Matters of Exchange
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AN INFORMATION ECONOMY

In this matter again many Philosophers insist that whomever wishes to go through life prudently and to obtain a knowledge of things should begin with traveling afar.

—CAROLUS CLUSIUS, *Aromatum, et simplicium aliquot medicamentorum*

The ways of knowing that surrounded objectivity established highly probable facts despite a world in constant change. This appreciation for things and their descriptions gave substance to the culture of taste and objectivity and was in turn built on the sociable interactions of exchange. Like the values of taste and consumption, exchange began from the precise knowledge of things that came via personal experience, but it also included the ability to transform one value into another. Methods of exchange, then, also had fundamental implications for establishing the value of certain kinds of knowing, turning information into knowledge.

EXCHANGE AND TRAVEL AS TRANSFORMATIVE EXPERIENCE

Objects themselves might be said to be stable and enduring, at least for as long as the processes of decay can be forestalled. But they can produce transformations in the people who exchange them. One of the social analysts of a century ago, Georg Simmel, underlined the changes induced by the process of exchange. All human relationships involve exchange of one kind or another, he noted, for even in ordinary conversation something is exchanged. In exchange one gains something by giving something, altering one's state in the process. When an exchange of word, gesture, or object takes place, the two parties involved are changed in terms of what they know, experience, or possess. Due to the exchange,

each party has given something but also has had something added, which is the source of *value*. "When we subsume the two acts or changes of condition" that occur between the parties to an exchange, "it is tempting to think that with the exchange something has happened in addition to or beyond that which took place in each of the contracting parties. This is like being misled by the substantive concept of 'the kiss' . . . into thinking that a kiss is something that lies outside the two pairs of lips, outside their movements and sensations." In other words, value is something that expresses a state within people rather than something abstract, something over and above, or separate from and in addition to, them. We nevertheless commonly reify the outcome by associating values with objects. Or put another way, "the value of the gain is not, so to speak, brought with it, ready-made, but accrues to the desired object, in part or even entirely through the measure of the sacrifice demanded in acquiring it."[1] Value is read into objects but is rooted in a change of personal state, a consequence of interpersonal exchange.

Simmel was rejecting the classical understanding in which exchange is a mere necessity allowing something gathered or produced to reach the person or place where it can be put to use.[2] Early political economists developed theories that rooted monetary value in labor, utility, or scarcity rather than in exchange itself, seeing price, for example, as the reification of all the social relationships that go into producing things rather than a value placed on exchange. On such accounts, the "middlemen" who engage in exchange should merely add the costs of transportation and handling to the natural price of the things transported, and perhaps add a small profit for organizing the venture. Anything else often appears to be unfair or immoral, an exploitation of what should be a simple relationship between producer and consumer. Aristotle himself argued something similar, while theologians held that the prices charged by middlemen were usurious and hence sinful; ordinary people sometimes rioted against the prices charged by middlemen as not befitting a moral economy; and analysts such as Karl Marx could write that the "immorality of trade" was obvious.[3]

Simmel, however, not only rejected the view that trade was immoral, he went so far as to locate in exchange the roots of the highest ascetic sacrifices and aesthetic goods: "Exchange is just as productive, as creative of values, as is so-called production." Expanding on the point, he noted that "value and exchange constitute the foundation of our practical life." Or, developing the point more universally, he exclaimed, "Exchange is the purest and most concentrated form of all human interactions in which serious interests are at stake."[4] Others have gone further by emphasizing that "the conceptual foundations upon which both economics and culture rest have to do with notions of value,"[5] which is especially apparent where issues such as aesthetic appreciation, taste, social cachet, pleasure,

and playfulness affect what value is placed on objects and their associations.[6] Perhaps exchange is even what makes humans different from other primates: primates may make and use tools, communicate, live in societies, and so on, but only humans exchange things.[7] Moreover, in this view, demand is as important as production. As Arjun Appaduari put it, demand is not "a mysterious emanation of human needs [nor] a mechanical response to social manipulation" but rather "emerges as a function of a variety of social practices and classifications."[8] Or, as an account of the modern artist J. S. G. Boggs put it, after finding he could live by trading images of money, "Faced with so many successful transactions, and such interesting ones, he began to sense how the transactions themselves, beyond the simple drawings, were the true aesthetic objects."[9]

The transformations wrought by exchange can therefore be life-enhancing in many ways. But only if they are between more-or-less equal partners, as Simmel's analysis of the exchange of a kiss suggests. When something else takes place between two parties, such as a forced kiss or worse, or a bad bargain made because of deception or coercion, or when appropriation, theft, or even destruction occurs, personal change is also a result, although far from a life-enhancing change. Bad interactions might not be exchange relationships in the full meaning of the term, but they certainly involve interchanges shaped by the movement of objects, or the absence of such movement. It is manifest that the acquisition of objects and even of accurate information about them sometimes—too often, in fact—occurred in ways that were unequal and destructive, as well as through equal and mutually beneficial exchanges.

The causes of change therefore lie within persons, causes that early modern people termed the "passions."[10] They are not the watered-down "emotions" of the modern world, which in today's conversation implicitly emerge from mental states. For early modern analysts, the passions were movements arising from body as well as mind, expressions of life united rather than divided, powers that moved in and through one's whole being. They prompted action and thought together. Derived from the Greek *pathos*, meaning something that has befallen one, what one has experienced or suffered, and moving into Latin as *passio*, the term carried three meanings: bodily suffering, as when someone was termed a "patient," or as in the "passion of Christ";[11] being acted upon, suggesting passivity or allowance; and—following on this—a movement of the *anima* caused by some force (as in "Elias was a man subject to like passions as we are").[12] The passions could even be taken to be the forces behind all natural actions: Sir Francis Bacon wrote that "the principles, fountains, causes, and forms of motion, that is, the appetites and passions of every kind of matter, are the proper objects of philosophy."[13] "Suffering from passion" therefore suggested allowing oneself to

be controlled by faculties other than reason. These were, in turn, the result of movements that occurred especially in the sensitive soul or (as Plato termed it) the middle soul. The movements of the sensitive soul were in turn bound to the *spiritus*, faculties, and organs of the body.[14] Consequently, the relations between one's soul and one's body were intimate, complex, and dynamic. The famous ancient dictum to "know thyself" (*nosce teipsum*) was directed toward precisely these relationships.[15]

Related to passions are interests. Curiously, however, even recent histories that question many established assumptions continue to make the case for the disinterested nature of scientific knowledge. As Steven Shapin put it in his short account of the scientific revolution, natural knowledge was, or at least was meant to be perceived as, "benign, powerful, and above all *disinterested*."[16] To make a similar point, Lorraine Daston wrote about the "moral economy of science." It is a phrase introduced by the great historian of the English working classes, E. P. Thompson, which he used to speak about the uncommoditized, interpersonal bonds that existed in local communities, which often united them against those who placed the highest premium on money.[17] Daston adapted the phrase to describe the "web of affect-saturated values that stand and function in well-defined relationship to one another," which refer, "not to money, markets, labor, production, and distribution of material resources, but rather to an organized system that displays certain regularities."[18] This she used to criticize the concepts of the "norms" of scientific communities described by the sociologist Robert K. Merton: like him she wished to explain the values of the scientific community, including why it is consensual, but she also wanted to allow for conflict and change. To do so, she properly introduced a concern for affect and emotion. Yet the passion she considered to have most affected the development of early modern science was "wonder," which, she declared, was described as "remarkable . . . for its disinterestedness."[19] Such views are, on this point at least, redolent of Plato and Immanuel Kant and his successors, who taught that entangling the mind in worldly pursuits was a distraction from the cultivation of intellectual virtue (*bildung*), a form of life that should have no goals outside of itself.[20]

But if one examines those who were involved in the close searching out of natural objects and events, it is noticeable that they were deeply interested. Indeed, when giving an account of the rise of the modern world, one historian, Albert O. Hirschman, noted how words like "interest" were coming to be used in a positive way by the eighteenth century.[21] The English word "interest" is enormously diverse in its connotations (as are the Dutch words related to *interesse*). It is a powerful and fruitful word, sometimes even linking personal attributes such as curiosity to social and economic relationships. Indeed, according to the *Oxford*

English Dictionary, "there is much that is obscure in the history of this word." From the late fifteenth century onward, as a noun the word was used to indicate such matters as the "relation of being objectively concerned in something, by having a right or title to, a claim upon, or a share in" it, as in legal, spiritual, or financial concerns in something; "the relation of being concerned or affected in respect to advantage or detriment"; and twelve other major meanings with multiple nuances. Someone can exercise one's "interest" to get another a job, to earn money by lending to a bank or other party, to pursue one's selfish desires, to have a share in a business, and so on. The last of five meanings of the verb yield the modern most common usage: "To affect with a feeling of concern; to stimulate to sympathetic feeling; to excite the curiosity or attention of." In other words, there are countless ways in which people had an interest in nature. Consequently, those who had the most to gain or lose from knowing about the world—those who were most interested—often had the best claim to speak credibly about it.

If knowledge of the world depended on the transformations wrought by exchanges rooted in the passions and interests, it also depended on moving about. Not only did the lives of early modern Europeans bob about on a rough sea of events, thoughts, and passions, they were also very often in the process of trying to get to someplace else. Most men and women took to the road because they had to, going from high pasture to shelter as the weather dictated or moving in the search for employment and enjoyment, fleeing disease and famine, joining armies or avoiding them, searching for love or crashing through seas in search of foreign goods. Masses migrated from one rural region to another according to the seasonality of work, or from rural regions to cities, where they took work as laborers or sailors, or settled for a period as servants and apprentices before returning home, or instead staying on to raise families, or simply added their lives to the high death rates of urban environments.[22] Others felt compulsions, visiting distant relatives, setting out with bands of pilgrims, or taking up distant posts on behalf of church or sovereign.[23] In some parts of Europe, journeymen were even expected to move from place to place, working with different masters to improve their skills in a craft. The *perigrinatio academica* of students from one university to another in search of intellectual masters was similar. And merchants had to travel to acquire and trade their goods.

Of course everyone knew that setting foot on a road often altered the voyager. It mattered not whether people traveled for necessity, education, or the acquisition of wealth: travelers broke old habits of life in the process of encountering new people, places, and customs. Archaic legends throughout the world told of life-altering journeys. A famous example in the so-called Western tradition is one of the first works to be recorded in an alphabetic script, Homer's *Odyssey*, telling of

the transformation of Odysseus from a merely good warrior-prince into one of the greatest of men—a model of patience, prudence, ingenuity, and supple physical and mental toughness—through the experiences he encountered on his long way home from battle. Later Greeks and Romans also looked to the more historical example of Alexander the Great, who went wherever he liked, to the edges of the known world, sending back knowledge of people, places, and things to his former teacher, Aristotle. Fantastic stories about travelers still abounded in early modern Europe, whether as figures of romance, like the chivalric adventurer Sir John Mandeville or the knights of the Round Table, or as historical legends such as Marco Polo. The importance of transformation also expressed itself in the enormous popularity of Ovid's *Metamorphosis* in early modern Europe. New stories of strange peoples and places from both the East and the West created additional excitement. While many travelers must have been as transformed by their voyages as Odysseus, even the stay-at-homes learned things from the tales they heard and the people who passed by.

Because much of this traveling about removed people from systems of governance that presumed rootedness, it also often created social disorder and subversion. By the sixteenth century, religious authorities often did their best to persuade ordinary people against going on pilgrimages, since they saw them more as an occasion for indulging in worldly passions and vanities than as acts of piety. They also often attributed the rise of moral relativism and "libertinism," even atheism, to travel.[24] It encouraged people to consider the various religions they encountered to be merely customs of a locale that, like other customs, were different but equal. Two early-seventeenth-century examples illustrate the point. The famous French aristocrat and author René Descartes, who traveled widely in Europe in his youth and lived outside France for most of his adult life, wrote, "I have recognized through my travels that those with views quite contrary to ours are not on that account barbarians or savages, but that many of them make use of reason as much or more than we do."[25] Similarly, only after he visited lands to France's north, the low countries, did his correspondent Marin Mersenne come to think for the first time that philosophers of a different faith from his own might be both moral and worth listening to.[26]

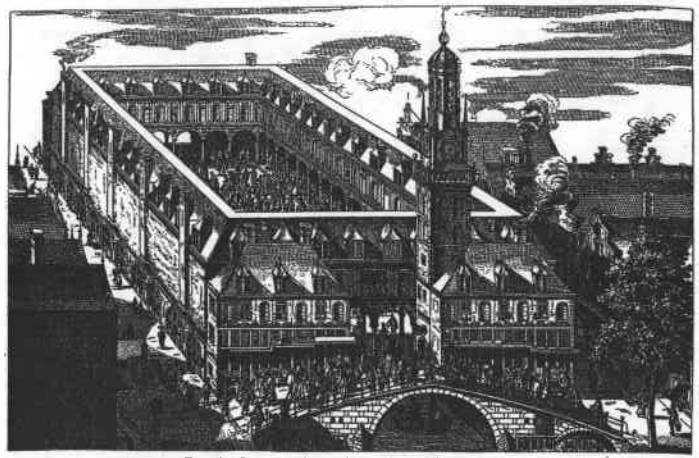
To encourage the benefits of travel but to minimize the problems, many people of affairs urged young men to undertake properly disciplined travel—in imitation of the travels of members of respectable merchant houses—usually under the guidance of a tutor.[27] The accomplished Sir Thomas Elyot, for instance, recommended travel as part of a young English gentleman's education in his *Boke Called the Governour* (1531). Some decades later, Lord Walsingham, who had spent time on the Continent during the reign of Queen Mary, wrote to a nephew

that books alone "are but dead letters, it is the voice and conference of men that giveth them life and shall engender in you true knowledge," for which he should travel.[28] In a similar vein, Bacon declared, "Travel in the younger sort is part of education; in the elder a part of experience."[29] Indeed, by the Elizabethan period in England, travel had become "an 'art,' to be practiced by a properly taught young man in order to complete his education."[30] In France, too, the great iconoclastic philosopher Pierre de la Ramée, better known as Petrus Ramus, in his writings of the 1560s and 1570s made travel a necessity for the discovery of truth, while around 1579 the famous Michel de Montaigne recommended travel for shaping *jugment* and *entendement*.[31] In the low countries, Philip Marnix, one of the well-educated political leaders of the low countries, recommended strongly that after studying languages and acquiring a sound religious and physical training, a young man should travel. He was echoed by the famous scholar Justus Lipsius. Lipsius wrote a letter to Philippe de Lannoy in 1578 (published shortly afterward) that explicitly drew on the example of Homer's Odysseus to claim that travel enriched one's insight, knowledge, and character by bringing one into contact with new people who had different rites, manners and civil customs. People in the northern netherlands often referred to Lipsius's ideals about travel. The diary of a late-sixteenth-century resident of Utrecht who took several journeys opened with a string of mottoes from Lipsius and other humanists on the importance of travel for broadening the mind and expanding knowledge. Not surprisingly, perhaps, its author held the view that his soul's time here on earth was a "sojourn," several decades before John Bunyan developed that commonplace for English readers in his *Pilgrim's Progress*.[32] By the middle of the seventeenth century, traveling the usual routes for this kind of edification would be called the Grand Tour.[33] Parochialism—staying put in one's own parish—became a word with negative connotations.

It is no surprise, then, to note the turn of phrase about intellectual "movements," for both the content and the framework of knowledge could be reshaped in the encounters with strangers. A model developed by sociolinguists is helpful here: they have noted that new words and information are often introduced to strongly knit social groups via loose acquaintances rather than close friends or relatives. Core members of a group develop their own ways of doing things and tend to imitate one another, or at least their leaders. But people who are not core members, such as the children of friends, tend to be the ones to introduce innovations like new linguistic expressions or fashions in dress to the insiders. Drawing on a study of "hysterical contagion" in a textile plant, Mark Granovetter generalized that the most influential innovators tended to be "individuals with many weak ties," since they were "best placed to diffuse" their ideas. Put another way, "Weak ties are more likely to link members of *different* small groups than are strong ones, which tend to be concentrated within particular groups." Paradoxically, then, "weak ties, often denounced as generative of alienation . . . are here seen as indispensable to individuals' opportunities and to their integration into communities; strong ties, breeding social cohesion, lead to overall fragmentation."[34] Subsequent sociolinguistic findings in both Philadelphia and Northern Ireland "emphasize the need for acknowledging the importance of loose knit network ties in facilitating linguistic innovations."[35] Putting this concept into historical language, it might be said that intellectual movements, like linguistic changes, were rooted in the travels of people who did not know one another particularly well but who met and conversed, exchanging words and concepts, or even misunderstandings, in a creative way. Following their meeting, people sometimes decided to stay in touch in the future, creating networks of literally distant acquaintances who fostered the exchange of letters and books as well as gifts and objects. Webs of connections first established through personal meetings therefore lie behind abstractions like "the Renaissance," "the Scientific Revolution," "the Enlightenment," and so on. Travel proved critical for creating the loose communities who led intellectual movements.[36]

COMMERCIAL AND SCIENTIFIC PRACTICE

Moving about in the world and exchanging things with others were the basic practices of merchants. Commercial practices of the early modern period began by bringing people and goods together in one vicinity. Medieval merchants had traded their goods more or less one-for-one: they put things they deemed valuable aboard ship and traveled to places where they might be exchanged for other goods or money, and they either returned with their new goods or exchanged them in turn at another place for what they valued more highly, doing so at city fairs that might occur once, twice, or in rare cases three times or more during the year in any one location. In a very few places, merchants could come together regularly to trade. By the 1530s, Antwerp was attracting so many merchants from so many locales with so many different goods to trade that they could simply ship their goods there to be stored, knowing that an appropriate buyer would easily be found. To facilitate this kind of trading, in 1531–32 Antwerp built the Nieuwe Beurs, a covered place for the merchants to meet that was open every day but Sundays and important religious holidays. (In the early seventeenth century, Amsterdam followed Antwerp's example by building its own Beurs.)[37] In other words, Antwerp became a permanent staple market, the major entrepôt of northwestern Europe.



The Amsterdam Exchange (Beurs) in the seventeenth century.
Unattributed engraving after an old woodcut in the Nuremberg Museum.
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Once inventory had been accumulated in one place, however, it could be transformed into something with universal value, usually embodied in the strange thing called "money."[38] From at least the thirteenth century, most of urban Europe had been monetized: that is, people commonly used currency to pay taxes or settle accounts. But with monetization came other problems, such as how to convert the value of one set of coins into another. Coins were minted at a variety of sovereign territories, with the content of noble metal in them also varying with time. One might call it the problem of commensurability: How does one find the common denominator among diverse coins, allowing comparison?[39] Specialized money changers and bankers arose who dealt with such problems by developing methods of conversion, enabling people to use currency in their possession to settle accounts in another currency.[40] Perhaps their methods prompted philosophers of the period to try to quantify the similar qualities in diverse things, such as the hot or cold qualities of different medicinal herbs, as a way of making them commensurable, too.[41] Metaphors from agriculture and small crafts could not help one understand what was occurring here: one was not planting seeds to get "growth," or even turning labor and materials into a product. Rather, people trading in money became wealthy by finding the lowest common denominator among diverse items and exchanging them, making things that seemed to have little in common commensurable and taking a profit from recognizing the common denominator. Once brokers found methods to allow them to become a medium for the exchange of relative value, coins themselves even increased in value. From at least the end of the fifteenth century Girolamo Butigella and other jurists realized that the value of a coin could be greater than its metallic content because money possessed some sort of added value by virtue of its easy exchangeability. By the mid-sixteenth-century, a French jurist, Charles Dumoulin, could explicitly declare the value of a coin to be simply what others assess it to be, that is, its value in exchange (a particular problem in probate when former debts needed to be paid in money that had changed its value in the meantime).[42] The value of money was therefore a cipher, a denominator of value that allowed very different things to be made comparable through a system of negotiation, and it was therefore valuable in itself. And through it, otherwise incomparable values embodied in things themselves could be turned into number, and counted.

The Exchange was, then, first and foremost a meeting place for the exchange of information—and a place where the accuracy of information was highly valued. As a public forum, parties trading on the Exchange knew the prices at which the goods had recently been going for: indeed, recent prices were written down for the use of other brokers, and traders circulated such information to one another. The collection of commodity prices and exchange rates had been a necessary part of late medieval Italian banking practice, and perhaps the Italians also were the first to begin to print such information; it is certain, however, that a commodity price "current" was being published in Antwerp by about 1540, with an exchange rate current appearing at roughly the same time. The publication of such information was a service provided for the general community of merchants rather than for an individual house or firm, allowing for long-distance public circulation of information about commodities and exchange rates. Indeed, the mutual dependence of merchants on the accuracy of the published lists and of the publishers on the accuracy of the information reported to them made the data published in the currents very reliable.[43] Along with the distribution of information about prices went information about events that might affect business—they became the first printed newspapers. At the Exchange, further discussions could take place about the exact quality of commodities to be traded, where they had been purchased, for what price, and what they were likely to fetch when sold in another place. The Exchange was therefore "a mustering field not only for the coincidental surplus production . . . but also for information" about commodities and exchanges worldwide, helping to stimulate collective decisions by merchants on the allocation of capital.[44]

Access to precise and up-to-date information remained fundamental to business practice.[45] Amsterdam set up a direct postal exchange with Antwerp in 1568 to facilitate the exchange of business information and within a few decades had established four postal centers, one for correspondence with the southern netherlands, France, Spain, and Portugal, one for Hamburg and the Baltic, one for all correspondence "beyond Zwolle" (to Cologne, the upper Rhine and the German "Rijkspost"), and one inland, for other Dutch cities. Throughout this system, certain writers would collect information and undertake to send out newsletters; in 1592, the States General itself even contracted with Hendrik van Bilderbeeke in Cologne to collect and supply regular news at a salary of two hundred pounds, later raised to three hundred, with his news from there sent to The Hague and copied to other Dutch cities. By the 1590s and early seventeenth century, brokers can be found who made their living from collecting and sending specified newsletters to their clients, with regularly printed and numbered newspapers appearing in the second decade of the century.[46] The post offices, newsletters, and newspapers at first depended on merchants for their main clientele, focusing their content on information about prices, goods, the events of war and peace, and other facts that might affect business.

But business depended on exchanging not only commodities and information but promises. One kind was a sort of paper money, recognized first by the Antwerp law courts in 1507 (and throughout the low countries by 1537): a promissory note made out to the bearer. Merchants had previously written out IOUs as a form of credit, the borrower certifying that he would pay the lender a certain amount on a certain date. The promissory note, however, could be traded like any other commodity. That is, payment was made not necessarily to the lender but to whoever possessed the note. The notes themselves could therefore be exchanged in lieu of credit or sold to raise ready cash: the first evidence of discounting such a note (that is, selling a mature instrument for less than its face value, with the new bearer taking the risk of being paid his due from the payee) is from 1536. Something similar soon allowed not only money but goods to be traded in a similar way, as bills of exchange developed. By 1541 these had developed into legally enforceable promises to hand over specified goods to anyone possessing the bill. Both promissory notes and bills of exchange were traded on the Exchange, too. Soon merchants could also raise capital on the market by trading paper "stocks," representing a share of "interest" in a business relationship. Paper instruments themselves had become commodities. In other words, by the mid-sixteenth century, merchants could bring goods, money, or simply written promises to Antwerp and there trade them with anyone, all year round, allowing the merchants to deal in any and all commodities and to put excess capital

or credit to work by trading pieces of paper.[47] This freed many more merchants from the necessity of traveling about with their goods or with cash in hand in order to conduct business, allowing them to concentrate on finance.

One of the most critical assessments lying behind commerce, then, was another characteristic considered essential for the development of scientific knowledge: dependable honesty and related attributes, such as "credibility" and "credit," from the Latin *credo* ("I believe"). For a great merchant, honest dealing and creditworthiness in all that he said were the foundation of his way of life. "His word is his bond" applies even better to the businessman than to the gentlemen. Of course, personal credit lay behind most material exchanges in the period, even in small villages.[48] But whereas sectarians might trust only others of their common faith, or villagers only people of long acquaintance, merchants had to find other ways to weigh trust among diverse and sometimes brief relationships. In the world of the Exchange, then, from trust "came recommendations, guarantees and credit. Trust was perhaps even more important than capital, the main function of which indeed was—and is—to generate trust, and thereby credit." In other words, one of the essential ingredients in the making of money from money was credibility: money generates credit; credit gathers money.[49]

The grandest merchants therefore possessed—and had to possess—sound personal reputations earned from years of consistent honesty and the meeting of obligations. Participants in their world were keen to display signs of honesty in their gesture, word, and dress. Public modesty and consistency of word and deed counted for far more than codes of arms or extravagant behavior, which might signal an egoist or spendthrift who would use money for excessive personal pleasure and public display rather than for reinvestment (which would be of benefit to other merchants). Cities were certainly not places for fine horses, hunting, or dueling. Merchants also tended to frown on gambling and whoring. Instead, they valued more domestic pleasures, getting together in the halls of the militias, guilds, or other civic associations, or gathering to celebrate the conclusion of a contract or a personal anniversary. There they might collectively indulge in oceans of good drink and mountains of fine food, cultivating a discriminating taste for wines, spices, and tobacco. They also displayed a sense of humor in bringing out trick glasses and goblets that spilled all over unwary drinkers and became well known for their farces, although many of these practices gradually came to be associated with lower-class rowdyism instead of well-to-do laughter.[50] Moreover, rather than dressing like peacocks in a wide palate of colors with gold and silver thread and gemstone highlights—as courtiers did to draw attention to themselves—merchants and their wives mainly dressed in dark cloth with white accents of bleached and starched linen. On closer inspection, the fabrics might

be expensive silk or beautifully woven brocade, but one needed to look closely at textures rather than from afar at sparkling jewels to see the wealth invested in their clothing (although sometimes the sons and daughters of the rich could not forebear the chance to show off in brightly colored garments).

The leading men and women of city life therefore liked to think that real value emerged not from haughty princely authority but from the common outlook of more widely distributed, less eminent but important opinion-makers, people like themselves. The most loved play of the Dutch playwright G. A. Bredero—a social farce, *The Spanish Brabanter*, first performed in 1617—included many likable characters based on honest, materialistic Amsterdammers while making fun of the polite pretensions of southern aristocrats. The noble fop from Brabant, Jerolimo, appears on stage well dressed but without a penny to his name, exclaiming, "This city's *magnafique*, but what a grubby folk! / In Brabant we're all quite exquisite / In dress and bearing—in the Spanish mode— / Like lesser kings, gods visible on earth." But of course appearances deceive. Jerolimo is so proud and dissimulating that for a moment he convinces even street-savvy prostitutes that he possesses wealth, whereas instead the apparently poorly dressed Amsterdammers have quietly amassed the real thing.[51] Max Weber's analysis of the Dutch burgers as displaying an unworldly asceticism rather misses the point; Simon Schama's sense that they were "embarrassed" by their riches—in the sense that they did not flaunt their wealth—gets closer to the bone.[52] The demand for consistent modest public behavior to show that they were not high risk-takers in their personal lives nor careless with their purses was a necessary component of being trustworthy and dependable, which in turn helped to establish their creditworthiness.

Similarly, scientists are also among those who seek to give or take "credit" where it is due. Bruno Latour and Steve Woolgar have therefore discussed how one sense of credit among scientists is as a kind of commodity to be exchanged. Such observations led them to comment that "there is no ultimate objective to scientific investment other than the continual redeployment of accumulated resources. It is in this sense that we liken scientists' credibility to a cycle of capital investment." Their arguments about how modern science is done therefore sought to show how *credibility* was "materialized" into facts.[53] In a similar way, Pamela Smith suggested that the early modern alchemist and projector Johann Joachim Becher turned symbols into money, largely through the use of *Kredit*, which could be taken in different and sometimes conflicting ways as a term either for aristocratic honor or for financial reputation. Becher also seemed to be aware of the "paradox" of regeneration through consumption, which was a rich vein of alchemical analysis.[54] Steven Shapin offered a different view, trying to boil down the essence of credibility to trust, which he thought in turn depended on social

authority, with the only people who had enough of it to arbitrate early modern claims of natural knowledge, in his view, being gentlemen.[55] Others have seen princes as the arbiters of truth.[56] But in the Dutch world, at least, gentlemen, aristocrats, and princes had a reputation for being notoriously fickle in their behavior. They might feel bound to discharge debts of honor while at the same time feeling no similar obligation with regard to their financial debts.

Moreover, promises were not based on personal trust alone. They were reinforced by various powerful rituals backed up by coercion: in other words, they were rooted in the power of contract. Contracts—written agreements promising one thing in return for another, in the exact language of notaries and lawyers, with enforceable penalties for nonperformance or noncompliance—became the bedrock of society in the low countries. Investment in enterprises other than landholding, especially, depended on more than custom, relying on written and enforceable agreements to back up promises. For instance, the preamble to the Perpetual Edict of 1540, issued by the Hapsburg emperor Charles V, spoke not only of checking heresy but also of other aspects of necessary good order and justice, such as preventing people from fleeing their creditors. Absconding from debt would be treated like common theft, with wives or anyone else who aided and abetted such fugitives becoming liable for the debts, while if the thieves were caught they would be summarily dealt with and hanged. The same edict allowed the payment of interest on debts while prohibiting monopolies because they threatened the ability to make money from freely contracted enterprises.[57] All kinds of economic activity, including collaborative undertakings such as trading ventures, could flourish only when "property rights" had in such ways been abstracted beyond real property (that is, land and buildings) and specified by law and enforced by local or national bodies.[58] By the 1570s, contractual obligations were so deeply embedded in urban society in the low countries as to be assumed to apply to almost any relationship. The Dutch Revolt of the time was itself often portrayed as standing up against a party who was in breach of contract: the king was said to be acting without consideration for ancient liberties as guaranteed by contractual charters. Even divine relationships could be viewed similarly: the period witnessed a shift from an older concern with the seven deadly sins to a newer set of anxieties about the Ten Commandments, while "covenant theology" developed the theory that God and humankind were bound by mutual promises and obligations and was around long before receiving its clearest definition from the Leiden professor of theology Johannes Cocceius in the 1640s.[59]

It could also be said that the whole commercial system depended on something like a religious hope for a better future. It did not, of course, lie in the hope of being taken up after death into the eternal and timeless world, but anticipated

a "secular" future in the world of time (from *saeculum*, an age). Most historical discussions of changing concepts of time have focused on the development of a sense of its uniformity. It was famously the invention of mechanical timekeepers that conveyed the view that time is uniform. The sense that time changes with the seasons, with one's age, with peace or war, and during moments of stress or bliss accords with human felt experience. But mechanical clocks moved steadily, invariably (aside from mechanical inconsistency), dividing the day into equal hours. Now it was the night or day that changed according to the hour, not the hour that altered according to the light. Clocks quickly appeared in the towers of guildhalls and other municipal buildings, striking the hours to regulate commerce and other activities of large numbers of people: workers in the low countries had been complaining of "working to the clock" from at least the fourteenth century.[60] By the lifetime of Galileo Galilei and Descartes, both natural philosophers and musicians could take the uniform nature of time for granted, "timing" events according to regularized beats.[61] As Norbert Elias put it, "The significance of the emergence of the concept of 'physical time' from the matrix of 'social time' can hardly be overrated."[62] In the same period, however, another sense of the relationship between time and human life developed; there was a growing sense that new methods of using time could bring material goods. Capitalist forms of economy depended not only on drawing attention to the rapid passage of time or on making work more regularized. The Dutch financial world also depended on new methods of commerce that extended time: long-term arrangements, which required personal commitment to behave at an appointed date in the future as specified: something called "investment." Indeed, as economic historians have pointed out, "the essence of capital is time."[63] Commerce thrived on secularization.

In the world of commercial credit and contract, living honestly according to the future consequences of one's promises came to be one of the chief marks of credibility; one of its hallmarks was the associated clarity of speech. Lawyers and notaries might use jargon, but for those who understood it, this technical language made for greater precision and less ambiguity. Again, the contrast with the European upper classes is illuminating: whereas noblemen and women might speak clearly to their inferiors when ordering them about, when they spoke with their peers and superiors complex power relationships encouraged the shadow-worlds of allusive and metaphorical courtly speech. In commerce, however, being clear and consistent was a sign of truth and credibility. In establishing one's credibility, then, the cultivation of exact and unadorned speech, or "plain dealing," went down well. If the commercial world of the netherlands placed a high value on plain speaking, so did the new science. Plain

speech was noted at the time as being very important to clear descriptive expression and analysis. The physician Cornelis Bontekoe, for example, introduced his book on the benefits of tea-drinking with the following common sentiment: "I am accustomed to pay more attention to the subject, and to the truth of what I say than to the fair choice of words and eloquence of style: all the more since I believe I am eloquent enough if I can make myself understood, since the only standard of speaking and writing is that of being understood."[64] Previous historians have sought the origins of this aspect of the new philosophy in the plain style of Puritan preaching.[65] More recently, it has been associated with the rhetorical techniques of "virtual witnessing" that also marked the emergence of the new philosophy.[66] But the ways in which urban commerce might have encouraged plain speech have not been explored.

In short, then, a number of values were shared by both merchants and those we would now call scientists, including: travel, seeing things afresh, exchange, commensurability, credibility, the hope of a better material future through worldly activity, and a preference for plain and precise language. Above all, among the values shared by science and commerce were a certain kind of interested engagement with objective knowledge and an attentive appreciation for collective generalizations based on exacting information about the objects in with which they dealt. Exchange values, openly based on both passion and calculation, placed certain forms of knowing about objects, even living objects, front and center. When such values began to reorient natural philosophy, something recognizably like modern science emerged.

A NATION OF MERCHANTS

The commercial methods pioneered in places like Antwerp were built into the foundations of the new nation-state emerging in the northern provinces of the low countries in the later sixteenth century. As the wars of the Dutch Revolt devastated the southern provinces, the center of mercantile exchange for northwestern Europe shifted north from Antwerp to Middelburg, Delft, Rotterdam, Enkhuizen, and especially Amsterdam.[67] Like other northern cities, Amsterdam benefited enormously from the wealth and knowledge brought to it by refugees from Antwerp and other cities of the south. After the establishment of the seven United Provinces in the mid-1580s—the seven northernmost provinces who combined in a close alliance against Hapsburg impositions—wealthy urban merchants with both capital and information about global trade had flocked to the northern netherlands from their places of refuge, bringing their political outlook, social values, and business skills with them and making the Dutch Republic

the center of what some have termed the "first modern economy."[68] Amsterdam, for instance, experienced a threefold rise in the number of its merchant community between 1585 and 1620 (from about five hundred to about fifteen hundred), with the refugees from Antwerp alone increasing the city's total capital stock by about 50 percent.[69] Many of the immigrants had experience in organizing some of the carrying trade from the Baltic and the Levant, a few had experience in venturing as far as West Africa and the Caribbean, and there were even immigrants who had recently expanded into the Muscovy trade, sending ships north around Norway to Archangel laded with silver, spices, silks, Mediterranean goods, herring, wine, and salt, from whence they brought back furs, caviar, rhubarb, and other expensive products, many from Central Asia.[70] Former Antwerpers also brought sugar refineries in large number to Dutch cities, especially Amsterdam.[71] With their collective involvement, the re-export of Portuguese spices to other parts of Europe via Amsterdam had become so great by 1594–97 that the city virtually controlled the European trade in colonial goods.[72]

The United Provinces was more or less run by these urban merchant oligarchs, becoming the greatest contemporary exception to the rule that nation-states were monarchies. The state ordinarily had neither a strong center nor an authoritative prince, nor even a powerful civil service; it did not even have a well-developed sense of collective nationhood.[73] There was neither a national supreme court nor a unified treasury: each of the seven provinces had its own set of courts and fiscal arrangements, each contributing a proportional share to the finances of the union. Sovereignty therefore remained with the several provinces individually, within each of which various groups—especially the leading citizens of the numerous cities—jockeyed for power and kept an eye on one another. With representatives from a wide spectrum of interests watching their every move, the civil service remained small, and always subordinate to the offices they served. The most influential denizens were therefore the great merchants and their wives who, when they also held political office, were called the *regenten* ("regents"). They imagined the civic polity as a large family, in which the fathers and mothers had duties toward those less able to care for themselves. Indeed, in the early seventeenth century, the Dutch use of the word *regent* was reserved to the men and women who acted as a father or mother in their civic community, holding office in the city government (a male-only option) or on one of the boards of the civic charities (where female regenten often governed the institutions inhabited by girls or women).[74] Whatever power the regenten possessed therefore came not from their individual but from their collective persons as forged in meetings and committees. This enormously complex political system functioned only because, as with business, interests were negotiable and because they found that in the end some interests were common to all.

The interest that most firmly linked the people of the United Provinces was a bit of economic magic called the national debt. The debt gave concrete expression to Dutch collective confidence, paying for the troops, weapons, fortifications, and ships that protected the country, while it also bound together everyone with even a small income into a system of credit and interest. Or to put it another way, a certain share of the livelihoods of a great many people was invested in collective goods that smoothed over social problems and reduced collective risks, which helped to make profit-making activity more secure and less expensive. The new methods of warfare required expensive new technologies in shipbuilding, fortification, gunnery, munitions, and the endless drilling of regular (and regularly paid) troops in the use of new weapons and formations, all of which required mountains of money.[75] But certain kinds of fiscal arrangements originating in the province of Holland, which on the heels of the Revolt reached out to bind all the seven provinces, managed not only to maintain the defense of the state but to spread prosperity in doing so.[76] Cities, provinces, and even the whole union paid for necessary expenditures in ready money, raised mainly from low-interest loans, which were in turn paid back in small but regular amounts over long periods from tax revenues.

Not only the large merchants but many small investors participated in this method of transferring money to the state in return for a steady income—almost anyone who came into a bit of money could in effect lend it to the government in return for guaranteed, long-term income (which was much less risky, if less lucrative, than speculating in business ventures). Indeed, many of the loans were paid back in the form of annuities, some of which lasted for the lender's lifetime, others of which lasted for a fixed number of years and could be inherited or sold—with the consequence of secondary markets developing in these instruments.[77] (The calculations for public lotteries and annuities performed by leading regenten concerned with public finance also provided the basis for the development of mathematical probability.)[78] Lenders also were investing social capital in that they expected and supported the continued solvency of the state throughout the duration of the loan. Because so many persons invested social and financial capital in this way, and directly benefited from state payments, they were also amenable to living with very high levels of taxation compared to other Europeans countries—with grumbling but without rebellion—because they felt they were getting as much or more value than they gave. Because the loans were paid back in small amounts over a long term from tax revenue, which in turn came from several sources, especially excise taxes, the state avoided the debt crises and defaults that so plagued monarchical governments. The experience of personal trust being rewarded with a steady income boosted confidence in the fiscal responsibility of the managers of the state which meant that they in

turn could borrow at low interest rates, averaging around only 4 percent—several times lower than, say, the king of Spain. Although wages remained steady in the first half of the seventeenth century, there was real growth in per capita income, meaning that the growth in income was coming not from wage labor but from investments, with a substantial proportion of commercial profit taken out of riskier partnerships and more safely invested in government, benefiting many small investors.[79] The secret to the success of the Dutch Revolt, then, lay in a widely shared, well-managed national debt.

It helped that few individuals gained exemption from taxation. Even the capitalists, as they were called (perhaps for the first time), were taxed: in 1621, in Holland, certain extraordinary taxes were levied on land, houses, obligations, manors, tithes, and offices, with those owning more than two thousand gilders' worth of such property called "capitalists" ("half-capitalists" were defined in 1625 as owning one thousand to two thousand gilders).[80] A steady flow of revenue from taxes also meant that expectations about the state's income from year to year developed, which in turn provided a talking point for negotiations among the various parties: a proto-state budget. All this meant that the fiscal steadiness of the Republic proved remarkable, allowing competing groups to strike compromises and find common cause, and making it possible for a relatively small nation to mobilize enough resources to stand up to a huge power like Spain or, later, France. By encouraging the pursuit of individual wealth within a managed polity full of checks and balances, the regenten could pay for their collective security while enjoying material luxuries. It was an alliance of financial and political knowledge that could be seen to be about collective values, something like what Adam Smith would later call "the wealth of nations."

By the 1630s, Dutch merchants had virtually created a state resembling an aggressive commercial firm, the "Republic, Inc." They had combined commercial finance and state policy to such an extent that they were able to shoulder their way into most of the important commercial markets around the world, even managing to monopolize most of the trade with Asia, from source to market. The most obvious instrument for their ability to create states and wage war in the interest of grasping as much commerce as possible was the Dutch East India Company: the Verenigde Oostindische Compagnie, known as the VOC, or simply "the Company." It was a new kind of corporation in world history.[81] In their early days sailing to Asia, the Dutch felt weak in entering a region where other merchants had long been established in trade. A century before, the Portuguese had forcibly disrupted some of the long-established relationships of the region and co-opted others in order to profit from the intra-Asian trade.[82] The Dutch at first tried to avoid the more powerful Portuguese fleets, which tended

to head northeast from the Cape of Good Hope toward their great rendezvous at Goa. The Dutch therefore instead sailed south, not to the Indian subcontinent but directly to the Southeast Asian archipelago. They also had to avoid the Portuguese-controlled city of Malacca, which controlled the Straits of Malacca and provided a base to which all sorts of people from eastern and western Asia came to exchange goods.

The region they had entered was peopled by ethnically diverse and complex cultures inhabiting the coastal cities throughout Southeast Asia, often going by the rubric of "Javanese" no matter what island they came from. Most were commercially sophisticated, had a social hierarchy based on wealth derived from trade, possessed slaves, often worshipped according to Islamic teachings, used the Malay language in commercial interactions, built sometimes very large freight ships (the word associated with Chinese ships, "junk," derives from the Javanese *jong*, a word dating to at least the ninth century), and produced other items requiring skilled craftsmanship. Inland, in the often heavily forested and mountainous interior regions of the sometimes very large islands, could be found states ruled by charismatic leaders, often religiously Hindu or Buddhist. The spice trade provided the basis for the intra-Asian commerce upon which many of these various states depended for their wealth and power. Geographically, the most critical areas lay near the Sunda Straits, the gap between Sumatra and Java. Through the straits passed much of the shipping between China and south Asia, and between the Spice Islands and the western destinations of India, Ceylon, Arabia, Africa, and Europe. India itself consumed twice as much of the spice produced in Southeast Asia as Europe, and China took perhaps three-quarters of all the pepper production of Sumatra and other parts of the region.[83] In exchange, cotton textiles and silver jewelry flowed to the Southeast Asian archipelago from the Indian subcontinent, together with silk and other luxuries from China.[84]

During their first ventures, Dutch merchants and captains depended on fair trading practices and good political relations to obtain the spices they desired. When they first arrived in the region, the Dutch were often welcomed as competitors and rivals of the Portuguese. Many local princes therefore seized the opportunity of playing one European group against another for both profit and power. When the prince of Atjeh (in the north of Sumatra) declared war on the Portuguese factories in his region in 1600, for instance, he looked for and used Dutch allies.

After the first successful trading ventures of the late 1590s, however, various problems of organization were recognized. Because every voyage was undertaken by a different partnership (*partenrederijen*), each Dutch fleet was in competition with every other one trading in Asia, including those sent out by compatriots.

Such temporary companies acted according to a familiar contractual arrangement: the partners invested in a voyage or group of voyages, took their profits on the return of the ships and sale of the goods, and then individually decided to end their association or continue in the group for another expedition. Out in the Indies, each venture bid against the others for produce (increasing investment costs), while on return each had to vend their goods at a price lower than the others (reducing income), with consequent reduced profit for the investors. Moreover, the rivalry among ventures made it very difficult for the competing merchants and captains to coordinate their power against common threats. A single managerial system for the Eastern trade would, however, create new advantages, making the trading companies not only more profitable but powerful enough militarily to take on the Portuguese directly. The States General therefore compelled the various Eastern trading companies to negotiate with one another about a common strategy. Between 1600 and 1602, fraught discussions took place under the watchful eye of Johan van Oldenbarnevelt, the advocate of the States of Holland, and with the personal intervention of the stadholder, Prince Maurits. Finally, in March 1602, the Verenigde Oostindische Compagnie was set up. The companies that had previously been involved in Eastern ventures were turned into "chambers" that met in the cities that had been their headquarters (Amsterdam, Middelburg, Hoorn, Enkhuizen, Delft, and Rotterdam), and each chamber was allotted a certain number of delegates for the general board of directors, who were called the Heren XVII ("Gentlemen Seventeen" or "Lords Seventeen"); as in other Dutch assemblies, the largest chamber, Amsterdam's, with eight members, dominated the board but did not hold a voting majority. The officers of the VOC had to swear an oath of allegiance to the States General and promise to keep the states informed of events in Asia, while during periods of wartime emergency they had to transfer money, ships, manpower, and equipment to the Republic on easy terms. In return they were given the power to negotiate treaties, build fortifications, enlist soldiers, and otherwise act as a sovereign power east of the Cape of Good Hope.[85] The VOC was, therefore, a profit-making, semi-independent arm of the Dutch state.

With the founding of the VOC and their new ability to coordinate their efforts in Asia, the Dutch could take independent action more effectively.[86] In December 1603, the VOC sent out a fleet of a dozen heavily armed ships to attack the Portuguese forts in Mozambique and Goa, but it and subsequent expeditions had little success against the centers of Portuguese power in India or Malacca. The Heren XVII therefore reorganized their efforts, forgoing direct assault on the main Portuguese strongholds in favor of getting the sources of spice production into their own hands. In 1605 a VOC fleet managed to capture the Portuguese

castle on Ambon, which had been established to maintain their position against depredations from the sultan of Ternate. During the sixteenth century, the island had seen large-scale planting of cloves, which local growers traded for rice, textiles, musical instruments, gold and silver jewelry, and other imports. Portuguese attempts to force this trade into their own hands had, however, led to friction with the majority population of the island, who increasingly turned to Islam against the Catholic Portuguese and the minority population (*uli siva*). When Steven van der Haghen arrived at the head of a fleet in 1605, the Dutch were therefore welcomed by the majority of the local population as enemies of the Portuguese, and they threatened a bloody insurrection in support of a Dutch assault on the fortress. In the face of this threat, the Portuguese governor surrendered the castle, its eighty-three cannon, and its garrison of six hundred without a shot being fired, thereby ceding effective control of the trade in cloves. The Dutch renamed it Fort Victoria. In 1607 a monopoly contract was also drawn up with the powers on nearby Ternate for cloves in return for protection against other European powers.

The VOC began trading directly with the Indian subcontinent in the same year Fort Victoria surrendered, when a ship arrived on the east (Coromandel) coast where Portuguese influence was weak. VOC operations in the area came to be directed from Fort Geldria, in the city of Pulicat. Attempts to trade with the western (Malabar) coast of India were blocked for some years by the Portuguese, but in 1616 Pieter van den Broecke managed to obtain privileges from the Mogul Empire allowing the VOC to operate out of Surat. From Surat the VOC entered Persia, setting up a factory at Gamron (now Bandar Abbas) in 1624, enabling access to the southern parts of the Levantine trade. A station established at about the same time at Mocca, at the entrance to the Red Sea, completed the VOC's ports of call in what came to be called the "western quarter," from Surat to Mocca.[87] The establishment of the English at Masulipatnam in 1611 and Armagon in 1620, and of Danish East India Company factories at Tranquebar and Serampore in 1616, posed no immediate threat.[88] The Coromandel coast and western quarter of VOC activities supplied cotton textiles and other goods that were traded for spices and other products within Asia. Controlling large amounts of the seaborne intra-Asian trade became the key to the VOC's long-term profitability. Seeking access to the silver produced abundantly in Japan, the VOC was also able to establish a factory there in 1609, competing directly with the Portuguese and Spaniards.[89]

Many of the VOC's early successes came because its internal organization—unique for the time—gave it new abilities to carry out middle- and long-term planning. As a joint-stock company, it most unusually (compared to partnerships and regulated companies) accumulated a permanent capital fund to pay

for its operations.[90] That is, no longer was money invested in a ship or a voyage paid back on completion along with any profits. Rather, people invested sums of money in the VOC chambers to be used as the VOC saw fit, for which they received a proportional share in the company. With the support of the States General, instead of paying off the investors after making immediate profits, the Heren XVII reinvested the income from all the voyaging back into the company to build up capital reserves, to construct facilities in The Netherlands and in Asia, to finance military operations, and to trade on a continuing basis. Not until 1610 did shareholders receive a dividend, which then turned out to be 75 percent, although issued in kind, in the form of mace; other payments in kind followed, and finally some cash was paid to shareholders in 1612. On rare occasions, the books were closed and the shareholders were offered an opportunity to cash out. But new shares were seldom offered to anyone beyond the original circle of investors, which meant that when old investors sold shares they went for a high price, so almost all members of the VOC stayed invested in the Company in return for whatever dividends the governors saw fit to pay. The largest investors also generally ran the chambers and got elected to the Heren XVII, while many others of them also sat in municipal, provincial, or national assemblies, combining business and political power in their persons. In other words, perhaps for the first time in history, a publicly chartered trading company came into being that gave the directors the ability to accumulate a permanent capital stock and a related material infrastructure to use as they saw necessary, and with their many other activities in other businesses and civic duties, the investors in the VOC could count on their interests being well represented throughout the Republic. Within the VOC, information circulated to committee, where it was used to assess current situations and future activities. With coordinated management and a growing permanent body of human and material resources, the Heren XVII could make plans to expand VOC operations as opportunity and determination allowed and in coordination with the state.

It was no easy matter to do, however: the Heren XVII had to plan for the building, fitting-out, provisioning, and manning of ships sent out each year, the sale of goods brought back to The Netherlands by the return ships, and the various needs of their factories in the East for manpower, weapons, fortifications, ships, merchants, and clerical staff. Given the time it took to traverse the distances with broad-bottomed ships and fickle winds, they had to make plans according to a two-year cycle: fitting out a ship already built and getting it to its Asian destination took almost a year of intensive labor, and almost another year was necessary for it to load cargo in the appropriate places in Asia and return to The Netherlands; the construction of new ships and other necessities needed to be planned

far further in advance. Official letters and other documents might make the return more rapidly—in under a year—since they could be passed on by the most rapid means, but to learn of developments in the East, assemble the necessary personnel and equipment to respond, and transport it to its destination usually took a couple of years of exhausting work.[91] To carry out such a complicated business, the governors of the local chambers met regularly, and their representatives, the Heren XVII, met three times a year at one of the chambers, on a rotating basis, to coordinate their activities. They were assisted at first by the secretary of the Amsterdam chamber, after 1614 by a permanent counsel (*advocaat*), and after 1621 by two *advocaten;* after 1606 they also relied on a number of standing committees appointed by the chambers. Out in Asia itself, beginning in 1609, the Heren XVII appointed a governor-general to carry out their orders and administer daily activities, and a local council arose to aid and advise him.[92]

A pattern of business soon developed. The main meeting of the year lasted three to four weeks in the autumn after the yearly return of ships from Asia. At this meeting the Heren XVII decided on the equipping of the next season's outbound ships, the amount of precious metal to be sent to Asia for purchases, the goods to be ordered from Asia, and the manner of auctioning off the imports to get the highest prices. In the spring, financial plans were firmed up based on the outcome of the last auctions. The summer meeting reviewed the correspondence from Asia and drew up the lengthy orders of the Heren XVII, which were sent out with the first ships. At every meeting, the gentlemen also reviewed the financial situation of each chamber. Each chamber also undertook the task of building ships for their use. The shipyards of the chambers—especially in Amsterdam—became huge hives of activity, building, repairing, and outfitting ships of various sizes. The largest were the East Indiamen, designed to be *retourships*, or ships for sailing out to the Indies and back many times on the high seas: they were high, square-sterned, full-hulled, and capable of carrying cannon, similar to the warships of the Republic's fleet but not as fast or as fully armed. Other smaller ships were intended for a few years of return service before spending their last years in the intra-Asian trade, whereas some ships were built for Asian service alone.[93]

The Heren XVII also took stock of what they had on hand in The Netherlands, noted current and anticipated prices, and placed orders for new goods with their merchants in Asia. Although to modern eyes the spices attract attention (and are usually thought of only for use in cooking), the order placed in 1617 is revealing for the amount of imports used in medicine as well:

pepper, 70,000–100,000 "bales" (sacks; used in medicine and cookery)
cloves, "as much as possible" (used in medicine and cookery)

nutmeg, 1,000 "barrels" (*bhaar;* used in medicine and cookery)

mace, 300 barrels (used in medicine and cookery)

long pepper, 5,000 pounds (used in medicine and cookery)

galingale (*galleguen;* a rhizome with a hot, ginger-peppery flavor; used in medicine and cookery), 6,000 pounds

ginger and cinnamon, "as much as there was space available" (used in medicine and cookery)

lignum aloes (a scented resin), 6,000 pounds of the best kind (used in medicine and cookery)

India rubber (*gommelack*), 30,000 pounds

camphor from Borneo, 6,000 pounds (used in medicine and cookery)

China root (a medicine), 30,000 pounds, but "fresh and scentless"

benjamin (a gum from *styrax benzoïn,* used in medicines), 20,000 pounds of the best that can be found

musk, "none"

dragon's blood (a red resin from an ancient tree found on Sumatra and nearby places, often used as a color in varnishes and as a medicine), "none until further order"

wax, 200,000 pounds

wood of cassia fistula (a less valuable member of the cinnamon family; used in medicine and cookery), 3,000 pounds

spikenard (a well-regarded oil from India; used in medicine and cookery), 5,000 ounces

cubebe (another form of long pepper; used in medicine and cookery), "a good amount"

raw borax (used in soaps, enamels, and ceramics), 5000 pounds[94]

Other contemporary orders also ask for cardamom and sugar (used in medicine and cookery), amber, indigo, and bezoar stones (concretions from the stomachs of certain goats, used as an antidote against poisons and powerful diseases). In 1622, the VOC set aside three hundred thousand gilders for trade in "cloth from the Coromandel coast, all sorts of rarities, drugs, and porcelain." And there were always significant amounts of other items such as medicinal and cooking herbs and roots, special medicines, and various exotics.[95]

Other products gradually also became important for sale in Europe. Tea (from Japan and China) turns up at auction sales in 1651–52, and coffee (*cauwa de Mocha*) in 1661–62, about a decade after they first started to be brought back

The four continents making offerings to Amsterdam, who holds a caduceus and a shield bearing the arms of the city. Title page from *Historische beschryvinghe van Amsterdam* (Jacob van Meurs, 1663). By permission of the Rijksmuseum, Amsterdam

in smaller quantities.[96] Both were first introduced for their beneficial medicinal effects, and only gradually, as they became common foods, did they become massive items of trade. Saltpeter from the Coromandel coast, sugar and cotton textiles from the Coromandel and Malabar coasts, copper from Japan, raw silk from Persia, Bengal, and China, carpets from Persia and other places, and fine porcelain from China all also came to play an important role in VOC sales; none

of them being a monopoly of the Company. The wealth tied up in such imports can be gathered from a passage in the diary of an official with the English admiralty after he toured a Dutch East-Indies ship captured in the Second Anglo-Dutch War. On 16 November 1665, Samuel Pepys wrote that Lord Brouncker and Sir Edmond Pooly "carried me down into the Hold of the India Shipp, and there did show me the greatest wealth lie in confusion that a man can see in the world—pepper scatter[ed] through every chink, you trod up it; and in cloves and nutmegs, I walked above the knees—whole rooms full—and silk in bales, and boxes of Copperplate, one of which I saw opened." Pepys was noting only the main items stored onboard, while silver, jewels, and other items of highest value would have been removed at once, under guard. Nevertheless, it was "as noble a sight as ever I saw in my life."[97] Another East India ship, from 1697, contained the following inventory: low in the holds were placed four hundred chests of Japanese copper, 134 pieces of Siamese tin, twenty-five tons of sappanwood, 580,281 pounds of black pepper, fourteen hundred bags of saltpeter; higher up were packed "candied ginger, nutmeg, cloves, cardamom, ginseng, white pepper, benzoin, cotton cloth and yarn, raw silk, drugs, various textiles including Bengal, Persian, and Chinese silk, cinnamon, indigo, civet, tea, and two small cases of birds' nests" (for soup).[98] One recent authoritative estimate finds that European shipping via the Cape (of which the bulk was carried by the VOC) had completely undermined the overland caravan trade by the 1620s.[99]

WISDOM FROM SELF-INTEREST

The values inherent in the world of commerce were explicitly and self-consciously recognized to be at the root of the new science by contemporaries. One of the most thoughtful analyses to make the point came from Casparus Barlaeus, acclaimed as one of the best minds of his generation. In early 1632 he gave an inaugural address on the foundation of an advanced school in Amsterdam. A sign of Amsterdam's civic pride, the new Athenaeum was to be a university in all but name, and Casparus Barlaeus had been appointed one of its two first professors. Given his new position, he would of course wish to praise learning. Barlaeus could also take it for granted that the search for wisdom was considered important for any magistrate. It was already enough of a commonplace that Cornelis Pietersz. Hooft, speaking as one of the most influential of the libertine Amsterdammers of a generation before, could simply declare that only people of both education and wealth should hold political power.[100] The very fact that the city was establishing the Athenaeum made the continuance of such values plain. The city had also recently combined and strengthened some of the already excellent

teaching available at its advanced Latin schools. Because something like 7 percent of late-teenage Amsterdam boys went on to university intending careers in church, law, medicine, or public affairs—a very high rate for the period—there were also practical reasons for founding the new school in Amsterdam: their expenses would be considerably lightened if they studied at home.[101]

It was in full awareness of the material benefits of the Dutch world that Barleaus took up the subject of the union of wisdom with commerce to mark the occasion of the foundation of a new school. He did so in a speech to be delivered before the social, economic, and political leaders of the wealthiest and most powerful city of the Dutch Republic. For his theme, he chose a modern twist on a classical work that would be well known to all the former schoolboys and schoolgirls in the audience, Martianus Capella's *Marriage of Mercury and Philology*. In the original version, the mortal Philology—a young woman who studies books all night—acquires immortality by her marriage to Mercury, the god of commerce. Barlaeus substituted the activity of Mercatura (trade) for the god Mercury, and the efforts of Sapientia (wisdom) for the person of Philology, remaking the myth into a metaphor that spoke for the proud new world of Amsterdam.[102]

He nevertheless faced a difficult challenge in trying to reassure some other people of learning that creating wealth would not harm but instead increase "ruminations of the mind." To people who devoted their lives to the pursuit of learning or the study of God, giving attention to worldly matters was often considered to be a distraction at best, a sin at worst. Various passages in the New Testament, for instance, indicated that wealth was inimical to salvation. Perhaps the best known is the Gospel According to Mark, which commented, "It is easier for a camel to go through the eye of a needle, than for a rich man to enter into the kingdom of God" (10:25). Some of the most famous authors of classical philosophy had also argued something similar. The eighth book of Plato's *Republic* had opined that "in proportion as riches and rich men are honored in the State, virtue and the virtuous are dishonored."[103] Aristotle's *Politics* tempered this a bit, proposing that the getting of wealth is a natural and important part of household management. But for him, gathering goods was compatible with virtue only as long as it was limited to the provision of necessities, for otherwise wealth corrupted.[104] In other words, many of the best authorities had set at odds the values of *negotium* and *otium*, business and the peaceful life, work and contemplation.

Barlaeus was therefore bold in his intention to refute the common assumption that commerce stood in opposition to virtue and the pursuit of wisdom. Some learned Dutch commentators had already moved part way toward such a reconciliation. Dirk Volckertsz. Coornhert, for instance, an advocate of toleration and religious liberty and a constant thorn in the side of the dogmatists and their fel-

low travelers, wrote a Dutch dialogue of 1580, *Coopman* ("The merchant"), in which he explored how a merchant could live as a good Christian. He thought that if the search for gain was undertaken not with the intention of piling up riches but for the general good, so that the virtuous merchant would generously give away his gains to good causes (such as charity, or supporting the Revolt), then wealth and virtue were compatible.[105] In this sense, Coornhert took a line followed by the Reformed church more generally. On the problem of usury, for example, they argued that public banks and money exchanges were allowable as long as their profits went to charitable causes. Even private lending, which technically debarred a person from the communion table, was generally tolerated because it was necessary for the creation of the wealth that supported the struggle against Spain.[106]

But there was a fundamental problem at the heart of Coornhert's strategy. One of his interlocutors put it this way: "How can the merchant seek wealth but yet not desire to possess it?"[107] That is, if merchants could be moral only by giving away their wealth, why would they seek it? This problem had, of course, been forced on the mind of others, too. For instance, the Reformed minister and early advocate of taking the war to the Spaniards in the West Indies, Willem Usselincx, laid many of the troubles of the early West India Company (WIC) at the feet of greedy merchants. He wanted people to support the WIC for the glory of God, for the damage it could do to their common enemy, Spain, and for the benefits it would bring to the Republic. But in the end, he had to admit that "the principle and most powerful inducement [for attracting investors] will be the profit that each can make for himself."[108] Even for a man of the cloth, then, the common ship of state moved toward the good when the quest for private gain drove men to ply its oars, even if this had nothing to do with individual salvation. The general good could result from the acquisitive spirit or even from immoral promptings like greed.

But Barlaeus went further. He did not simply overlook personal fault in order to see the general good. Of course, there were general goods that came from such personal strivings: trying to make a profit could indeed solve grave problems, such as inducing merchants to ship grain from storage to where it could be sold for a high price and thus breaking a famine, an example employed by Cicero. But for Barlaeus, the merchant could do good even when keeping the benefit of his activities rather than only by giving away his wealth; commerce could itself be among the best pursuits of human life. Others were arguing for something similar. In France, for instance, a powerful new current of moral writing focused on *amour-propre* (self-love) as the stimulus for most human behavior.[109] Similarly the Dutch jurist Hugo Grotius, with whom Barlaeus shared many interests, argued that the most elemental law of nature was self-preservation, and the next most fundamental right was therefore self-interest. On this argument about natural law rather than on the special rights of governments, which were often said to be derived from divine law, he had based his work on free trade, *Mare liberum* ("Freedom of the seas," 1609)—one of the founding documents of international law. The outcome was a view of civil society that, as Richard Tuck has put it, "is a construct by individuals wielding rights or bundles of property," with governments only possessing rights held by individual persons.[110] That the pursuit of such self-interest is right and natural is also implied by Barlaeus. He, like Grotius, also held as a corollary that self-interest made people sociable, since by engaging with one another they obtained what they needed. Commerce therefore also brought people together in ways where they learned from one another. By engaging fully in the part set for each of us in the theater of the world by an omnipotent and omniscient God, his will would be done. God was therefore like a merchant; indeed, a contemporary Dutch translation of Barlaeus's address even used the term "the great Factor" (meaning head of a trading station) to refer to God.[111]

In discussing the relationship between commerce and wisdom, then, Barlaeus began with comments on the general good, showing that periods of great learning and great wealth went together, to which he added a distinct note of local pride.[112] A quick look around showed anyone a city of harbors and docks, canals, locks, and other waterworks, to which fleets of ships from all over the world sailed richly laden with merchandise. The result could be seen in the splendid edifices seen on all sides and in the general affluence of Amsterdam's citizens. In addition, their actions showed them to be people of prudence, obedience, modesty, reverence, and lawfulness, appreciating above all good public order. In the wise and noble leaders of the city, Mercury and Pluto (the gods of intelligence and wealth) found a home, and here in this center of commerce wisdom abided.

In this part of his argument, about how virtue and magnificence came from the union of learning and worldly activity, Barlaeus was building on two lines of argument. One was the well-established position that the active life (*vita activa*) was more virtuous than the contemplative life (*vita contemplativa*). The civic humanism of the Renaissance Italian city-states had long ago turned the duties of male citizens to participate in political, military, and economic affairs into new virtues (or more properly, *virtú*).[113] Barlaeus had no difficulty in turning the moral qualities of the man of action into those of the man of commerce, since commerce was so bound up with courageous activity in the world. The second part of this aspect of Barlaeus's argument drew on new interpretations of history. Poets, playwrights, and philosophers in many places were asserting that contemporary material progress supported an extraordinary flourishing of arts

and sciences even greater than in Rome.[114] For instance, Louis Le Roy, professor of Greek at the Collège Royal in Paris, had written a universal history in 1576 showing that "the conjunction of Power and Wisdom," or might of arms and of letters, created the greatest nations. But while God's Providence had in previous instances laid even these mighty nations low, he thought that the wheel of fortune could be reforged into a line of constant progress if the learned worked hard to "carefully preserve the arts and sciences, as also all other things necessary for life."[115] In England, just a few years before Barlaeus spoke, Sir Francis Bacon had been advancing similar arguments about the union of philosophical and worldly utility in constructing a just and powerful state. It might be expected, then, that Barlaeus's audience needed little persuasion to agree that the union of worldly enterprise and learning in their own city made this place and this moment one of the most noble in history, one that would persist for ages.

But Barlaeus took this line of argument a large step further in showing not just that knowledge and commerce were in conjunction but that they arose from the same source in the human spirit—a kind of love that produced them both. He discoursed on antiquity to show this, introducing examples of moral conduct. To gain their true ends, both the sage and the merchant had to act according to the dictates of natural virtue: to moderate their desires, to cultivate honest conduct in all things, and to value all matters in helping them to their ends. Precisely these connections between virtue and knowledge were being underlined in a set of vernacular terms new in Barlaeus's day. The Italian word for a person who combined both tasteful knowledge and natural virtue was *virtuoso*.[116] The English adopted it for themselves. In Dutch, *liefhebber* (or German *liebhaber*), indicated something similar: someone who had a sincere and discriminating love of things that indicated inner virtue.[117] With similar aims, the French later coined *amateur*, from the Latin *amare* ("to love"). Indeed, this language about the deep associations between personal and material goods quickly came to mean someone who collected objects, whether made by fine craftworkers and artists or by nature. Such people spoke about how precious objects were exemplifications of the best part of the human spirit or God's creation, feeling themselves uplifted by them. As patrons and collectors, they had the ability to identify and to bring forth enduring examples of the good and the beautiful despite human sin and mortality. Barleaus seems to have had these virtuous collectors of information very much in mind as the best embodiments of modern wisdom, for in going on to show that commerce encouraged the study of "speculative philosophy" he gave a telling list of its parts. It included nothing on theology or traditional philosophy, not even natural philosophy, certainly nothing of the occult philosophy. Instead, he drew the attention of his listeners to geography, natural history,

astronomy, languages, and the study of the various characteristics of different peoples. To our eyes, he was describing nothing like speculative philosophy, but information-based subjects about nature and humankind.

Finally, in his conclusion Barlaeus returned to showing by example that ancient cities clearly displayed how great wealth and philosophical excellence developed together, the one supporting the other. By implication, philosophers who promoted contemplation rather than action were mistaken. So were those who tried to instruct communities to live according to God's plan as set out by reasoned theories: they would only divert merchants and philosophers from exploring their authentic paths through the world. It was not from doctrine but from the interactions found in buying and selling, and in the search for knowledge that was another aspect of exchange, that modesty, honesty, and natural truths emerged. The ways of life on which the Dutch political economy depended were thus reflected in a certain kind of objective investigation of nature, the kind referred to by Barlaeus as "speculative philosophy" and which we would call natural history.

It was therefore not only bulk commodities that the regenten valued. They also highly prized individual specimens of particularly rare or beautiful appearance and the knowledge rooted in them. Many examples could be introduced from the high culture of fashionable clothes, furnishings, painting, and books, but perhaps the clearest example from the Dutch world is that of the so-called tulip mania, which peaked just three years after Barlaeus's address.

Many new flowering plants arrived in the low countries from Ottoman lands. The Turks planted tulips by the thousands in the sultan's gardens in Constantinople, frequently stuck them into their turbans (from which the European name "tulip" derived), and often depicted them in the naturalistic art that established itself in the Ottoman world in the second half of the sixteenth century.[118] So it was that the tulip had been first described for Europeans by Pierre Belon during his travels in the Levant in the late 1540s.[119] It had a further notice from one of the most influential seekers of new garden plants, Ogier Ghiselin de Busbecq. Originally from Flanders, and an able diplomat, Busbecq took up the very sensitive posting of the Holy Roman Emperor's ambassador to Constantinople for the purpose of negotiating a peace treaty with Suleiman the Magnificent. To do so, he resided in Ottoman lands for most of the period from 1555 to 1562.[120] He took with him on his embassy a physician born in the low countries who was also a fine botanist, Willem Quackelbeen.[121] Busbecq and Quackelbeen identified many plants unknown in Europe or known only through the ancient descriptions of Dioscorides, and they sent many seeds and cuttings to the well-known Italian botanist Pierandrea Mattioli and others, for which Mattioli offered sincere and

Turkish (Iznik) pottery dish, painted with tulips, hyacinths, and carnations, c. 1560–1565. By permission of the Courtauld Institute of Art Gallery, London

profuse thanks. It was plants from Ottoman gardens that revolutionized European horticulture, and Busbecq and Quackelbeen introduced many of them.[122] He and Quackelbeen are, for example, credited with introducing the horse chestnut, at least one kind of gladiolus, "true" *Hermodactylus* (probably "Dutch Iris"), sweet flag, spiny broom, lilac, the plane tree, grape hyacinth, and other species to Europe.[123] (He also convinced the emperor to purchase from a Jewish physician at the Ottoman court an ancient and beautifully illustrated manuscript of Dioscorides, now called the "Codex Vindobonensis," which remains in Vienna.)[124] In the letters he wrote from Turkey and afterward published, Busbecq noted that the Turks were "passionately fond of flowers, and though parsimonious in other matters they do not hesitate to give several *aspres* for a choice blossom." He also

commented that in traveling from Adrianople to Constantinople "we were presented with large nosegays of flowers, the narcissus, the hyacinth, and the tulipan (as the Turks call this last). . . . The tulip has little or no smell; its recommendation is the variety and beauty of the colouring."[125]

The first record of a tulip growing in Europe is from 1559, when the natural historian Conrad Gesner visited the garden of the Augsburg councilor Johannes Heinrich Herwart and saw one there.[126] Probably only a few years later, the soon-to-be famous naturalist Carolus Clusius saw one for himself. In 1569, Clusius also obtained tulip seeds from Busbecq, acquired during Busbecq's residence in Turkey.[127] Clusius was enthralled with the diversity of form and color of the flowers exhibited by this species, and he cultivated many varieties while spreading enthusiasm and specimens among his acquaintances. The tulip became one of the most widely coveted of the flowering plants introduced to European gardens in the late sixteenth century, and the Dutch became particularly associated with its cultivation.

One of the attractions of the tulip was that it came in an astounding assortment of shapes and sizes, with new varieties continually emerging by accident or design. Tulips ranged from the small spiky flowers of those from the wild mountains of eastern Asia to the tall, rounded blossoms of the cultivated garden plants, some with petals overlapping to make the flower look like a deep cup, others just touching shoulders to flatten out like saucers, almost all standing proudly upright toward the heavens. They bloomed variously from early spring to early summer. The colors ranged through the spectrum from white to yellow to red, even to dark purple, missing only true black. Most petals appeared in a solid color from stem to edge, but some were "broken," meaning that they had colored streaks on a solid background. These breaks seemed to occur by chance, with a bright red tulip, for example, blooming the following year with yellow streaks. Once the change occurred, however, it usually remained in succeeding years, and it sometimes spread to others nearby, suggesting that broken tulips expressed something unusual in the soil where the break occurred. (In the twentieth century the breaks would be explained as the result of an infection by a virus.) Breaks among yellow and red varieties appeared most often, while such occurrences among whites were much harder to come by.

The most prized tulip had it all: a white petal on a base hinting of blue, with broken flames of vivid crimson shooting up to the top. One of the appraisers of tulips in 1625, Nicolas Wassenaer, had no doubt that Semper Augustus was the best. In 1624 its bulbs were valued at twelve hundred Dutch florins each (about four times the annual wages of a skilled laborer), but in the following year their owner was offered more than double that for each of them, even though the

Tulips, from John Gerard's *Herball* (1633); that in the upper left is labeled "The white Tulip with purple streakes." Courtesy of the Wellcome Library, London

bulbs themselves had multiplied. The owner sold one to a close friend for two thousand florins, but with the restriction that the buyer could not pass on any of the bulbs to anyone else without the seller's permission. By 1636 and 1637, when the "tulip craze" was reaching its height, it was said that Semper Augustus bulbs were worth ten thousand florins each.[128]

The man who owned this most valuable of tulips was Adriaan Pauw, son of a powerful and conservative Calvinist family of merchants and politicians from Amsterdam (some of whom had been among the first investors in the VOC), himself a distinguished moderate Calvinist servant of his country and first cousin to Pieter Pauw, professor of botany at Leiden and colleague of Clusius.[129] It was in the gardens of his estate at Heemstede that he planted Semper Augustus. Like other members of the urban magistrates of his generation, he turned a working estate into a country retreat, and it would have been incomplete without a pleasure garden.[130] Pauw had concluded negotiations to purchase the estate in 1621 for thirty-six thousand gilders: it was situated near the great inland lake called the Harleemermeer—which was being converted into arable land through a huge draining project, in which Pauw probably invested—and the purchase brought him the noble title of Heer van Heemstede.[131] Twelve bulbs of Semper Augustus were known to exist in 1624 (worth about one-third the price of the Heemstede estate at then-current prices); all were in Pauw's hands. To multiply the effect of the dozen spring blossoms and give the impression that he had even more, Pauw had a gazebo covered with mirrors constructed. By devoting land and property, employees, personal energy, and other valuables to the cultivation of gardens, Pauw was expressing an appreciation for shaping nature in ways that could be shared with others of like feeling and judgment, a moral appreciation associated with knowledge and taste.[132]

Pauw's Semper Augustus was valuable, then, because when people saw it they experienced, or could be taught to experience, or could be taught to pretend to have, certain pleasurable sensations; the sight elicited conversation as well as contemplation. Or more accurately, fanciers were able to share with other people their appreciation of the flower by exchanges of gesture and word, which were in turn associated with other cultural assumptions, such as the goodness of natural beauty. Fanciers with access to many gardens, and dealers who handled many varieties, produced ranked lists of tulip flowers, in effect serving as experts on good taste and discernment. Some of the lists expanded to illustrated booklets, with the flowers handpainted on sheets of paper or, for more mass audiences, as woodcuts (to which coloring was often added by hand for an extra price). Emanuel Sweerts published the first such illustrated guide, the *Florilegium*, in 1612, followed by Chrispijn van der Passe's *Hortus floridus*, with a host of others

soon seeing print.[133] The only woman known to have made her living by painting at the time, Judith Leyster, became involved in producing illustrations for the tulip trade, as did Rembrandt's master, Jacob van Swanenburch.[134] The distribution of such works helped create a consensus about the relative beauty of one variety in comparison to others. Some people might disagree with the high value placed on this or that variety, but in the ability to discriminate between varieties and assess subtle differences of opinion also lay chances for exchange.

Thus like others of its kind, the value of Semper Augustus lay not only in the loveliness of its blossom but in its ready potential for commerce. The lovely but ephemeral flowers of the tulip were embodied in their hardy bulbs, the enduring tokens of particularly constituted varietal expression, ready to burst forth in predictable glory the following spring. Like onions, which once dug up could easily be stored for long periods, tulip bulbs can easily be accumulated and handled. While fertile seeds took roughly seven years to produce a mature bulb and flower, and with results that were unpredictable, varieties bred true from bulbs. Flowers cross-pollinate with others of this widely varied species, and moreover, their seeds do not convey the streaking that made the "broken" varieties so lovely and valuable. The only way to be certain of having either the same or a broken blossom in the following year was to propagate new specimens from bulbs. To do this, the gardener cut the flower heads after the petals fell, leaving the tulip's leaves to wither away gradually on their own, which produced a relatively large bulb with smaller offsets that was dug out of the soil ("lifted") in the summer and stored in a cool, dry place until autumn planting. Bulbs had the advantage over leafy plants of not needing much attention, and once dug were readily transported, making them easy to give, sell, or steal; yet they would faithfully produce flowers the next season just like the blooms they had produced the year before, while their offsets grew into new bulbs. Tulip bulbs were therefore a bit like cowry shells or even coins, whose material presence could count as a representation of value that could be exchanged for other things.[135] In other words, tulips are a good example of how shared values are often abstracted into the realm of "currency," things that have an agreed current value exchangeable for other things. In the case of tulips, then, because of the materiality of the bulb from which the flower's beauty arose, their moral and aesthetic value could readily be converted into price. Demand for tulip bulbs arose more generally from the high cultural value placed on pleasure gardens and flowering plants, together with the unusual properties of the particular tulip plants themselves.

The chance for profit followed from the desire for exchange. As a person growing up in a world that valued certain kinds of experiences of nature, including the cultivated pleasures that plants could bring to the eye, and as someone with

an education that gave him the tools by which he could interpret botanical forms along with the most expert, Pauw had a sense of the value of Semper Augustus and acquired it. Yet not only wealthy fanciers valued tulips. The Netherlands was remarkable for the fact that even ordinary craftworkers might have paintings hung in their workshops and homes; just so, ordinary people could also learn something about the rules according to which the beauty of flowers was appreciated by those of a higher station. Many people could participate in growing and exchanging tulips for money, even if they were not particularly wealthy. As the variety of early introductions became more numerous, whether through gift, sale, or theft, the bulbs came into the hands of many people beyond the small group of original cultivators. As regard for gardens was affirmed and broadened, the market for garden plants also expanded rapidly, not only in the low countries but in France, Germany, and many other regions; tulips became one of the early staples with growers and dealers. The bulbs could be named, measured, weighed, and stored. In this way, buyers and sellers both knew what they were handling. For varieties that were agreed to be particularly lovely and unusual, bulb dealers could get very high prices, since everyone seemed to want some. Because no special gardening experience was needed to cultivate the flower, even people of relatively modest means and a bit of soil outside the back could grow and propagate tulip bulbs, hoping for a break and the wealth that would follow. As demand rose, so did prices. And as prices rose, increasing numbers of people got into the market for bulbs not for personal or social pleasure but because they saw them as a way to invest. Even dormant brown bulbs could be associated with a colored picture of the flower they would produce, could be compared to other flowers, and could be weighed and assessed for maturity and number of offsets; moreover, because the bulbs were often exchanged at public auctions, a knowledgeable investor could compare past prices again current ones, giving a reasonable hope of measuring the consensus about which types were valued most highly and perhaps even predicting future value according to the movements of taste indicated by the auction prices.

A speculative market took off, based on a sense that the market for bulbs would always rise. The ingenious financial methods developed in the early modern period also allowed investors to profit who did not have a personal interest in growing bulbs in their gardens; indeed, they did not even need to touch one. As with other expensive commodities, bulbs could be traded on paper: the owner of a bulb would take a sum of money from someone and write down a promise of delivering the bulb in the future, such as when it could be safely lifted. But delivery of the bulb on the appointed date would be to whomever possessed the piece of paper on which the promise was written, which meant that the prom-

issory notes themselves, not just bulbs, could be bought and sold. This meant that if people in the market noticed demand rising for a certain kind of tulip, the promissory notes would be traded for higher prices, and conversely someone with notes for varieties with weakening demand could unload them before they dropped further. The original owner got his money and the person taking delivery in the end also made money if the bulb's value had risen above what he paid for the promissory note; in the meantime, many other people might have handled the note and made a profit by selling it on.

The bulb market was not, then, very different from other kinds of transactions occurring among the greatest merchants of the day at places like the Amsterdam stock exchange (Beurs). The major difference was that when it came to bulbs, it took much less capital to get into the game, at least at first, for ordinary kinds of tulips. Trading in bulbs, contracts, and speculative futures drew in large and growing numbers of people, even being done in taverns and inns or wherever else gatherings of interested investors took place, giving the impression of endless growth. As the investments of ordinary people in the trade grew ever greater, critics started to call it the *windhandel* ("trading in wind" or, in a less savory connotation, flatulence). The frequent satires about the business, which often relied on variants of old expressions about fools and their money, might even have been appreciated by those inside the business as long as they kept getting richer—at least on paper. Prices shot up, rising to unheard of levels during 1634–37. The average price for a single bulb at an auction in Alkmaar on 5 February 1637, arranged to benefit an orphanage, rose to sixteen thousand stuivers (eight hundred gilders), the amount of money a junior merchant might make in a year if employed by the VOC in the rich Asian markets; at that level, stately houses in Amsterdam were not much more expensive than a handful of the most desirable bulbs. But the alchemy of ever-increasing demand for bulbs ultimately failed. When for some reason demand slackened, probably because the market was getting too expensive for even wealthy investors, the bubble burst. In the middle of February, only a few days after the huge prices paid at Alkmaar, an auction failed because there were too few buyers at the prices being touted. The bottom quickly fell out of the market, with prices plummeting, causing large numbers of ordinary people to lose most or all of their investments. The lawyers and magistrates had years of work ahead trying to sort out the transactions and ensuring that the bulb growers got at least a fraction of what they had been promised.[136]

Some of the most advanced forms of social and economic transaction, therefore, underpinned the bulb market. They included trading in a futures market based on promissory notes. That is, people contracted to purchase a bulb at an appointed future date at a set price, hoping that by then it would be more valuable but risking a fall in value—but no money changed hands between the grower and the investor until the future date. This not only allowed buying and selling of goods without having to transport the goods to a particular place for physical exchange but also permitted financing according to expectations of future developments. The grower, too, also had to risk the potential failure of the investor before the due date while gambling that the best time to commit to a sale was the present. That is, if one can gain resources now and pay later based on the income earned from using the resources, or pay low rates for future goods that will be worth more when in hand, both borrower and lender will be better off. As long as the demand for tulips continued to rise, everyone made money, including the notaries who wrote up the contracts. It all depended on having confidence in one's expectations for the future and—at least for those at the heart of the market—a firm understanding of the attributes of the objects in which one dealt.

The so-called scientific revolution resulted from movements in the world and in persons, leading to countless efforts to find out matters of fact about natural things and to ascertaining whether that information was accurate and commensurable. This discovery of the world—its geography, peoples, plants and animals, and astrological and alchemical associations; the accumulation of specimens of it, the cataloging of its variety, and the detailing of its structure—created extraordinary public excitement, as well as bringing about unanticipated consequences. "Matters of fact," like objects, traveled with people, who moved about exchanging goods and information. In the process, local knowledge was often transformed into universalizable truths. Trust and credibility rooted in modesty and work, supported by plain speech and the rule of law, oriented toward finding out and accumulating a knowledge of the exact details of the material world and exchanging them commensurably: these constituted the values of the hard-headed merchant and his fellow travelers just as much as they did the values of the naturalists and physicians. Indeed, these values supported the very fabric of the Dutch Republic, making it a bastion of safety against their enemies and a place of refuge for those who lived from knowing about how best to transform worldly things into valued specimens of consumer taste and personal good. Objectivity had the power to whet the appetites, even to alter perceptions, concepts, and moral strictures. It did not float above the world but was deeply involved with it.