

The VOC Insurance Contract of 1613

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Abstract

This paper analyses an insurance contract of the Dutch East India Company (Verenigde Oost-Indische Compagnie, VOC) initiated in 1613. As this contract is an early example of risk management, we try to understand its motivation from recent insights in risk management theory of Froot, Scharfstein and Stein (*The Journal of Finance* 48, 1993, 1629-1658), in which growth opportunities and costly external financing induce a risk management strategy resembling the VOC contract. We describe that the contract aimed at securing the VOC's continuation and growth and refute alternative explanations, including that the VOC managers initiated the contract out of self-interest or that the VOC acted as arbitrageur in the insurance market.

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Introduction

In March 1613 the Dutch East India Company (VOC) was about to send its ninth fleet to Asia, spending almost all its remaining cash on the fleet's armament and silver cargo. To secure the company's ability to meet its financial obligations upon the expected return of the ships in 1616 and to be able to send out a new fleet, the directors (*bewindhebbers*) drafted an insurance contract with a nominal value of *f* 3.2 million. The insurance contract was drafted on March 1, 1613 and mainly sold to current shareholders of the VOC, for a 5 per cent premium. In case the revenues by Augustus 1616 would be below *f* 3.2 million, the insurers would pay the difference between the revenues and the amount insured. As the insurers were never called upon in 1616 or 1617, and the VOC never again sold a similar policy, scholars have largely ignored this contract or regarded it as an oddity at best, perhaps even a con trick played by the directors on hapless shareholders and other underwriters (Stapel and Den Dooren de Jong 1928, p.83-84).

It is quite conceivable that the contract was a shrewd attempt by the *bewindhebbers* to mislead ignorant participants and enrich themselves with an easily earned 5 per cent premium. In the early years of the company's existence the directors met with considerable opposition from shareholders who attempted a bear raid on the company shares (1609), colluded with the kings of France (1610) and Denmark (1615) to create competing concerns, and fought a vicious pamphleteering war to change the company's governance structure (1622). At the same time, however, in this period the VOC directors demonstrated a remarkable ability to adapt the company organization and its finances to changing military and economic circumstances (Steensgaard 1982; Gelderblom, De Jong and Jonker 2013; Dari-Mattiacci et al. 2012). Thus the insurance contract might just as well be a logical extension or adaptation of existing insurance practices, that is an attempt to manage real financial risks with a policy carefully tailored to the demands of experienced underwriters and well-informed shareholders. It is true that the VOC never returned to this kind of contract in subsequent years, but in the 1630s

the English East India Company (EIC) repeatedly sold identical insurance policies to manage financial risks resembling to some extent the ones faced by the VOC in 1613.¹

In this paper we apply a theoretical framework developed by Froot, Scharfstein and Stein (1993) for modern firms to demonstrate that in 1613 the VOC was exactly in the position described by them: facing the need to continue heavy, strategic investment, about to reap the benefits but strapped for cash and finance. The VOC management expected that in case the 1613 fleet would not have returned with sufficient goods, they could not equip new fleets. Obviously, in this situation the VOC would also be unable to attract new financing at reasonable costs. Insurance then becomes a sensible safeguard for the continuity of operations. Risk management adds value for financiers when it can ensure that the corporation obtains sufficient internal funding in order to invest in valuable growth opportunities. The insurance contract of 1613, we argue in this paper, was indeed a sophisticated adaptation of existing insurance practices which engaged a clearly defined group of investors in securing the VOC's continuity of operations. Interestingly, the contract was never exercised, which emphasizes the option-like nature of the contract and the VOC's access to more effective solution to secure continuity of its operations in 1617.

Our paper is organized as follows. In Section 2 we describe the precarious financial situation of the VOC in March 1613, and we detail the potential contribution of the insurance contract to the solution of these problems. Section 3 analyzes three potential motivations for the contract. In Section 4 we show that the contract was offered almost exclusively to shareholders, with directors bearing a disproportionately large share of the risk, an exposure that belies the possibility of managerial self-interest driving the directors to insure the company's 1616 revenues. In Section 4 we also analyze the subscriptions of insurers in Amsterdam to determine what motivated them to participate in the insurance contract. We then present a valuation of the contract in Section 5, in order to further substantiate our claim that this was a fair contract designed in the interest of the company and its shareholders. Using the information on incoming and outgoing

¹ In the period 1636-1643 several insurance contracts were issued (Stapel and Den Dooren de Jong, 1927, p. 102-105). Typically, the contract size equaled the face value of the debts outstanding. Because the EIC had unlimited liability and relied on debt financing, the main purpose of the insurance contract seems to be shielding shareholders from claims by debtors.

shipping and sales revenues available to the company directors in 1613, we show that the 5% premium was an appropriate compensation for the risk taken by the underwriters. In Section 6 we analyze the contribution of this financial innovation to the development of colonial trade in the first half of the seventeenth century. We ask why the VOC never again used the insurance contract. Section 7 concludes.

2. The VOC and the 1613 contract

At its foundation in 1602 the VOC obtained a 21-year monopoly on trade with Asia, defined in the charter as the area between Cape of Good Hope and the Straits of Magelhan. This monopoly was considered necessary to provide the company with sufficient market power in dealing with its rivals and with Asian counterparties (Van der Chys, 1856, p.130-131). To secure support from active merchants and investors for the monopoly, the charter stated that the VOC should benefit the residents of the United Provinces and it effected this by splitting operations over semi-autonomous divisions, called chambers, in six Dutch cities, and by opening share subscriptions to anyone wishing to participate. Shareholders subscribed to a company which would exploit the monopoly for its first ten years. On completion of that term in 1612 the board would present full accounts, liquidate the company, return its capital to the shareholders, and launch a new venture to exploit the monopoly's remaining term.

The charter remained quite vague about the VOC's legal personality, referring to it as a 'compagnie' without specifying what that was supposed to mean. Whereas numerous articles of the charter dealt with the managers-directors and their relationship to the Estates General, little or nothing was said about the position and rights of shareholders. Dutch legal scholars broadly agree, however, that shareholders possessed limited liability (Van der Heijden (1907) and particularly Van Brakel (1908, after p. 161)). Until recently it was also thought that charter clause 42 gave the directors-managers limited liability, but new research shows that they remained fully liable until they bestowed it on themselves (Gelderblom, De Jong and Jonker 2013). Even the transferability of shares, a compensation for shareholders committing their money for a

period of ten years, was not mentioned in the charter, but in the preamble to the subscription contract (Gelderblom, De Jong and Jonker 2011). Share trading started almost immediately upon the closure of subscriptions, already in March 1603 the Amsterdam chamber recorded the first share transfers. Between 1603 and 1607 up to 200 shares in the Amsterdam chamber were traded per year, 6-7 percent of its capital (Gelderblom and Jonker 2004; see also Petram 2011).

Despite attracting a large capital totaling 6.4 million guilders, the VOC operated under serious financial constraints during its initial decades, for three reasons. Firstly, establishing a powerful presence overseas required heavy military investment, draining the funds available for trading. Moreover, success proved elusive, so stable returns from trade remained a long-term prospect. As early as 1606 the directors realized that they stood no chance of attracting subscriptions for a new company of the VOC would be wound up in 1612, because the investments were unlikely to have yielded sufficient returns by then. Secondly, the directors did not tailor the company's capital structure to the heavy fixed investment required. The entire capital was spent on the first three fleets during 1603-1605, by which time it was expected, on the basis of the earlier expeditions to Asia, that sales from returning ships would have generated enough money to equip new expeditions. This worked well enough for the leading chamber, Amsterdam, and possibly also for the second biggest, Middelburg, but the other, smaller chambers found it hard to muster sufficient resources. Enkhuizen, the third biggest, suffered shipping losses and obtained its first return cargoes only in 1610, by which time the chamber had been technically bankrupt for two years (Schalk, Gelderblom and Jonker 2012).

Thirdly, as a result of the above the VOC could not pay dividends so investors started getting restive. Though Isaac Lemaire's famous 1609 bear raid failed in its objective of forcing the board to change overall policy, it was a signal that could not be ignored. Disgruntled shareholders pushed successfully for dividend payments but theirs seems to have been a Pyrrhus victory. For the dividends declared in August and September 1610 were almost entirely in kind, with pepper for 50 per cent of the nominal share value and mace for 75 per cent. Only a fraction (7.5 per cent) would be paid in cash but only to participants who accepted the distribution in kind. Shareholders liked neither the terms nor the actual value of the dividend, which stood in stark contrast with the very

high returns (27% per annum) on investments in the early companies. An additional declaration of 30 per cent in nutmeg in March 1612 did little to change attitudes.

Exactly how reluctant shareholders were to accept dividend in kind becomes clear from a reconstruction of dividend payments by the chambers of Enkhuizen and Amsterdam. As Schalk (2010) and Schalk, Gelderblom, and Jonker (2012) have shown, shareholders of the Enkhuizen chamber – many of whom were merchants from Amsterdam – were unwilling to accept the payment in spices, forcing the Chamber to draw up an alternative dividend scheme for cash payments in 1612, 1614 and 1616. Leafing through one of the very few remaining account books of the Amsterdam Chamber – the *Journal van Actien* for the period 1607-1612 – Van Dillen (1958, p. 256) surmised that the Amsterdam chamber did distribute most of its dividends between 1610 and 1612. Upon closer inspection this was not the case, however. We have used the 1607-1612 *Journal* to reconstruct all dividend payments made to Amsterdam’s shareholders. The results are summarized in Table 1.

Table 1. Dividends paid to shareholders in Amsterdam, per 5 December 1612.

Dividend	Percentage	Declared	Value	Paid	Unpaid	%unpaid
mace	75 %	August 1610	2,755,256	528,406	2,226,850	81%
pepper	50 %	September 1610	1,836,838	1,475,673	361,164	20%
cash	7,5 %	September 1610	275,526	124,115	151,410	55%
nutmeg	30%	March 1612	1,102,103	420,607	681,495	62%
<i>(not specified)</i>	n.a	n.a	n.a.	42,630	n.a.	n.a.
Total	162,5%		5,969,722	2,591,432	3,378,290	57%

NA 1.04.02 VOC, Inv. Nr 7066 (Journal van Actien 1607-1612)

The tabulation of dividends paid by the Amsterdam Chamber shows a remarkable reluctance of shareholders to accept dividends in mace and nutmeg. Per December 1612 almost 3 million guilders of this dividend had not been collected. As a result a large part of the cash dividends – conditional on the acceptance of dividend in kind – also remained unpaid, albeit for a fraction (150,000 guilders) of the value of the mace and nutmeg

outstanding. This lack of interest in mace and nutmeg stemmed at least in part from the limited demand for these goods on the Amsterdam market – it would seem the directors merely tried to get rid of a stock of merchandise they would have a hard time selling themselves. Indeed, pepper, the most desired of all colonial wares, was distributed in much larger quantities, valuing almost 1.5 million guilders. Some shareholders even managed to obtain pepper instead of nutmeg in March 1612.

The company directors must have known in advance that many shareholders were not interested in these dividends in kind. The Amsterdam *bewindhebbers* themselves only collected 460,000 guilders worth of dividends for a total share capital of 606,000 guilders, thus leaving a claim of 670,000 guilders outstanding. The board nevertheless declared a 162,5 per cent dividend to facilitate a major reorganization of the company. Faced with increasing competition from Portugal and England, and with related high, partially sunk costs of the Asian operations, the company did not want to liquidate its first ten years' account. Declaring a 162,5 per cent dividend effectively meant a full reimbursement of the initial investment by shareholders, plus a 6.25 per cent compensation for every year that money had been in the company's possession. This in turn, allowed the board to work on the Estates General to waive the company's statutory liquidation (Gelderblom, De Jong and Jonker 2013). Obtained in July 1612, this waiver turned the VOC de facto into a permanent concern and thereby provided the basis for further investment into strengthening its grip on the lucrative Indonesian spice trade (Dari-Mattiacci et al. 2012).

But then in 1613 a fleet was about to sail for Asia, while the VOC was still under pressure from shareholders to pay dividends and had limited access to new debt or equity financing. Moreover, its liquidity position was weak, because all previous fleets were mainly financed from the initial equity issue and retained earnings. Despite this fragile financial position – in terms of cash and access to external finance – the VOC had proven to be successful in their voyages and already build-up a valuable trading network. This led the company to take three measures. First it renegotiated the payment schedule of dividends, setting two additional terms for the payment of 42.5 per cent in 1614 and 62.5 per cent in 1616. Second, the VOC opened negotiations with the EIC to achieve a merger with the English company. Third, on March 1 of 1613 the VOC initiated a contract with a

large number of counter-parties in order to guarantee the revenues from the fleet, which was ready to sail in the Spring of 1613.²

The contract specified that the subscribers are insuring the VOC against revenues below *f* 3.2 million: “*And this only and for no other risk than that from East India into these lands of Holland and Zeeland arrive for the aforesaid company, and will be stored in its warehouse or warehouses, return goods for a value of 32 tons of gold*” and “*In such cases we put ourselves in your position to protect you from all losses and damages. And if, which God forbid, the return of 32 tons of gold should not have arrived between now and ultimo August 1616, we bind ourselves herewith to pay to the directors of the General East India Company the aforesaid 32 tons of gold or that part of it which is lacking*”. The insurers would pay the difference between the revenues and this amount insured and received a premium of 5% in May 1614. The ships and equipment were not part of the contract. The contract expired by August 1616 and payments were due in February 1617 (50%) and August 1617 (50%). (See Appendix for a translation of the full text of the contract).

3. Risk management

In the contemporary finance literature, the risk management decision is treated similar to other financial decisions, for which Modigliani and Miller (1958) show irrelevance in case market imperfections – such as taxation, contracting costs and distortions of optimal investment policies – are absent. In other words, the motivations for risk management can be derived from real world imperfections.

Mayers and Smith (1982) are the first authors to analyze motives for corporate insurance. A general idea is that insurance allows value creation through risk shifting, because firms with access to financial and insurance markets have a comparative advantage in bearing risks, over firm claimholders as employers and managers. In other

² The contract has been described in detail by Van Dam (1927, p.207-208), Stapel and Den Dooren de Jong (1928) and Van Dillen (1958, p.73-97)

words, when companies can engage in a contract at low costs to sell a risk to a counterparty, this may be attractive.

Also bankruptcy costs can be reduced through insurance, because risk management reduces the downside risk. Building on agency theory, Mayers and Smith argue that insurance can serve as a bonding device towards prospective bondholders (see also Myers, 1977). Finally, the authors describe a set of characteristics of the US tax laws, which induce incentives to insure.

The argument that risk management may be motivated by a firm's investment policies has been forwarded by Froot, Scharfstein and Stein (1993). In their model firms face variability in cash flows, which result in either a demand for external financing or fluctuations in investments. In a setting with valuable growth opportunities it is undesirable that investments are driven by volatile cash flows, because the firm may forego value-creating investment projects. In a perfect capital market external financing will always be available in situations with growth options and insufficient cash flows from internal financing. However, in a more realistic setting with increasing marginal external financing costs, firms with volatile internal financing will face financial constraints and valuable growth options are not exercised. Since risk management can reduce the volatility of cash flows, these policies will secure a firm's investment policy from internal financing, and thus enhance firm value. The costs of external financing are based on information problems between firm management and outside investors (Myers and Majluf, 1984). An interesting outcome of the Froot, Scharfstein and Stein model is that full insurance is typically not the optimal strategy, because safeguarding future investments is a sufficient goal for risk management. Moreover, the authors find that non-linear (option-like) instruments are better in coordinating financing and investment policies, when compared with linear instruments (such as futures and forwards), because the value-creation stems from preventing downside cash flow surprises.

In addition to the previous arguments, based on maximization of shareholder value, Smith and Stulz (1985) have introduced managerial risk aversion as a motive for risk management. Because managers are typically poorly diversified with human (reputation) and financial (shareholdings plus future salary) capital, bankruptcy costs are high. In case managers cannot hedge personally against these bankruptcy costs, it is

optimal for them that the firm reduces its risks. Thus, managerial self-interest may drive risk management (Tufano, 1996).

It is interesting to note that Lessard (1991) claims that two key arguments for hedging can be derived from ensuring the firm's ability to meet two critical cash flow commitments: dividends and futures investments. As explained before, the investments argument has been theoretically developed. However, the dividends argument has never been formalized. At best, one can argue that a stable dividend policy reduces the costs of external equity financing, which indirectly reduces the motivation for risk management.

Nance, Smith and Smithson (1993) measure differences between US firms users of derivative instruments versus non-users and find that tax functions, debt financing and growth options are key determinants of risk management. Tufano (1993) studies the North-American gold-mining industry and finds most support for theories based on managerial wealth maximization – in particular, managers with more shares are more inclined to manage gold price risk. The most comprehensive analysis is provided by Bartram, Brown and Fehle (2009), for over 7000 firms in 50 countries. The authors find that risk management strategies are largely determined endogenously with other financing and investment decisions.

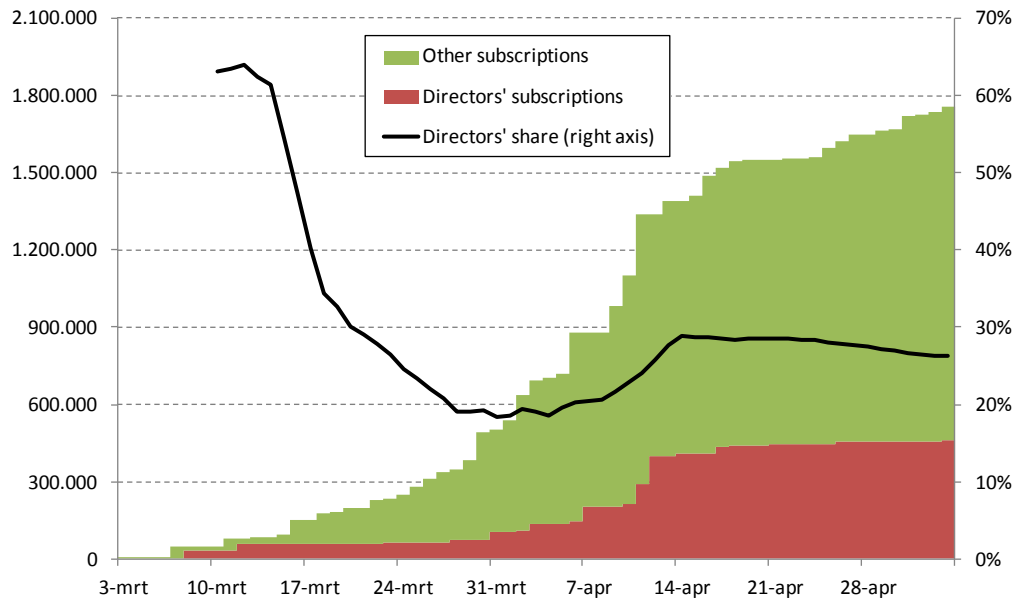
In the remainder of this paper, the insurance contract will be interpreted from the perspective of the contemporary finance literature on insurance and risk management. Two characteristics of the VOC are relevant. First, the very limited use of debt financing leads to a minor role for bankruptcy costs and bondholder-driven agency costs as motives for risk management. Secondly, convex tax curves are also not relevant in the VOC setting. This leaves us with three potential motives for the insurance contract: (1) the VOC managers initiated the contract at their own benefit (Smith and Stulz, 1985 and Tufano, 1996), (2) the contract was underpriced (Mayers and Smith, 1982); and (3) the contract aimed at securing the VOC's continuation (Froot, Scharfstein and Stein, 1993), and. These motives will be discussed in detail.

4. Subscriptions: insurers and shareholders

A first potential explanation for the insurance contract is managerial risk aversion, i.e. the possibility that managerial self-interest drove the directors to insure the company's 1616 revenues (Tufano, 1996). Stapel and Den Dooren de Jong (1928, p.84) are very critical about the *bewindhebbers* and claim that the shareholders were trapped in a syndicate to guarantee their own dividends. In our view, this idea is incorrect for three reasons. First, there is no strong rationale for the VOC to aim to guarantee dividends through this contract. In case the fleet would return with insufficient cargo, the shareholders may receive a self-paid dividend, but prices would collapse because of the loss of faith in the company. Second, the shareholders benefit from the value creation via the insurance contract, which safeguards the continuation of the company. Third, the *bewindhebbers* of the VOC held significant stakes in the company's shares. For these directors it would have been attractive to reduce the riskiness of their poorly diversified portfolios through insurance.

Shareholders of the VOC had a preferential right to participate in the contract. According to Van Dillen (1958, p.74), until March 20 the subscription was exclusively open to participants and the goal was to have all participants subscribe up to 50% of the nominal value of the shareholdings. Only for the Amsterdam chamber the register is available: the total inlay is 1,723,885 guilders, which amount to about 50% of the equity participation of 3.6 million guilders in 1602. The register shows that some entries are literally for half of the share value (Van Dillen, 1958, p.76). Although initially 50% of the share value is also the maximum subscription allowed, as of April 1, participants are allowed to subscribe up to the total nominal share value. Van Dillen (1959, p.78) describes that the subscription was problematic (source: resolutieboek of the chamber of Amsterdam). In the Amsterdam chamber, 252 entries were made (compared to 934 shareholders in 1612), including *bewindhebbers*. Van Dillen (1958 p.79-97) described the background of the largest of Amsterdam subscribers; we extend his analysis to all insurers.

Figure 1. Subscriptions to the Insurance Contract of the Amsterdam Chamber by directors and other subscribers (3 March - 1 May, 1613)



Note: the Directors' share is calculated as a five days' moving average.

Our comparison of the names of the insurers with those of the insurers shows that the contract was offered almost exclusively to shareholders, who took up more than 98 per cent of the sum underwritten in return for a 5 per cent premium.³ What is more, less than a quarter of the shareholders participated for an average 110 per cent of their shareholdings in 1612. The directors themselves bore a large share of the risk (see Figure 1). In Amsterdam, for instance, they owned 573,025 guilders (15.6 per cent) of the company shares at the end of 1612, while they underwrote 463,960 (26.9 per cent) of the policy.⁴ What distinguished these subscribers to the insurance contract from the non-subscribers? Although the set of potential subscribers is very large we only include in our

³ Van Dillen (1958, 81, 97) documented the subscriptions of 101 out of 252 insurers. Together they subscribed 1.4 million guilders (76%) out of a total of 1.8 million. All but five of these insurers owned shares in the company in December 1612: NA 1.04.02 VOC, Inv. No. 7066. With only 22,000 guilders the subscriptions of these outsiders was negligible. The administration of insurers kept by the directors of the Zeeland chamber reveals that 69 shareholders and 4 outsiders underwrote the policy in Middelburg. NA 1.04.02 VOC, Inv. No. 13860, 13861.

⁴ Based on their initial shareholdings and share transactions registered in the 'Journaal van Actien' of the company (NA 1.04.02 VOC, Inv. No. 7066) we can calculate the holdings of the initial directors (excluding Isaac Lemaire) at 573,025 guilders in December 1612. In 1613 fourteen directors signed the insurance contract for a total of 463,960 (Cf. also Van Dillen, 1958, pp. 81, 97)

data set the owners of VOC capital per December 1612. We have described already that the insurers were almost exclusively VOC shareholders, which raises the question why some VOC shareholders would subscribe to the insurance contract, and others not.

We distinguish three groups of variables. The first group relates to the share ownership and we measure the total share capital owned per December 1612 (in guilders), the percentage growth in share capital from December 1607 to December 1612 (capped at -1 and 1), and the number of transactions over 1607-1612. The second group of variables concerns the dividend take up by shareholders. Because many declared dividends were not taken up by the shareholders, many shareholders held a claim on the company. We measure the magnitude of this claim as the dividend right (7.5% of ownership in 1609 plus 155% of ownership in 1610) minus the sum of all received dividends. We also include indicator variable for dividends received in pepper, nutmeg, mace and cash. Finally, we include an indicator variable for shareholder with a 57.5% pepper dividend and no cash, because these shareholders have chosen to substitute pepper for cash. The third set are personal characteristics measured via indicator variables, i.e. whether the shareholder is a VOC board member, has an account with the Amsterdam *Wisselbank*, is a merchant from the Southern Netherlands and has subscribed on behalf of others in 1602.

Table 2. Descriptive statistics for sample of 923 shareholders in 1612.

	Mean	25th %tile	Median	75th %tile	Standard deviation
Insurance participation	0.233	0	0	0	0.422
Magnitude insurance participation	1794	0	0	0	6800
Insurance participation/share capital	0.220	0	0	0	0.527
Share capital 1612	4083	600	1500	3600	8116
Growth share capital 1607-1612	0.028	0	0	0	0.307
Transactions 1607-1612	1.991	0	0	1	5.541
Unpaid dividends	3627	244	1103	3250	7510
Unpaid dividends/dividend right	0.615	0.230	0.650	1.000	0.308
Received pepper in dividend	0.542	0	0	1	0.499
Received nutmeg in dividend	0.293	0	0	0	0.455
Received mace in dividend	0.204	0	0	0	0.403
Received cash in dividend	0.144	0	0	0	0.351
Received 57.5% pepper and no cash	0.096	0	0	0	0.295
<i>Bewindhebber</i> in 1612	0.021	0	0	0	0.142
<i>Wisselbank</i> account 1609-1612	0.184	0	0	0	0.388
South-Netherlands merchant	0.142	0	0	0	0.349
Subscribed shares for others	0.034	0	0	0	0.180

The results in Table 2 show that 23.3% of the shareholders subscribed to the insurance contract for an average amount of 1794 guilders. A key result is that the average unpaid dividend equals 61.5% of the dividend rights. The 25th percentile is 23.0% and the 75th percentile is 1, implying that as late as December 1612 many shareholders had not received any dividends declared in 1609-1610. Table 3 compares the characteristics of shareholders with and without participation in the insurance contract.

Table 3. Differences between insurers and non-insurers.

	Insurance participant	Not insurance participant	Difference (t-value)
Magnitude insurance participation	7703 (3000)	0 (0)	- -
Insurance participation/share capital	0.944 (1.000)	0 (0)	- -
Share capital 1612	9012 (3100)	2586 (1200)	6427*** (10.79)
Growth share capital 1607-1612	0.123 (0.000)	-0.001 (0.000)	0.124*** (5.24)
Transactions 1607-1612	2.781 (1)	1.751 (0)	1.030** (2.39)
Unpaid dividends	7123 (2050)	2565 (975)	4557*** (8.06)
Unpaid dividends/dividend right	0.529 (0.600)	0.641 (0.835)	-0.111*** (-3.61)
Received pepper in dividend	0.781 (0)	0.470 (0)	0.312*** (8.34)
Received nutmeg in dividend	0.419 (0)	0.254 (0)	0.164*** (4.69)
Received mace in dividend	0.237 (0)	0.194 (0)	0.044 (1.40)
Received cash in dividend	0.144 (0)	0.144 (0)	0.001 (0.01)
Received 57.5% pepper and no cash	0.177 (0)	0.072 (0)	0.105*** (4.60)
<i>Bewindhebber</i> in 1612	0.079 (0)	0.002 (0)	0.076*** (7.07)
<i>Wisselbank</i> account 1609-1612	0.144 (0)	0.316 (0)	0.172*** (5.80)
South-Netherlands merchant	0.219 (0)	0.119 (0)	0.100*** (3.70)
Subscribed shares for others	0.088 (0)	0.017 (0)	0.071*** (5.16)
Observations	215	708	

Note: reported are mean and medians (in parentheses), and the mean difference with the *t*-statistics of an independent sample test of differences. Significance levels are indicated with *** (1%), ** (5%) and * (10%).

In Table 3 the first row describes the magnitude of participation within the sample of 215 shareholders/insurers: the average contract size was 7703 guilders (median of 3000 guilders), which was 94.4% of the equity stake. The median is 1, which implies that the majority of the insurers subscribed much more than the 50% the VOC initially aimed for. The differences between the insurers and non-insurers are significant for many variables. For example, the average share capital of insurers is 9012 guilder and 2586 guilders for non-insurers. Using an independent sample *t*-test we find for the difference of 6427 guilders a *t*-value of 10.79, which implies significance at the 1% level. Obviously, the variables in Table 3 are correlated, which makes the interpretation of the bivariate comparisons difficult. In order to deal with this issue, we estimate multivariate regression models. The explained variable is dichotomous, i.e. one in case of participation and zero otherwise, which makes the use of a discrete choice logit model appropriate. The results of a series of regressions are presented in Table 4.

In Table 4 model (1) includes the share capital of the shareholders (we log-scale the value in order to allow for a decreasing marginal influence). The result is positive and significant at the 1% level. This result proves that larger shareholders were more likely to participate. This is a non-trivial result from an economic perspective, because these shareholders are increasing their exposure to the VOC. The *bewindhebber* indicator variable also is significantly positive. We had obtained this result already in the descriptives of the timing of the subscription; we now find that this effect holds also, after correcting for ownership stakes. In model (2) we add the growth of share capital and again find a significant positive effect. In other words, shareholders who increase their share are also willing to bear the risk of the insurance contract. This most likely is evidence of their confidence in the VOC's future. The number of transactions in 1607-1612 yields a negative effect. In models (3) and (4) we measure the effects of dividend claims of the shareholders. While the fraction of unpaid dividends has no effect, in particular the shareholders that claimed pepper subscribe to the contract. Interestingly, this effect is not driven by the shareholders asking for pepper instead of cash. In model (5) we control for other personal characteristics and find no effects.

Table 4: Logit regression results.

	(1)	(2)	(3)	(4)	(5)
Intercept	-6.20*** (-10.97)	-6.20*** (-10.23)	-6.37*** (-9.50)	-6.70*** (-9.01)	-6.69*** (-8.74)
Log(1+Share capital 1612)	0.65*** (9.09)	0.71*** (8.44)	0.70*** (8.03)	0.59*** (6.53)	0.58*** (6.29)
<i>Bewindhebber</i> in 1612	1.99** (2.45)	2.08*** (2.65)	2.05*** (2.61)	1.92** (2.42)	1.61* (1.93)
Growth share capital 1607-1612		0.55** (2.04)	0.50* (1.81)	0.53* (1.88)	0.55* (1.93)
Transactions 1607-1612		-0.06*** (-2.69)	-0.06*** (-2.69)	-0.04** (-2.02)	-0.05** (-2.08)
Unpaid dividends/dividend right			-0.290 (-1.31)	0.55 (1.28)	0.56 (1.29)
Received pepper in dividend				1.12*** (4.01)	1.13*** (3.99)
Received nutmeg in dividend				0.33 (1.12)	0.32 (1.11)
Received mace in dividend				-0.23 (-0.50)	-0.26 (-0.56)
Received cash in dividend				-0.46 (-1.00)	-0.41 (-0.87)
Received 57.5% pepper and no cash				0.19 (0.59)	0.19 (0.58)
<i>Wisselbank</i> account 1609-1612					0.08 (0.33)
South-Netherlands merchant					-0.10 (-0.38)
Subscribed shares for others					0.58 (1.09)
Pseudo R-squared	0.134	0.147	0.149	0.176	0.178
Observations	923	923	923	923	923

Note: Logit regression models explaining participation in the insurance contract. Reported are regression coefficients and z-statistics. Significance levels are indicated with *** (1%), ** (5%) and * (10%).

5. Pricing the Contract

By the time the VOC directors designed their insurance contract, merchants in the Dutch Republic, Amsterdam and Middelburg in particular, were well aware of the possibilities to insure against the perils of the sea. Marine insurance was first adopted in Amsterdam by Antwerp immigrants in the early 1590s in the trade with the Iberian Peninsula, Italy, and the Levant, i.e. shipping routes where piracy and privateering loomed large (Van Niekerk, 1998, p.575; Go 2009). Already in 1598 Amsterdam's local court deemed it necessary to create a specialized subsidiary court, the *Assurantiekamer*, for the adjudication of insurance conflicts (Go 2009). Two years later one of the VOC's

predecessors, the *Oude Oostindische Compagnie* in Amsterdam tapped into this nascent insurance market for its ships. Most if not all of the directors of the VOC were familiar with marine insurance but they did not use it for the company, because the scale of its operations was large enough to bear incidental losses, while at the same time the capacity of Amsterdam's insurance market – let alone that of other cities – was probably still too small to underwrite policies for fleets valued at 1 million guilders or more (Van Niekerk, 1998, p.577; Stapel and Den Dooren de Jong, 1928, p.93).

Building on twenty years of experience—perhaps even more in the case of directors of Flemish origin—the board of the VOC must have been quite capable to set the right terms for the insurance contract of 1613, perhaps up to the point of misleading the underwriters as Stapel and Den Dooren de Jong contend. To test this hypothesis, we try to value the contract and describe its risk profile. The basic term of the contract was that underwriters received a premium of 5%, while they were obliged to compensate the VOC for revenues below 3.2 million guilders of the 1613 fleet. For that they needed to judge the chance that enough ships would return with sufficient cargo value, that is to say the chance of shipwreck for individual ships plus the likelihood of a ship remaining in Asia. Consequently, our model uses the ship movements which an alert insurer could have observed in the ten years prior to the contract, and a range of sales revenues for goods arriving in the Republic. In case the 5% premium was much lower than the “model” value we can claim that an inefficiency drives the contract.

The ship movements data, drawn from the priceless De Bruijn et. al. (1987) database, includes (1) ships departed from the Republic (2) ships lost on outbound voyage; (3) ships that stayed in Asia; (4) ships that returned to Republic within one year after arriving in Asia; and (5) ships lost in outbound voyage. The main risks of the Dutch-Asian voyages included shipwreck, warfare and bad weather. Two uncertain factors are whether ships return and the duration of the travels. We use the terms of the contract and information about voyages from 1602 until March 1613, i.e. all information available to an insurer at the initiation of the contract, and simulate revenues and the timing of the revenues. In each simulation run we can compare the 5% premium with the payoffs to the VOC. We perform simulations and describe the distributions of the potential outcomes for insurers. This allows us to assess whether the 5% premium is fair compensation.

The contract is an option on the difference between the revenues (S) per August 1616 and 3.2 million guilders (X). The minimum is 0 revenues (contract pays 3.2 million) and above 3.2 million of revenues the contract pays 0. Between 0 and 3.2 million of revenues the contract pays 3.2 million minus the revenues. For the VOC the pay-off is $\text{Max}[X-S;0]$. This is the equivalent of a long position in a European put option. For the insurers, with a short position in the put option, the pay-off is $-\text{Max}[X-S;0]$. In this analysis we will take the perspective of the insurer. The pricing of the option to find option price P requires the modeling of the outcomes of S , the revenues. In case the revenues can be described with a single stochastic process, the pricing is simple as the Black-Scholes formula can be used for European options. However, the case of the 1613 contract the revenues S are dependent on several underlying processes and contingent on decisions of the VOC. Moreover, the contract involves payments after maturity. In this setting the valuation can only be performed via Monte Carlo simulation.⁵

Table 5: the 1613 Fleet

<i>Name</i>	<i>Tonnage</i>	<i>Chamber</i>
Wapen van Amsterdam	1000	Amsterdam
Hollandia	800	Amsterdam
Mauritius	800	Amsterdam
Witte Valk	360	Amsterdam
Arend	300	Amsterdam
Delft	800	Delft
Hoorn	700	Enkhuizen
Middelburg	800	Zeeland
Zeelandia	800	Zeeland

The terms of the contract are as follows. On March 1, 1613 the contract is initiated. Principal amount is 3,200,000 guilders of revenues (based on fixed prices for pepper, nuts, cloves and mace and market prices for other goods). The ships and equipment are not part of the contract. In the Spring of 1613, the fleet leaves Texel; see Table 5 for the composition of the fleet. In May 1614, a 5% premium is received. (This premium P is 5%, but the goal of this exercise is to estimate the premium.) In Augustus 1616, the contract expires and in February and August 1617 payments to the VOC are due. Although the

⁵ Hull (1993); Section 14.1 describes Monte Carlo simulations for the valuation of European options.

contract is settled based on revenues per August 1616, revenues after this date are also taken into account and insurers receive a compensation for these revenues including 6.25% interest. The contract pay-off is paid in equal parts in February and August 1617. Thus, the payments are made respectively 33 and 39 months after the payment of the premium (assuming all payments are made on the same day of the month). In order to compare the payments with the premium we need to discount the payments with monthly compounding in order to find the present value of the payments per May 1614.

From information about the voyages from 1602 until March 1613 we calculate the probabilities of ship losses and the average, minimum and standard deviation of the duration of the voyages. A potential subscriber to the insurance contract living in the Republic who would obtain all information about ships sailing to Asia and returning as well as about the whereabouts of non-returning ships, would have obtained the information in Table 6. The expected revenues are estimated on the tonnage of the ships and sales data over 1602-1613. Based on this data we start with an expected value of 900 guilders per ton. We use 6.25% as our discount rate.

Table 6: Overview of voyages 1602-1613

<u>Ships departed from the Republic</u>	92
Lost on outbound voyage	<u>3 -</u>
Arrived in Asia	89
Stayed in Asia	<u>66 -</u>
Returned to Republic	23
<u>Returned to Republic</u>	23
Lost on inbound voyage	1 -
Too late to observe	<u>1 -</u>
Arrived in Republic without stay in Asia	21
<u>Stayed in Asia</u>	66
Lost in warfare	7 -
Lost due to shipwreck	9 -
Broken up	2 -
Other reasons for not returning	17-
Lost on inbound voyage	<u>4 -</u>
Lost in Asia or inbound voyage	39-
Too late to observe	<u>5 -</u>
Arrived in the Republic after stay in Asia	22

Table 6 continued

Probability of not arriving in Asia = $3/92 = 3.26\%$

Probability of not arriving in Republic when no stay in Asia $1/(23-1) = 4.55\%$

Probability of not arriving in Republic when stay in Asia $39/(66-5) = 63.93\%$

Statistics on arrival in Republic without stay in Asia (21 observations minus 2 missing observations)

Average 669.84 days

Standard deviation: 209.62 days

Minimum: 246 days

Statistics on arrival in Republic with stay in Asia (22 observations)

Average 1270.41 days

Standard deviation: 245.39 days

Minimum: 941 days

Note: data from Bruijn et al. 1979-1987. The other reasons for not returning are that ship stays in Asia permanently (8 ships), out of sight (2 ships), unknown (7 ships). Stayed in Asia is defined as ships having a duration of stay in Asia of more than one year.

We define the simulation structure in eight steps. (1) We start with the nine ships in the 1613 fleet and for each ship we simulate arrival or loss based on a random draw and probability of non-arrival of 3.26%. (2) Next, we assume that the chamber of Amsterdam with five ships in the fleet will immediately return the two largest arrived ships. The chamber of Zeeland will return the largest ship and Delft and Hoorn will jointly return the largest ship. Based on this strategy we determine which arrivals return and which stay in Asia and return after service in the region. (3) Then, we simulate arrival in the Republic for the ships without a stay in Asia, again based on a random draw, and with probability of non-arrival of 4.55%. (4) We also simulate arrival in the Republic for the ships with a stay in Asia, again based on a random draw, and with probability of non-arrival of 63.93%. (5) For each ship that returns to the Republic we simulate the duration of the journey – including the stay in Asian waters – in order to simulate the timing of the revenues. We randomly draw from a normal distribution with averages and standard deviations as in Table 6. We also impose a minimum duration, based on actual data. In this simulation we distinguish journeys with and without a stay in Asia, because the latter

journeys take much longer. For all arrivals we multiply the tonnage of the vessel by the cargo value per ton. Initially we take 900 guilders per ton.

(6) Per August 1616 we determine the total value of the returns. In case the value exceeds 3.2 million the contract is terminated without further cash flow consequences. In case the revenues are insufficient, payments will take place in two installments. (7) For a period of ten years after August 1616 we make a monthly overview of returns. In case the contract has been terminated in step 6, these revenues have no consequences. Otherwise we simulate that the VOC returns these late revenues to the insurers taking the 6.25% (not compounded, according to 17th century practice) interest into account. We keep returning cash to insurers until the total revenues equal the 3.2 million guilders. (8) Finally, we discount all cash flows to May 1614 values, when the 5% premium is received. This allows a comparison of all relevant cash flows in equal terms. Note that we apply monthly continuous compounding.

Following the simulation structure above we perform 10,000 runs (n) of this simulation. This yields 10,000 simulated P 's. We take the average of the P 's (\bar{P}) and the standard deviation (σ_P). The standard error of the estimate is σ_P/\sqrt{n} , i.e. more simulations increase the accuracy of the estimate.⁶ The expected price is \bar{P} . We also describe the distribution of the outcomes, both per August 1616, i.e. excluding late revenues and over the full period. Table 7 presents the results of the simulation.

The average pay off to the VOC per August 1616 equals 4.38%, which is the simulated price and can be compared to the 5% premium. The standard error of the simulated average is 0.08%. This result implies that the 5% price is reasonable, even in case the VOC would decide to discontinue the contract after 1616. In case payments after August 1616 are taken into account, the price is 1.83%. However, the risk of the contract for the insurer is serious. For example, the lowest revenue per August 1616 we find in our simulations is 900,000 guilders, which implies that the insurers have to pay 2.3 million guilders, which – discounted to May 1614 values – is a loss of 59.62%. The pricing reveals the non-normality of the payoffs, which are a consequence of the option-features in the contract. A widely-used metric for risk in non-normal distributions is the 5% value-at-risk. Until August 1616 this value is 22.29% and over the full period 8.90%.

⁶ Hull (1993), p. 333.

Table 7: Simulation results

	Average	Median	StDev	StError	Minimum	Perc25	Perc75	Maximum
Number of ships arriving in Asia	8.71	9.00	0.53	0.01	5.00	8.00	9.00	9.00
Number of ships arriving in Republic	5.51	5.00	1.15	0.01	2.00	5.00	6.00	9.00
Average travel time in days	844.61	852.04	127.53	1.28	388.93	762.42	933.37	1287.04
Value of goods arriving before Aug 1616	3,305,903	3,294,000	574,263	5,743	900,000	3,060,000	3,690,000	5,724,000
Value of goods arriving after Aug 1616	502,765	324,000	515,761	5,158	0	0	720,000	2,970,000
Payoff to VOC per Aug 1616	-169,017	0	298,235	2,982	-2,300,000	-140,000	0	0
Payoff from VOC after Aug 1616	99,322	0	212,143	2,121	0	0	140,000	1,760,000
Payoff to VOC per Aug 1616 discounted to May1614 values in guilders	-140,205	0	247,396	2,474	-1,907,927	-116,135	0	0
Payoff from VOC after Aug 1616 discounted to May1614 values in guilders	81,684	0	175,394	1,754	0	0	113,026	1,521,789
Total payoff from VOC discounted to May 1614 values in Guilders	-58,521	0	167,728	1,677	-1,534,637	-10,693	0	92,700
Payoff to VOC per Aug 1616 discounted to May1614 values in percentage of 3.2m	-4.38%	0.00%	7.73%	0.08%	-59.62%	-3.63%	0.00%	0.00%
Payoff from VOC after Aug 1616 discounted to May1614 values in percentage of 3.2m	2.55%	0.00%	5.48%	0.05%	0.00%	0.00%	3.53%	47.56%
Total payoff from VOC discounted to May 1614 values in percentage of 3.2m	-1.83%	0.00%	5.24%	0.05%	-47.96%	-0.33%	0.00%	2.90%

Obviously, our simulation is based on assumptions, which do influence the outcomes. In particular the return policy of the VOC for arriving ships in Asia and the 900 guilders revenue per ton are debatable. In order to describe the effects on our results we perform several additional simulations with other parameters. First we vary the revenue per tonne, from 600 guilders to 1,000 guilders. With 600 guilders, the price of the contract is 17.89% (5% VAR is 36.91%), for 700 guilders, the price of the contract is 9.33% (5% VAR is 29.11%), for 800 guilders, the price of the contract is 4.17% (5% VAR is 18.66%), and for 1000 guilders we find a contract price of 0.71% (5% VAR is 3.63%).⁷ Interpolation shows that the 5% premium is obtained with a sales value per ton of 784 guilders. That is to say, the 5% premium was a fair compensation for the risk taken by the

⁷ When we set the revenue back to 900 and now assume that the Amsterdam chamber also returns one ship after arrival in Asia immediately to the Republic, the price becomes 5.76% (5% VAR is 22.29%). In case all chambers return two ships the simulated price becomes 0.17% (5% VAR is 0%).

underwriters if sales revenues averaged 784 guilders per ship ton. Lower revenues would have required a higher premium, and the other way around. Conversely, average sales revenues of 500 guilders meant that insurers would have to pay out more than 28 per cent of the 3.2 million, i.e. almost 900,000 guilders. Judging by the company's operations before 1613, the 784 guilders' figure appears about right. Revenues from six ships returning in 1611, i.e. just prior to the contract, averaged 799 guilders per ton for a total of 3.5 million, and this included cargo taken over from a ship stranded near Mauritius.

However, the scarce available data suggest that actual revenues from the 1613 fleet fell short of the 3.2 million total. A first indication is the likely amount of silver carried by the 1613 fleet. Writing to the Estates General in 1614, the VOC directors put the cost of equipping a fleet of ten to twelve ships at 1.8 to 2.0 million guilders, including 500,000 to 600,000 worth of silver. If the 1613 fleet of 12 ships did indeed carry 600,000 guilders of silver, it could only have generated 3.2 million guilders with a gross trade margin of over 500 per cent. This was way above the VOC's normal margin. The Rotterdam, one of the 1611 return ships, realized a gross margin of 176 per cent, and two ships returning to Enkhuizen in 1618 realized 313 and 335 per cent respectively. A 1618 memo on the value of silver shipments found amongst the papers of an Amsterdam director calculates with a gross margin of 250 per cent.

The little we know of the 1613 fleet returns suggests that they are unlikely to have achieved even that. Only three ships returned to the Republic, one in 1615, one a few weeks after the set date in September 1616, and one during the summer of 1617. The invoice value of their cargo totaled 320,000 guilders, that is to say about half the value of the silver presumably sent out. Possibly some of the goods bought with silver from the 1613 fleet returned with other ships, for instance the six ships from other fleets which arrived home during 1614, 1615 and 1616, but it is highly unlikely they carried up to 300,000 guilders worth of cargo on account of the 1613 fleet.

Directors must have known from experience, and from the amount of silver sent out, that sales would remain below the 3.2 million guilders threshold. Whether the other shareholders-insurers knew as well is difficult to tell. Shipping details such as incoming and outgoing cargoes, provenance, destinations etc. were common knowledge in commercial centers, but insurers may have known only the VOC's revenue per ton and

not its trade margin on silver sent out. Even so the information asymmetry between the directors and the other insurers did not really matter because the directors shared the risk taken with them.

6. Insuring growth opportunities

The insurance contract has several features, which are in line with the Froot, Scharfstein and Stein (1993) theory. In particular, the presence of growth opportunities in the VOC is an important element. By 1613 confidence in the future of the VOC activities had grown significantly. The lifting of the company's obligation to liquidate its first ten-years' account in 1612 allowed the VOC to maintain a standing fleet in Asia, which in turn increased the likelihood of a regular supply of pepper and other spices in the Dutch Republic. (Gaastra, 2007; Gelderblom, De Jong and Jonker 2013; Dari Mattiacci et al. 2012). With the signing of the Twelve Years' Truce in 1609 Dutch merchants also regained easy access to Mediterranean markets turning Amsterdam into a commercial hub able to meet the demand for spices in virtually every European market. At the same time, the VOC was financially constrained in terms of cash availability (see Gelderblom, De Jong and Jonker 2013). It could still fund the 1613 fleet from large sales revenues in 1611 and 1612 but unpaid dividends amounted to at least 6 million guilders payable in two installments in 1614 and 1616. If the 1613 fleet did not return with sufficient goods it might be impossible to meet the latter obligation in particular.

The relevance of the theory of Froot, Scharfstein and Stein (1993) seems plausible from the perspective of the VOC. In order to guarantee the permanence of the business, the adaptation of the legal and organizational structure is a first step, but the company's operational and financial policies also need to be set in accordance with this goal. Continuity is enhanced through three mechanisms. The first mechanism is simply a sound business model with sufficient cash inflows, which is sustainable on the long run. This implies that the firm needs to obtain a competitive advantage on the product market and needs to keep investing in the operations in order to grow towards the optimal scale. The second mechanism is financing of the operations, via retained earnings, debt and new

equity. Obviously equity financing has a positive effect on continuity, acting as a buffer against losses. Debt financing creates fixed obligations towards creditors and continuity is threatened when interest obligations and principal repayments cannot be covered via liquid assets and cash inflows from operations. The third mechanism is active risk management, as a tool to provide financing in case retained earnings fall short and access to debt/equity is constrained or expensive.

The idea to construct *ex ante* an option-like contract on the returns of the 1613 fleet allowed the *bewindhebbbers* to protect the company against the probability of cash shortage and thus to secure future growth. In case of a return of the 1613 fleet of at least *f* 3.2 million, the revenues will be sufficient to pay dividends and equip a new fleet. In case of lower revenues, the VOC will use the guarantee to obtain cash. This way, the VOC would be able to benefit from the trading network in place, and stay ahead of its European, notably English competitors. In this respect, it is interesting to consider a situation without an insurance contract and insufficient returns to equip a new fleet. In this setting the VOC *bewindhebbbers* would have to raise external financing. It can be expected that without sufficient returns the stock price will drop and current or new shareholders will be willing to participate in new equity only against high costs. Moreover, the dividend overhang will make shareholders hesitant to contribute to future growth (cf. Myers, 1977). Finally, debt financing will only be possible against high interest rates and on the personal credit of the *bewindhebbbers*. Given the enormous information asymmetries between insider *bewindhebbbers* and prospective shareholders or bondholders, it seems highly unlikely that debt or equity can be raised on attractive conditions. Thus, it can be expected that the VOC would have been severely financially constrained.

From the perspective of a participant in 1613, it is important to distinguish between (1) shareholders who had not claimed their 1611-12 dividends, and (2) shareholders who had claimed all dividends. The first group of participants receives the 5% premium in May 1614. In case the 1613 fleet would return with sufficient cargo, the contract would have no consequences. In case of insufficient returns, the participant will contribute cash for the equipment of future voyages. In case of personal distress, the guarantee will first be netted with the dividends and the shares serve as collateral for any remainder. In case a

shareholder had already claimed all dividends, the netting is not possible, but the shares still serve as collateral. Surely, both groups of shareholders-insurers were subject to information asymmetries that made it difficult to assess how effectively the 1613 fleet would be deployed to meet the company's long term commercial goals but notably those shareholders who were active in the Dutch spice trade would suffer more from the inability of the company to pursue its long-term strategy.

Although the insurance contract closely resembles the Froot, Scharfstein and Stein (1993) thesis, it is also possible to find elements that may refute the applicability of this model. First, the 5% insurance premium to be paid in May 1614 is a payment of 160,000 guilders, which has a negative effect on the cash balance. Apparently, the market conditions required this upfront payment, because a later payment would have been more attractive for the VOC. Second, the contract specified the return value mainly against fixed prices for the spices. This implies that in case market prices are below the contract prices the VOC will realize lower revenues. Again, most likely market conditions did not allow the VOC to sell both the quantity and price risks to the participants.

Third, and most remarkably, it looks as if the contract's conditions were met (Gelderblom, De Jong and Jonker, 2013) and that the VOC could well use the money in 1616, but nevertheless did not pursue its insurance claim. The likely explanation is the fact that virtually all insurers doubled as shareholders, many of whom still had an outstanding claim on 62.5% dividend in 1616. Even though the 1613 policy stipulated that sums due under the contract were not to be offset against any other claims between parties, the VOC could hardly press insurers to pay up without risking counter-pressure to pay up itself. Consequently the company's lack of cash appears to have prevented it from using the ingenious stopgap designed to relieve it in case of need. As the Estates General also failed to reach an agreement with the English Crown about the merger of their respective East India companies, in 1613 and again in 1615, the VOC seemed to have exhausted all possible means to keep the company afloat. And then the directors succeeded in eliminating the bottleneck which constrained them in 1613: they collectively decided to become jointly liable for debts issued on behalf of the company – a mutual guarantee among 72 directors divided over six chambers that inspired sufficient

confidence for investors to lend up to eight million guilders between 1616 and 1623 (Gelderblom, De Jong and Jonker 2013).

7. Conclusions

The Fall of Antwerp in 1585 led to a fierce struggle between Portugal, England, and the Dutch Republic for control over the supply of Asian spices to Europe (Steensgaard 1965; Kellenbenz; De Vries 2001). The challenge for each of these countries was formidable: set up fixed trading posts in South-East Asia, organize a regular flow of spices to Europe, secure access to markets around Europe, and control prices on these markets. The biggest challenge was a financial one. On the one hand the VOC was sufficiently successful to be able to send out ships, buy spices, and if necessary grant credit to buyers. On the other, the company faced high sunk costs in soldiers and armament, in the building of trading posts, maintaining a standing fleet in Asian waters, and the keeping of stocks of fine spices in European entrepots. To meet these opposite requirements, Portugal had created the Casa de India to organize shipping and maintain trading posts, leaving the sales of spices to syndicates of merchants (Boxer; Ewert). The English and Dutch, on the other hand, when they first entered the scene sailed with privately funded fleets, fetched spices, returned to Europe, sold their merchandise, distributed profits, and assembled a new group of investors for a subsequent voyage (Scott; Chaudhuri; Gaastra).

The Dutch quickly understood that this mode of operation would never give them control over the Asian spice market, and in a deliberate attempt to emulate the Portuguese example they created the Dutch East India Company (VOC) in 1602 with the explicit purpose to establish themselves as a military might in Asia, organize regular shipments of pepper and other spices, and control prices and outlets in Europe (Gelderblom, De Jong and Jonker 2011). Eventually this turned out to be a very successful strategy but in the short-run it created immense, almost insurmountable financial difficulties, which took the VOC twenty years to solve (De Heer 1932). One important step was the creation of a permanent capital stock in 1612, really an act of expropriation of the investors in the company who in 1602 had pledged their capital for ten years only (Steensgaard 1982). When in 1613 the English decided to create a joint-stock company to finance a string of

voyages, a further adaptation of the Dutch company was necessary to stay ahead of competition, and thus a second, equally crucial step was taken in 1617, with the limitation of the directors' liability for debts contracted on behalf of the company. This allowed the VOC to borrow on a much larger scale than before – funds it immediately invested in the equipment of large war fleets that were then used by Jan Pieters Coen to establish Batavia and put the VOC's operations in Asia on a permanent footing (Gelderblom, De Jong and Jonker 2013).

However successful these strategies were in the long run, in the short run they created immense financial problems, notably the 1612 continuation of the first ten years' account, which could only be achieved by paying off shareholders with a dividend of 162.5% dividend. As many shareholders subsequently refused to accept these dividends in kind, and the VOC directors still bore unlimited liability for any debt they contracted on behalf of the company, the VOC strategy became endangered. In these circumstances the company directors in 1613 designed an ingenious insurance contract to secure the company's future. This paper documents that the initiation of the contract aimed to serve the long-term continuity of the VOC. This largely forgotten episode yields three important insights. First, the contract presents an exceptionally early case of risk management in which the conditions of the VOC closely resemble the assumptions in the model of Froot, Scharfstein and Stein (1993). The case demonstrates the reasons for the contract to be valuable for the company's shareholders. Second, the idea behind the contract is based on a notion of permanent capital. In the early 17th century co-operations typically concerned a single voyage. The VOC was initially, among others, based on the structures of these early companies (Gelderblom, De Jong and Jonker, 2010). It was only during the growth of the scale of the activities, that the *bewindhebbers* (as well as the Estates-General of the Dutch Republic) became aware of the value of continued activities (Van Dillen, 1958, p.31). The structure of an insurance contract, which serves to guarantee future investments in order to benefit from the trading network and posts in the East, is in this respect an important financial innovation. Finally, the contract is interesting because other companies, notably because the English East India company adopted similar insurance policies after 1629 with close resemblances of the 1613 contract – an emulation we hope to explore in another paper.

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Appendix: Translation of the 1613 insurance contract

We the undersigned promise and bind ourselves to insure and we insure hereby through this document on behalf of the directors of the General Chartered East India Company, that is to say each one of us for the sum for which he signs, from the East Indies until here in Holland or Zeeland, on all possessions of the aforesaid company on islands, continents, or on what location or on locations in the East Indies it may have, or on its way there or back, no location or locations excepted or set aside, be it the island of Japan or even further away, wherever the company may possess any money, goods, or assets, on condition that the Governor-General, Sublieutenants, head merchants, clerks, and assistants, wherever they so desire, shall be permitted to trade and deal with the money and trade goods from these lands for Indian or other goods, to trade and sell, unload and load, sail and dispatch, to those destinations and as often as they shall think fit and proper. And they shall also be free to deal both friendly and unfriendly, offensively and defensively, on water and on land.

And the insurance shall cover money, every kind of spices, drugs, indigo, sugar, silk textiles, amber benjoin, linen textiles, cotton, yarn, gemstones, and further all kinds of merchandise of whatever kind or kinds they might be, none excluded or excepted, not even those that ought to be named and specified according to the customs of insurance and that are not specified here. And this only and for no other risk than that from East India into these lands of Holland and Zeeland arrive for the aforesaid company, and will be stored in its warehouse or warehouses, return goods for a value of 32 tons of gold, to be calculated a pound of pepper, coarse or small, at thirty groats a pound, a pound of assorted nutmeg nuts at 16 stivers a pound, cloves 54 stivers a pound, mace 48 stivers a pound, everything as it arrives on the quayside dry and in good condition. And further all other kinds of merchandise traded or obtained peacefully or otherwise (to the extent that the company can lay claim to them) for as much as they shall be worth in ready money in these lands. Nor shall any costs, be they crew pay, lighter costs, sorting and sifting, or other costs to be charged here, be deducted from the spices or other merchandise, or shall the aforesaid merchandise be burdened with them.

But the ships, cannon, ammunition of war, and everything pertaining to that, shall be left out of consideration and they shall not be counted as return goods, the company's East Indian ships being permitted, both outbound and homebound, to sail forward and back again, to turn and swing around left or right and into all directions, and to enter, out of necessity or free will, any harbour or roads that pleases the head merchants or captains or deemed fit by them. And if out of necessity or free will the goods are unloaded and reloaded onto any other ship or ships, big or small (which they will be permitted to do on their own authority, without waiting on our consent or order) we will bear the aforesaid risk and adventure as if the aforesaid goods had never been unloaded.

We will also insure you for any sea risk, bad weather, fire, and wind, for friends and for enemies, for arrests and seizures by Kings, Queens, Princes, Lords, and Commons, from letters of marque and of countermarque, for bad faith and negligence from Governors, Sublieutenants, head merchants, clerks, assistants, ship's captains, ship's crew and soldiers, and for all other risks and adventures to which the aforesaid goods might foreseeably be exposed, with or without intent, usual or unusual, none excepted. In such cases we put ourselves in your position to protect you from all losses and damages. And if, which God forbid, the return of 32 tons of gold should not have arrived between now and ultimo August 1616, we bind ourselves herewith to pay to the directors of the General East India Company the aforesaid 32 tons of gold or that part of it which is lacking, each one of us in proportion to what he has signed for (both the first and the last insurer in the six policies in the respective Chambers, which we hold to be one policy), one half ultimo February 1617 and the other half ultimo August following, promptly, without protests. Nor shall a formal abandoning of the insured property be required, only a public posting of a claim for payment, which we shall take for such an abandoning, an announcement, and a claim for payment.

And if subsequently any return goods might arrive, each one will receive his money back pro rata and as far as the amount stretches with interest calculated at 6.25 per cent. And should the goods suffer any damage (which God forbid) we fully authorize the directors of the aforesaid company and any other person to help in salvaging and recuperating the aforesaid goods, be it to our profit or to our loss. And should any of such goods arrive in this country burdened with costs of salvage, of freight rates on another

ship, of additional crew pay, or any other costs, to such an extent that they are worth only half of their original value, then only this remainder shall count. That is to say, all the aforesaid costs, which we will accept from those who have made them on their oath, shall be deducted from that amount. And this all on bad tidings and good tidings.

And whereas in accordance with the uses and customs of insurance the insured has to present the cargo lists and bills of lading on which the insurance is based to those risking ten per cent or a certain amount, and whereas in this case such custom cannot be upheld, because that would require lists and accounts of the goods in India in so many and different offices, countries, and places, and also of that which is outward bound and homeward bound, from which would arise endless issues and disputes, therefore we relieve and discharge the insured from this obligation, stating hereby that the insured or company shall not have to hand over anything or to present bills, cargo lists, bills of lading, or any other kind of evidence than only this present policy of insurance, inscribed in the ledgers of the respective chambers and signed by us. And of the goods sent over we shall accept and be entirely satisfied with the lists and calculations which will be made by the board of seventeen and will be signed by the directors delegated by that board, provided that they shall pay the premium in full and not by deducting it from any amounts due. Similarly we promise not to deduct payments from amounts due.

Nor shall the insured be held to send out for this present account any more ships than are now being readied to sail this coming spring. But subsequently the decision whether or not to send out ships for this account shall be solely for the board of seventeen to take and resolve, without us having the right to interfere in any way or to have a say in it, even if the ships that might be sent out for this account, and the goods that they might bring back, if this happened, would be to the benefit of this insurance. And we are satisfied that the insured, as they promise herewith, will pay us the price of this insurance on the first of May 1614 being five per cent. And in order to avoid turgidity, we hold this insurance policy to be of such great value as if it had been drawn up before the city officials, and so succinct as if all the clauses stated therein had been drafted as one could imagine them to your benefit and our disadvantage. Everything in good faith and also, as men of honour, renouncing all official regulations and customs with respect to insurance

which run counter to this policy, promising that we will not take resort to them, nor to any disputes or excuses, within law or outside it.

For this we bind ourselves and our possessions, present and future ones, and also our share in the company to the amount for which we shall have signed this policy.

Drawn up this first March of 1613.

I, [name] am satisfied with this insurance which God may preserve for the sum of [amount in letters] guilders on the [date], say [amount in figures]

First two signatures dated 7 March 1613