BACHELOR THESIS FINANCE

RESEARCH REPORT: TULIP MANIA

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Abstract

The tulip became popular in the seventeenth century, because of its strangeness and rarity. It was a symbol for the new things that arrived with the emerging sea trade. It became a social fashion to be able to collect tulips and talk about it. Tulips emerged and were seen as art and social status was derived from possessing special and rare bulbs. However, the fashionable leisure activity was only achievable for the rich. Slowly, tulip trade became connected with finance and investments. Mostly in the province of Holland the tulip trade was on its peak, allowing around three hundred men to profit and engage in it.

When the prices rose, innovations in payments occurred. Mostly futures were used, to guarantee payment and delivery, but also options of share exchanges were used. The tulip trade was so valuable that special trading clubs, notaries and contracts were needed to settle differences and claims. The price of the tulip bulbs increased strongly and in November 1636, people started to get a bit reluctant to pay such high prices. In February 1637, the tulip trade collapsed resulting in many disputes. No court was willing to settle the quarrels and the persons involved in trade and contracts were basically told to solve it themselves.

Nowadays researchers proclaim that the tulip mania was the first financial bubble of modern financial history. However, after some empirical analysis the contrary seems to be true.
If the tulip price index is compared to the stock index of VOC shares, no significance influence of the stock market is noticeable in the tulip price index. The same is true when the tulip price index is compared to the real estate index. Thus, it is likely due to the fact that relatively few people were involved in the trade, which were often very prosperous, the influence of the tulip crash on the Dutch economy in the seventeenth century was limited.

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Introduction

When people think of the Netherlands in modern days, the first few things that come to mind are cheese, wooden shoes, and tulips. However, in the sixteenth century no one had ever heard of or seen tulips in the Netherlands. Tulips were completely unknown, until some sailors and merchants saw them in Turkey and brought them back to the Low Countries (Goldgar, 2007). Since then, a lively exchange of bulbs and offsets commenced between the so-called *Liefhebbers*, people who were fascinated by all kinds of flowers and plants (Goldgar, 2007). This group expanded and more people got interested in tulips. After a while, more people that were not gardeners or botanists also got interested. This new group saw tulips as art, and even the ability to talk about tulips, could be used to derive social status. With so much more interest involved, the value of tulip bulbs rose. People wanted to get in on the hype and money and trade started to get involved. It was seen as a good investment, since prices were only on the rise.
The value of tulip bulbs was only getting higher and was on an all-time high in February 1637. After the price increases, the prices declined and people who were involved were grieving their money. In today's world, tulip mania in the world of economics and finance stands synonym for irrational speculation (Garber, 1990).

Researchers involved in the research of tulip mania differ in opinions whether or not it should be categorized as a financial bubble. Some say the tulip mania is the first financial bubble of modern history (Mackay, 1852), while others say it should not be categorized as such, as relatively few people were involved (Goldgar, 2007), or because of the economic situation of the Netherlands at the times of tulip mania (Thompson, 2006). In order to understand the economic situation and other facets of the seventeenth-century Dutch society, which were relevant during the tulip mania, a descriptive study should be done. The object of this thesis is to research the causes of the tulip mania, as well as if there were possible consequences for the Dutch economy and society.

Several facets need to be researched in order to get a good overall view and in order to answer the problem statement with knowledge of the economic situation of the Netherlands in the seventeenth century.
The first chapter is a more introductory chapter about the social and economic fascination that consisted in the Netherlands in the seventeenth century. The arrival of tulips in the Netherlands will first be discussed. Since the arrival, more and more people started to see tulips as a form of art, and as a collectable such as paintings and shells. After a while, when the prestige and money involved increased, more people started to get involved and it is interesting to see the motivations behind trading in tulips.
In the second chapter the financial practices that occurred when trading tulips will be discussed. Since there were many ways to get tulips and to pay for it, examination of what kind of practices occurred, but also whether it is similar to the view is on those practices from a modern perspective is necessary. These financial practices consist of several techniques we now know as options, futures, and forwards. The third chapter will be a short informative chapter on the downfall of tulips.
Finally, the relations between the tulip mania and the seventeenth century Dutch economy will be examined. This can be done by looking at the price index of the tulips compared with the Herengracht index (i.e. real estate index) and the VOC index (i.e. stock index).

Chapter 1: Socio-economic fascination of tulips in the 17th century

This chapter will give more background information about the social and economic aspects that were relevant to the time the tulip mania occurred. It is relevant in the sense that it is necessary to understand the fascination of the Dutch, which made it possible for the tulips to gain immense popularity. First, the arrival of the tulips in the Netherlands will be discussed. Then a comparison between tulips and art will be made. Following that section, a description will be given of the people involved in the trade and what their motivations were for trading in tulips.

1.1 Arrival of tulips in the Netherlands

Even though the tulips are inextricably connected to the view foreigners have of the Netherlands, this has not always been the case. Before the sixteenth century the Dutch population had never heard of or seen tulips. The tulips came to Europe around the year of 1555 via the Ottoman Empire (Berg & Clifford, 1999)(Quataert, Salzmann, 2000). The tulips were imported by the Turks, via Asia, and the "Tulipan" had long been cultivated in the gardens of Turkish officials and at court (Berg & Clifford, 1999)(Goldgar, 2007). Since there were growing relations in trade between the Ottoman Empire and Western Europe, the tulips soon arrived in the hands of Dutch, Belgian and German merchants (Bulut, 2002). After more journeys by different trade companies, such as the Dutch East-India Company and the navy, more tulip bulbs arrived in the Netherlands (O'Brien, 1996). These bulbs arrived in the botanical gardens that were linked to the universities, pharmacies and some privately owned. The circle of botanists often exchanged plants and seeds, and this so-called circle of "Liefhebbers" distributed tulips throughout the Netherlands (Goldgar, 2007)(Berg and Clifford, 1999). The novelty and strangeness of tulips fed the interests of people outside the Liefhebbers-circle; it even became fashionable for gentlemen to garden. Mostly the people in the north of the Netherlands, who exercised the avocation, were merchants and saw the commercial possibilities of tulips (Goldgar, 2007). The tulip annually increased in reputation; it was seen a proof of bad taste in a man of fortune to be without a collection of them (Hirschey, 1998).

1.2 Comparison of tulips with art

The novelty of the tulips was the main driver of the fascination. In the sixteenth century there was a culture of collecting strange and rare things in the Netherlands (Goldgar, 2007). The trade by sea brought a lot of things that conformed these standards back to the Dutch harbors. There was a so-called "consumer hunger for new goods"(Quataert, Salzmann, 2000). The tulips stood out in the sense that their variety was big and they surprised every botanist and merchant involved, over and over again. Their brightness and color variety grew mystery, which attracted these people even more. Their infinite variety in color and shape was the true feeder of the fascination behind tulips in the sixteenth and seventeenth century (Berg & Clifford, 1999). The more rare the tulip, the higher the value and desire towards that tulip (Goldgar, 2007).

The fascination in tulips was not only expressed in the cultivation and collecting of bulbs, the merchants and collectors also wanted to immortalize their beloved tulips in art; especially paintings. Still lives of tulips emerged, and constituted a whole new art section. Their compositional freedom and unending colors gave artists a reason to picture the tulips in a whole new way (Berg & Clifford, 1999). People saw it as a perfect transfer of the new esthetic values and the appreciation was not hindered by cultural and religious boundaries (Quataert, Salzmann, 2000). The very fact that tulips could now be looked at and appreciated throughout the year and was not constricted to the botanical cycle, where the tulip only blossomed several weeks a year, was another major influence of the fact that the paintings of tulips were increasingly popular (Goldgar, 2007).

Goldgar (2007) has a very innovative and elaborate view on the way the seventeenth century people looked at tulip bulbs and paintings of tulips. In her book, she explains that tulips (as flowers, bulbs or displayed in paintings) were seen as a luxury good and the tulip craze was part of a bigger mentality. The group of tulip dealers and collectors derived their status from their collection of bulbs and their paintings; to be able to say that you owned a rare bulb and you were able to talk about paintings of tulips with proper knowledge, possibilities of climbing the social ladder were very forthcoming. Goldgar also mentions that art in that time was not only in the form of paintings, but also in collectibles. Next to tulips, collectors also collected shells.

Figure 2: Vase with tulips and shells (Balthasar van der Ast, 1650-1657)

There were several characteristics of shells and tulips that reinforced the collecting culture in the seventeenth century. What must not be forgotten is the fact that sea trading just emerged and more foreign, rare, exotic and strange-looking products arrived in the Netherlands. If you could show your friends and family something stranger and very rare, you would increase in stature. Furthermore, the variety and variability of shells and the additional changeability of tulips, gave the possibility of collecting something unique, something that no one else might have. Shells and paintings of tulips could easily be preserved and enjoyed throughout the year. An additional feature that was very much appreciated was the marble patterns on shells and certain tulips, that gave once again the feel of luxury.

The tulips and shells displayed in paintings symbolized the finitude of human existence, which already shows what a high regard there was for these collectibles since they were used as a symbol for human life. Paintings allowed preservation of what was precious, and might perish and could be saved in still lives. It even came to the point that tulips had its own portraits, just like people. Tulips were named, just like people. This also reflects the luxury feel of tulips, from which people derived their status.

As Goldgar says as a reflective, conclusive sentence in her book: “Rarity helped to create a fashion that then defined the standard of beauty; this, in turn, led to a high price”. Thus, rarity, luxury, and the fashion of tulips led to the commercialization of tulips and eventually to the lively trade in tulips.

1.3 Who traded in tulips

1.3.1 Commercialization of tulips

Since the merchants in the northwest of the Netherlands, hereafter Holland, came in touch with tulips their fascination grew, and after a while this fascination augmented the price and desire for tulips. This occurred because from the start there was an association of power and wealth by the prestige of owning tulips (Quataert, Salzmann, 2000). Market forces began to enter and the commercialization started around 1592 (Goldgar, 2007). Thus, the buying and selling process started long before the so-called mania in 1637.

1.3.2 People involved

Often the tulip mania is characterized as a time where everyone in the Netherlands had everything they owned, or did not own, invested in the tulip trade. However, quite the opposite is true. The people actually involved in the tulip trade formed a fairly small group (Krelage, 1942)(Goldgar, 2007). These people were often merchants and wealthy craftsmen from the urban areas, such as cities as Amsterdam, Haarlem and Enkhuizen (Goldgar, 2007). They traded in tulips, certainly in the beginning, next to their regular vocations. These tulip traders were often related, family or friends, and even more closely intertwined through the religious backgrounds. With the information of the records available, there were about 370 traders involved in the tulip trade, some with more influence than others (Goldgar, 2007).

1.4 Motivations behind trading in tulips

Foremost, and already explained above, the fascination of the variety and novelty of tulips is the true driver that made it possible that the tulip became a luxury and wanted product. Even after the collapse of prices in 1637, the tulips continued to enjoy great popularity (Berg and Clifford, 1999). But during the rise of the tulips, more and more people started to see the commercial possibilities of the trade in tulips, and just as art,

saw it as a solid investment. Shells and tulips were so rare and appreciated that it was just a matter of time before money and wealth would start to get involved in the trade (Goldgar, 2007). Extensive knowledge of the tulip trade was required, though. It was a whole different vocation, since not only economic knowledge about prices and futures and legal knowledge about contracts, was needed, also botanical knowledge about the varieties and the "goodness" (i.e. the quality) of the bulbs.

As Goldgar (2007) mentioned in her book:

> *"To be able to deal in tulips one had to be able to understand them: the nature of the flowers, how they grew, what the different varieties were, not to mention who owned which tulips and what transactions had recently taken place*".

Tulips were seen as a solid investment, because the bulbs were not only tradable, they also produced offsets which could increase the tulip population by hundred to hundred-and-fifty percent each year. So just as stock, the tulips had a face value and a dividend return each year. As soon as more people discovered this, the investments in tulips increased and several techniques were developed to finance these investments.

Chapter 2: Financial practices in the 17th century

In this chapter the financial markets and derivatives used in the seventeenth century will be discussed. It starts with an examination of the early capital market that was established in the Netherlands. Next, the derivatives that were used in the seventeenth century in trade will be discussed. It is necessary to evaluate which practices were common and also the history of those practices, since it reflects how the tulips were traded. The third section will describe the overall feel towards using derivatives in trade. This is more a social reflection on the establishment of the capital markets. The last section will focus on the contracts and enforcements used in the tulip trade.

2.1 Early capital markets

In the sixteenth century, the Netherlands was a major sea power (Day, 2006)(O'Brien, 1996). New opportunities arose for the Netherlands when forward trading gained popularity in trading bulk commodities which was in the beginning mostly grain. Because of the fact that forward contracts were established, sailors were guaranteed payment deliveries upon return from sea. The Dutch were now able to combine sea-trade and trade over land, which enabled a constant exchange between major cities and Amsterdam. When this trading technique grew in popularity, exchange rates between the cities were quoted on a daily basis. By the end of the sixteenth century, variations on forward trading emerged and forwards for other commodities became relatively normal (Gelderblom & Jonker, 2003).

In 1602, Dutch firms trading with the East Indies combined to form one unified firm, namely the Dutch East India Company (i.e. Vereenigde Oost-Indische Compagnie, VOC)(Hirschey, 1998). They needed funding for their overseas travels and raised it by the emission of transferable shares, which had the ability to transfer owners. However, as there was no public derivatives market, as the governmental bonds market in England, available to raise funding, the Dutch society decided to create a private derivatives market. So the world's first derivatives market was established on the Amsterdam Stock Exchange (Gelderblom & Jonker, 2003). The VOC was first to appear in this market with their joint-stock company. Over the years, more and more merchants wanted to subscribe to the Dutch East India Company in the anticipation of revenues

and the dividend emissions (Gelderblom & Jonker, 2003). The expansion of the extent and intensity of trade and the international influence of a great colonial empire, turned Amsterdam into a leading commercial city. Conclusively, it was during the seventeenth century that Amsterdam became the financial capital of the world and had the strongest and most innovative economy of the Western world (Day, 2006)(Hamilton, 1946). During this Golden Age, the tulips were introduced to the population of the Netherlands (Hirschey, 1998).

2.2 Derivatives used in the seventeenth century

In the early seventeenth century the popularity of the transferable shares of the VOC, which could be liquidated at any point in time and could be paid for in four years, led many traders into this new way of trading in shares. In the first couple of years, this transferability made it possible for the shares to change owners a couple of times. However, the possibility of transferring was rarely exercised. The dividends and high share prices attracted others, and the innovation in derivatives developed further. Merchants started to speculate by themselves (Gelderblom & Jonker, 2003). The speculation in forwards and shares gained popularity and regulations were needed to stimulate proper development of derivatives on the private liquid market. The city of Amsterdam assigned notaries to see to fair trade and established protocols.
The contracts of Amsterdam notaries displayed that early on forward transactions for different commodities were established for years in advance, most of them having terms ranging from one to three years (Gelderblom & Jonker, 2003)(Stringham, 2002). This might indicate that merchants acted on strategies based on longer terms. This long-term orientation changed in the 1630s, when contracts for delivery within six months started to become more common practice.

The developments on the Amsterdam Stock Exchange were relevant to the tulip trade because in the 1630s, the trade also became more lively and it started to use derivatives to ensure delivery and payment. The tulip trade was limited by its dependence on the seasons. In the spring bulbs blossomed and were then sold for delivery. Because of the fact that the trade was all year round, the trade mostly consisted on future delivery of the bulbs. This future trade obviously depended on trust, since deals that were made in

winter could only be proven true in the blossom period of the tulip. Furthermore, the influences of seasons and nature added risk to nearly every transaction (Goldgar, 2007). The demand grew and prices increased and futures and options started to substitute forwards, because these had terms that were too long to keep up with the most recent changes in price (Gelderblom & Jonker, 2003).
A stellage was an example of option used in the seventeenth century for grain. This was a forward contract for amounts of grain that could be annulled after a certain time had passed if the prospective buyer paid a premium in advance to the grain's seller (Gelderblom & Jonker, 2003). These contracts matured on a regular basis. Merchants paid the premium in advance in order to secure the right to buy or sell a certain quantity of grain at a certain price after a certain period of time (Gelderblom & Jonker, 2003) (Day, 2006). This is similar to the principles in modern finance that are known as options, in which the buyer or seller has the right to buy or sell a certain commodity in exchange for a fraction of the price; a premium (Eiteman et al, 2010).

Investments became classified and could either be "safe" investments or "speculations or unsafe" investments. This classification was based on the backer or the type of guarantee the investor could count upon when making the investment. Safe investments were activities with extensive public relations like marine insurance, the Wisselbank (the exchange bank), and the Baltic trade. Riskier but critical investments, were such that were backed with shares of the Dutch East India Company (Day, 2006). These "unsafe constructions" also emerged in the tulip trade, since now stocks (often backed with commodities or money) were traded forward for tulips. These constructions were not planned, but emerged from the activities that took place in other trade areas. The practices on the private derivatives market thus had, a great influence on the practices of commerce.

From the legal perspective, the stock market was not heavily regulated and left to its own devices, but the government officially did had a problem with the innovations on the private derivatives market. The state permitted the most straightforward sales, but they did not approve of all the activities going on at the Amsterdam Stock Exchange. They looked at it with suspicion, because they thought that trading techniques were solely used to manipulate the stock prices (Goldgar, 2007)(Stringham, 2002). As a result,

the government tried to ban these markets, but after numerous prohibitions, the market was still going strong and continued to do so (Day, 2006)(Gelderblom & Jonker, 2003).

2.3 The attitude towards trading in derivatives

The fact that the States-General tried to prohibit forward selling of VOC shares gives some information about the general beliefs of the Dutch population toward speculation in the Netherlands in the seventeenth century. Although speculative practices were not uncommon and took place in a variety of economic fields, there was still a sense that this was not actually productive work, but a form of gambling (Goldgar, 2007). The investment in tulip trade "violated the Calvanist work ethic" (Day, 2007). Secondly, the division among religion also played a big role. The issues relating to betting, and thus speculation and tulip trade, were a matter of great concern for the Dutch Reformed, other Protestant groups and Catholics. Many sins were associated with this pastime, for example drinking and fighting (Goldgar, 2007). Instead of attending to the will of God, the people engaging in trade and speculation were inflicted with the will of Bacchus, the god of amusement and earthly pleasures (Goldgar, 2007)(Mackay, 1852).
Later on, when the prices of tulips fell heavily and quarrels began to enter court, no judge want to edict a verdict, since the trade in tulips was still considered gambling. And bets considered under Roman Law had the outcome of basically cancelling all contracts, so that the sellers of the tulips could not recover the money owed under contract with the buyer (French, 2006). The fact that courts would not lay their hands on contract quarrels would only increase the tension in the chaos.

2.4 Contracts

With the growing interest in speculation, the importance and need for standardization of forward contracts and futures grew (Gelderblom & Jonker, 2003). The operations of the trade became so complex, that it became necessary to set up a code for the guidance of the dealers in tulips (Mackay, 1852).

Documents of handwritten futures in 1610 made it clear that the emergence of forwards and futures did not depend on the availability of standardized, printed contracts. For a time, private handwritten and notarized contracts appear to have circulated alongside each other. Printed and more standardized contracts presumably were most common by

1620. These contracts informed both parties of the conditions of the deal such as market conditions and the immediate or future delivery of the commodity (Gelderblom & Jonker, 2003). The forms left spaces for the names, dates and prices of commodities, which could be filled out and signed, by the selling partner, buying partner and the broker, and then exchanged between the dealing parties (Stringham, 2002).

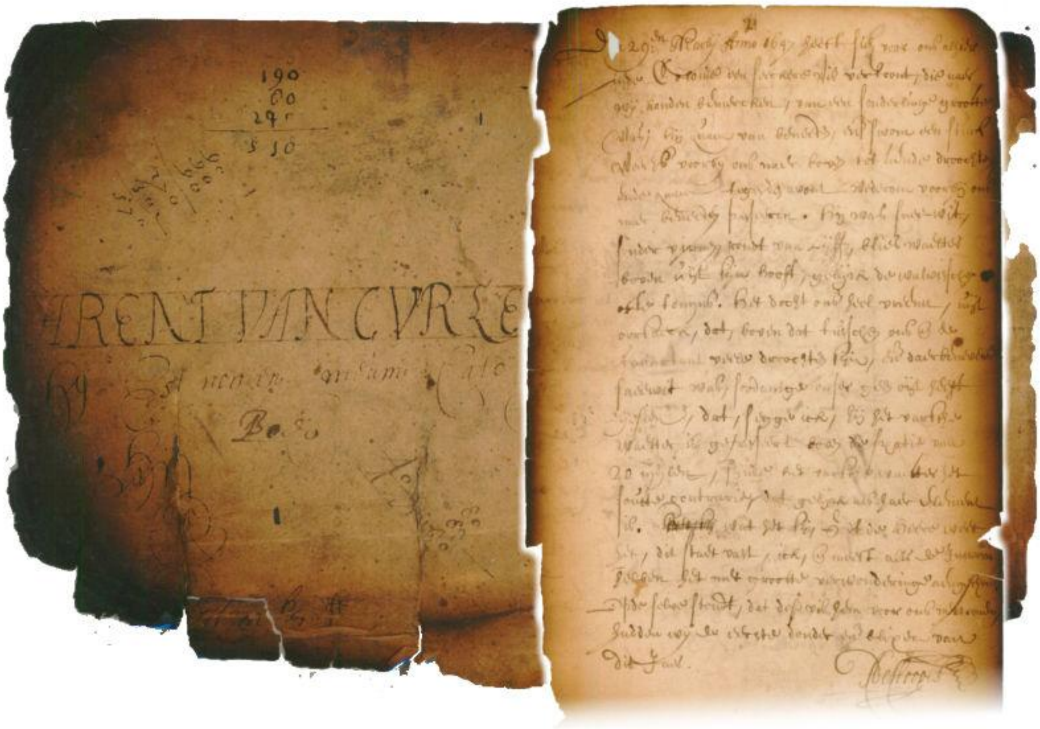
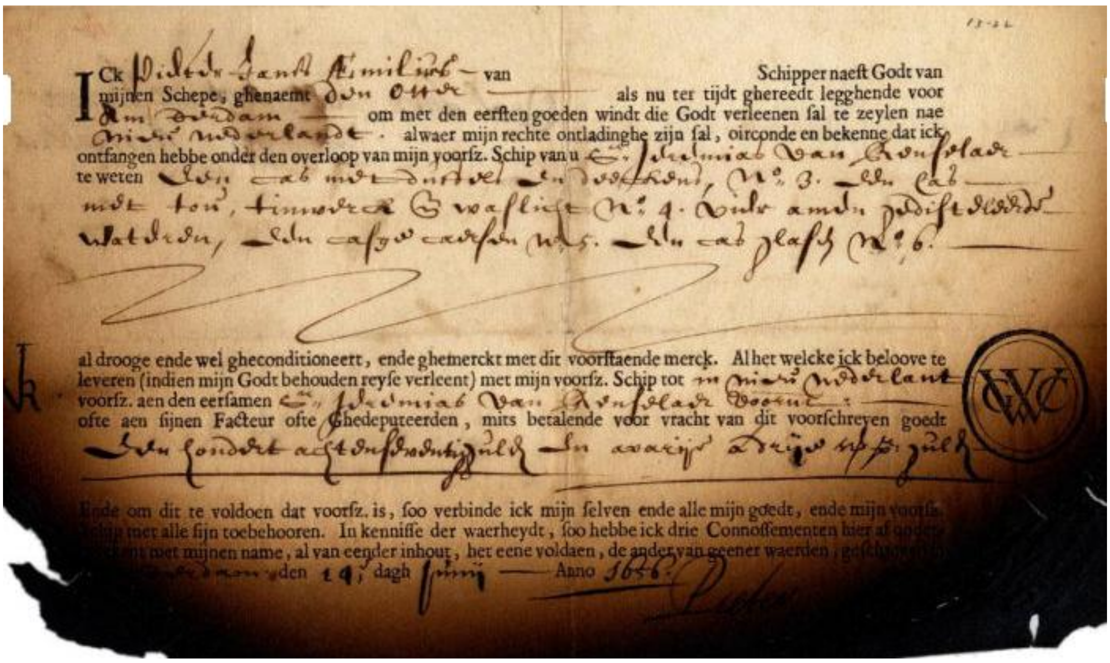


Figure 3: A handwritten contract of the year 1624 (New York State Library, 2010)


ICk ... van ... Schipper naeft Godt van mijnen Schepe, ghenaemt ... als nu ter tijdt ghereedt legghende voor ... om met den eerften goeden windt die Godt verleenen fal te zeylen nae ... alwaer mijn rechte ontladinghe zijn fal, oirconde en bekenne dat ick ontfangen hebbe onder den overloop van mijn voorfz. Schip van u ... te weten ...

al drooge ende wel ghecondirioneett, ende ghemerckt met dit voorftaende merck. Al het welcke ick beloove te leveren (indien mijn Godt behouden reyfe verleent) met mijn voorfz. Schip tot ... voorfz. aen den eerfamen ... ofte aen fijnen Facteur ofte Ghedeputeerden, mits betalende voor vracht van dit voorfchreven goedt ...

Ende om dit te voldoen dat voorfz. is, foo verbinde ick mijn felven ende alle mijn goedt, ende mijn voorfz. Schip met alle fijn toebehooren. In kenniffe der waerheydt, foo hebbe ick drie Connoffementen hier af onder... met mijnen name, al van eender inhout, het eene voldaen, de ander van geener waerden ... den ... dagh ... Anno ...

Figure 4: A pre-printed contract of the year 1624 (New York State Library, 2010)

In times of the emergence of the tulip trade, merchants made transactions via trading clubs or by themselves. Private arrangements were often arranged by the brokers, appointed by the city council and under oath to act as impartial intermediaries between buyers and sellers (Gelderbom & Jonker, 2003). They were obliged to register all of the arranged contracts and through this they were able to organize an effective clearing at regular intervals. Once involved in the buying and selling of shares or commodities, it was only a small step for brokers to provide clearing facilities. For these services they asked a small fee. The group who arranged their deals privately was only of small scale, trading clubs were used to a greater extent (Gelderblom & Jonker, 2003).

In order to manage the tulip markets, people involved in the tulip trading started trading clubs, which were led by a board and administered by a bookkeeper. These trading clubs are often faulty displayed based on the satires and songs after the mania, such as the assembling of fools of speculative excess, the get-together of all sins and so further (Mackay, 1952) (Goldgar, 2007). However, these sessions were thoroughly organized in order to prevent quarrels from sketchy deals. The bookkeeper kept track of all transactions and cleared the settlements of payments by cancelling out mutual financial claims (Gelderblom & Jonker, 2003). They established the official contracts and trading clubs turned out to be very effective in making transactions run more smoothly. Nearly all notarial deeds exposing deals gone bad, were arranged outside a club, therefore not subjected to the supervision boards. Thus, the clubs acted as a moderator in the process of speculation, in contrast to the assumed drivers (Gelderblom & Jonker, 2003).

Chapter 3: The downfall of the tulips

In this chapter the downfall of the tulip trade will be discussed. It mainly focuses on the legal actions taken by the government, deputies and local institutions to create order in the chaos that was the consequence of the imploding tulip market.

After a while the tulips were introduced to society and people started to trade their tulips. The first data for the price index is available of the year 1634. The data of 1634 is used in the table below as starting point in the tulip price index. Since 1634 the prices were on the rise, but after the summer in 1636, the wiser involved in the tulip trade began to see that this increase in prices could not last forever. Those people who realized that no longer bought the flowers to keep them in their gardens, but tried to sell them again at par or preferably with profit. Effectively, they were liquidating their tulip holdings (Hirschey, 1998). This sudden selling of their tulips resulted in steep price increases and this is visualized in the table and graphs below as a peak in the tulip price index over the period November, 1636 until February 1637. The steep prices were considered not to be able to hold up, and anyone buying bulbs was almost certain to lose money, since other buyers were not willing to go higher (Goldgar, 2007). As this thought spread throughout the country, prices fell dramatically in February of 1637. The interest in tulips decreased drastically and the trade almost ceased to exist (Mackay, 1852).

Date (Day-Month-Year)	Tulip Price Index
12-1634	22
05-1636	61
06-1636	38
07-1636	51
08-1636	61
11-1636	97
12-1636	176
01-02-1637	199
03-02-1637	202
05-02-1637	178
09-02-1637	148
11-02-1637	145
05-1637	11
00-1642	30

Table 1: The Tulip Price Index (Garber, 1990)(Krelage, 1942)(Thompson, 2007)

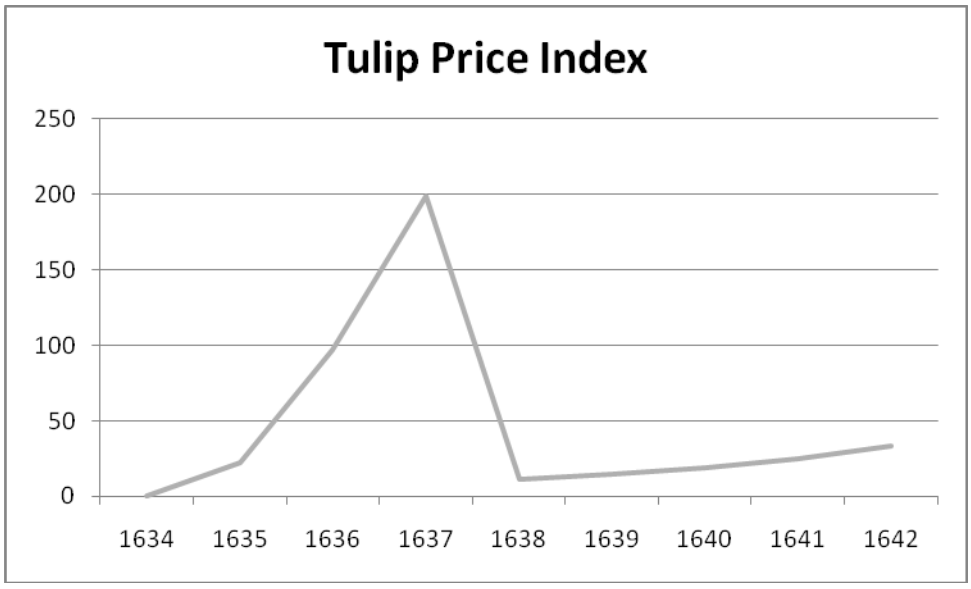


Figure 5: The simplified graph of the Tulip Price Index for period 1634-1642. To get a better overview and to compare it to other indexes, a simplified graph was created to see the prices on a nine-year basis. The simplification consisted of calculate one-year indexes, and in the period 1637 to 1642 according to Garber (1990) there was a 32% increase each year. The steep rise was during the last months of 1636 and the first two of 1637. The crash in prices of 1637 is also clearly visible.

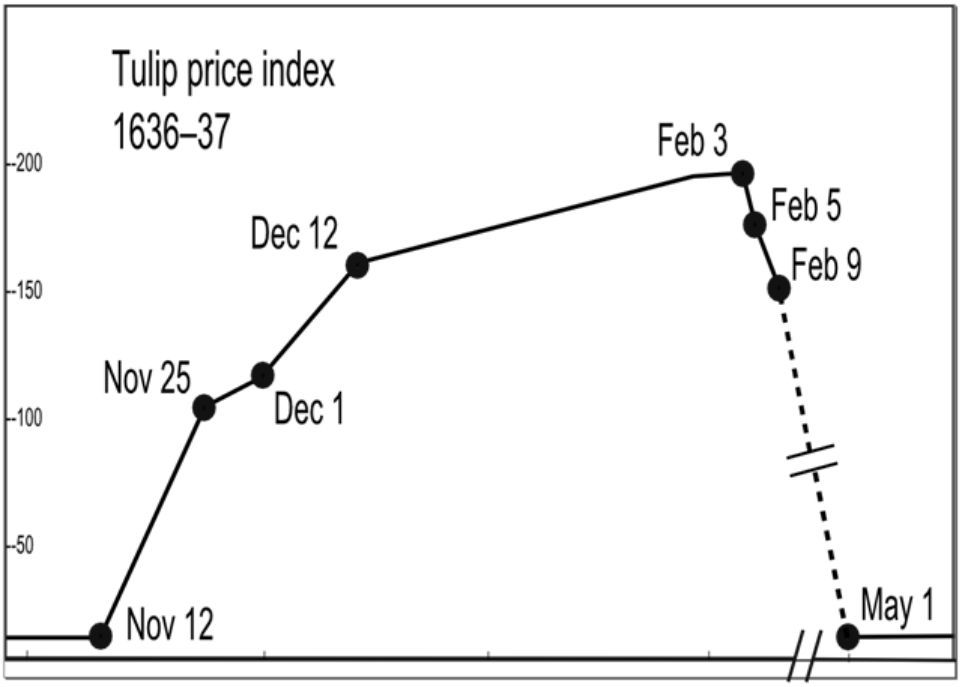


Figure 6: Tulip price index for the period November 1636 – May 1637 (Thompson, 2007)

The crash of 1637 woke the people up and the tulip-holders in the several towns held public meetings to device what measures were best to be taken to restore public credibility and stabilizing prices (Hirschey, 1998). At first, the opinion was to find solutions locally and let local officials rule on the situation. It was generally agreed upon that deputies should be sent from all parts to Amsterdam, to consult with the government for some solution if quarrels and cases could not be resolved on a local level (Mackay, 1852). The government did not want to get involved, but advised the tulip traders to agree to arrange it among themselves. It was believed that in a civil and proper society it was possible for the social harmony to return through arbitration (Goldgar, 2007).

After not getting any support from the government and after much arguing and debating, it was agreed in Amsterdam, by the assembled deputies, that; "all contracts made in the height of the mania, or prior to the month of November 1636, should be declared null and void, and that, in those made after that date, purchases should be freed from their engagements, on paying ten per cent to the vendor"(Mackay, 1852). However, this decision gave no satisfaction to either the selling party, because they would not receive their full price, or the buying party, since they did not want to pay anything for something they did not got in possession. Cases for breach of contract appeared in all the courts of the country; but the judges refused to take part in the evaluation of the gambling transactions under old Roman Law. The judges claimed that debts contracted in gambling were no debts in law. Finally, the matter was referred to the Provincial Council in The Hague, and it was expected that this council with final authority would come up with a measure by which credit could be reestablished (Mackay, 1852). After a period of three months, the Provincial Council declared that they could offer no final decision since they felt they had not enough information to judge. On 28th of May in 1638 the Haarlem city council, which was later followed by other cities, declared that sellers received a 3,5% of the contract price as compensation (Smart, 2010). After this last resort, the matter rested and the people involved had to compromise and find a feasible solution by themselves.

Despite the legal and social chaos many centuries ago, the Dutch are still known for their preference for tulips, and continue to pay higher prices for them than any other people although not as high as in the craze of 1636-1637 (Hirschey, 1998)(Mackay, 1852).

Chapter 4: An Empirical Analysis of the Tulip Mania

In the empirical analysis section of the thesis several aspects of the seventeenth century Dutch economy will be researched to see if there were economic changes due to the tulip mania. First, the contribution of the province Holland to the overall Dutch economy will be researched. If Holland had such a significant role in the Dutch economy, the figures of great cities in Holland could be a reflection of figures elsewhere in the Netherlands. Then the relation between changes in stock prices and changes in tulip prices will be evaluated by means of theory of the relation between luxury consumer goods and equity premiums. After that, the changes in real estate prices of Amsterdam will be compared to the changes in tulip prices. At the end a preliminary evaluation will be given about the significance of the tulip mania on the seventeenth century Dutch economy.

4.1 The significance of Holland

The main goal of this empirical analysis is to evaluate whether the tulip mania had effects on the Dutch economy. A first step to do this is to examine the influence of the province of Holland on the overall Dutch economy. Most of the tulip trade occurred in the province Holland and its main cities Amsterdam and Haarlem. As can be seen in Table 2 below, the province of Holland had a dominant influence on the Dutch economy in 1616-1792 (Jonker & Zanden, 1997). The hypothesis is therefore: because of the fact that the tulip trade almost exclusively occurred in the province of Holland, and because of the dominant influence Holland had on the overall Dutch economy, that if the effects on the tulip trade were not noticeable in Holland, there were most likely neither noticeable in the rest of the Netherlands. Since the data of cities in Holland would be best to do comparisons with, the data on real estate prices of the city of Amsterdam and rental prices of the same city will be used in the section where changes in real estate prices will be compared to changes in the prices of tulips. Furthermore, the prices and premiums of equity shares of the VOC issued on the Amsterdam Stock Exchange will be used in the next section. Since these were issued in Amsterdam, these were also easier accessible for merchants in the province of Holland.

Financial History of the Netherlands (Contribution by province 1616-1792)	
Zeeland	9.1%
Drenthe	1.0%
Utrecht	5.7%
Groningen	5.7%
Gelderland	5.5%
Overijssel	3.6%
Friesland	11.6%
Holland	**57.8%**
Total	100%

Table 2: Contribution by province 1616-1792. Since these percentages represent the influence over almost two centuries, the influence of Holland might have fluctuated over time, but the fact remains that Holland as a single province contributed more than all the others combined (Jonker & Zanden, 1997).

4.2 Relation between equity premiums and luxury consumption goods

4.2.1 Theory based on Aït-Sahalia, Parker and Yogo (2004)

To research the relation between the purchasing of luxury goods and the stock markets, such as the purchasing of tulips and the stock prices of the VOC and WIC in the seventeenth century in the Netherlands, an article by Aït-Sahalia, Parker and Yogo (2004) is used. In this article the authors research the correlation between the consumption of luxury goods and equity premiums. The population observed contained mostly rich American households, since they were most likely engaging in the stock market as well as purchasing luxury goods. Rich households have satisfied all their basic needs in goods, such as food, housing, education etcetera, and their discretionary income coupled with their stock investments are most likely to response to shocks in the stock markets. The authors found that the consumption of luxuries covaries significantly more with stock returns than does aggregate consumption" (Aït-Sahalia, Parker and Yogo, 2004). With aggregate consumption, the authors mean that the consumption of basic goods covaries less with stock returns.

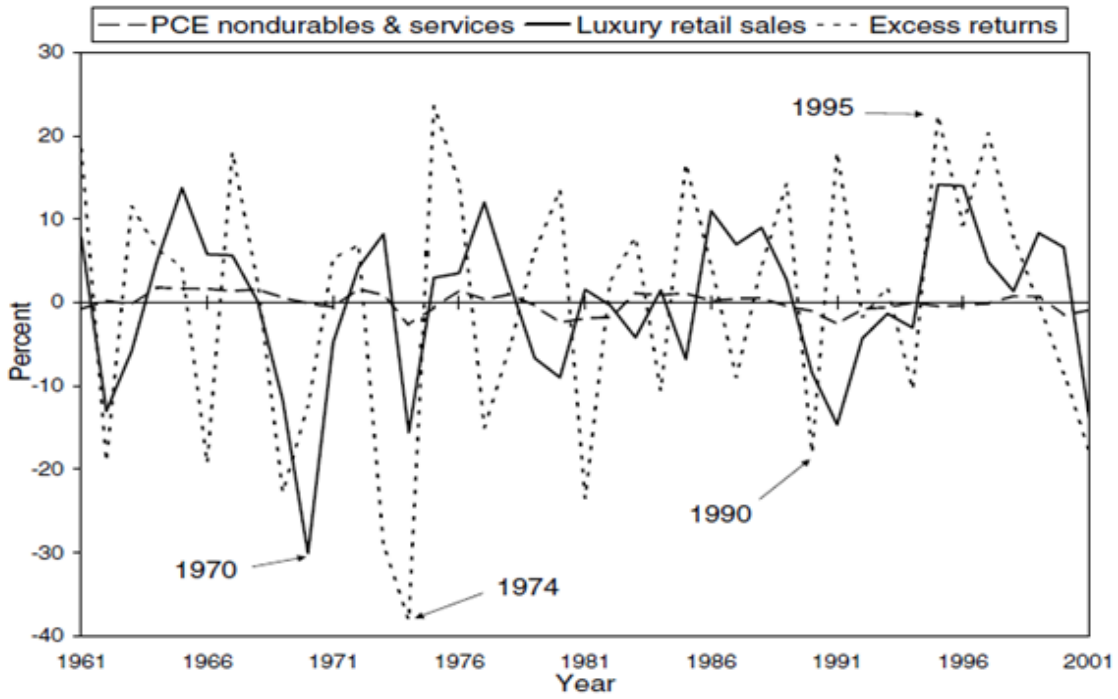


Figure 7: Graph of nondurables, Luxury retail sales and Excess return (Aït-Sahalia, Parker and Yogo, 2004). Nondurables and services are basic goods, which are needed to fulfill the basic needs. Luxury retail sales refer to the luxury excess consumption goods, which can be purchased with the discretionary income. Excess returns refers to the stock prices and its returns.

Furthermore, the authors researched different categories of luxury consumption, such as luxury automobiles, luxury retail sales, jewelry, import of retail and charitable contributions, and their correlation with the equity premium returns. In the table Appendix A2 on page 32, a summary is given of the categories and their correlations with the equity premium returns. From the different categories it becomes clear that there is a correlation between stock market performance and the purchasing of luxury goods. The years with negative growth rates for the companies selling luxury consumption goods, were also bad years for the stock markets, e.g. the years 1969, 1974, 1987, 1990 and 2001. Similarly, when stock markets boomed (for example in the 1990s) the sales increased as well (Aït-Sahalia, Parker and Yogo, 2004). This was true for luxury automobiles, Tiffany sales, and charitable contributions as can be seen in the graphs in the Appendix A2 on page 32.

Thus, when the stock market boomed or busted on a national level, the effects of it were also noticeable nationally within the luxury consumer good segment. It is important to note that the stock market represented the national economy and thus this information can be used to analyze the so-called relation between the tulip (as luxury consumer good) and the VOC share prices (used to resemblance the stock market, and thus national economy) in the seventeenth century.

4.2.2 Relation between VOC share prices and tulip prices

The theory of the article of Aït-Sahalia, Parker and Yogo (2004) indicates that there is a correlation between luxury consumer goods and equity premiums. To test this theory to the situation in 1637, the stock market prices of the VOC will be used to see if there was a relation between stock market prices and the tulip trade.

In table 3, the data that is used for the construction of figure 7 is displayed. For more extensive information, such as the VOC share price index from 1602-1652 and its dividends issues, please look in the appendix A3 on page 34.

Year	VOC Share Price Index	Tulip Price Index
1634	220	0
1635	240	22
1636	236	97
1637	280	199
1638	340	11
1639	380	15
1640	414	19
1641	480	25
1642	384	33

Table 3: Comparison between VOC Share Price Index and Tulip Price Index (Aït-Sahalia, Parker and Yogo, 2004)(Gelderblom & Jonker, 2003) (Garber, 1990)(Krelage, 1942)(Thompson, 2007)

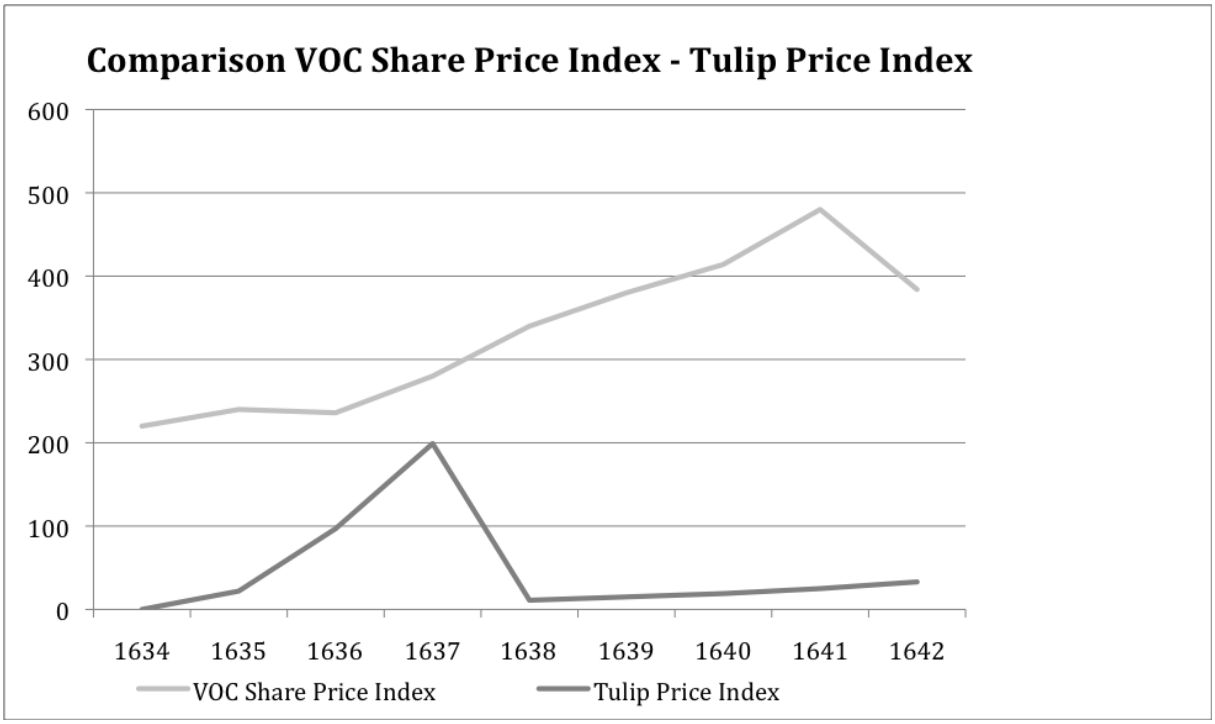


Figure 8: Visual display of comparison between VOC Share Price Index and Tulip Price Index (Aït-Sahalia, Parker and Yogo, 2004) (Gelderblom & Jonker, 2003) (Garber, 1990)(Krelage, 1942)(Thompson, 2007)

Despite the fact that the data that is available is too limited to obtain reliable coeffients, by looking at the data and the graphs it can be said that the correlation of the VOC share price index and the tulip price index is weak. The graphs neither move together in one direction nor move in an opposite direction. Both graphs have an independent path. In the graph the VOC index is increasing until 1641, where there is a decline. However, this constant increase in stock prices is not visible in the tulip price index. The tulip price index even declined in 1637, while the VOC stock prices only increased.

An explanation could be that even though the tulips were seen as luxury goods socially, not everyone who had excess money were willing to engage in the tulip trade and actually purchase the luxury consumer good. Therefore, the relation between luxury consumer goods and the stock returns as proposed by Aït-Sahalia, Parker and Yogo (2004) might not visible in the graph.

A second reason can be that the total number of people in the tulip trade formed a fairly small group of about three hundred people (Krelage, 1942)(Goldgar, 2007). The group of people who were trading in VOC shares in the stock market was considerably larger (Gelderblom & Jonker, 2003). The fact that the group investing in tulips was substantially smaller might be an explanation of the limited influences of the stock market on the tulip price index.

However, if the stock market was not responsible for the shocks on the tulip price index, thus having a weak relation, did the tulip trade have effects on the Dutch economy? Another relation that could give an answer is the one between de Herengracht index and the tulip price index.

4.3 Relation between Herengracht index and the tulip price index

In this section the Herengracht index will be used to represent a representative real estate index for the Dutch economy. The Herengracht is one of three canals that were developed during the prosperous Golden Age (1585-1660). Goldgar (2007) researched that most of the tulip traders were living on the Herengracht, Keizersgracht and Prinsengracht. The reason was that these houses were built with gardens where tulips could eventually be cultivated. Thus, there is a relation between tulip traders and these specific residential areas. If there were influences of the tulip trade, they should be noticeable on this real estate index.

Eichholtz constructed a biannually table starting in 1628 to 1973, in this table there is a real index and a nominal index of the prices on the Herengracht (see Appendix A3 page 34). The information for the Herengracht index that is used to construct table 4 to compare the Herengracht index and the tulip price index, is based on Eichholtz (1997) real price index. This indicates that inflation is accounted for.

Year	Herengracht Index	Tulip Price Index
1634	117	0
1635	120,7	22
1636	124,4	97
1637	130,6	199
1638	136,8	11
1639	162,8	15
1640	188,9	19
1641	219,6	25
1642	250,2	33

Table 4: Comparison between Herengracht Index and Tulip Price Index (Eichholtz, 1997) (Garber, 1990)(Krelage, 1942)(Thompson, 2007)

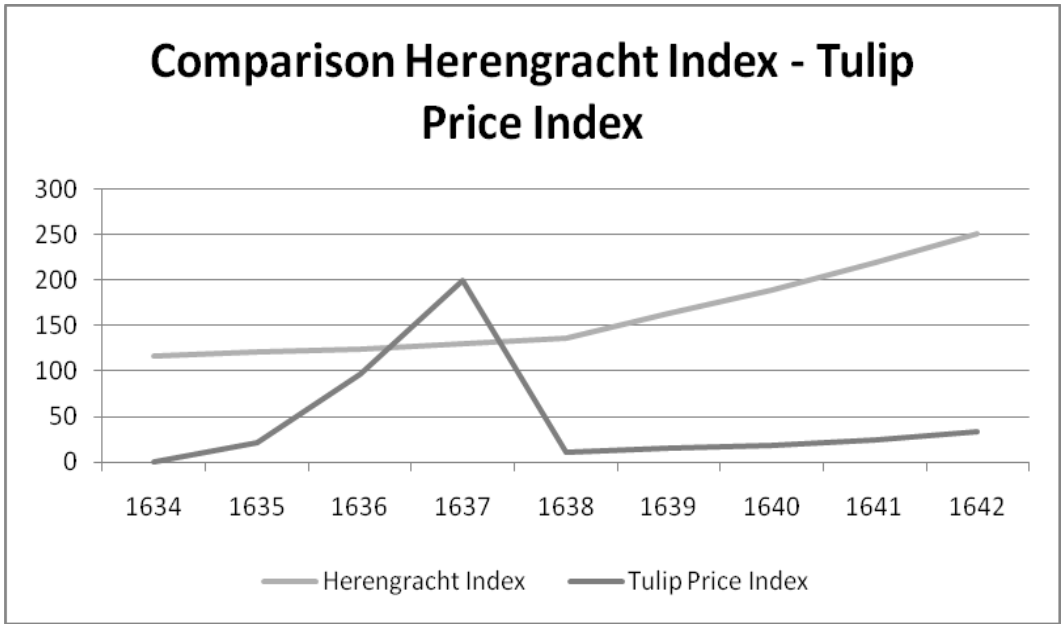


Figure 9: Visual display of the comparison between Herengracht Index and Tulip Price Index (Eichholtz, 1997) (Garber, 1990)(Krelage, 1942)(Thompson, 2007)

In real terms, the prices of housing markets did not seem to be influenced by the tulip mania. In fact, just after the tulip crash in 1637, the Herengracht index seems to increase more sharply. However, in nominal terms the real estate prices did decline in the period between 1632 and 1634 (Appendix A3 page 34). This was due to the plague that killed almost 14% of the population of Amsterdam (Eichholtz, 1997). However, this was far before the tulip mania was on its peak. Both in nominal and real terms, the real estate sector did not experience effects of the tulip crash in 1637.

Another study by Eichholtz and Theebe (1999) show same results for the rental prices in Amsterdam in the seventeenth century. Just as the real estate prices, the rental prices did not fluctuated due to the tulip mania. If the times in the city of Amsterdam were good, the housing prices would increase, if the city experienced bad times, the housing prices would decline. The real estate sector was strongly dependent on the economic situation of a city or region, but the real estate sector was not influenced by the tulip crash in 1637(Eichholts & Theebe, 1999).

4.4 Evaluation

Both the stock market and the real estate sector, which are representative for the most influent province, Holland, have been researched to evaluate the influences of the tulip crash. The tulip trade was most popular in Holland and the effects of the trade on the Amsterdam Stock Exchange and the Herengracht index were, after empirical analysis, not noticeable. The fact that within the most influent province of the Netherlands the effects of the tulip mania were very limited, gives the impression that this was also true for the rest of the Netherlands.

Conclusion

The tulip became popular in the seventeenth century because of its strangeness and rarity. It was a symbol for the new things that arrived with the emerging sea trade. Social status was directly derived from the ability to collect and purchase tulips. But the foremost reason for its popularity among the high social class was the appreciation for the beauty of the tulips. The stranger or rare the mosaic pattern on the tulip, the higher the value of it. The desire to possess such bulb or flower was so high, that the prices of tulips were able to increase to never-before-seen prices.

The high prices led to a crash in 1637 and the legal and financial aspects have been explained in the body of the thesis. However, the very consequences or effects seemed rather vague in the articles of other researchers. A statement proclaimed by many researchers that the tulip mania was the first financial bubble of modern history is probably an exaggeration, basing their information on the satiric pamphlets and stories about the tulip mania.

As the empirical analysis showed, the effects of the tulip crash were hardly noticeable in the economy and trade in Holland, let alone noticeable in the seventeenth century Dutch economy. In the empirical analysis the tulip price index was compared to the stock index of VOC shares, and the tulip price index was compared to the real estate index. Both comparisons indicate that the tulip crash during 1636-1637 had no effect on the stock market or real estate sector.

The crash probably only affected those involved in the tulip trade. A relatively small group was involved in the tulip trade, approximately three hundred people, and they were often very prosperous. So, the decline in prices hit them, but they were still able to live above the average standard. It apparently did not force them to sell shares or sell their properties. Thus, it is likely that due to the fact that relatively few people were involved in the trade, the influence of the tulip crash on the Dutch economy in the seventeenth century was limited.

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Appendix

A1 List of figures and tables

List of figures:

List of tables:

Appendix 2 – Luxury consumer goods

From the article by Aït-Sahalia, Parker and Yogo (2004) the following information has been derived:

Correlation between Series and Equity Premium Returns

Series	Period	Correlation	Standard Deviation
Luxury Automobiles	1970-1999	0.216	0.108
Luxury Retail Sales	1961-2001	0.299	0.095
Tiffany Sales (Jewelry)	1961-2001	0.288	0.098
Import Luxury Retail	1984-1997	0.587	0.110
Charitable Contributions	1954-1999	0.339	0.204

Table 7: Correlation between series and equity premium returns (Aït-Sahalia, Parker and Yogo, 2004)

From this table the correlation with equity returns can be derived. Those correlations show that there is a relation between the purchasing of goods and the returns on the stock markets. The following graphs exhibit that in the peaks of the stock markets, the sales increase and when the stock markets bust, the sales decline rapidly. Three graphs are displayed: Luxury Automobiles, Luxury Retail Sales, and Tiffany Sales (Jewelry).

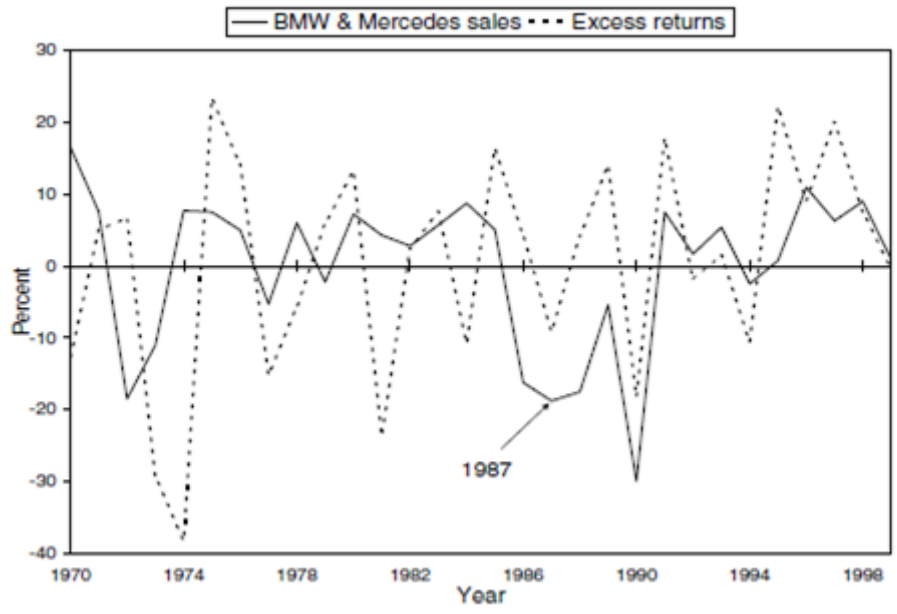

Figure 10: The relation between Luxury Automobiles and Excess Returns

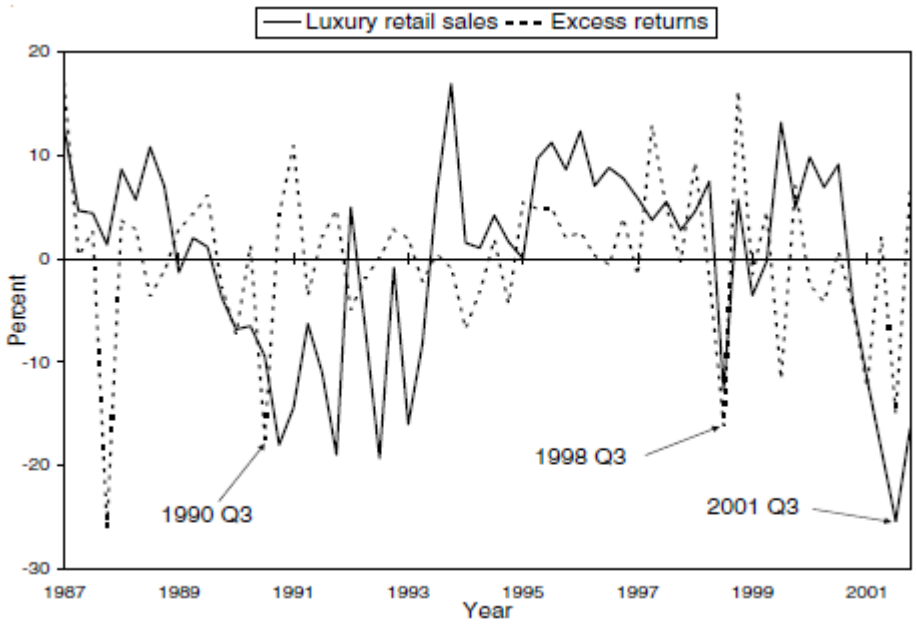

Figure 11: The relation between Luxury Retail Sales and Excess Returns

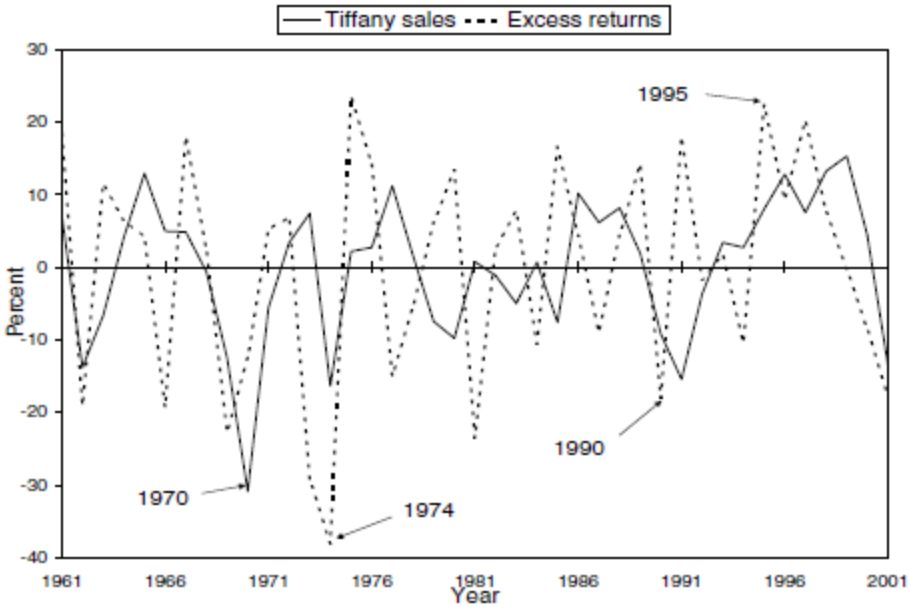

Figure 12: The relation between Tiffany Sales (Jelwelry) and Excess Returns

Appendix 3 – Data on VOC share prices, Herengracht prices, and tulip prices

Data used for VOC Share Price Index

Year	Dividend	Stock Prices Index
1602	-	-
1603	-	109
1604	-	117
1605	-	134
1606	-	168
1607	-	194
1608	-	120
1609	-	122
1610	132	140
1611	-	152
1612	31	250
1613	-	260
1614	-	142
1615	-	126
1616	-	120
1617	-	114
1618	-	110
1619	-	140
1620	38	180
1621	-	220
1622	-	206
1623	23	192
1624	-	178
1625	20	164
1626	-	150
1627	16	158
1628	-	166
1629	26	174
1630	-	182
1631	18	190
1632	-	180
1633	35	189
1634	-	220
1635	46	240
1636	39	236
1637	41	280
1638	37	340
1639	-	380
1640	17	414
1641	40	480
1642	26	384
1643	66	464
1644	-	460
1645	45	420

1646	23	458
1647	26	464
1648	26	496
1649	31	540
1650	20	412
1651	17	524
1652	25	456

Table 5: VOC share price index and dividend issues (Gelderblom & Jonker, 2003)

Over the period 1634 – 1642, the following graph can be constructed:

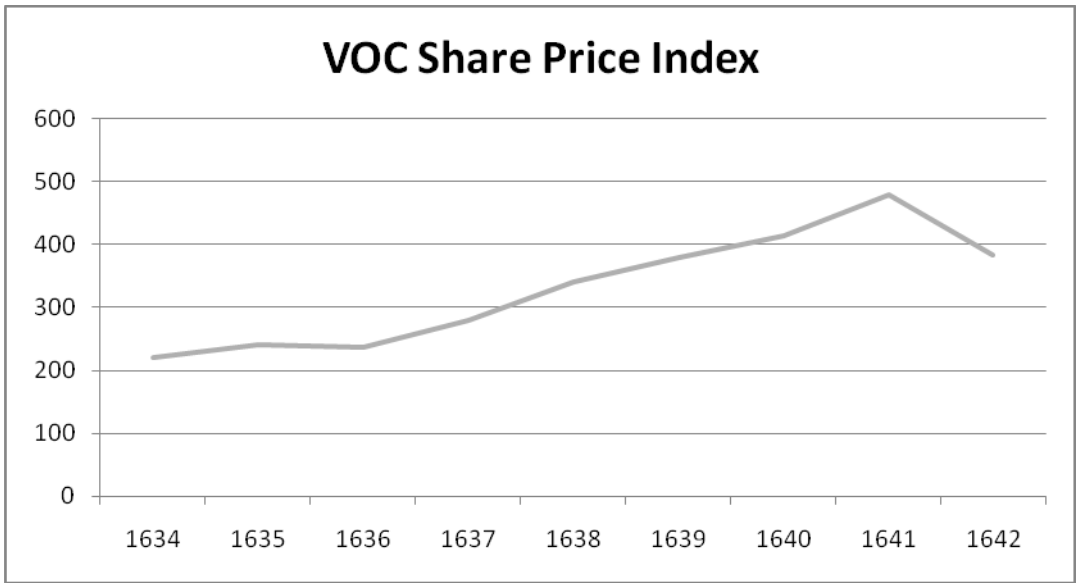

Figure 13: VOC Share Price Index

Data used for Real Estate index

Year	Nominal index	Real index
1628/9	100.0	100.0
1630/1	131.2	110.7
1632/3	218.0	212.7
1634/5	117.0	113.5
1636/7	121.4	124.4
1638/9	140.9	136.8
1640/1	193.8	188.9
1642/3	250.5	250.2
1644/5	221.8	210.3
1646/7	250.8	256.1
1648/9	230.2	210.6
1650/1	247.2	206.2
1652/3	254.3	209.8
1654/5	218.7	211.2
1656/7	266.2	250.8
1658/9	310.8	289.0
1660/1	349.2	306.7

Table 6: Real Estate Index in nominal and real terms (Eichholtz, 1997)

Over the period 1634 – 1642, the following graph can be constructed:

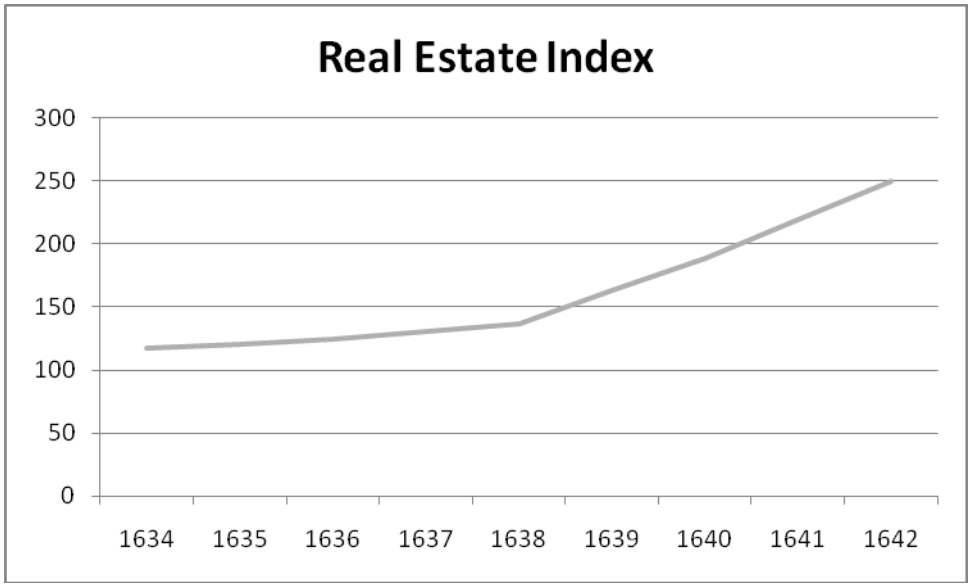

Figure 14: The Real Estate Index

Data used for the Tulip Price Index

Index as composed by Garber (1990), Krelage (1942) and Thompson (2007). Since 1637 to 1642 according to Garber (1990) a 32% increase each year.

Date (Day-Month-Year)	Tulip Price Index
12-1634	22
05-1636	61
06-1636	38
07-1636	51
08-1636	61
11-1636	97
12-1636	176
01-02-1637	199
03-02-1637	202
05-02-1637	178
09-02-1637	148
11-02-1637	145
05-1637	11
00-1642	30

Table 1: The Tulip Price Index (Garber, 1990)(Krelage, 1942)(Thompson, 2007)

The graph of the period November 1636 – February 1637

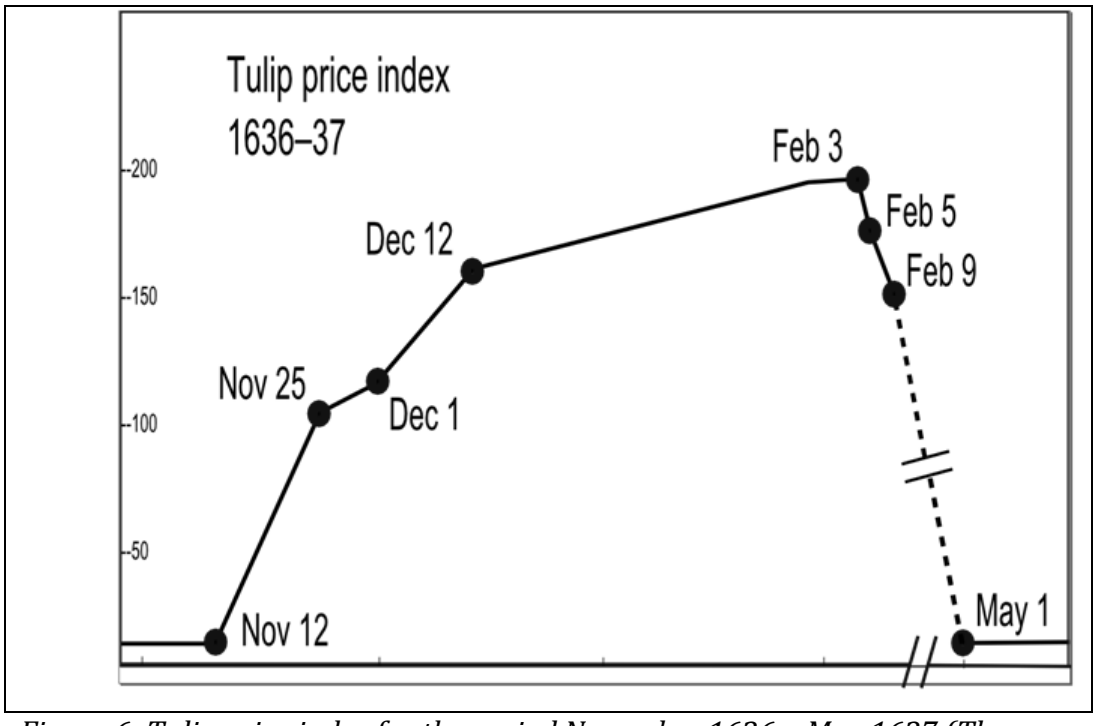

Figure 6: Tulip price index for the period November 1636 – May 1637 (Thompson, 2007)

The simplified graph of the Tulip Price Index, over the period 1634 – 1642:

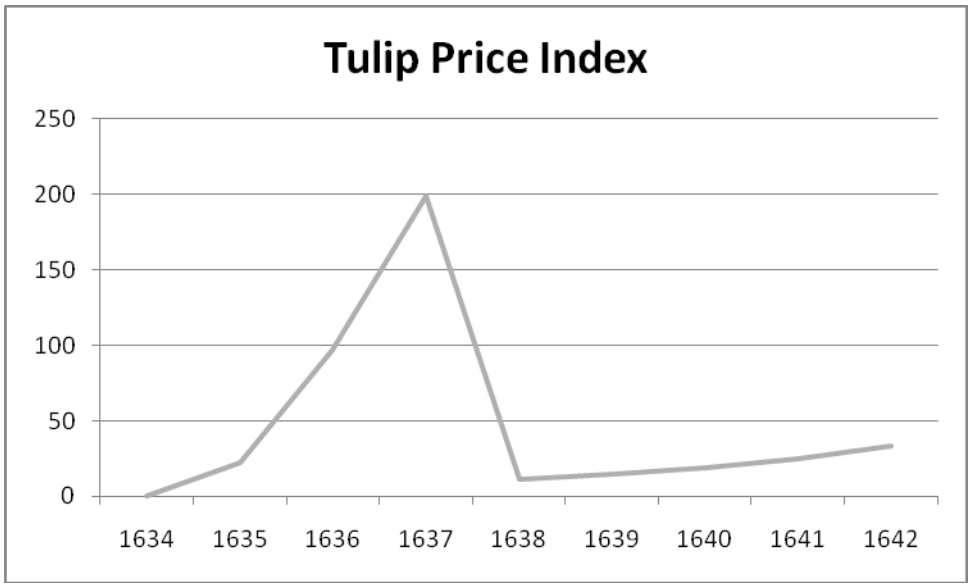

Figure 5: The Tulip Price Index for period 1634-1642