his book, they had to obey the law. Source of law in late XIII Genoa at least fourfold.

There was first the "Genoese law". The focal point of the Genoese law was constitutional law, but it soon extended into the field of business and trade. Genoa looked at other tradition to fuel its own legal background, and in particular Lombard law, notably as far as business contracts, were concerned (but not wills), did matter. The Roman law was also influential because late middle age revisited ancient legal literature. This process started around 1150. The famous notary J. de Scriba had a copy of the Justinian Institutes and many other notarial traces from that time show the revived influence of the Roman law. Gradually another source of law appeared : the *Ius Mercatoria*. This informal international law of merchant was an emerging informal international customs binding itinerant merchants between them but also these merchants to their hosting local ruler. In addition, there was the Canonical law and church's doctrine. These are for instance the bills or the Decretales of Rome. But in addition to legal regulatory armours there are the huge literature of Doctors. Here we need to be highlight a specific feature of Roman law : usury prohibition (see under). Eventually, there was the jurisprudence. They were many several important legal authorities in XIIIe Genoa. We know there is a Chief Judge in charge of merchants. We know the Commune recruited arbiters to settle disputes between merchants. All these produced years after years a myriad of example of judgements and all those were paving way for future interpretation of the law.

There are several regulatory documents displaying indications about the legal obligations, and their evolution: The Oath to the Compagna (1157) or latter the Status of Pera. A big part of Genoa's law was designed for merchants and many rules applied to what was the obligation and duties of people involved in business transactions. It was about the way of contracts, rights and duties of the merchant or the shipowner with its employee, safety standards for transportation, settlement and litigation procedure for instance in the case of the death of a merchant abroad. Two particular institution can be mentioned : first the *Officium de Mercantia* (late XIIIe), focusing on everything related to business, and later the famous *Officium Gazarie* (1337), covering international trade of the Genoese. Three year later (1340), there is a trace of specific legal requirements regarding shipment to Flanders and England. The Commune also established many specific legislation relating to professions or commodities. It could be quota or attributes for a profession, quality standards for goods and commodities or even monopoly. Lopez for instance believed that the Commune gave a monopoly on imported alum to Genoa to the Zaccaria .

As mentioned once by R.S. Lopez, the adapted Lincolnian principle of Genoa would have been : a government of merchants for the merchants Many have described the foundation of the Genoa's Commune as a private partnership of wealthy aristocratic (*bonitas*) merchant families.

In XIIIe, there was no shame about making money, on the contrary it was a sign of entrepreneurship. In XIIIe, the spirit of the Law was very much “free-trade” oriented as soon as this could boost Genoa’s expansion and the interest of its merchants. For instance, in XIIIe, there was no formal Guilds to protect local merchants, simply because the law simply allow anyone, and in particular foreigners, to set up almost all kind of commercial activity in Genoa.¹⁷⁵ Citizenship was granted to all who promised to respect the Law of the Commune, except when a short-lived law of 1404, in the middle of a terrible recession, imposed foreigners to prove at least 3 years residence before they could apply for citizenship.¹⁷⁶

Respect of contract was a key elements of the law. The first tool to prevent agency was to make contracts public and then impose rigorous accounting. The law also imposed heavy financial penalties to those who committed phoney contracts. In could be worse for cheaters, there is a trace of a notary who lost his hands and the witnesses have been beaten and then had their noses cut off.¹⁷⁷ There was also a prison, Malapaga, hosting merchants or business agents who did not respect their duties. In particular, Genoa used this prison to keep in jail deposit bankers who defaulted on deposit, notably during the banking crises of mid XIIIe. In some other cities (e.g. Florence), bankers transferred assets to family member in order not to reimburse customers. In Genoa the law was very strict, and lenders were put in the jail of Malapaga before judgements to protect smaller investors, and some even died before settlement of the litigation .¹⁷⁸ The Law also gave definition of standard rights and duties of contracting parties agreeing on a commenda, a societatis or a simple employment contract for a mariner, and the rules for determining the fair business relationship between parties. For instance, the law imposed the oarsman to receive as a minimum a standard food package per day with bread, vegetables or cereals. In XIII, these mariners could not be slaves, because this was considered as too risky in long distance trade. The Law also imposed some shipment rules but before Office Gazarie of 1334 it is difficult to assess what those rules where precisely. Certainly it dealt with recommended season of transport, use of convoy and mutual assistance in case of shipwreck or piracy. As we will see, in this Zaccaria contract many elements refer to the law, and in a sense they are somehow redundant. But the law precisely imposed contracting parties several standard contracting forms they had to follow. Indeed parties, the Zaccarias and Suppa & Grillo, agreed that the ship will be well equipped, that a scriba will be on board to monitor the transaction, and so on and so forth.

All this show that, even if they were problems of incomplete markets and specific issues related to long-distance trade, the institutional context also helped contracting. However there was one critical institutional problem : usury prohibition.

Public institutions constraining contracting : usury prohibition and sea loan ¹⁷⁹

As mentioned, medieval Genoa was very Christian city, and, in XIIIe, two popes were Genoese : the Fieschi Innocent IV (1243-1254) and Adrian V (1276). If the law protected merchants, it was also aimed at making sure merchants obey, or look as if they obey, according to moral rules established by the Church. In particular, in Genoa, merchants had to observe of the usury prohibition. Historians are still debating whether or not usury prohibition was a genuine moral

¹⁷⁵ This question needs to be further investigated. Other documents show that there was a Judge in charge of Guilds in XIV. (Esptein, 1996)

¹⁷⁶ Lopez () . For Lopez, this legal requirement was quickly withdrawn (see discussion with Greif and Gonzales de Lara in Part I).

¹⁷⁷ Epstein (1994 : 318).

¹⁷⁸ Lopez ()

¹⁷⁹ Among many others, Le Goff (1986) , Langholm (1992), and Lapidus (1992) and Ceccarelli (2001, 2006) on the insurance (and sea loan), and Munro (2001) for an updated bibliography on this topic.

and regulatory constraints that limited credit availability and therefore business expansion, or just a moral façade, businessmen and clerics would often go around as soon as significant profits were involved. Le Goff has convincingly shown that there is no clear cut “black and white” interpretation, and that significant exceptions allowed money lending with interests. In Genoa, in particular, made extensive use of fictive contractual covenants to present contracts in an acceptable way for the Church : loan “gratis et amore”, complex dry exchange transaction and fictive buyback clause were among many form of contractual terms to disguise debt. Many others have noticed that, during the Middle Ages, credit and savings institutions existed or even emerged, even during the fiercest anti-usury period of the Church. But exceptions are not the rules, and if forms of “credit” existed we will see in case of Zaccaria’s transaction, that contract were designed is such a way that they insured that risk associated to usury prohibition was fully integrated in all “terms and conditions”. The vast majority of contracts – a guess is more than 99% - do not include explicit interest rates, and we know “usurers” – the Jews and the Lombards, mainly – were often the targets of ignominious and violent campaigns, sometimes fuelled by rulers who played the stick (when they wanted to default) and the carrot (when they wanted to borrow).

Two particular aspects should be mentioned concerning the 1298 contracts to show that “usury prohibition” was a serious issue. Pope Gregory IX, in 1227, wrote that those who extended “sea loans” (*foenus nauticum*) could be considered as usurers. Interestingly enough, the Pope did not say they were usurers but said that they could be considered as usurers (“*usurarius est censendus*”). Nevertheless, the Decretale Naviganti vel eunti ad nundinas of 1234 by the same Pope Gregory IX prescribed tough treatment to usurers, including expulsions, taxes and trade prohibition. The question is what is a sea loan.

André Lapidus (1992), who made an insightful reading of the Decretale, observed that an outsider to a transaction, say, a theologian, did not have access to the private information that the lender had. In particular, he did not know whether or not the lender overestimated the risk he incurred in order to transform a usurious profit into a legitimate income. As a matter of fact the straight sea loan was not a simple deal in which two mutually exclusive states of nature could occur: safe arrival or loss at sea. Indeed, even if the cargo arrived intact, the merchant was not sure that his market expectations would be confirmed. This risk was overlooked in the sea loan. As a result, in case of a safe arrival, the borrower was left alone facing the risk. Hence, the sea loan could be considered as usurious. This gave a way to theologians to check the usurious character of a transaction: They verified whether or not risk was separate from ownership. Separation was an indication of potential usury. The key issue for those keen to circumvent usury prohibition was to highlight the full sharing of both casualty and business risks for all contracting parties.

If the acid test of full risks sharing is correct, we should mentioned that, for quite sometimes, there was no coherent accounting and moral framework by the Church doctrine to evaluate contract, as very well described by Ceccarelli. Some went further by saying that even a commenda, which does not differ in essence from a societatis, if the investor was a passive financial investor, could be treated as usurious. The same assertion, but for different motives, based on St Thomas d’Aquin’s doctrine, can be found in the *Tracatus de usuris* of Egidio de Lessines (1276-1285) or in the *Summa* of Giovanni de Friburgo (1294), se Raimondo de Peñafort, who is said to be maybe the monk “R” mentioned in the Naviganti and potentially the writer of the decretal, stated in his *Summa de poenitentia* (1235-36), that even *cambium nauticum* (exchange with sea loan) was usurious : casualty risks plus currency risks were not enough to protect financiers from the Church accusation. Furthermore some theologians did not like the distinction between two level of asset holders, between the passive financiers “speculating” on future returns (principal) and the “hard working” merchants (agent). A solution was for merchants and financiers to establish in common a societatis, where the lender

had actually to be tied up to the investment vehicle, as proposed by Goffredo de Trani. (1243ca) in his *Summa super tituli decretalium*.

Gradually, however some started to disentangle the two sides of the instrument: the insurance and the loan. A justification of the maritime insurance was made by Bartolomeo de S. Concordio (1334), and this was likely to be based on previous comments from Giovanni de Regina around 1320. The same is true later with Piero Strozzi et Domenico Pantaleoni. The idea is that there is a clear cut between risks finance and risks transfer. Some heretic went even further. As argued by an original and somehow heretic theologian around 1300, I. Butrigarius, in his *Code*, reflecting on the ancient Roman sea loan:¹⁸⁰

“Maritime loan as game of dice [is] not prohibited, just as games of dice are not, because of the risk and by the reason of the doubtful outcome”

Against this opinion, the XIIIth century Church has decided that all form of maritime loan, including the insurance component, was in fact prohibited because it was in essence a loan. Contract could be accepted only if parties could show that the funding was in fact a genuine risk-taking “equity” investment.

Having said that the Catholic doctrine did not prohibit interest but excessive interest charges. The interesting question is what level of loan was acceptable in late XIIIe Genoa? According to the Statutes of the Pera, a Genoese colony, the maximum threshold was 1,25% a month: *“Non possit nec debeat mutuare nec dare pecuniam ad usuram alicui persone, pro usura recipiat vel habeat ultra denarios iii per libram in mensem et ab mense infra per eandem rationem”*.¹⁸¹ This makes about 14,5% a year. This is a crucial element the Zaccaria deal had to manage. On paper, as we will, see this deal, if it was a straight debt, or some sort of insurance loan, yields a 26% interest a year. That was not unacceptable for the Church. The only way to make this type of return acceptable is to make sure investors are bearing commercial risks as well, and even better, in order to be even more compliant with the spirit of the Law, it was always better to make sure all parties actively involved in the business.

Contracting with trust : private-order institutions and albergo (II)

Above institutions there is people, and any business is about connecting people. Sometimes people can build on private relationship to complete or even circumvent inefficient institutions. In all case, trust of people is required whatever the institutional framework: no trust, no business, because any business is about contracting and contracting parties can always breach their duties. In long distant tarde, trust was a central issue. As far as capital issue was concerned, the Status of Pera mentioned *“et quia multociens fraudes committuntur per acomendatarios in rebus societatis seu acomendationum”*¹⁸². Trust was an issue in each and every contacts, and not only commenda. We have seen that Zaccaria’s business was a nexus of contracts. From our investigation, we have found at least one hundred contracts involving directly or indirectly Benedetto Zaccaria. These contracts established the boundary of Zaccaria’s business: employees, suppliers, customers, and external investors.

To foster trust the medieval genoese merchant, and Zaccaria in particular, relied on the familial clan, called from XIIIe Albergo. At the top of the Zaccaria albergo was the *pater familias*, called *domus* in the contract, Benedetto Zaccaria. He was clearly the leader of the Zaccarias. As far as business was concerned, there was the fraternita between Benedetto and his brother Manuelle. Once they had some conflict as far as their business interest in Phocaea was concerned, but

¹⁸⁰ Quoted by Franklin (2001: 291-292):.

¹⁸¹ Epstein (1994 :318)

¹⁸² “Many frauds are committed by people raising money through an accomendatio (acomendatarios) concerning goods in a societatis or commenda” in Epstein(1996, p. 70)

Benedetto and Manuelle were bounded together in good and bad times by explicit formal contracts where both agreed that each of them could act on behalf of the other. Benedetto Zaccaria also worked with his brother Nicolo, but this business relationship was certainly far less developed than the closed ties between him and Manuelle. There is for instance a contract in which Genoese merchants, for a venture to England (*ad partes Angliae*) in 1278, leased two galleys owned by “Benedictus” and “Nicolinus” Zaccaria, as well as Uguetus Embriacus. Step by step, it became also true for Paleologo, the eldest son. In Genoa, the relationship between the father-son was often legally crafted in the formula : *jussu voluntate patris* or, with more emphasis on the legal responsibility and the independence of the son, *juvenis emancipatus*. This legal binding took first the form of long term *procuratio* by which the Zaccarias gave mandate to each others to conduct business, being managing operations or raising funds, in the name of the others. It was certainly not in the individualistic Genoese mentality to give a “blank check” to other, and even for relatives these were limited. It could be a few years or a specific venture or both of them, as mentioned in the contract. This core relationship was extended by a wide ranges of specific agreement for specific ventures, where interest of one was linked to those of the other. One could raise money and then invest of the venture managed by another. Assets, like galleys or nave, were leased when a project required it, and the Zaccarias could become lessor as well as lessee of each others. Other young relatives might be accepted in the closed circle of benedetto. As mentioned earlier, at the end of his life, Zaccaria mandated his nephew Tedisio (1288-?), which is in fact the son of a Clarissa Fieschi who was the spouse of Benedetto’s cousin. Genoese families were very large at that time. Zaccaria had 9 brothers and sisters. In 1282, the Doria had about 250 distant relatives involved in the battle of Meloria, and this excludes women and children that remained in Genoa.

Albergo is often viewed as a vertical kinship institutions. In a sense, this is correct. But this vertical structure was able to expand or to establish network horizontally. First many alberghi did work a lot together. Sometimes different alberghi were so closed that they used to share some spaces and buildings, for instance a loggia (see above). The Zaccarias also did collaborate with other alberghi. The Di Negri (e.g. Carlotto, Guidetto, Bonifacio, Pietro), the Doria (e.g. Paolino Doria who was his gender), the Cattaneo (e.g. Andreolo Cattaneo who was also his gender), the Spinolas, the Grillos, the Della Voltas, the Di Castro, and so on. Business relationship was reinforced by marital exchange married as most of these other albergo had some family link with the Zaccarias, who at the end of XIIIe raised from the low rank of albergho popolo to the top of the Commune. Some have said that the Zaccarias were not very keen to establish direct commercial links with other alberghi, except maybe with the Di Negri, another “popolo albergo”.¹⁸³ Most of outside relationship were based on the gradual integration among aristocratic alberghi through marriages.

If contracts and marriages enable Zaccaria albergo to work with others alberghi, notarial contracts show that Zaccaria employed dozens of agents, being *procuratores*, *nuncii*, *missi*. The most common form of contract with agents was the *procuratio*, as shown in this 1298, is a contract by which one party give another a mandate to run a business. Most of the time the *procuratio* contract specifies a time-horizon, the assets involved and the flexibility given to *procuratores* to run the venture. This kind of contract is significant because if a procurator fails to deliver a promised quantity of good or the payment of a certain cash amount, then the one that issued the *procuratio* is also fully liable. Nucci and missii are agents. Missi were sent to conduct or supervise a whole range of transaction abroad, while a nuccius, most of the time, holds a very specific role often (e.g. collecting cash abroad). Again, in case of problems, liabilities extended to the principal and not only to his agents, even if some specific clause might precisely defined to which extend, e.g. a maximum of money or a specific geographical area, the agents could conduct business transaction in the name of the principal. The list of people working in

¹⁸³ Balard (1978 : 526)

the name of the Zaccarias is long, and here are a few of them : Andreolo Pelato – a key associate, according to R. Lopez - Giovanni di Rovegno, Giovanni Barbieri, Buonsignore Caffaraino, Pietro and Bonifacio Di Negro, Tommaso Di Murta, Benedetto Scoto, Andreolo Pelato, Enrico di Sarzana, Guglielmo Rosso, Lorenzo Bonaventura, Simone de Bulgaro, Enrico di Piazzalunga, Guglielmo di Castiglione, Frederica Sylvagni. Not all of them were exclusive “business agents”. For instance, Pietro and Bonifacio Di Negro were not “employees” of the Zaccarias. They were regular agents of the Zaccarias, but worked first for their wealthy family. Many of them had some focus on specific geographical areas. An Enrico di Piazzalunga was clearly the main agent of the Zaccaria in Pera and Soldaia. Buonsignore Caffaraino worked a lot in Crimea, for both the Zaccarias and the Dorias, like Andreolo Pelato. Incidentally those agents often became merchants or investors on their own, like Benedetto Scoto.

Closest agents, like Pelato, are not *bonitas* or *boni homines* (noble) but hard working and trustful representatives from *popolo*. Their function was clear : to collect and transmit information, to supervise transaction and to bring back profits. At a layer further down, there are the vast number of employees who actually run the business. Peglotti mentioned about 3,000 people working in Phoecea in early XVI. Zaccaria did recruited a huge number of men required to produce the alum output. There were also the people necessary to support the business functions. As the owner of a significant fleet, he also paid salaries and expenses for several hundreds, and that is a guess, of mariners and men in arms protecting galleys, being *balistarii* and *supersalientes*. Eventually, there is a last and not estimable category of people without any employment contracts : the slaves. Zaccaria like all other Genoese did bought, sold and use slaves. Men, women, infants.

In a sense the family-based *albergo* is like an onion of relationships The first level is made of the external employees. The second one include to those affiliates who became years after years almost part of the family. Then, and a third level, we enter into the family circle with, first, the numerous relatives : some were only sharing a common name, some other were involved in daily business relationship, and then at the centre, the father and mother, the sons and daughters. The latter did married to members of other *alberghi*, and were reinforcing collaboration among aristocrats. If we look at the contract, it gives an example about how Zaccaria was precisely using this structure to contact business. But it is time now to turn to the transaction itself.

Summary : the context-specific “functions” of the contract

From our historical investigation, we understand that managing and contracting a venture between Genoa and Bruges in 1298 took place within complex web made of both risks and constraints, and also supporting institutions favouring such a type of ventures.

Any contract agreement is about *functions*. These functions, as far as business and finance are concerned, are aimed at increasing the wealth of contracting parties. The ultimate objective of economic agents is more (return) for less (risks) and as fast as possible (time). These functions are have been described by modern financiers ¹⁸⁴ (Part I) , and this contract shows that seven hundred years ago economic agents had to fulfil the about the same functions. In this sense, these functions, with some minor amendments, are universal. and this can be done by using and developing contractual tools that can fulfil functions in economic exchange. However, instead as being “an-historical”, these functions evolve according to their context-specific environment which is precisely what we described in Part II. Neoclassics see functions as a universal “invisible hand” driving markets towards more efficiency. On the contrary, we see a continuous tension between these universal functions and their incarnation within a

¹⁸⁴ Merton (1992, 1995), Merton & Bodie (2005), Culp (2001), Tuffano (2004)

institutional and contractual context-specific regime. This regime for instance impose medieval merchants to take into account their familial roots, which is both an advantage (information, control, trust) and a disadvantage (obligation to involved family members in transaction. A modern Western banker can invent a straight innovative credit-linked “derivative”, while medieval financiers were constrained in doing so. It does not mean they could not and the human creativity and capacity to adapt to constrains is endless. However designing and contracting such prohibited products in XIIIe required much more caution, time and effort. In particular, In the same vein, a merchant and financiers of XIIIe needed to take into account the existing

Building on that, we can now list the functions that Zaccarias and Suppa & Grillo needed to fulfil :

- *pooling funds* from investor and enabling fund transfer/payment (Genoa-Bruges-Genoa;
- *completing incomplete markets* and potentially creating with previously existing instruments new ones that fulfil the roles of non-existing standard ones;
- *managing risks* (mitigation, finance, transfer) for such a cash-and-carry venture of alum to Bruges (price, currency, casualty, liquidity), notably by adding more financial and business flexibility (transport, stock, information);
- *controlling potential agency* problems between Zaccarias and Suppa & Grillo, notably by lowering and controlling *asymmetry of information* (screening, monitoring, auditing) and designing incentives to respect contract covenants and to reveal information *ex ante* and *ex post* ;
- *managing the risks of lower asymmetry of information*, as contract was be publicised (notary, witnesses), with (i) the competitors (competition), (ii) the State (taxes), (iii) the Church (usury);
- *maximizing contracting the aforementioned benefits vs cost of contracting* (legal fees, time, enforceability, complexity). In particular, contracts need to optimally weight the value of simplicity (lower cost) and the advantage of complexity to maintain the asymmetry of information (competitors, State, Church)

Now we can now turn to the terms of the transaction to see how, and if, the overall structure managed to fulfil all these objectives.

* * *

PART III

“It is a capital mistake to theorise before one has data”

Arthur Conan Doyle, *A scandal in Bohemia*

“ Real evidence is usually vague and unsatisfactory. It has to be examined - sifted. But here the whole thing is cut and dried. No, my friend, this evidence has been very cleverly manufactured - so cleverly that it has defeated its own ends.”

Agatha Christie, *The Mysterious Affair at Styles*.

Based on the historical insights about the alum business and its institutional framework in 1298 we have laid out the functions this contract was aimed at fulfilling (Part II). In this section, we provide a detailed analysis of the contract in order to show how the parties designed, thanks to a whole range of options, a solution matching these functions. We first provide the full translation of the contract. This translation is rather literal in order to keep all aspects as in the original and not dilute them in too much philological interpretation. We will review the key aspects of the contract and articulate their overall logic. This will enable us to model it analytically and then to feed it with some data to test its logic.

The contract

Archivio di Stato di Genova, Notai Antichi, cart. Andreolus De Laneris, f. 38.

In the name of the Lord, Amen. Me, Paliologo Zaccaria, in my name, fully liable, and by procuration of the Lord Benedetto Zaccaria, my father, fully liable, a procuration which has been acted by the hands of the notary Georgio de Camulio, on 26 June 1296, the names of parties having already mentioned here above, I acknowledge to you, Enrico Suppa, who solemnly pledge to deliver [the money] and to gather it in your name, for two thirds, and in the name of Baliano de Grillo, for one third, that I, the names of parties having already been mentioned above, have received from you the sum of 3,000 Genoese £, being 2,000 £ from you, the aforesaid Enrico, and 2,000 £ from the aforesaid Baliano.

Acknowledging that, but waiving the exception that the amount of money have not been received, or not in full, and according to every legal obligations, I, the names of parties having already been mentioned above, in exchange of this above mentioned amount of money, and based on this sale transaction, I sale, transfer and deliver to you, the aforesaid Enrico, in your name and in the name of the aforesaid Baliano, 650 of Genoese cantare of brut, quality and tradable alum from Phoea, this alum being sourced from the one I have in Provence, namely in Aigues-Mortes. [And this alum], I, the names of parties having already been mentioned above, promises to you, the names of parties having already been mentioned above, who will received it, to deliver it either to you, or to one of your agents which will be accredited, and to store it in Aigues-Mortes, either directly myself or through one of my agents, between now and the next Kalende of the month of April. [This alum will be] loaded, at my own expenses, on the two galleys, or one of the two galleys, that I have or will have through a societatis agreement with Gabriel Spinola, which has been acted by the hands of Johan Abendo, Notary, this year, on the 21st of the current month of October. [I also promise] to register this alum under your name and the name of Baliano, or one of you, according to the aforesaid respective shares of both of you, in the book of this or these galleys on which the alum will be loaded.

And this alum, I have to ship it, at my own expenses, for both the ongoing cost and all extra charges, and I promise to do it from the aforesaid place of Aigues-Mortes up to Bruges. However, the aforesaid alum, as soon as loaded, and up to Bruges, will be shipped at your own risks, or those of the aforesaid Baliano, being risks from the sea or from men, until the alum will be unloaded in the aforesaid place of Bruges, or in any other harbours of Normandy, Picardy or Flanders where the galleys will be unloaded. I promise you, the names of parties having already been mentioned above, who will receive this alum, that the galleys will be in good state, well protected, with a [full team of] sailors and oarsmen, and equipped of armours for the sake of the travel and the aforesaid transport. [I promise you also] to bring you along and to transport you in the aforesaid galleys, you or the named Baliano, with all your belongings and servants, from Genoa or from the harbor of Genoa up to the aforesaid place of Bruges, or up to the place where the galleys will be unloaded, at my own expenses, me Paleologo and my father, covering all food and drinks, which will be of acceptable quality, and excluding all other transport expenses.

In addition, it has been acted, in the present agreement between the aforesaid parties, that if Paleologo or Benedetto, his father, or any other person acting in full rights on their behalf, or on the behalf of one of them, would like to take back and buy back the aforesaid alum from the aforesaid Enrico and Baliano, they will keep the right to do so over there, and that the aforesaid Enrico and Baliano would be bound [by this right], and should give back and sale back in return this alum to the same Paleologo or Benedetto, or to one of them, for the price of 3,360 Tournois £, which should be paid to the aforesaid Enrico and Baliano by the aforesaid Paleologo and Benedetto, or by one of them, within a period of 2 months, starting from the day galleys will be unloaded,

And if the aforesaid Paleologo and Benedetto, or one of them, do not pay, or do not full fill all conditions, within a period of 2 months, regarding the said sum of 3,360 Tournois £ [to be paid] to the aforesaid Enrico and Baliano, or any other person acting on their behalf, then Paleologo and Benedetto, or any other person acting on their behalve, would have to provide and to pay to the aforesaid Enrico and Baliano, in Genoa, within a period of 1 year starting from the next Kalende of November, 13,5 Genoese £ for each 12 Tournois £, up to the full reimbursement of the aforesaid amount of 3,360 £.

In the aforementioned case, the aforesaid Paleologo and Benedetto will have to transfer to Enrico and Baliano, and to consign [under theirname], in the aforementioned place of Bruges, as a security and a pledge for the said 3,360 £ to be paid in Genoa, a certain quantity of commodity or goods worth 3,500 Tournois £, based on both the actual price of the goods and the sales and exchange transaction, loaded on the said galleys, or on one of those, or in any other galleys of the same quality, which will ship this [freight] to their destination, Genoa. [and] that these commodities or goods, after they will be delivered to the aforesaid Enrico and Galiano as a pledge and a guarantee for the aforementioned debt, and loaded on the aforesaid galleys, are to be [consigned there] and shipped up to Genoa at Enrico's and Balioano's own risks [of sea] and fortune, for the whole amount of 3,360 £, before the Kalende of November 1299, and if this or those galleys, on which the pledged or the consigned goods will be loaded as a guarantee for the aforesaid debt, are still travelling after the month of October 1299, with the aforesaid pledge in question, then this pledge and goods will be and will be transported at the own risks and fortune of Benedetto and Paleologo themselves, and not at those of Enrico and Baliano, or any one of both of them, after the said month of Octobre. And, in the aforesaid galleys in which the pledge will be loaded to be shipped to Genoa, Benedetto and Paleologo will have to take onboard the said Enrico and Baliano, with their servants and all their belongings, and to transport them in the aforesaid galleys from the aforementioned regions up to Genoa, at no expenses [for you] and that will be covered by the aforesaid Benedetto and Paleologo, i.e. all food and drinks for them [Enrico and Baliano], and their servants, all transported without additional charges.

It has been acted by agreement between parties, whom names have already been mentioned above, that if these galleys will not leave Genoa in order to undertake this travel before the Kalende of next May

[1299], the aforesaid Paleologo will have, and he committed himself, to give and to pay to the same Enrico who will receive the amount, the names of parties having already been mentioned above, 3,250 Genoese £ as the price for the said alum according to the wishes of the aforesaid Enrico; after the Kalende of May and once the payment being made, the present contract will be broken, cancelled and [to be considered] without value.

To all this, and to each and every covenants, I, the said Paliologo, in my own name, fully liable, and in the name of the procurator, the said Benedetto, my father, fully liable, I promises and agree with you, in your name and in the name of the said Baliano who receives it [my commitment], to take care of, to full fill, to observe, and not to circumvent in anything, under the penalty of [having to pay] the double of the said amount, the commitment having been solemnly expressed, and providing as a mortgage, and liable of, all my assets and assets of my aforesaid father. The aforesaid [details] being ratified, it has been acted about all that has been written above, that the said Paliologo, is in his own name, fully liable, and his [contractually] bounded in the name of the procurator, his father, in his own name, fully liable, renouncing to their own right, waiving the legislation on join-liability, according to the Epistle of the divine Hadrian, and that themselves and their assets can be the object of a transaction, renouncing, the names having been already mentioned, to all their privilege abroad, and according to all legal obligations.

Done in Genoa, in the portica (domain) of the house Egidio Lercari, in the Year 1298 of the Nativity of the Lord, during the 11th indiction, the 29th day of October. Witnesses: Guilielmo di Turri, banker, Ruffino di Zuano, Antonio Usumaris and Nicola di Bruce. They have decided that there should several identical copies of the contract including all that has been said above.

A first reading

In this contract, written on 28 October 1298 by the Notary Andreolus de Manuelis in Genoa, Paleologo Zaccaria and his father Benedetto Zaccaria agree to sell (*vendo, cedo et trado*) 650 *cantari* of alum, or 30,972 tons¹⁸⁵, to Suppa & Grillo in Aigues-Mortes, in exchange of an upfront payment of 3,000 Genoese £, being made for two thirds (2,000) by Suppa, and for one third (1,000) by Grillo. The contract clearly mentions that the alum will come from Phocaea (*alumnis de Fogia*) and should be of good quality that could be assessed from its brilliant white colour (*boni et nitidi*). The alum will be delivered not later than 21 April 1299 in Aigues-Mortes.

The contract mentions that if Zaccaria does not leave Genoa in his galleys before the Kalende of May (hence abandons the venture), he will have to repay from 21 May 3,250 Genoese £. If Zaccaria decides to start the venture, the alum will be shipped by Zaccaria to Bruges, on one or two galleys (*in duabus galeis*) which will actually come from Genoa. The place of departure of the galley(s) can be inferred because the contract specifically mentioned that Suppa & Grillo could travel with the Galleys from Genoa. All shipment costs – including good food, drinks and taxes (*avaris*) - will be covered by Zaccaria (*ad expensas et misones mei*). This aspect has much in common with the maritime renting contract called at that time *nolis*. As mentioned, the final destination is Bruges, but the contract clearly mentions the possibility for the galleys to unload the alum in another place (*vel ad locum*), in the Low Countries, such as Normandy, Picardy or elsewhere.

In one of the destinations mentioned above - let's assume it is Bruges - the Zaccarias have the right if they wish (*voluerint*) to do so, but not the obligation, to buy back the alum. The buyback conditions are not fully clear. We know Zaccaria's buyback price is fixed at 3,360 Tournois £. The contract also specifically pinpoints that all transport casualty risk (*rixicum*), being "Act of God" or the risk from sea (*fortunam maris*), as well as "man-made" (*gentium*) risk such as piracy,

¹⁸⁵ 1 Genoese cantaro in XIIIe = 48kg

are to be borne by Suppa & Grillo. This clause seems to be redundant : a sales *sui generis* transfers risks to them and the contract mentioned that the sales is to be recorded in the scriba's book (*in cartulario dicte galee*). But such a redundant clause is there to insist that Suppa & Grillo are liable for any damages affecting goods during transport. In other words, Suppa & Grillo accepted that, in case of major casualty at sea, all or part of the initial fund provided will not be recovered, and that the merchant or ship commander could buy back the alum at lower price, being 3,360 Tournois £ minus the loss in value contingent of the adverse event. This buyback price includes therefore both a potential premium but also implicit exchange rates between Genoese £ and Tournois £, which is in essence what was called a *cambium nauticum*: An initial funding in one currency paid back later, with an explicit, or implicit premium in another currency.

The contract provides Zaccaria with two additional months to actually pay the buyback price in Bruges to Suppa & Grillo. This is a classical clause in this type of contracts, enabling the merchants to find a buyer and collect cash proceeds before having to pay back the initial fund providers. Alternatively, might pay on the way back, in Genoa. The idea is to enable Zaccaria to buy, with the sale proceeds, in Bruges other goods, for instance a lot of beautiful draperies from Ypres, the famous *pannos dipra* as often called, and then to ship and sale them in Genoa. The lot of drapery could even be shipped further east, for instance up to Caffa, in the sea of Azov, where Zaccaria used to be involved in the import of drapery from Low Countries and from Champagne (Part II). If the final payment will be made in Genoa, it has to take place not later than Kalende of November 1299. However, in this case, Zaccaria will have to pay 3,780 Genoese £. In this scenario, the transaction is a change and then re-exchange, being a cash upfront and a fixed payback a year later, with no exchange rates exposure for Suppa & Grillo.

If Zaccaria buys back and payment is to be made in Genoa and not in Bruges, Zaccaria is required to transfer, as collateral, some goods valued at 3,5000 £ Tournois (*que valeant libras III milia D turonesium*). Eventually, the contract stipulates that if alum has been repurchased but not paid in Bruges, on the way back from Bruges to Genoa, Suppa and Grillo will be given the freight or part of the freight as a mortgage or a security for the money to be repaid by Zaccaria. Here again, in case of adverse event, Suppa & Grillo are liable, and therefore the loss in value in case of adverse event should be deducted from the buyback price in Genoa of 3,780 Genoese £.

Now, if we want to link these locations with the main transactions mentioned in the contract the following chart captures, incompletely at this stage, the most basic aspect of the contract, assuming final payment to Suppa & Grillo may be done by Zaccaria in Genoa, after the sales of alum and the acquisition of drapery in Bruges followed by the sale of drapery in Genoa.

[Insert about here Exhibit 7]

The contract however adds several niceties. First, the parties involved are not just the Zaccarias on the one hand, and Suppa & Grillo on the other. As time and resource constraints matter, as well as information and transaction monitoring, the signing parties explicitly mandate, or keep the right to mandate, other people to implement the transaction. First, and foremost, the contract is not signed by Benedetto Zaccaria but by his son Paleologo, who refers to a delegation (*procuratoris nomine*) given by his father, with all his reputation background – the contract grants him a noble predicative of *Domini*. We already know that Benedetto is both the owner of the alum, with his brother Manuel, and the real decision-maker in the Zaccaria family.

In addition, the contract mentions Zaccaria's agents: The actual person who will deliver the alum in Aigues-Mortes before April 1299 (*tibi vel tuo certo misso per me vel meum missum hinc ad Kalendas Aprilis proxime venturi*), the manager of the transport to Bruges, or the one who will buy back the alum in Bruges could be any other legitimate person mandated to transport and

potentially buy back the alum (*vel alia legitima personna pro eis vel altero eorum voluerint recuperare et reemere dictum alumen a dictis Enrico et Baliano*).

Eventually, the contract also refers to a *societatis* agreement with Gabriel Spinola (*in societate cum Gabriele Spinula*). A *societatis* is classically a sort of “joint-venture” where two parties provide an equal amount of assets, and then share future profits and losses accordingly. Variant includes all possible respective shares of both founders, sometimes a number of investors higher than 2, or an active management role for one of the investors while the other remains a passive hands-off fund provider. In this case, the *societatis* refers to the two fully-equipped galleys that will be used to transport the alum, and more than likely other goods or commodities.

The following exhibit summaries the structure of the transaction :

[Insert about here Exhibit 8]

The role of alberghi in the contract

We have talked earlier about the albergo structure as a crucial private-order institution for Genoese merchants. Let us see how it works in this contract. At the top, we have Benedetto Zaccaria, the *pater familias*. The alum comes from Phoea, which is in fact managed by Manuelle, his brother. Then we have the son Paleologo who has a long term *procuratio* from his father. The business partner of Benedetto Zaccaria, Gabriele Spinola, came from an important albergo in Genoa. Garbiele is not the most prominent member of this family, but we know that he played the role of diplomat for the Commune. For instance, in 1305, along with Cavalinno de Medicis, he negotiated an agreement with Sancho de Majorca about a 2,000 £ litigation concerning some damages caused by the Genoese on the island¹⁸⁶. As far as investors are concerned, Grillo is also a well-known family name in 13th century Genoa. Andreolus de Laneris, the notary to the contract, is not unknown from the Zaccarias, and several records demonstrated that he has dealt more than once with them.

Furthermore, in order to confirm what we have said about Zaccaria’s “firm”, as well as the Genoese business practices based on a network of formal (e.g. “procuratio”) and informal contracts (e.g. trust), we provide a list of the names of Genoese commerce in XIII-XVth centuries. This is a list compiled from several sources (Ballard, Lopez, Kedar, ...). These names are known of all historians of Genoa. We have simply put in bold all names with formal familial connections to the Zaccarias. In addition, when these names are mentioned in the contract, these are in italic letters. We can cross-check this list of names with other sources providing the list of business partners of the Zaccarias. This tells a lot about about the way Genoese built up a commercial powerhouse based on few at the top. This transaction mirrors this situation. Here is a short list, in alphabetic order, of some of the 33 most prominent names, we have compiled from different sources.¹⁸⁷

Adorno,
Balbi,
Calvi, Cattaneo, Centurioni, Cibo,
Della Volta, Di Cruce, Di Mari, **Di Negro**, Doria,
Embriaci,
Fieschi,
Gentili, Ghisolfi, Giustiniani, **Grillo**, **Grimaldi**,
Imperiali,

¹⁸⁶ Jehel (1993 :)

¹⁸⁷ Kedar (1976), Balard (1978), Jehel (1993),

Lercari,
Lomellini, Mallone, Malocelli,
Pallavicini, Pessagno, Piccamiglio,
Spinola, Squarzafico,
Usodimare, *Usumaris*,
Vento, Vivaldi,
Zaccaria.

First, the contract has been signed in the house of a **Lercari**, and one of the witnesses is an **Usumaris**. Both names are well-known among the Genoese establishment. Second **Zaccaria** has a *societatis* with a **Spinola**. First, Paleologo Zaccaria himself married Giacomina Spinola. Second, Orietta, the daughter of Manuale Zaccaria, the brother of Benedetto, and joint owner of the Phocea, has been married to Rainaldo **Spinola**. Third, one of the investor is a **Grillo**. Fourth, Benedetto Zaccaria's daughters, Argentina and Eliana, have been engaged with a Paolino **Doria** and Andrealo Cattanei **Della Volta**. These two men were crucial in the management of Zaccaria's business interest. Going further other branches of the Zaccaria (Ogerio, 1182-1200) were relatives to **Fieschi**, **Grimaldi** and **Di Negro** families. What it says is that this contract evolves around several key Genoese families who know each other very well, mixing business and private relationships.

Zaccaria was structuring his business organisation around his family. First, there was the nucleus with his brother and son. Second, there was other alberghi, notably the one with family connexions to the Zaccarias (Spinola, Doria, Grillo, della Volta). Third, Zaccaria did collaborate on a case by case basis with other alberghi (e.g. De Negro), in order to both raise capital for his venture or to conduct business overseas. Fourth, eventually, he also enlarged the family circle to non-aristocratic and dedicated agents. These agents were often long-term associates and sometimes they were assigned a specific geographic location. Family did play a crucial role in the way Genoese merchants manage their businesses. The third lesson is a question, somehow present in Lopez's study on Zaccaria's familial organisation of business¹⁸⁸: Is it the familial relationships the cause of the shape commercial organisations, or were the commercial interests that drove the evolution of families of merchants? The answer is of course a mix of both. And in case of Zaccarias, the genealogical tree of this recent albergo suggests indeed that many marriages coincided with business interests and commercial alliances.

The contract as options

We can now review the contract in an option based framework. Here is a non-exhaustive list of the most critical options that both parties explicitly negotiated.

For the Zaccarias :

¹⁸⁸ Lopez (1968)

- Option to terminate the contract if cash received does not meet quantity (3000) and quality standards
- Option to hire agents to conduct the venture
- Option to defer delivery of alum in Aigues-Mortes up to May 1299
- Option to claim/default up on (part of) of 3,000 £ in case of adverse event between Aigues-Mortes to Bruges.
- Option to unload alum in other location than Bruges (Picardy, Normandy,)
- Option to buy back alum in Bruges
- Option to defer decision to buyback alum up to 2 month
- Option to defer the payment on the buyback until the Kalende of November 1299 in Genoa.
- Option to default up to 3,500 Tournois £ in case of adverse event between Bruges to Genoa, before 1st November 1299

For Suppa & Grillo's :

- Option to claim back cash and terminate the contract if alum does not meet quantity (650 cantare) and quality standards
- Option to monitor the venture, all expenses paid
- Option to claim back fund if safety and security's requirements the galleys are not fulfilled at departure
- Option to claim "indemnity" in case of decision not to start the venture
- Option to recover collateral shipped from Bruges to Genoa for a minimum value of 3,500 Tournois, in case of default by Zaccaria
- Option to claim indemnity (double amount of 3,780 £) in case of obligations breached and default by Zaccaria (no payment before 1st November 1299)

If we keep only the most crucial options, we can design a tree capturing, in this case from Zaccaria's perspective, the payoff according to the future states of nature

[Insert about here Exhibit 9]

The model : one way venture (I)

The following basic model is somehow a primer that helps understand how contractual provisions can be reframed as options. We assume a fictitious venture that is only a one-way trip from Aigues-Mortes to Bruges. The Zaccarias sell to Grillo and Suppa, say, 10 cantari of alum for 100 £ (or price = 10/per cantaro) upon departure. At the same time, Suppa and Grillo grant the Zaccarias a buyback option on the alum. This option can be exercised in Bruges at a pre-agreed price (strike) of 120 £. Finally, the Zaccarias benefit from a "sea loan" covenant: They can claim up to 100 £ in case of casualty. We assume that there is no currency exchange between Aigues-Mortes and Bruges.

Let t_0 , t_1 respectively denote departure time and arrival time. P is the price at departure in Aigues-Mortes, P^* is the price at destination in Bruges, and Q the quantity of alum deliverable there. Hence from the Zaccarias' standpoint, the value of the venture is given by:

$$V_z = 100 - 10P_{t_0} + \text{CallMax} \left\{ \left(\left[10P_{t_1}^* | (\text{no casualty}) \right] + \left[QP_{t_1}^* + \text{Put Max} \left(100 - 100 \frac{Q_{t_1}}{10}, 0 \right) \right] | (\text{casualty}) \right) - 120, 0 \right\} \quad (1)$$

Expression (1) says that the Zaccarias net gain is made of the proceeds of the initial sale and a compound option. Indeed, the Zaccarias have an option to buy back the alum at a pre-agreed price (120 in this simplified version) from Suppa and Grillo. The underlying asset to this buyback option is contingent upon the occurrence of a casualty. If the galley safely arrives in

Bruges, Zaccaria will buyback only of the value of the goods, or $10P^*$, exceed the strike price of 120. In case of casualty, the buyback price is lowered, and, instead of paying the full 120, he is long a put option on the loss at sea, based on the initial valuation at departure of 100. This put option is $\text{Put}_{\text{Max}(100 - 100 \frac{Q_{t_1}}{10}, 0)}$, and Zaccaria will buyback only if the value of alum in Bruges, QP^* , plus the value of the put option in case of casualty, exceeds 120.

In others words, Zaccaria is long a put (option to default in case of casualty) on a long call (option to buyback). However this model ignores three key elements from the contract : (i) Zaccaria has the option to leave or not; (ii) Zaccaria comes back to Genoa after the call in Bruges; (iii) In any case, if Zaccaria decides to leave he commits his galley as well as the transport expenses to Bruges.

The model : both ways with option to cancel/start the venture (II)

We know revert back to the original contract and model it along the tree of events given in Exhibit (10) which is a stylized version of the global tree in Exhibit (9).

[Insert about here Exhibit 9]

This tree differs from Exhibit (8) in three ways. First, the fundamental difference, in this scenario tree, is that Zaccaria can rent his galley(s) if he does not buyback. The contract does not mention it because if Zaccaria does not buyback, the contract is in effect terminated. However, Zaccaria has to come back any way, and he will have pay the transport expenses and being exposed to sea risks on the way back. Instead of doing so unloaded he could ship goods either for himself or for others. We assume here that he if he does not buyback, he rent his galley(s) and cash in revenues for a one way *nolis* from Bruges to Genoa. Secondly, we assume no risks of default by Zaccaria. We represent her again the venture from Zaccaria's point of view : Zaccaria's expected payoff and his decision to start and to buyback should not be based on a possibility to breach the contract. Thirdly, we assume a full loss of galleys and commodities (alum or draperies) in case of casualty.

In summary, the Exhibit (9) shows that Zaccaria has first to decide whether he will or not proceed with the venture, that is to leave from Aigues-Mortes to Bruges. If he decides to go ahead, there is the risk that the cargo is lost during the trip at sea. In this case, we assume total loss of both galleys and goods and the story is over : he does not buyback. If the cargo arrives safely in Bruges, Zaccaria has to decide whether or not to buy back the alum from Suppa and Grillo. If he does, he has the option to pay now or to be granted a time extension, that is to pay later in Genoa. If he decides to postpone the payment to Genoa, Zaccaria will have to pledge goods valued at 3,500 Tournois £ to Suppa and Grillo. In case of a casualty on the way back to Genoa, the contract says an indemnity up to 3,500 Tournois £ could be deducted from the 3,780 £ owed to Suppa & Grillo. Again we assume full loss, or full indemnity of 3,500 Tournois £, in such a scenario. Eventually, we assume that Zaccaria pays on the way back.¹⁸⁹

The timing of the venture follows the sequence described in Exhibit (11) :

[Insert about here Exhibit 11]

According to this timing, options are not American-type (exercisable up to maturity) but European-type (exercisable at maturity). Let t_0 denotes the date when the contract is signed and cash 3,000 £ paid to Zaccaria, and 650 cantari of alum transferred to Suppa & Grillo; t_1 when

¹⁸⁹ We will see that it does not make sense for him to pay in Bruges (See under)

Zaccaria decides to buyback immediately for 3,250 £, or to leave from Aigues-Mortes; t_2 , the expected date of arrival in Bruges (and the decision to buyback for 3,780 £); and t_3 , the expected date of arrival in Genoa, on the way back.

We represent the venture from Zaccaria's point of view, and accordingly let $E(.)$ be the expectation operator, V the value of the venture, or the present value of future contingent cashflow, and z Zaccaria's indicator.

Q is the quantity of commodities, and $Q_A = \text{alum}$, $Q_D = \text{drapery}$, as we assume that Zaccaria, in case of safe arrival and decision to expand the venture buy draperies in Bruges. P denotes the price of commodities, with P , P^* , P^{**} , respectively, the market price in Aigues-Mortes, in Bruges and Genoa. S is the exchange rates between Tournois £ and Genoese £.

G denotes the galley(s). N is the actual transport cost from Genoa to Bruges and back to Genoa, and αN is the market price, or a *nolis*, for such a two ways transport. In other words, $\alpha N/2$ is therefore the additional revenue Zaccaria could cash on the way back,

For the decision/event tree, we adopt the following convention, $p(.)$ being the probability :

- $p(1)$ = Decision to buyback in Aigues-Mortes
- $1-p(1)$ = Decision to Start the venture
- $p(2)$ = Casualty before Bruges (full loss)
- $1-p(2)$ = Safe arrival in Bruges
- $p(3)$ = Decision to lease galleys (no buyback in Bruges)
- $1-p(3)$ = Decision to buyback
- $p(4)$ = Casualty before Genoa (way back)
- $1-p(4)$ = Safe arrival in Genoa

Accordingly, the expected payoff for Zaccaria. It articulates the 6 different scenarios, according to Zaccaria's expectation Ez , in Exhibit (11), with their attached conditional probability :

- scenario 1 = $Ez[(\text{cashflow})|p(1)]$
- scenario 2 = $Ez[(\text{cashflow})|p(2)|1-p(1)]$
- scenario 3 = $Ez[(\text{cashflow})|p(4)|p(3)|1-p(2)|1-p(1)]$
- scenario 4 = $Ez[(\text{cashflow})|1-p(4)|p(3)|1-p(2)|1-p(1)]$
- scenario 5 = $Ez[(\text{cashflow})|p(4)|(1-p(3))|1-p(2)|1-p(1)]$
- scenario 6 = $Ez[(\text{cashflow})|1-p(4)|1-p(3)|1-p(2)|1-p(1)]$

Zaccaria's Payoff : put on call (on put) on call

$$V_Z = \left[650(Pa_{t_1} - Pa_{t_0}) - 250_{t_1} \right] p(1) + \text{Call Max} \left\{ + \left(\text{Call Max} \left\{ \left\{ \text{Put Max} \{ S_{3,500,0} \}_{t_3} \mid p(4) + \left[(P^{**}Q_d)_{t_2} + G_{t_3} \right] 1-p(4) \right\} - 3,780_{t_2} \right) 1-p(3) + \left(\left(G_{t_3} \right) 1-p(4) + \frac{\alpha N}{2} \right) \mid p(3) \right) 1-p(2) - (N+G)_{t_1} \right\} \mid 1-p(1) \quad (2)$$

Zaccaria's decision rule (1) : Decision to Start the venture, or 1-p(1) :

$$1-p(1) = \text{Probability to start} = E_{Z_{t_1}} \left(p \left(\left(\left(G_{t_3} \right) 1-p(\text{no casualty}) + \left(\frac{\alpha N}{2} \right)_{t_2} \mid p(\text{no casualty}) \right) - (N+G)_{t_1} \right) - \left[650(Pa_{t_1} - Pa_{t_0}) - 250_{t_1} \right] > 0 \right) \quad (3)$$

Decision rule (2) : Decision to Buyback or not (rent) in Bruges, or 1-p(3)

$$1-p(3) = \text{Probability to buyback} = E_{t_2} \left(p \left(\left\{ \text{Put Max} \left\{ S(3,500 - 3,500 \frac{Q_d}{650}), 0 \right\} \mid p(\text{casualty}) + \left[(P^{**}Q_d)_{t_2} + G_{t_3} \right] p(\text{no casualty}) - 3,780 \right\} - \left[\left(G_{t_3} \right) p(\text{no casualty}) + \left(\frac{\alpha N}{2} \right)_{t_2} \right] \right) > 0 \right) \quad (4)$$

The previous equation capture the value of the venture for Zaccaria (equation 2), with two decision rules, start or don't start (equation 3), and buyback or not buyback (equation 4).¹⁹⁰

In equation (2), the first bracket is the no start scenario, with the probability $p(1)$: Zaccaria sold alum in $t=0$ and recovers it in $t=1$, and pays a premium of 250 £ to Suppa and Grillo for the 6 months. The second side of the expression is a complex compound options to defer buyback decision up to Bruges, or, which is the same thing, a call option on the venture, contingent on the decision to leave, or $(1-p(1))$. In this case, and this is the initial cost of this option, Zaccaria has to invest his galleys as well as the operational expenses for transport (food, salaries, taxes). For the sake of simplicity we have written that both were actually spent in t_1 . It does not change anything if we assume that half of the operational expenses will be spent in t_2 . As we have said, if casualty to Bruges, Zaccaria will lose both galleys and cash paid for the transport. So the $p(2)|1-p(1)$ don't need to appear one the equation. However if he arrives safely in Bruges and he decides to rent instead of buyback, $(p(3))$ he pack in a additional payoff of $aN/2$. In this case, two scenarii can happened: either not casualty arrives on the way back, $1-p(4)|p(3)|1-p(2)|1-p(1)$ and then he gets back G at destination or there is a casualty, $p(4)|p(3)|1-p(2)|1-p(1)$, the galley are lost. But in this case there is no need to include in the equation, because as we have said the residual value of asset is 0.

If Zaccaria decides to buyback, $(1-p(3))$, he needs to payback 3,780 in any case. With the sales proceed of the alum, Zaccaria will buy draperies. In case of adverse event on the way back, $p(4)|(1-p(3))|1-p(2)|1-p(1)$, Zaccaria will lose the lot of drapery and the galleys, so the residual value is also 0. In case of safe arrival to Genoa, $1-p(4)|1-p(3)|1-p(2)|1-p(1)$, then the residual value of assets is equal to the value of drapery in Genoa $(P^*Q_D)_{t_2}$ and the value of galley at destination.

Equation (3) captures the decision rules to start, or don't start. We assume that Zaccaria leaves if his payoff in case of departure, but no buyback (bad market conditions, therefore rent), is higher than a no-departure scenario. In other words, Zaccaria's decision is based on a bounded rationality. Instead of weighting payoff of "no start" scenario agints all other scenarii (2, ...6), he is more prudent and leaves only if his payoff attached to the decision of leaving is bigger than a "don't start" decision, in case of bad market in Bruges. To make the reading easier, we replace notation for probability by actual word describing outcomes, with "casualty" being casualty to Bruges, and "casualty'", being casualty from Bruges. The payoff is weighted by probability of casualty both ways. In other words, Zaccaria leaves if the payoff of scenario 1 is less than the payoffs of scenarii 2,3, 4 or :

$$p(\text{Start}) = \begin{cases} 1, & \text{if (Scenario 1) - [(Scenario 2) + (Scenario 3) + (Scenario 4)] > 0} \\ 0, & \text{if (Scenario 1) - [(Scenario 2) + (Scenario 3) + (Scenario 4)] \leq 0} \end{cases}$$

During the 6 months preceding his decision Zaccaria may have gathered some news about the state of the alum market and, for instance, know that the market is bad and not worth the trip. If he were to leave, he would not buyback and be bound to a trip back. This can be written as:

Equation (4) translates the decision rule of buyback. Zaccaria will do so if his payoff when buying back for 3,780 £ (and buying drapery with the sales proceeds) is higher than the payoff provided when renting his galleys. Payoffs are weighted by the probability of casualty on the way back, in both cases. Zaccaria calls in Bruges if the payoff of scenario 5 and 6 is less than the payoff of scenario 3 and 4, or :

¹⁹⁰ Do note that in our equation discount factor does not appeared. This is because we view the venture capture in equation (2) as a full-funded vehicle where cost of capital is integrated in the payoff of Suppa & Grillo. In other words, net present value of asset for the venture's payoff minus Suppa & Grillo's payoff. We simply need to assume that for such a venture both parties have the same cost of capital.

$$p(\text{Start}) = \begin{cases} 1, & \text{if } [(\text{Scenario 5}) + (\text{Scenario 6})] - [(\text{Scenario 3}) + (\text{Scenario 4})] > 0 \\ 0, & \text{if } [(\text{Scenario 5}) + (\text{Scenario 6})] - [(\text{Scenario 3}) + (\text{Scenario 4})] \leq 0 \end{cases}$$

We end up with the following description of the tree as a complex compound options :

[Insert about here Exhibit 12]

If we keep in mind that we have to work backward, from end of the tree to contract before departure, Zaccaria is long a put (casualty on the way back to Genoa) on call (buyback in Bruges) on a put (casualty on the way to Bruges) on call (at departure from Aigues-Mortes).

We are now in a position to examine how the contract , in an option framework, is able to provide the solutions that Zaccaria, Suppa and Grillo were trying to find

Functions

The Zaccaria contract is a remarkable construction that encompasses an impressive number of issues.

The transaction first enables the pooling of funds. 3,000 £ were gathered jointly by Suppa and Grillo, very likely from other smaller investors, and they were invested in Zaccaria's venture. In addition, it organises the transfer of funds, in two ways. Zaccaria has received cash for a venture to and from Bruges, and this deal managed to solve the problem of re-funding from Bruges by providing all the sum upfront.

The contract also completes an highly incomplete markets. At a time where stock exchange, derivatives, straight debt did not exist or were banned, the contract creates an innovative solution that completes market gaps. In particular this unique product enables Zaccaria to better manage risk. The contract spreads, through transfer and financing, the various risks among the parties. For Zaccaria, this contract fits with his real option objectives : the financial options create and interact with real options to adapt the venture according to future information. It also introduced a very original dual valuation for the sea risks coverage, before and after Bruges in order to anticipate the value of the venture and the demand for risks coverage according to the value of the venture through times.

Because contracting is about trust, the transaction also make sure all parties received enough guarantees to make them confident that nobody will breach key covenants. Many elements of the contract addresses this agency i, being *ex ante* selection and *ex post* control of parties, and informational issues. First, it should be noted that throughout the venture, whatever the outcomes, Suppa & Grillo remained owners of the commodities. Such a contract design enables Zaccaria to demonstrate that he does not intend to breach his promises, because even in the case of litigation, from an accounting point of view, Suppa & Grillo own the asset to Bruges and then, in case of buyback by Zaccaria, they received goods valued at 3,500 Tournois £ as a pledge on the way back. To Bruges, the deal is a sale and, from Bruges, the funding become an asset-backed debt (*pignus*) embedded with a "sea loan" feature. They will remain owner until they have received the full amount and the contract will be then terminated by being crossed at destination. If Zaccaria does not pay, the books of the scriba will show that Suppa & Grillo are owners of goods valued at 3,500 Tournois £, and before Court's judgement they can already recoup part of the sum. In addition, as we will see, this sum exceeds the 3,780 genoese £, protecting somehow Suppa & Grillo from a market price drop of such goods. Because the scriba record transaction in the accounting books on board, any litigation is less controversial because *ex post* audit is possible.

Other covenants are aimed at reducing asymmetry of information where needed, by numerous covenants on screening (*ex ante*) and monitoring (during venture):

- screening quality of alum, money received, quality and equipment of galley before departure
- monitoring by Suppa & Grillo (or their agent) and scriba on-board during the venture

The transaction also address the agency problem, and informational asymmetry, with incentives. The option to start combined with the fact that Zaccaria has to provide the galleys enables Suppa & Grillo to make sure Zaccaria does not “cheap talk”: He will start only if his information tells him to do so. In other words, Zaccaria buys a real option to expand or not his venture to Bruges, but, because he has to commit transport cost and galleys, he has a strong incentive to find information about risks for the venture. And, given the tension in Flanders at that time, and the campaign of Philip the Fair, Zaccaria is in good position to collect such a type of data.

The contract, if one look at its analytical articulation is clear but its numerous options and covenants make it much more complex than traditional form of contracting. One advantage of such complexity, is that it increases the asymmetry of information with Competitors. Indeed, if the notary or witnesses leak information about the contract, its complexity will make it hard to disentangle crucial information. In particular, the destination where alum will be unloaded is open : Bruges, Normandy, Picardy. And the price of assets, as Suppa & Grillo, paid for both alum and transport, are not clearly defined.

Eventually, the transaction fosters family and business networks. The contract enables Zaccaria to take care of his son Paleologo and to maintain business relationship with close associates and other alberghi he wants to work with , and notably the Spinolas and the Grillos.

There is a final function we need to look at : the ability of this contract to circumvent usury prohibition

Put/call parity and usury prohibition.

Contractual provisions spell the rights and obligations of the parties to the contract. These rights and obligations boil down to future payoffs contingent upon some predefined states of nature. In other words they translate into the occurrence of sequences of cash-flows to be paid or to be received. One useful message of OPT is that there are many ways to Rome. Indeed, as long as different instruments yield the same cash-flows across states of nature they are identical from a valuation standpoint. However, they may not be totally equivalent depending on who is holding them. To use Robert C. Merton’s terminology they may be priced them but they may not fulfil the same functions. If one goes one step further, they may not provide the same manifest or latent functions that Robert K. Merton has distinguished. They may not provide the investor with the same ability to match the constraints he is facing. Zaccaria’s contract is no exception to this observation.

A critical aspect (Part II) was usury prohibition. We have seen thatPope Gregory IX prohibited sea loans as usurious in his Decretale *Naviganti vel eunti ad nundinas* (1234), and he prescribed some severe treatments to usurers. Usurers were facing threats of jail, expulsions, taxes, prohibition to trade. In some case, borrowers accused lenders of being usurers in order to default on their payment obligations. In any case, contract can be audited to check whether or not they pass the usury test. One test method, according to Lapidus (1992), was the separation between ownership and risk. The pure sea loan is viewed usurious because it separates risk from ownership. More specifically, it is argued at the time, that, in case of a safe trip (no casualties), the full venture risk is left in the hands of the merchant and the lender is no longer associated to the success or failure of the venture. In a typical sea

loan, merchandise ownership remains with the merchant while the at-sea risk is handed over to the lender.

However, there is a simple way though to circumvent this drawback of the straight sea loan, namely : “put/call parity”. As shown in two brief but exterey usefull papers of M. Knoll,¹⁹¹ Put/Call parity been used by Hebrews to manage interdiction of interest-based profits from lending among members of the community, medieval peasants and landlords, or even today’s Muslim investment managers and bankers to circumvent the ban of credit by *sharia*. We show hereafter that put/call parity is also at work in this deal.

Hans Stoll (1969) has formally derived the “put/call” parity. In an arbitrage-free market, if we combine a portfolio of call, put, shares and bonds, we should always obtaain thee ffollowing equalities. First, the value (C) of a call option is equal to:

$$C = S - Ke^{-rt} + P$$

In other words, the call option on a given underlying asset can be replicated by holding an asset, borrowing the strike price (K) at the risk-free rate and being long a put option on the underlying asset. From this it is easy to demonstrate that the value of a long put, is:

$$P = Ke^{-rt} - S + C^{192}$$

Eventually :

$$S + P = C + Ke^{-rT}$$

This what modern finance practitioners call a “protective put”, being the asset with a put to protect the owner from a downside, as an equivalent of a “fiduciary call”, the cash plus a call on the asset.

This what is meant by the very notion of asset replication: Same cash-flows but different asset combinations worth the same price, and we see the Zaccaria deal precisely articulates the identity between the “protective put” and the “fiduciary call”.

[Insert about here exhibit 13]

The Zaccaria contract is an example of the shrewd use of the put-call parity. An easy way to see it is to look at our simplified model of equation (1). It can be reformulated as:

$$V_Z = 100 - 120t + \text{Put Max} \left\{ 120 - \left(\left[10PT1 | (\text{no casualty}) \right] + \left[QPT1 + \text{Put Max} \left(100 - 100 \frac{QT1}{10}, 0 \right) \right] | (\text{casualty}) \right), 0 \right\} \quad (11)$$

In this reformulation, Zaccaria is long the alum, long a debt of 100 yielding 120 at maturity, plus a put option with an embedded “sea loan” put. This expression is “cash-flow equivalent” to the one we wrote earlier. However, from the Church point of view, the latter structure is clearly usurious: The deal is a loan with an embedded sea risk-coverage. Using put/call parity, Notary de Laneris has successfully circumvented the prohibition by presenting the deal in such a way that it did not raise the

¹⁹¹ Knoll (2001, 2004)

¹⁹² We can also infer that any asset can be replicated by a combination of a long call, a short put and a loan $Ke^{-rT} = C + P - S$,

attention of the Church. This is the *latent* function of the contract: Increasing the asymmetry of information with the Church to hide the real purpose. Moreover, if a Church auditor were to look at this contract, de Laneris contractual wording makes it difficult to de-bundle the debt component from the sea loan with potential buyback. On paper, Suppa & Grillo remained exposed to market risks up to the very moment when Zaccaria would make his mind. They were really part of the venture (no separation of risk from ownership), eventually travelling with the goods, and not passive financiers making money from labour of others and from the ultimate property of God: Time. A straight sea loan is unable to achieve the same outcome. There is some irony here. Indeed, nowadays, the whole purpose of the derivatives industry is precisely to enable investors to treat investment decisions and risk decisions separately: I own the asset but I can sell its risk via a derivatives transaction without having to part from my asset. In Zaccaria's contract this is exactly the opposite.

Auditing the options : from indices to numbers

For the Church, the question is what was the true *intention* of Zaccaria and Suppa & Grillo. If one is to suspect some usury in this contract, here is several indices. First, the initial 3,000 £ funding finances is said to be a sales. The question is what is sold for 3,000 £. The contract says, Zaccaria sold alum at departure. However, we know Zaccaria had to cover transport expenditures in case of departure. He sold alum and transport, and the contract even specifies what kind of expenditures (food, drinks, and so on). But in this case, Suppa & Grillo and Zaccaria payoff can be asymmetrical. Because all funding is provided upfront, if Zaccaria buybacks , he covers expenses for the return trip as well. But if he does not buyback, transport cost attached to Suppa & Grillo's payoff are only for one way trip to Bruges. As we have said, because Zaccaria's galley(s) are in Bruges anyway, he can use them (or lease them) for another venture. Therefore, if Suppa and Grillo were to travel with the goods, why they did not kept in hands the funding for the way back ? In such a way, they could spend it for themselves (if option to buyback not exercised) or they transfer it to Zaccaria (if option exercised).

A second problem focuses on yield curves. The contract says that Zaccaria has to payback 3,250 Genoese £ in 6 months or 3,500 Tournois £ in Bruges, or roughly a 2 to 3 months trip, or 3,780 Genoese £ in Genoa on the way back, again roughly another 2 to 3 months trip. If one compounds the 6-month rate of 250 Genoese £ up to one year, this yields a yearly 17,3%, or about 520 Genoese £ 1-year interest. If we assume that the exchange rates is 1:1 between Tournois and Genoese £ , for 3-month up to Bruges, Zaccaria has to pay only 110 £ interest, including the sea risks premium up to 3,000 £ . For the way back, Zaccaria had to pay another 320 Genoese £, with a sea risks coverage up to 3,500 £ losses. It does not make sense, especially if Zaccaria takes out the market risks from Suppa & Grillo, if he buybacks in Bruges. One might says that the exchange rates was indeed 1:0,89 as calculated in the contract (12 deniers Tournois for 13,5 deniers Genoese). In that case, Zaccaria will never payback in Bruges, because he can obtain a 0% loan for 6 months, with a 3,500 £ sea risk coverage for free.

A third problem is related to the respective role of financiers in this contract. Classical CT literature explained that financiers, through contract design, should give incentives to managers to deliver their best efforts. If managers do not deliver, owners take charge of the business and, because of the deal structure, leave managers without no or low rewards. This Zaccaria deal works the other way around. In case of poor management, for instance due to poor anticipation of inventory level in Bruges, Zaccaria can put on the venture. Furthermore, Suppa & Grillo, the financiers, could become managers of the middle of the venture, in a distant place, with no operational skills and no managerial alternative.

All this might suggest that Zaccaria had no real intention not to buy back in Bruges and no real attention to settle the payment in Bruges. This calls for a closer audit of the options at stake. To check

whether the call option in Bruges was “smoke and mirror”, the only possibility is to make some computation and see if numbers add up or not.

At the time of the transaction, the transport cost represents about one third and sometimes more of the revenues. It was mainly calculated on a *per cantaria* basis. From *nolis* contract between Genoa and Bruges in XIIIth century, we can estimate the transport cost at 20 S to Bruges, and 40 S both ways, or 2 £.

The market prices of alum in Genoa was around 50 S in 1297. The cost of transport was around 20 S to 25 S. for one way, and therefore 40 S for both ways. If we make the cost of Nolis being 21 S., and if we add the cost of alum at departure, and bearing in mind that 1 £ is 20 S., we end up with the following :

$$(42 S \times 650) + (50 S \times 650) = 1,375 \text{ £} + 1,625 \text{ £} = 3,000 \text{ £}$$

The alum price in Aigues-Mortes plus the cost of transport to and from Bruges yields is therefore almost precisely valued at the 3,000 £ paid upfront. Suppa & Grillo did paid for alum plus the transport both ways. It confirms something most historians do know already : in XIIIe, cost of transport, including maritime taxes, represented a high proportion of total cost, here about 45 %. Having said that, it also confirms that if Suppa & Grillo paid transport both ways at departure, it is unlikely that the option to buyback was ever to be considered in-the-money in Bruges. To confirm this, we have simply plugged additional numbers in the model. Our data confirm that, in 1298, an estimated exchange rate Genoese £/Tournois of 0,89, or as calculated at that time, 13,5 Genoese denari for each 12 Tournois denari, is likely to be about right. We have not found data on alum prices in Bruges. We have assume a profit rates during the venture between Genoa and Bruges, and on the way back for drapery. The idea is to start with a mark-up profit rate of 7,5% for a one way trip to Bruges : if goods plus the transport cost 100 at departure, goods were resold for 107,5% in Bruges. We then can make some sensitivity analysis to see what happened with different rate of profit (2,5%, 5%, 7,5%, 10%, 12,5%).

However Zaccaria owned the galley(s), and therefore market price of transport differed from actual cost. Here also we used a sensitivity analysis with a base case of $\alpha/N = 7,5\%$ or 7,5% mark-up profit on nolis (*N*) for a venture Genoa-Bruges-Genoa. A critical issue is the volatility of the venture’s payoff. Again data are sketchy. We know, as discussed, that the alum price was quite stable, but data were sketchy. We have used the same “sensitivity analysis” approach and we have tested our model with an hypothesis of a +/- 10% standard deviation (σ) per year, with 4 period of time of 3 months. We have used a binomial tree, going each step of 3 months up or down. For casualty, we have assumed a casualty rates of 2,5% for both ways, which makes in effect 2,4% chance probability of full loss on the way back (0.975×0.025).

Our simulation in Annexe 2. and Annexe 3. indicates that in all case :

$$p(\text{Start}), \text{ or } p(1) = 1$$

$$p(\text{Buyback}), \text{ or } 1 - p(3) = 0$$

In other words, it is always preferable for the Zaccarias to start the venture, and it is always better not to buyback in Bruges and instead renting his galleys.

$$(\text{Scenario 2} + \text{Scenario 3} + \text{Scenario 4}) - (\text{Scenario 1}) = \begin{array}{l} \rightarrow \text{Max} \quad 1.387 \\ \rightarrow \text{Mean} \quad 1.605 \\ \rightarrow \end{array}$$

	Min	1.677
	Max	-143
(Scenario 5 + Scenario 6) - (Scenario 3 + Scenario 4) =	Mean	-212
	Min	-707

For the option to start, sensitivity analysis of the causality rates are concerned does not really impact the results unless one assumes a very high probability of casualty (42%). This illustrates the fact significant dangers at sea or around Bruges were needed to induce Zaccaria not to leave. Given the current political context, this option made sense : because of tensions between France and the Flanders, trading to Bruges was maybe to become too risky or even impossible. The real option to start, or not, was valuable because Zaccaria was the best placed person to learn additional information about how Philip was to conduct military operations war in Low Countries, and in particular regarding the embargo of Bruges. Zaccaria was the one who planned the campaign. The other way around, maybe wanted to use the campaign to create synergies between his two activities : military expedition and trading. We don't know, but what we know is that he negotiated this option at departure.

For the decision to buyback, a joint sensitivity analysis with both price volatility and profit rates confirm this result to be consistent (Annexe 3). Figures in red indicate that the call option, to be exercise in Bruges after 9 months is out-the-money. In the "mean-value" scenario, where prices do not deviate from their initial expected value, we need to assume very high three moth mark up profit rates (12,5%) to make option in-the-money, and even then its value is insignificant. If we take the top of the tree (Max Value), where prices are going up three times at 3-month nodes, in most case option remains out-the-money at maturity.

One might suggest that mark up profits of 7,5%or even 10% are not high enough in the medieval context. This is where we have controlled our sensitivity analysis. In traditional commenda, an external investor providing all the funding usually obtain 2/3 of profits. In this case, Suppa & Grillo provided all the assets except the management. It is correct to assume that Zaccaria provided the management, and committed his the galleys. However, Suppa & Grillo provided, in addition to funding, up to 3,000 £ coverage to Bruges, and up to 3,500 £ from Bruges to Genoa. If we compare rates of return for Zaccaria for this venture and the annual return for Suppa and Grillo, it gives the following :

- Suppa and Grillo received 780 £, or 26% but including an insurance coverage of 3,000 and then 3,500 £.
- Zaccaria's compounding 3-months mark-up profit of 7,5%, plus the profit on 6-months 7,5% Nolis, yields a 62% per year in case of two ventures, or 43%/year for 1,5 venture (for instance after from Genoa to Pera, and 28% for only one 6-month venture per year.

This provide some confidence that our data do not underestimate the kind of profit that was made by Zaccaria. Assuming profits ranging from between 28% to 62% return per year when actual sovereign yield was 6-10% is not a tremendously pessimistic assumption. Even with such assumption the buyback option is "out-the-money".

What the deal was all about

We are led to the following assumption. Here again The advice of G. Jehel about such a kind of contract (Part 1) is spot on : some apparent gaps or anomalies in medieval Genoese notarial contracts impose us to assume that, in some case, parties often agreed on specific covenants that were written on a separate document but not in the original contract kept by the Notary. There was an additional informal agreement, stipulating that the Zaccarias were the “true” owners of the alum in case of safe arrival in Bruges. This agreement was potentially a simple oral commitment made by Zaccaria. Or, it might be included in copies given to Parties. We know Genoese notaries kept summary version of contract in their cartularies, and more detailed provisions were laid out in documents given to the Parties. This contract say that “voluerint quod de predictis plura instrumenta eiusdem tenoris fieri deberent”. Furthermore in the margin of the document, a brief mention indicates that other copies indeed existed and given to Parties. Of course, we will never know these documents included the real intention of Zaccaria, Suppa & Grillo.

[Insert about here Exhibit 14]

The fictive sales/buyback was aimed at bundling casualty and business (price, currency) risks in order to circumvent Church’s usury prohibition. This option was a way of maintaining the asymmetry information between the contracting parties and the Church. This deal has much in common with a classical, but prohibited, sea loan. Therefore, we are tempted to conclude that, in spite of their lack of analytical model, some historians¹⁹³ were correct when arguing intuitively that this deal was fundamentally a loan with sea risks coverage.

However, most historians did not fully understand two aspects of the transaction. The sea loan exceeded the value of goods enabling first to extend risks coverage to (part of) the value of galleys. Second, the loan enable him to collect more money than the initial value of alum : it was precisely one of the objective of the contracts, namely funding large working capital requirements for such a venture. In addition, such a complex asset-backed structured debt includes two different indemnities, namely to and after Bruges. The indemnity itself was more than the value of the goods insured. This shows that the “synthetic” sea loan was designed in such a way that, through a forward rate, it enabled the merchant to increase its risk coverage after the first transaction in Bruges, to incorporate the increased asset value after the transaction in Bruges.

The deal also includes a real, in both sense of the adjective, “abandon” option of 6 months to maturity. This option to abandon the venture creates a cash-flow timing uncertainty for the lenders. However, it was valuable because of the unforeseeable risks caused by the existing political tensions in Flanders. Zaccaria, a truly “informed” parties (e.g. Zaccaria wrote in French the plan for an embargo of Bruges for Philip The Fair) had a further 6 months to find information about the situation (e.g. Philip’s decision, Flemish resistance) regarding the embargo and the market in Bruges. This timing matched the value of waiting until the end of the winter season. A departure was a strong *signal* to that the Zaccarias were not “cheap talking”, especially because the sea loan coverage was partial and did not included galleys.

This transaction owes much to Benedetto Zaccaria’s reputation (skills, honour). He was unlikely to breach, or to allow his son to breach, both the formal and the informal contract. On paper, this contract creates a slight problem because, thanks to the buyback option mechanism, Zaccaria could have

¹⁹³ Lopez (1933) first mentioned the possibility of a fictive buyback, but Lopez thought the price of the alum was really 3,000 £, missing the transport-side of the transaction. Since then other authors (De Roover, Boiteux, Favier) also treated the option to buyback as potentially fictive. Our model confirm it with numbers.

decided not to buy back and to lease his galleys on the way back. Trust between the parties enables them to circumvent this problem. Compared with a Genoese “risk-free” sovereign yield (*compera*) of about 8%, this all-debt financed contract yields 26%. This includes the loan, the partial insurance up to 3,000 £ as well as the abandon option. If one assumes, by oversimplification, that *approximately* the abandon option has a cost of zero as no-sea risks were involved before starting the venture, the expected yield (risk premium) requires for the financing of this highly illiquid asset was 18%. This cost of capital in late XIIIth century Genoa was therefore not as prohibitive as one could imagine. Insurance premiums, excluding therefore the time-value money captured in the credit spread, were not cheap, but not as expensive as some have suggested.

The premium *pro securitate* for a venture Genoa-Bruges-Genoa was about 280 £ payable *sana autem nave* at destination or 9,1% of the upfront 3,000 £. Indemnity is up to 3,000 £ to Bruges and about 3,947 £ (3,500 tournois) from Bruges to Genoa. Therefore we obtain a rate of 8,1%. We don't know the assumed frequency/severity of sea casualties. Nevertheless, the bundling of financing and insurance did not produce enormous additional cost for the “policyholders”.

In any case, there was a Zaccaria's effect at work because at that time most merchants would have paid 6 to 10% for a one way trip only, if we rely on XIVth century figures of insurance premiums between *Oltramonti* and England, on the one hand, Genoa, on the other. For shorter trip between Bruges, Antwerp or England, and Cadix, some rates of 4% can be found, but sometimes also more (up to 10%).¹⁹⁴ It is true that Benedetto Zaccaria, admiral of the Philip The Fair, was not any kind of merchant. However, because the deal blend numerous options, the exact calculation of the separate elements of the contract is difficult to achieve. That was precisely one of the (latent) functions of the contract, namely to create opacity.

Did this deal left some traces ? Much later in the XVth century, in the same city of Genoa, a witness to a contract, trying to help one party to justify a default on “insurance loan”, claimed that all deals involving sales of goods to insurers were fictive and usurious.¹⁹⁵ Zaccaria's deal is one of the first one to have paved the way to make the usury barrier to trade less painful. But, this deal is more than that. It shows how an astute bricolage creates a remarkable package of options that span all sort of risks, and not only usury prohibition, and return appetite of both merchants and financiers involved in long distance maritime trade.

* * *

¹⁹⁴ Heers (1961), Aerts (1992),

¹⁹⁵ Heers (1961)

CONCLUSION

In 1298, Genoa's history was at the cross of the roads. Between the lines, the "Zaccaria deal" is precisely about this.

On the one hand, end XIIIe, Genoa was at the top of its economic and political expansion. The city had just defeated Venice in Curzola (1298) and a few years before it managed to win over Pisa in Meloria (1284). In many regions, all over the Mediterranean basin and in the Black sea, the Genoese colonies were fuelling profitable ventures. In XIIe and XIIIe, the Genoese have been among the most creative to develop or refine many contractual techniques (bill of exchange, commenda, societatis, pignus, sea loan) to boost their trade expansion. The citizens of the Commune managed to have a priority access to the supply of key commodities in the East, like alum and mastic. The Genoese also developed key nautical technologies (portulans, square rigs, cocha) to establish direct maritime trade with distant markets and improve transport productivity. They have been the first crossing the "Straits of Hercules" in order to establish a direct maritime route to Normandy, Flanders and England in 1277-1278. As a result, the key Genoese families (*alberghi*) made huge fortunes in just a few generations and Genoa had become a strong economic power. The city attracted more and more inhabitants, and its population grew from about 10 to 20,000 in XIe, to about 100,000 end XIIIe.

On the other hand, from end XIIIe, the Genoese started to face significant political and commercial problems. As discussed in Part I, there is no unique cause of Genoa's decline in XIVE. The list of factors is long : (geo)politics, institutions, cultural traits, technology, geography. The decline of Byzantium, its best business partner from 1261, was certainly problematic. Genoa's geography was another structural constrain. It obliged the Genoese to rely on external trade to sustain growth and did not offer them some sort of strong local basis for their economy. In particular, it made Genoa suffering from cyclical food shortages because of the lack of access to enough agricultural assets in the country side. Another problem came from wrong technological choice. The Genoese merchants developed very large cocha and these type of ships did not fit with the need for a leaner supply chain, from XIVE onwards. The Genoese familial structure (*albergo*), and the oligarchic nature of the Genoese society, was somehow useful in supporting individual entrepreneurship, by creating network of merchants and investors and solving agency issues in long distance trade. However, family clans became an impetus for endless rivalries and political turmoil, resulting in weak political institutions.

Genoa failed to become a leader in key Western markets from XIVE. For instance, in 1298 in Bruges, the Genoese had obtained no special privileges in spite of their maritime trade with the city for more than 20 years. Bruges was cautious when dealing with community of foreign merchants (*vreemde naties*) and trade privileges were difficult to obtain (e.g. the case of Hansa). However, this does not explain why, later in XIVE, Genoa was well behind Venice and Florence, in terms of local organisation for trade in key Western markets in XIVE and XVe. The Venetian sent galleys to Bruges about 40 years after the Genoese (1314), but they became fast the first and the most organised Italian community in the city. Consequently, in the Low Countries and in several other key markets in Western Europe, the Genoese merchants were missing a network of sedentary agents and business branches able to manage and monitor transaction but also to (re)finance long-distance trade. When they started to do so, others had already taken the best places.

Genoa also missed a wave of important contractual innovations. In a sense, the financial creativity of Genoese merchants seemed dried up. Other cities, like Florence or Venice, started to design better contractual solutions. The prohibited "sea loan" was replaced by a simple risk transfer instrument : a maritime risk coverage with the premium paid up front by the merchant and the indemnity paid later by the financier in case of casualty. In addition, instead of relying only on costly, time-consuming and sometimes risky (tax, usury, competition) notarial acts, other cities developed the private letters of

exchange. This debt, transfer and exchange instrument, also addressing usury prohibition, became a crucial form of contracts for post-XIIIe medieval merchants. Business vehicles, such as the *compagnia*, replaced gradually the short-lived *accomendacio* or *collegenza*. What was needed was long-term structure, with a better organisation determining roles and responsibilities, and providing sustainable grounds for long-distance trade, both for merchants and financial institutions. Such a cross-cities organisational structure across Europe proved to be crucial because it enabled to establish information channels, to mitigate agency risks and protect property rights abroad, and support all along the business and financial transactions of long distance trader.

This Zaccaria transaction was somehow before this turning point. Does the analysis of institutions helped us to understand what this transaction was all about ? Yes, parties were constrained by the institutional framework inside which they had to design a solution. But did parties produced something that went beyond institutions? Yes, in spite of many market frictions and institutional inefficiencies, Zaccaria and Suppa & Grillo did incorporate them into the contract in order to produce an original solution. In other words, the structure of the transaction fully reflects the institutional framework of late XIIIe. However this contract goes well beyond traditional contracts in Genoa at that time, and make somehow some institutions irrelevant and anticipated or paved the way for new contracts and other institutional arrangements to better support long distance maritime trade.

With his co-contracting parties, he went as far he could to design the best possible transaction based on all market and institutional tools inherited from the glorious business past of Genoa. Thanks to his connection with the Byzantium emperors Michele VIII and Andronic II, Zaccaria established a unique business franchise in the alum trading from the Eastern to Western markets. He controlled one of the two biggest mines of alum (*Phocea*) and, thanks to a large fleet and many contracts with other traders, he was central in organising Genoese shipments to the Low Countries. He was also admiral of Philip the Fair, and as such he had access to valuable information about the political situation in the Flanders during this period of high tension with France. His military skills certainly prevented him to be too much exposed to piracy risks.

Zaccaria wanted to find cash to fund his ventures, and contractual solutions to better manage risks. In particular, he was keen to add more flexibility in his business model. In long-distance trading, ventures required large expenditures up-front, with long time exposure to all sort of risk during shipment, and cash-and carry mode of transaction at destination. added an additional layer of uncertainties. Zaccaria understood how crucial were (i) transport capability to move inventories from one place to another and (ii) storage capacity to smooth cash-and-carry. Zaccaria did realised that contracting with external financiers could help him to better adapt its risk exposure by funding and transfer some risks attached to this flexible strategy. External financiers were keen to participate in Zaccaria's ventures because this was a profitable business. Of course, they required some guarantees and many covenants were written to protect them. But at the roots of this contract, there is what business is all about : trust. They trust each others, and this ingredient proved to be crucial in the way this contract to go beyond institutional boundaries.

We can use a metaphor: this contract is much like a Rubik's cube.

Insert about here Exhibit 15]

This is an astute bricolage that plays with many existing contracts (*societatis, nolis, commenda, sea loan, .etc*), many existing institutional settings, and mix them altogether to create an *ad hoc* solution matching, although never perfectly, the business strategy of the venture, the risk profile of both parties, and the existing institutional constraints.

The market was highly incomplete and many efficient institutional settings were missing . However, we have seen that any contract is a package of options. Options evolve around the three key elements of any economic transaction : return, risk, time. This Zaccaria deal shows how, through options, economic agents, universally, manufacture an infinite number of contractual solutions. In a sense, Zaccaria invented a synthetic loan at a time usury prohibition prevented the use of corporate debt. He designed a derivative years before the futures and options were traded. He created a highly structured insurance policy at a time nobody was trading such a kind of product. But these are modern wordings. This transaction is much less and much more than that. And for Zaccaria, it is not what mattered. Zaccaria, and Suppa and Grillo, wanted to find a solution to make good profits from a

venture of alum from Genoa to Bruges in 1298-1299. They wanted to find a deal that could improve the business model of the venture, share risks and returns between parties, and, at the same time, address relevant institutional requirements. And they found one.

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Annexe 1: The Contract

Archivio di Stato di Genoa, *Notai Antichi*, Not. Andreolus de Laneris (v.1, f. 38)

In nomine domini amen. Ego Paliologus Zacharias, nomine meo proprio in solidum et procuratoris nomine domini Benedicte Zacharie, patris mei, in solidum et de qua procuracione constat per instrumentum scriptum manu Georgii de Camulio, notarii, M^oCC^oLXXXVI^o die XXVI Junii, dictis nominibus, confiteor tibi Enrico Suppe, stipulanti et recipienti nomine tuo, pro duabus terciis partibus, et nomine Baliani de Grillo pro tercia parte, me, dictis nominibus, habuisse et recepisse a vobis libras III milia jan, videlicet a te dicto Enrico libras II mila et dicto Baliano libras mille.

Renuntians, dictis nominibus, exceptione non numerate et non recepte pecunie et omni juri, unde et pro quibus et ex causa vendicionis, dictis nominibus, vendo, cedo et trado tibi dicto Enrico, nomine tuo et dicti Baliani cantaria sexcenta quinquanginta de alumine de Folia ad cantarium Janue, grosso, pulcro et mercantili, videlicet ex illo quod habeo in Provincia scilicet in Aquas Mortas, et ipsum alumen, dictis nominibus, promitto tibi, dictis nominibus recipienti, tradere, et consignare in Aquas Mortas, tibi vel tuo certo misso per me vel meum missum hinc ad Kalendas Aprilis proxime venturi, vel infra ipsum tempus, oneratum, meis expensis propriis, in duabus galeis vel altera earum, quas habeo vel habere debeo in societate cum Gabriele Spinula et de qua societate est instrumentum scriptum manu Johanis de Avendo, notarri, hoc anno die XXI, presentis mensis octobris ; et dictum alumen facere scribi super te et dictum Balianum vel alterum vestrum, pro dictis partibus, in cartulario dicte galee sive galearum in qua seu quibus fuerit oneratum.

Et ipsum alumen, omnibus meis expensis et avariis, facere desferri debeo et promitto de dicto loco Aquarum Mortuarum usque Bruges, eundo tamen et navigando, dictum alumen, potsquam fuerit oneratum, usque ad dictum locum de Bruges, ad tuum et dicti Baliani rixicum et fortunam maris et gentium, quousque fuerit in dicto loco de Bruges exoneratum vel in alio portu de Normandie, Picardie vel Frandare ubi exonerabuntur dictee galee; et promitto tibi, dictis nominibus recipienti, dictas galeas in quibus fuerit oneratum dictum alumen habere bene et sufficienter munitas et guarnitas et marinariis, vogueriis et armis pro eundo et seuendo dictum viagum et te et dictum Balianum cum asnixio et famulis vestris levare et desfere in dictis galeis, de Janua sive portu Janue usque ad dictum locum de Bruges vel ad locum in quo dicte galee exonerabuntur, ad expensas et misiones mei, dicti Palialogi, et dicti patris mei, scilicet cibi et potus bene et conveniente et sine aliquo alio nauo.

Item fuit actum in presenti contractu inter dictas partes quod, si dictus Paliologus sive dictus

Benedictus, pater ipsius, vel alia legitima persona pro eis vel altero eorum voluerint recuperare et reemere dictum alumen a dictis Enrico et Baliano, quod illuc facere possint et predicti Enricus et Balianus teneantur et debeant ipsum alumen eisdem Benedicto et Paliologo vel alteri eorum restituere et retro vendere precio librarum III CCC LX turonesium, solvendarum predictis Enrico et Baliano per predictos Benedictum et Paliologum vel alterum eorum, ab eo die, qua dicte galee aplicuerint in dicto portu de Bruges vel in alio portu in quo dicte galee aplicuerint pro exonerando, usque ad duos menses tunc proximos.

Et si non solverint seu satisfecerint, predicti Benedictus et Paliologus vel alterum eorum, usque ad dictum tempus mensium duorum de dictis libris tribus milibus trescentis sexaginta predictis Enrico et Baliano vel cuilibet eorum pro sua parte, teneantur ipsi Benedictus et Paliologus et quilibet eorum dare et solvere predictis Enrico et Baliano, in Janua, a Kalendis novembris proxime venturi, usque ad annum unum proximum de quibuslibet den. duodecim turonensibus minutis denarios trescim et dimidium januinis usque ad integram solutionem tocius dicte summe librarum trium milium trescentarum sexaginta;

et in dicto casu teneantur predicti Benedictus et Paliologus tradere et assignare, in dicto loco de Bruges, predictis Enrico et Baliano vel alter eorum pro pignore et securitate dictarum librarum III milia CCCLX, que solvi debebunt in Janua, tot merces sive mercaciones, que valeant libras III milia D turonensium, oneratas in dictis galeis vel altera earum vel aliis equibonis galeis pro ipsis desferendis Januam; que merces sive mercaciones postquam fuerint assignate predictis Enrico et Baliano pro securitate et pignore dicti debiti et onerate in dictis galeis, sint et navigent usque Januam ad rixicum et fortunam predictorum Enrici et Baliani, videlicet usque in quantitatem predictam librarum in milia CCC LX, scilicet infra Kalendas novembris que erunt in M CC LXXXVIII, ita quod, si galee seu galea, in qua seu quibus esset ipsum pignus sive merces assignate ultra mensem octobris de M CC LXXXVIII cum ipso pignore seu mercibus, sit et naviget ipsum pignus sive merces ad rixicum et fortunam ipsorum Benedicti et Paliologi et non dictorum Enrici et Baliani vel alterius eorum, a dicto mense octobris in antea; et in dictis galeis in quibus dictum pignus fuerit oneratum pro desferendo Januam teneantur, ipsi Benedictus et Paliologus, levare facere dictos Enricum et Balianum cum eorum famulis et asnixio et desferri facere in dictis galeis de dictis partibus usque Januam, absque aliquo nauulo. Et fuit actum etiam inter partes, dictis nominibus, per pactum, quod si dicte galee non moverint de Janua proeando in dictum viagium usque ad kalendas madii proxime venturi quod predictus Paliologus teneatur et promist eidem Enrico, dictus nominibus recipienti, dare et solvere libras, tres milias ducentas quinquaginta jan. pro precio dicti aluminis ad voluntatem Enrici predicti, elapsis dictis Kalendis madii et facta dicta solutione, presens instrumentum tunc pro utraque parte sit cassum et irritum et nullius valoris. Que omnia et singula ego dictus Paliologus, nomine meo proprio in solidum et

procuratoris nomine dicti Benedicti, patris mei, in solidum, promitto et convenio tibi dicto Enrico, nomine tuo et dicti Baliani solempniter recipienti, attendere complere, et observare et in aliquo non contrafacere vel venire, sub pena dupli dicte quantitatis solempniter stipulata promissa et sub ypotheca et obligatione omnium bonorum meorum et bonorum dicti patris mei. Ratis semper manentibus supradictis, acto quod de predictis omnibus dictus Paleologus, nomine suo principaliter et in solidum, teneatur, et abrenunciantes dictis nominibus juri de principali, nove constitutioni de duobus reis, epistole divi Adriani et quod ipsi et eorum bona pro predictis possint ubique conveniri, et abrenunciantes dictis nominibus privilegio fori et omni juri. Actum Janue in porticu domus Egidii Lercarii, anno dominice nativivitatis M CC LXXXVIII, Indictione undecima, die XXVIII octobris, in sero.

Testes : Guilielmus de Turri, bancherius, Ruffinus de Zuano, anthonius Ususmaris et Nocolaus de Bruce, et voluerint quod de predictis plura instrumenta eiusdem tenoris fieri deberent.

* * *

Annexe 2 : convention 1 £ (Lira) = 20 S (Soldi) = 240 G D (Denarii)

Items	Symbol	Data	Comments	Base case	Sources
Price of alum at departure	P	46 S in 1292, 50 S in 1297, and 39 S in 1306 in Genoa.	Price between Genoa and Aigues-Mortes assumed to be identical.	1,625 £ 50 S/cantaro	Balard (1978 : 780-781),
Profit of alum in Bruges (drapery from Bruges to Genoa)	$(P^*-P)/P$ and $(P^{**}-P^*)/P^*$	_____		7,5%	_____
Price of transport	N	20 S in 1278 for 1 cantaria of alum from Genoa to England, 30 S in 1307 for 1 cantaria of wool from England to Genoa and 21 S in 1310 for 1 cantaria of cotton from Majorca to Bruges.	Data consistent across sources	1,375 £ 21 S/cantaro	Doehaerd (1938 : 16-17)
Profit on transport	a	_____	Inexistent data but business model should work without profit as traders use to lease galleys from others.	7,5 % for both ways, or	
Price volatility	P (σ)	_____	Inexistent data, sensitivity analysis to be used (see next page)	+/-10% standard deviation	_____
Exchange rates Tournois £/ Genoese £	S	1298: 1:1, 0,89:1, 0,89:1	gold/soldi equivalence of the Genoese £ devalued by about 27% between 1291 and 1327. Same declining trend with Philip the Fair disastrous monetary policy.	0,89:1	Jehel 1993, Spufford 1988
Casualty risks	casualty, casualty'	Full loss of 5-7% for the French and Dutch West Indies companies in Early XVIe.	Result of the model not very sensitive to casualty risks anyway.	5% both ways or 2,5% for 1-way.	e.g. Haudrère (1989)

Annexe 3 : Price of goods (alum, drapery)

Contract oct-98	Departure mai-99	Bruges Aug-99	Genoa nov-99					
Price of goods no casualty	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">1.600</div> <div style="border: 1px solid black; padding: 2px;">1.703 64,0%</div> <div style="border: 1px solid black; padding: 2px;">1.503 36,0%</div> </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">1.813 40,9%</div> <div style="border: 1px solid black; padding: 2px;">1.600 46,1%</div> <div style="border: 1px solid black; padding: 2px;">1.412 13,0%</div> </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">3.254 25,5%</div> <div style="border: 1px solid black; padding: 2px;">2.959 28,8%</div> <div style="border: 1px solid black; padding: 2px;">2.872 14,4%</div> <div style="border: 1px solid black; padding: 2px;">2.699 8,1%</div> <div style="border: 1px solid black; padding: 2px;">2.612 16,2%</div> <div style="border: 1px solid black; padding: 2px;">2.382 4,6%</div> </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">5.248 15,9%</div> <div style="border: 1px solid black; padding: 2px;">4.840 17,9%</div> <div style="border: 1px solid black; padding: 2px;">4.719 9,0%</div> <div style="border: 1px solid black; padding: 2px;">4.632 9,0%</div> <div style="border: 1px solid black; padding: 2px;">4.480 5,1%</div> <div style="border: 1px solid black; padding: 2px;">4.359 10,1%</div> <div style="border: 1px solid black; padding: 2px;">4.272 10,1%</div> <div style="border: 1px solid black; padding: 2px;">4.165 5,1%</div> <div style="border: 1px solid black; padding: 2px;">4.041 2,8%</div> <div style="border: 1px solid black; padding: 2px;">3.954 2,8%</div> <div style="border: 1px solid black; padding: 2px;">3.847 5,7%</div> <div style="border: 1px solid black; padding: 2px;">3.567 1,6%</div> </div>				
					Price of goods casualty		0 2,5%	0 2,4%

Annexe 4 : Sensitivity analysis of probability to call in Bruges

(Scenario 5 + Scenario 6) - (Scenario 3 + Scenario 4) < 0 = option out-the-money (red)
 (Scenario 5 + Scenario 6) - (Scenario 3 + Scenario 4) > 0 = option in-the-money (blue)

MAX Value		Profit (3 month/One way)			
		5,0%	7,5%	10,0%	12,5%
Volatility (annual)	5,0%	(412)	(292)	(170)	(47)
	7,5%	(341)	(218)	(94)	33
	10,0%	(268)	(143)	(16)	114
	12,5%	(194)	(66)	64	196

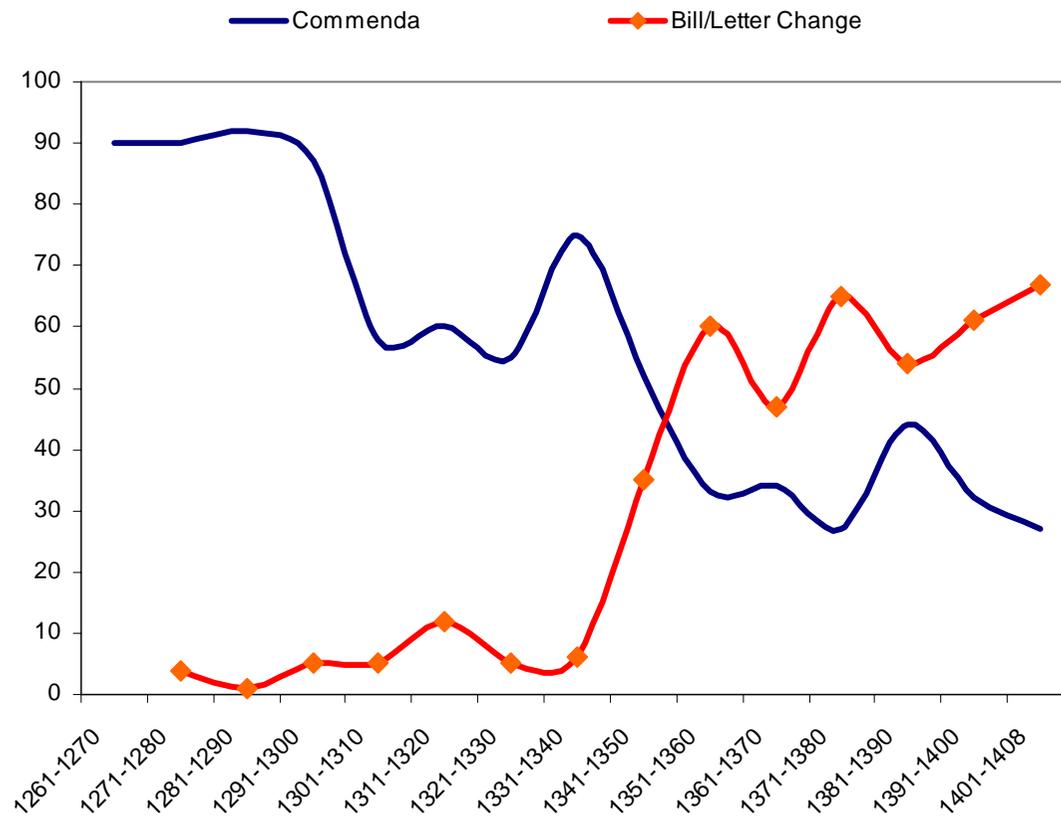
MEAN Value		Profit (3 month/One way)			
		5,0%	7,5%	10,0%	12,5%
Volatility (annual)	5,0%	(335)	(212)	(87)	39
	7,5%	(335)	(212)	(87)	39
	10,0%	(335)	(212)	(87)	39
	12,5%	(335)	(212)	(87)	39

MIN Value		Profit (3 month/One way)			
		5,0%	7,5%	10,0%	12,5%
Volatility (annual)	5,0%	(684)	(574)	(462)	(348)
	7,5%	(748)	(641)	(531)	(420)
	10,0%	(812)	(707)	(599)	(490)
	12,5%	(874)	(771)	(666)	(560)

* Probability to Buyback $p(3) = 1$, If (Scenario 5 + Scenario 6) > (Scenario 3 + Scenario 4)

Exhibit 1 : Commenda and bill/Letter of exchange

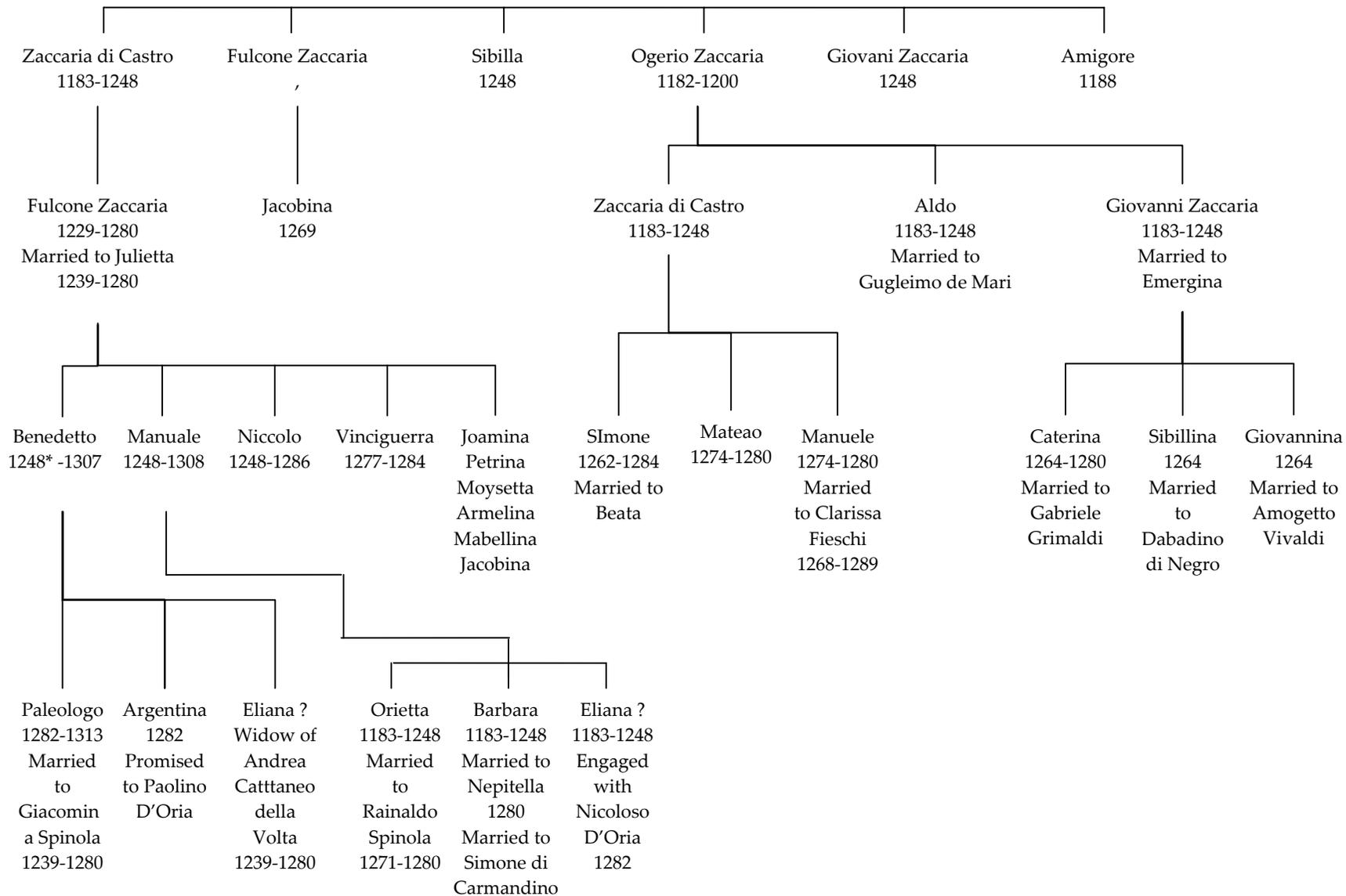
Total % of trade with "Romania" based 3,532 contracts (1261-1408)



Source : Balard (1978 : chap. X)

Exhibit 2 : The genealogical tree of the family ZACCARIA DI CASTRO

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* The date of 1248 is open to discussion (see Part II)

Source : Lopez (1933, annexe) based on Belgrano

Exhibit 3: Trading alum : vertical and horizontal integration

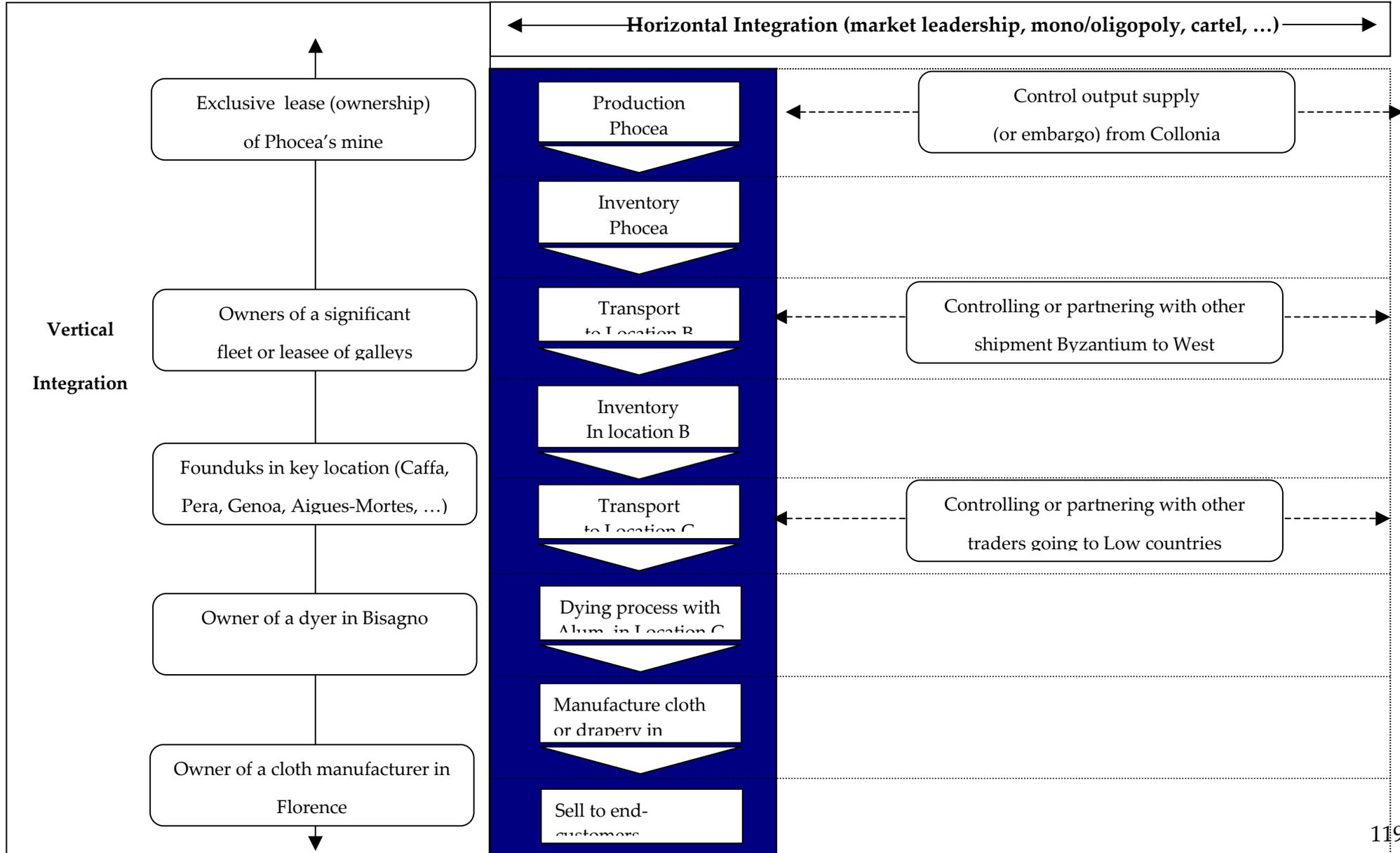


Exhibit 4 : Alum trading operating leverage

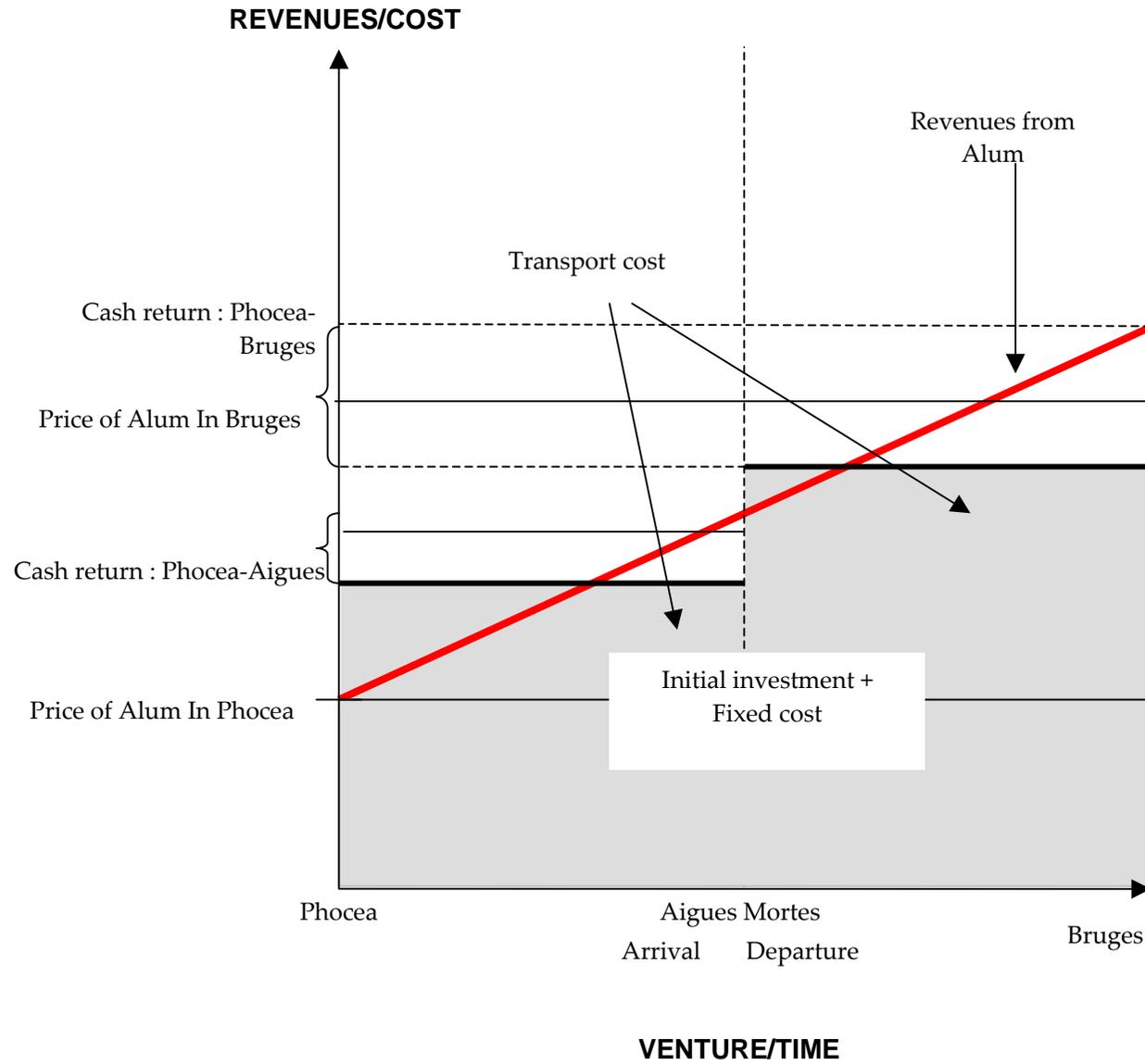


Exhibit 5 : A risk management framework

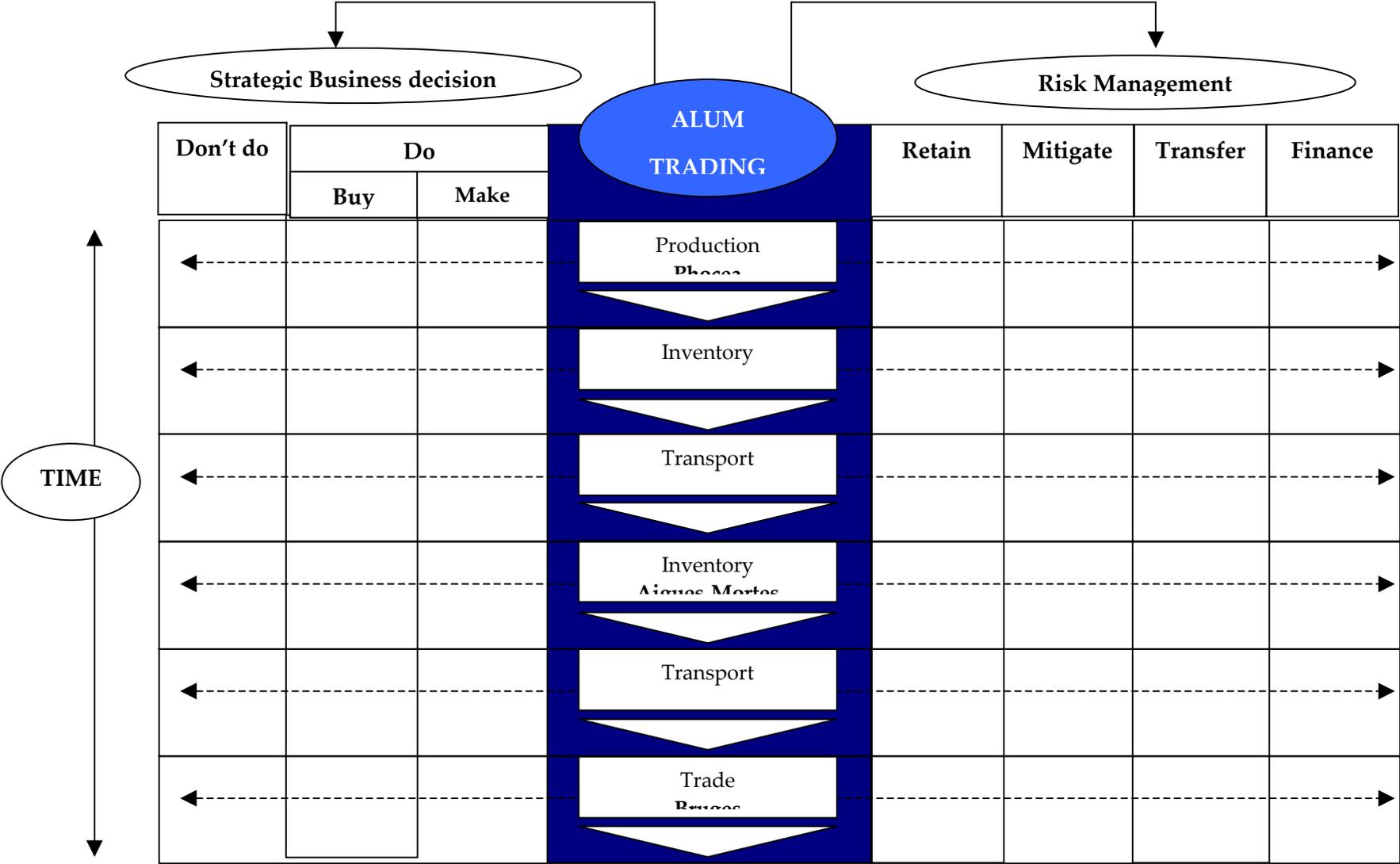


Exhibit 6 : The bill of exchange (contrat et lettre de change)

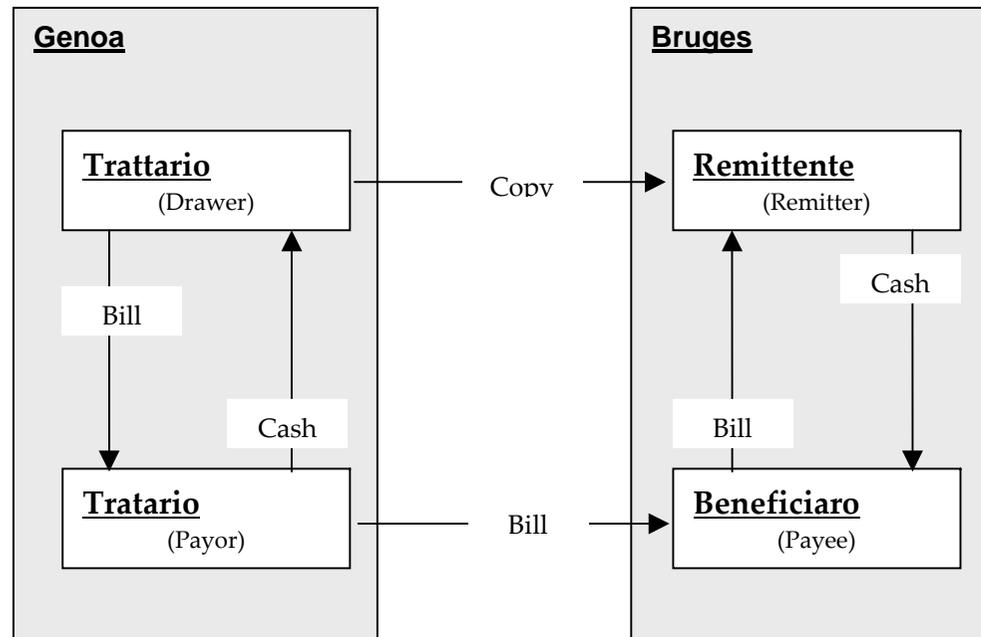


Exhibit 7: A sequence of transactions

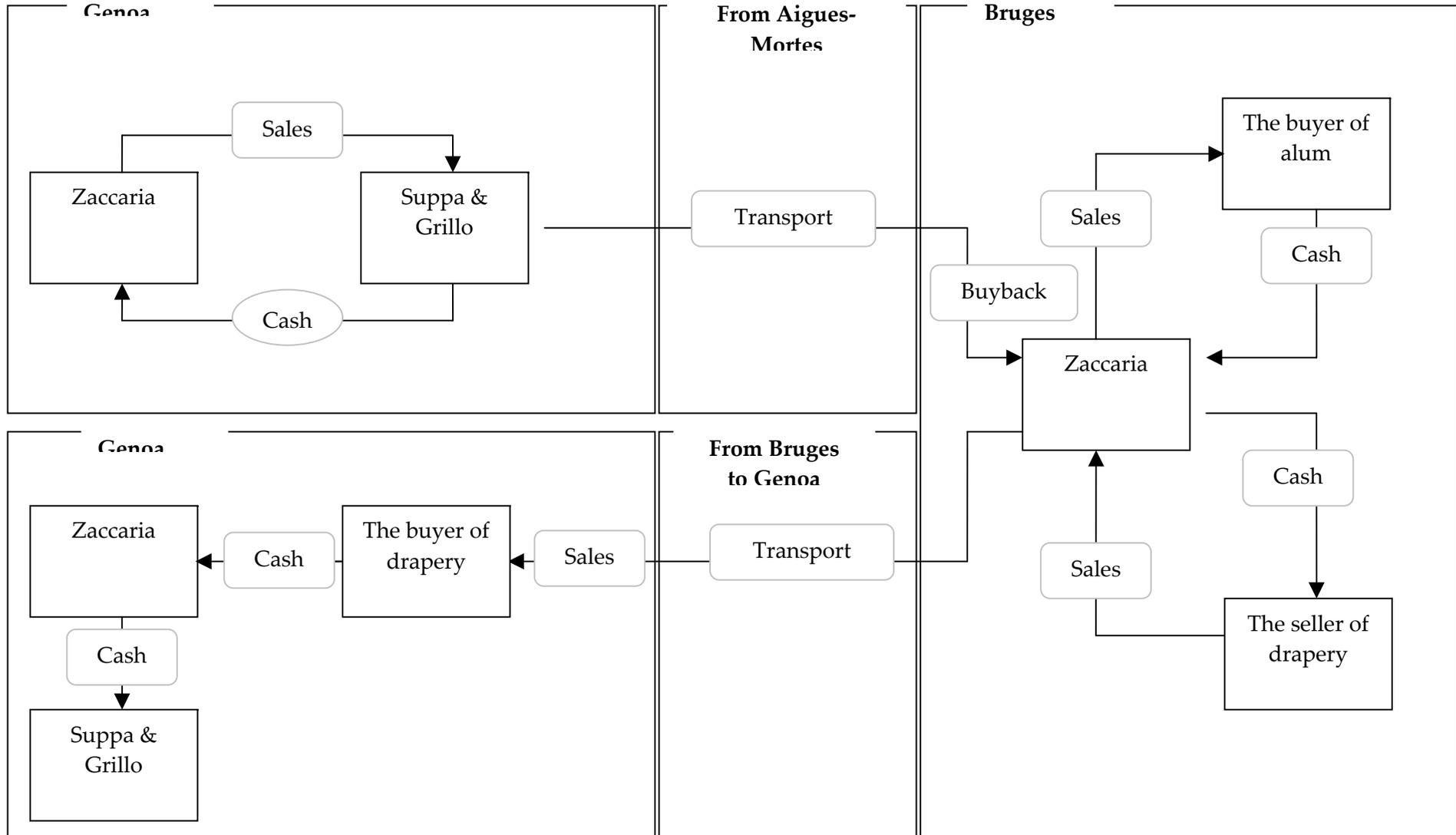


Exhibit 8 : The structure of the transaction(s)

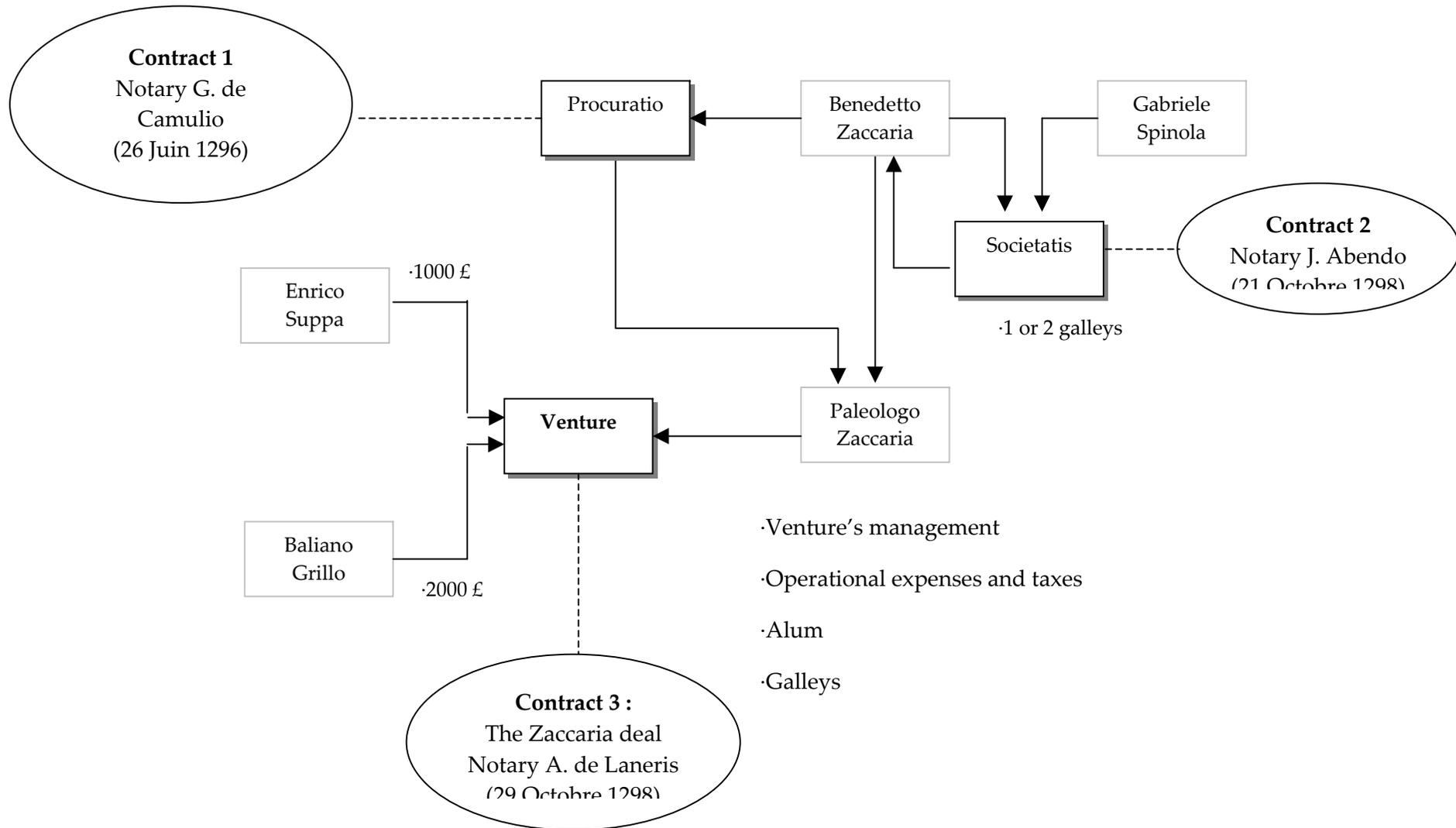


Exhibit 9 : the contract as an option decision/event tree

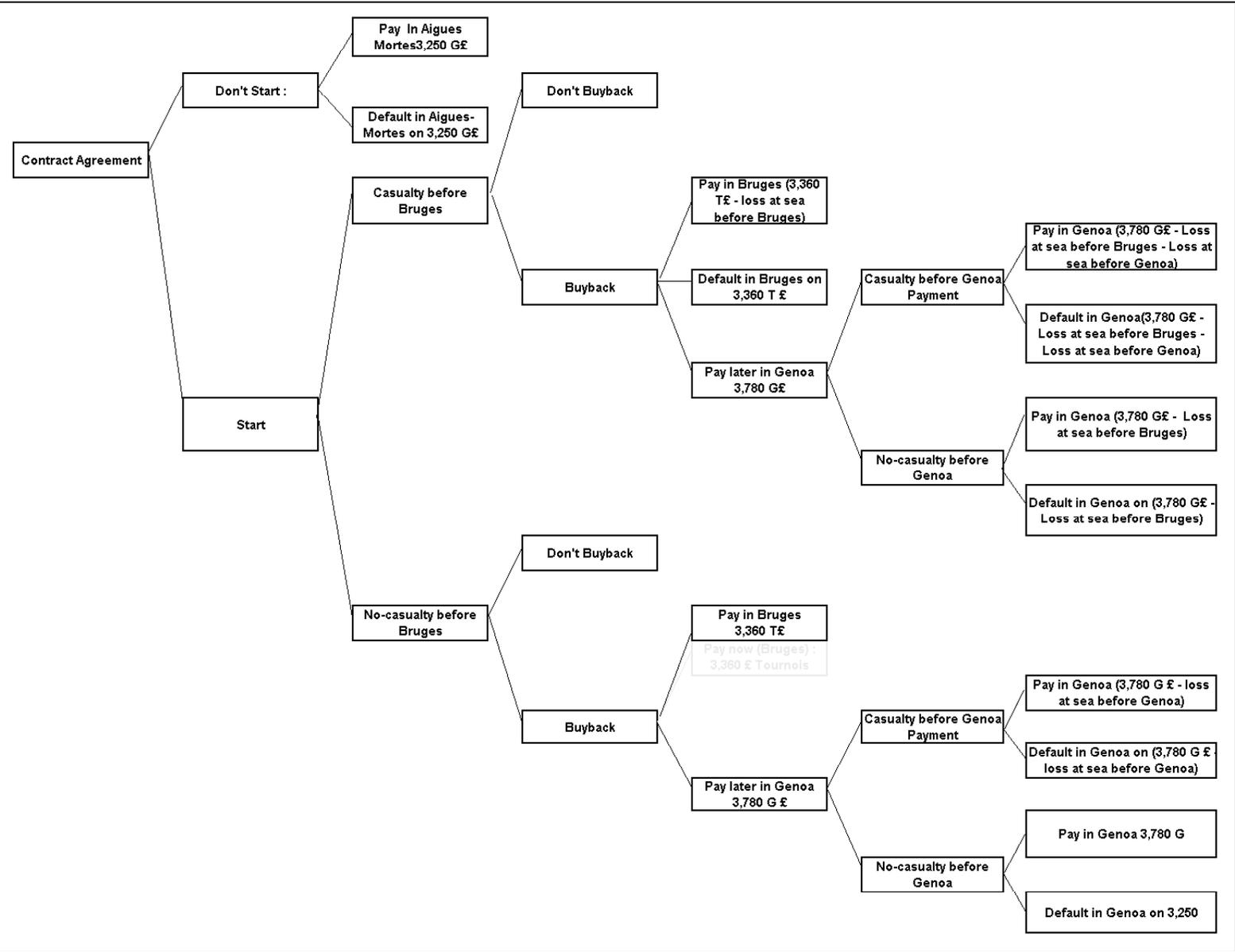


Exhibit 10: a simplified tree

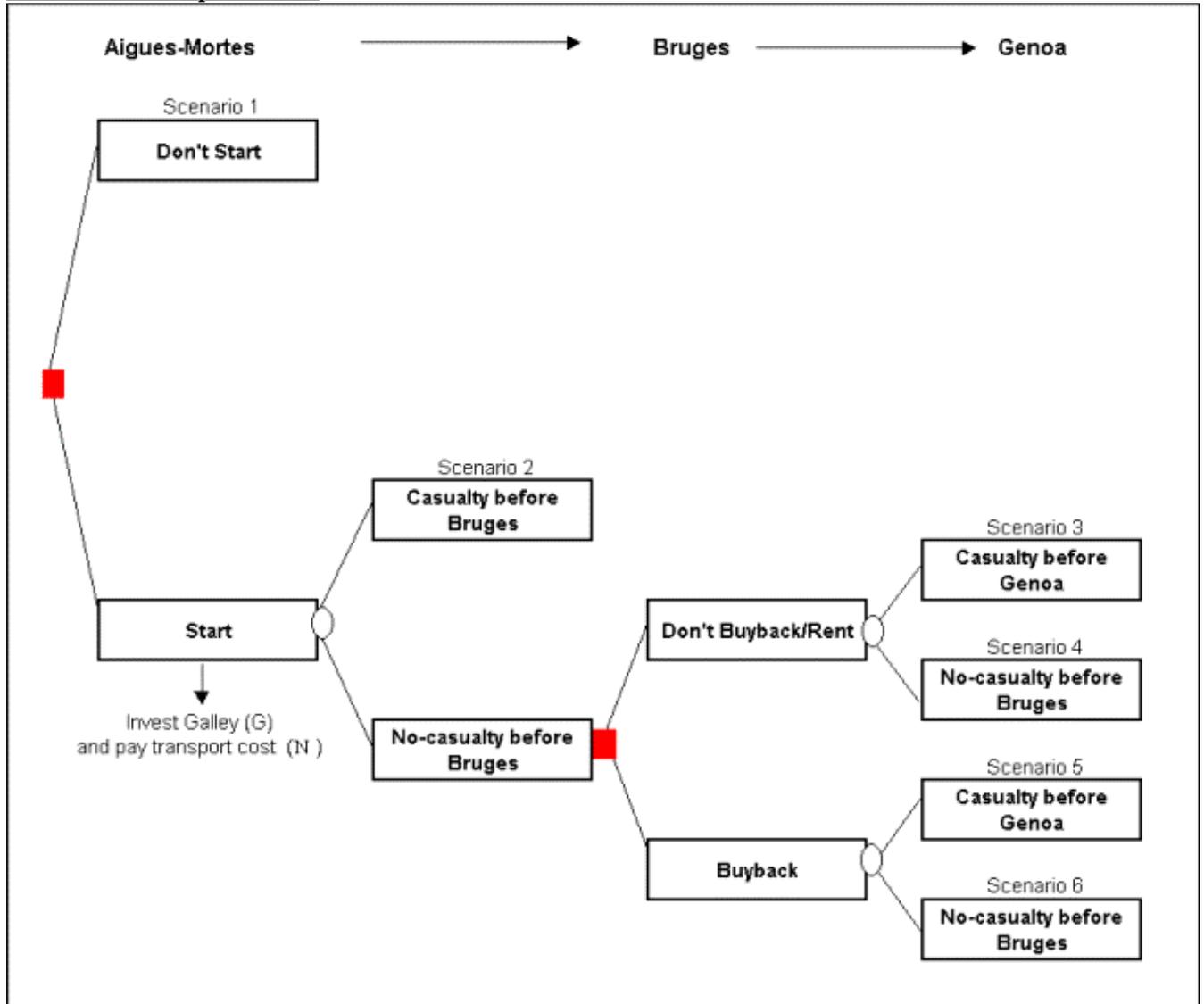


Exhibit 11 : Timing

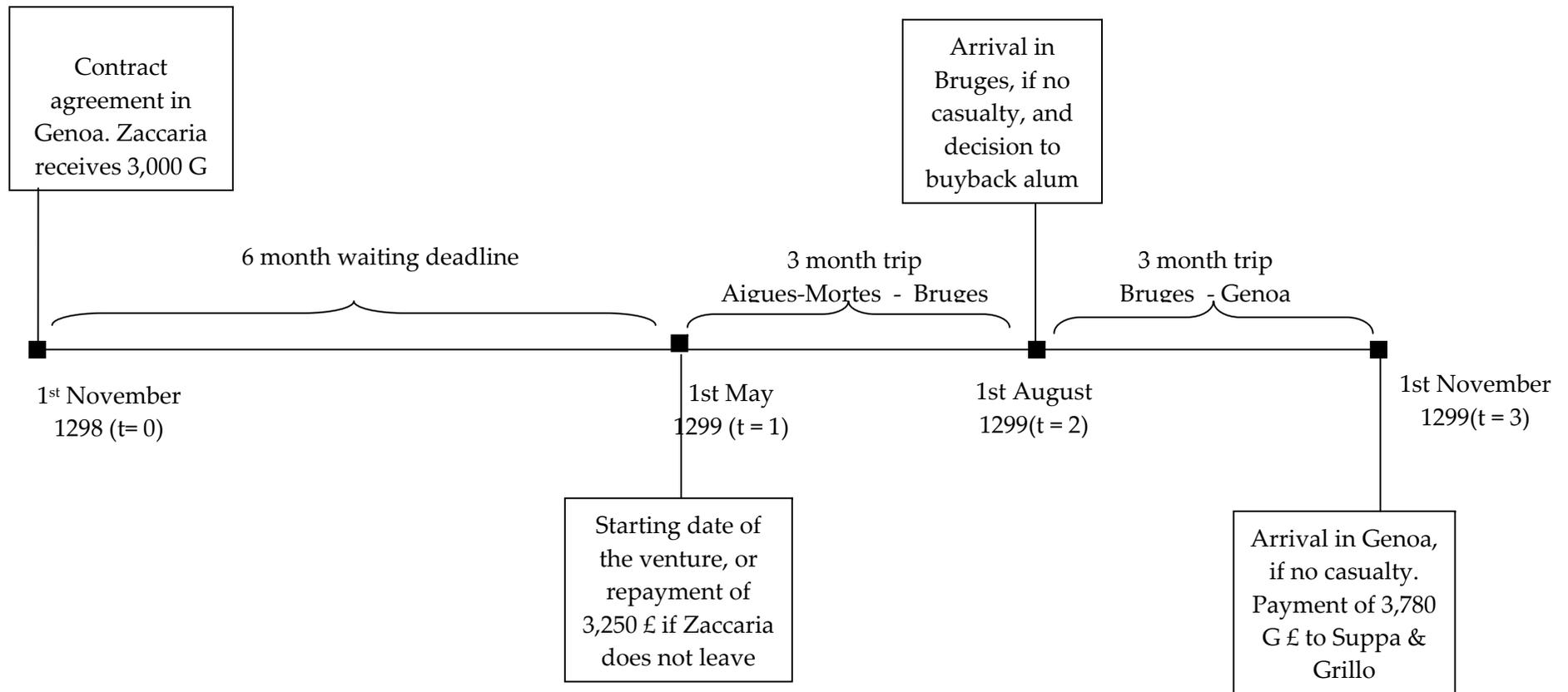


Exhibit 12 : the simplified tree revisited

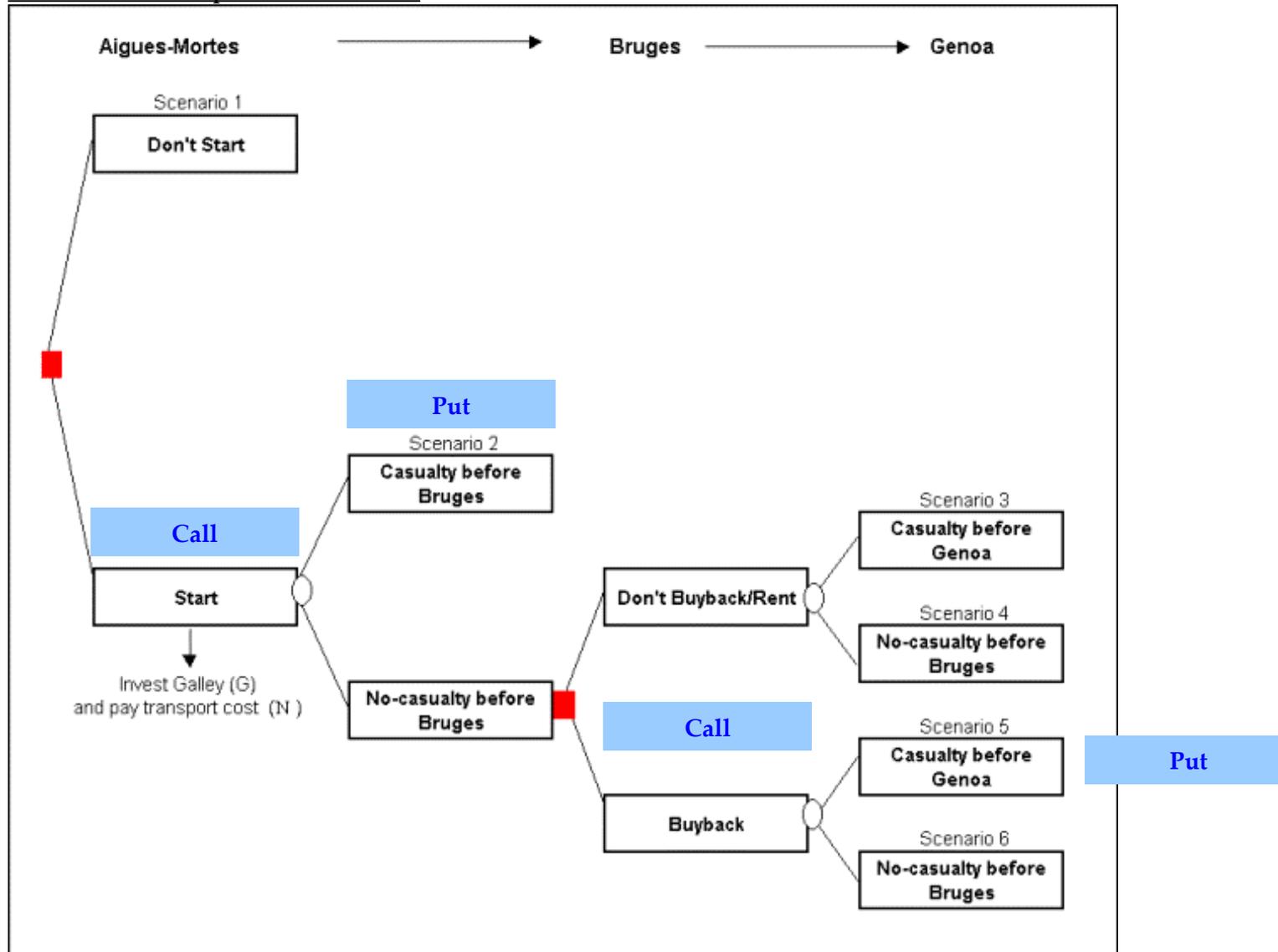
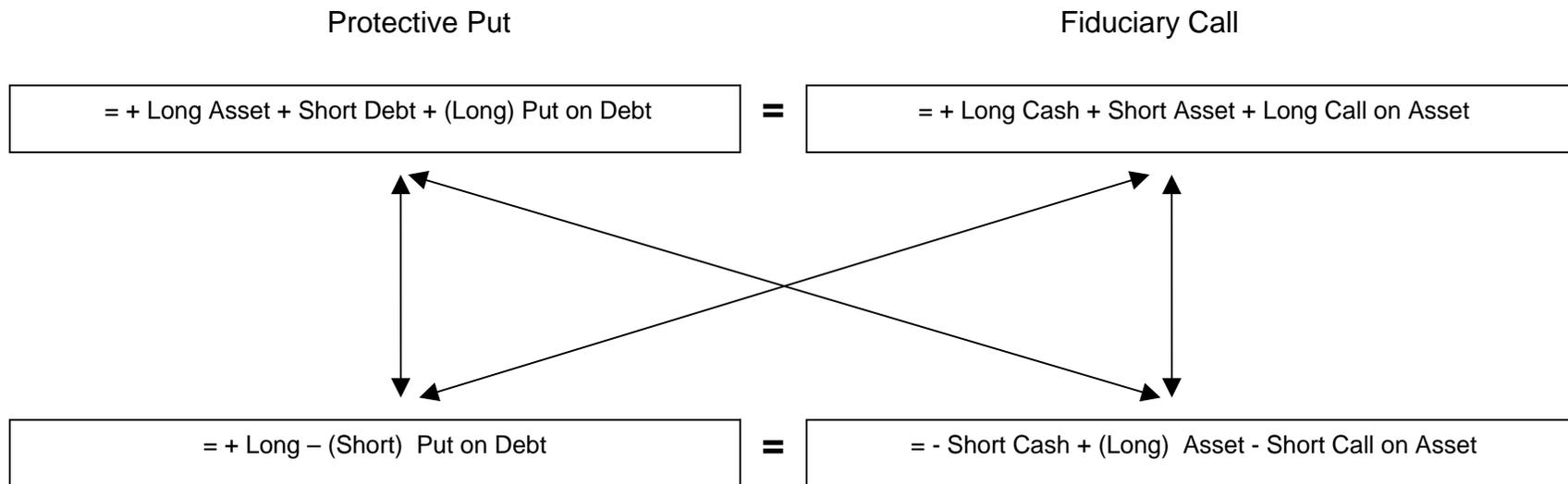


Exhibit 13: the put/call parity

The Zaccarias



Suppa & Grillo

Exhibit 14 : A note in margin indicates the existence several copies of the contract

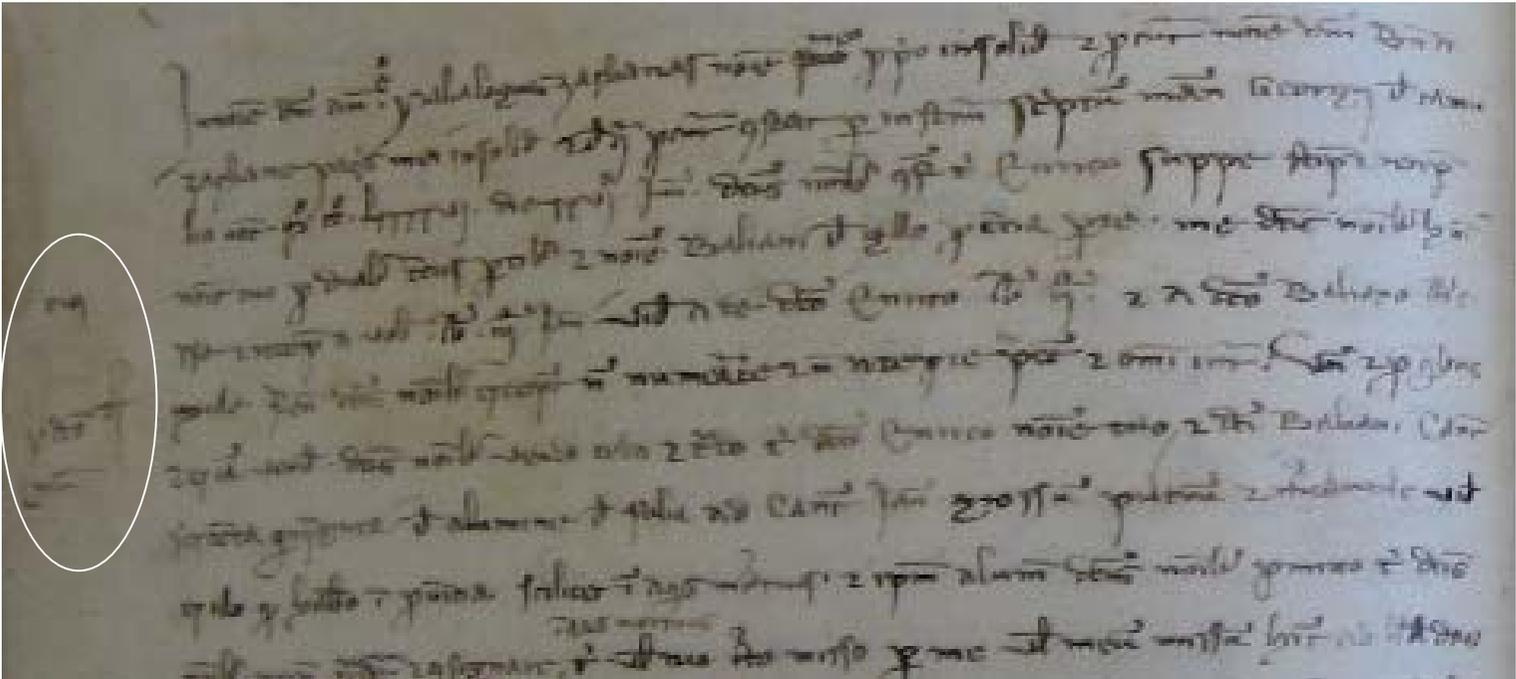


Exhibit 15 : Rukib's cube

