

# The Transformation of Europe

## chapter 23

### AP KEY CONCEPTS

**4.1.IV:** The new global circulation of goods was facilitated by royal chartered European monopoly companies that took silver from Spanish colonies in the Americas to purchase Asian goods for the Atlantic markets. Regional markets continued to flourish in Afro-Eurasia by using established commercial practices and new transoceanic shipping services developed by European merchants.

**4.1.VI:** The increase in interactions between newly connected hemispheres and intensification of connections within hemispheres expanded the spread and reform of existing religions and created syncretic belief systems and practices.

**4.1.VII:** As merchants' profits increased and governments collected more taxes, funding for the visual and performing arts, even for popular audiences, increased along with an expansion of literacy.

**4.2.II:** Traditional peasant agriculture increased and changed, plantations expanded, and demand for labor increased. These changes both fed and responded to growing global demand for raw materials and finished products.

**4.2.III:** As social and political elites changed, they also restructured ethnic, racial, and gender hierarchies.

**4.3.I:** Rulers used a variety of methods to legitimize and consolidate their power.

**5.1.III:** To facilitate investments at all levels of industrial production, financiers developed and expanded various financial institutions.

### AP HISTORICAL THINKING

**Comparison** Compare how the Constitutionalist (English, Dutch) and the Absolute Monarchist (French, Spanish, Russians) rulers began to centralize their authority.

**Synthesis** Explain the difficulty of royal families to centralize legal, judicial, and taxation powers.

**Contextualization** Cite whether any western European government matched the power of an eastern empire by ca. 1650.

**Creating an Argument** Explain how western European rulers used the arts and members of the middle classes to increase or legitimize their power.

### AP CHAPTER FOCUS

In the early modern period (ca. 1450–ca. 1750), western Europeans saw governments become centralized, religious and scientific beliefs change, and capitalism strengthened. They left their medieval institutions behind. Many wars occurred in this period, but focus on the Thirty Years' War for the AP exam. Although it began as a Catholic vs. Lutheran war *within* the Holy Roman Empire, Catholic France jumped in on the Lutheran side hoping to defeat the rival Catholic Holy Roman emperor. The Treaty of Westphalia in 1648 settled the war; all the kingdoms and faiths compromised, and it kept international peace in Europe for over 150 years.

The AP curriculum asks you to focus on how various rulers weakened the traditional power of local nobles. Many European monarchs used the divine right theory of rule, magnificent palaces, and patronage of the arts to impress their subjects. Merchants were happy to support a government that helped finance international businesses. In England and the Netherlands, however, constitutions created by nobles and bourgeoisie limited rulers' powers somewhat.

Global commerce brought new and inexpensive foods to Europe, causing populations to explode. More people moved to cities, but rural folks were also pulled into the modern economy by participating in cottage industries.

### The Fragmentation of Western Christendom

- The Protestant Reformation
- The Catholic Reformation
- Witch-Hunts and Religious Wars

### The Consolidation of Sovereign States

- The Attempted Revival of Empire
- The New Monarchs
- Constitutional States
- Absolute Monarchies
- The European States System

### Early Capitalist Society

- Population Growth and Urbanization
- Early Capitalism and Protoindustrialization
- Social Change in Early Modern Europe

### Transformations in Scientific Thinking

- The Reconception of the Universe
- The Scientific Revolution
- Women and Science



Martin Luther at age forty-two, depicted as a conscientious and determined man by the German painter Lucas Cranach in 1525.

### EYEWITNESS:

#### Martin Luther Challenges the Church

In 1517 Martin Luther of Wittenberg, an obscure German monk, denounced the Roman Catholic church's sale of indulgences, a type of pardon that excused individuals from doing penance for their sins and facilitated their entry into heaven. Indulgences had been available since the eleventh century, but to raise funds for the reconstruction of St. Peter's basilica in Rome, church authorities began to market indulgences aggressively. From their point of view, indulgences were splendid devices: they encouraged individuals to reflect piously on their behavior while also bringing large sums of money into the church's treasury.

To Martin Luther, however, indulgences were signs of greed, hypocrisy, and moral rot in the Roman Catholic church. He despised the pretentiousness of church authorities who arrogated powers that belonged to God alone. Luther believed that no human being had the power to absolve individuals of their sins or grant

them admission to heaven; he believed that the sale of indulgences constituted a huge fraud perpetrated on an unsuspecting public. In October 1517, following the academic custom of the day, he offered to debate publicly with anyone who wished to dispute his views, and he denounced the sale of indulgences in a document called the *Ninety-Five Theses*.

Although Luther did not nail his work to the church door in Wittenberg as popular legend asserts, news of the *Ninety-Five Theses* spread instantly. Within a few weeks, printed copies were available throughout Europe. Luther's pronouncement galvanized opinion among many who resented the power of the Roman church. It also drew severe criticism from religious and political authorities who sought to maintain the established order. Church officials subjected Luther's views to examination and judged them erroneous, and in 1520 Pope Leo X excommunicated the unrepentant monk. In 1521 the Holy Roman emperor Charles V, a devout Roman Catholic, summoned Luther to an assembly of imperial authorities and demanded that he recant his views. Luther's response: "I cannot and will not recant anything, for it is neither safe nor right to act against one's conscience. Here I stand. I can do no other. God help me. Amen."

Luther's challenge held enormous religious and political implications. Though expelled from the church, Luther still considered himself Christian—indeed, he considered his own faith the true Christianity—and he held religious services for a community of devoted followers. Wittenberg became a center of religious dissent that, by the late 1520s, had spread through much of Germany and Switzerland. During the 1530s dissidents known as Protestants—because of their protest against the established order—organized movements in France, England, the Low Countries, and even Italy and Spain. By mid-century Luther's act of individual rebellion had mushroomed into the Protestant Reformation and shattered the religious unity of western Christendom.

The Protestant Reformation was only one of several powerful movements that transformed European society during the early modern era. Another was the consolidation of strong centralized states, which took shape partly because of the Reformation. Alongside religious conflict and the building of powerful states, capitalism and early modern science also profoundly influenced western European society.

## THE FRAGMENTATION OF WESTERN CHRISTENDOM

In the third century C.E., Christian missionaries began to spread their faith from the Mediterranean basin throughout Europe, and by 1000 C.E. Christianity had established a foothold as far north as Scandinavia and Iceland. Although the peoples of western Europe spoke different languages, ate different foods, and observed different customs, the church of Rome provided them with a common religious and cultural heritage. During the sixteenth and seventeenth centuries, however, revolts against the Roman Catholic church shattered the religious unity of western Europe. Followers of **Martin Luther** and other Protestant reformers established a series of churches independent of Rome, and Roman Catholic leaders strengthened their own church against the challengers. Throughout early modern times, religious controversies fueled social tensions.

### The Protestant Reformation

**Roots of Reform** The **Protestant Reformation** dates from the early sixteenth century, but many of the underlying

conditions that prompted reformers to challenge the authority of the Roman Catholic church had existed for hundreds of years. Over the course of centuries, the church and its top officials had become deeply embroiled in the political affairs of western Europe. But political intrigues, combined with the church's growing wealth and power, also fostered greed and corruption, which undermined the church's spiritual authority and made it vulnerable to criticism. The blatant hedonism and crass materialism of church officials only further emphasized the perceived betrayal of Christian ideals. Although the church continued to enjoy the loyalty of most Christians, it faced a disapproval of its abuses that became increasingly strident in the decades before 1517. Alongside such criticism came a growing demand for a more personal involvement with the divine. Efforts by church authorities to eliminate pre-Christian traditions and alternative kinds of spirituality only intensified the desire among laypeople for forms of devotion that would connect them more directly with God than the church allowed. Martin Luther coalesced these expressions of religious discontent into a powerful revolt against the church.

**Martin Luther** Martin Luther (1483–1546) attacked the sale of indulgences as an individual, but he soon attracted

enthusiastic support from others who resented the policies of the Roman church. Luther was a prolific and talented writer, and he published scores of works condemning the Roman church. His cause benefited enormously from the printing press, which had first appeared in Europe in the mid-fifteenth century.

It was **Johannes Gutenberg** (ca. 1395–1468) who introduced printing to Europe, and his invention of mechanical movable type printing, around 1439, started a veritable printing revolution. From Gutenberg's hometown of Mainz, Germany, printing soon spread to more than two hundred European cities. Luther's translation of the Bible into German stimulated the printing and distribution of religious books and pamphlets and proved to be a decisive factor in the spread of literacy. A growing literate public eagerly consumed printed works on religious as well as secular themes, as both supporters and critics of Martin Luther took their own works to the printers. Religious controversies kept the presses busy churning out millions of pamphlets and treatises for a century and more.

In his publications, writings, and speeches, Luther attacked the Roman church for a wide range of abuses and called for thorough reform of Christendom. He advocated the closure of monasteries, translation of the Bible from Latin into vernacular languages, and an end to priestly authority, including the authority of the pope himself. Most important, Luther believed that salvation could never be earned through good works or through the prayers of others. Instead, he argued, humans could be saved only through faith in the promises of God as revealed in the Bible. The idea of "justification by faith alone" became the core of Protestant beliefs. When opponents pointed out that his reform program ran counter to church policy, he rejected the authority of the church hierarchy and proclaimed that the Bible was the only source of Christian religious authority.

Luther's works drew an enthusiastic popular response, and in Germany they fueled a movement to reform the church along the lines of Luther's teachings. Lay Christians flocked to hear Luther preach in Wittenberg, and several princes of the Holy Roman Empire warmed to Luther's views—partly because of personal conviction but partly because religious controversy offered opportunities for them to build their own power bases. During the 1520s and 1530s, many of the most important German cities—Strasbourg, Nuremberg, and Augsburg, among others—passed laws prohibiting Roman Catholic observances and requiring all religious services to follow Lutheran doctrine and procedures.

By the mid-sixteenth century, about half the German population had adopted Lutheran Christianity, and reformers had launched Protestant movements and established alternative churches in other lands as well. By the late 1520s, the prosperous cities of Switzerland—Zurich, Basel, and Geneva—had fledgling Protestant churches. The heavily urbanized Low Countries also responded enthusiastically to Protestant appeals. Protestants appeared even in Italy and Spain, although authorities in those lands handily suppressed their challenge to the Roman church.

**John Calvin** Meanwhile, an even more influential Reformation was taking shape in France and the French-speaking parts of Switzerland. The initiator was a French lawyer, John Calvin (1509–1564), who in the 1530s converted to Protestant Christianity. Because the French monarchy sought to suppress Protestants, Calvin slipped across the border to French-speaking Geneva in Switzerland. There he organized a Protestant community and worked with local officials to impose a strict code of morality and discipline on the city. Calvin also composed an influential treatise, *Institutes of the Christian Religion* (1536), that codified Protestant teachings and presented them as a coherent and organized package.

Although Calvin believed in the basic elements of Luther's Protestant teachings, his ideas differed from those of Luther in important ways. Most fundamentally, Calvin emphasized the awesome power of God more than Luther did. Indeed, he believed not only that humans could never earn salvation, but also that God had in fact already determined which individuals would be saved from damnation even before they were born. These individuals, known as "the elect," were predestined for salvation regardless of their deeds on earth. This doctrine of "predestination" grew increasingly important to the Calvinist church in the generations after Calvin's death.

Calvin's Geneva was bound by a strict code of morality and discipline. **Calvinists** were expected to dress simply, to study the Bible regularly, and to refrain from activities such as dancing or playing cards. It was, in effect, a Protestant model community. Geneva also became an important missionary center from which Calvinist doctrine spread to other parts of Europe. Calvinist missionaries were most active in France, where they attracted strong interest in the cities, but they ventured also to Germany, the Low Countries, England, Scotland, and even distant Hungary. They established churches in all these lands and worked for reform along Protestant lines. They were most successful in the Netherlands and Scotland.

**The English Reformation** In England a Reformation took place for political as well as religious reasons. Lutherans and other Protestants worked to build a following in England from the 1520s, but they faced stout government resistance until King Henry VIII (reigned 1509–1547) came into conflict with the pope. Henry wanted to divorce his wife, who had not birthed a male heir, but the pope refused to allow him to do so. Henry's response was to sever relations with the Roman church and make himself Supreme Head of the Anglican church—in essence, an English pope. While Henry reigned, the theology of the English church changed little, but under pressure of reformers, his successors replaced Roman Catholic with Protestant doctrines and rituals. By 1560 England had permanently left the Roman Catholic community. Indeed, by the late sixteenth century, Lutherans, **Anglicans**, and Calvinists together had built communities large enough that a return to religious unity in western Christendom was inconceivable.

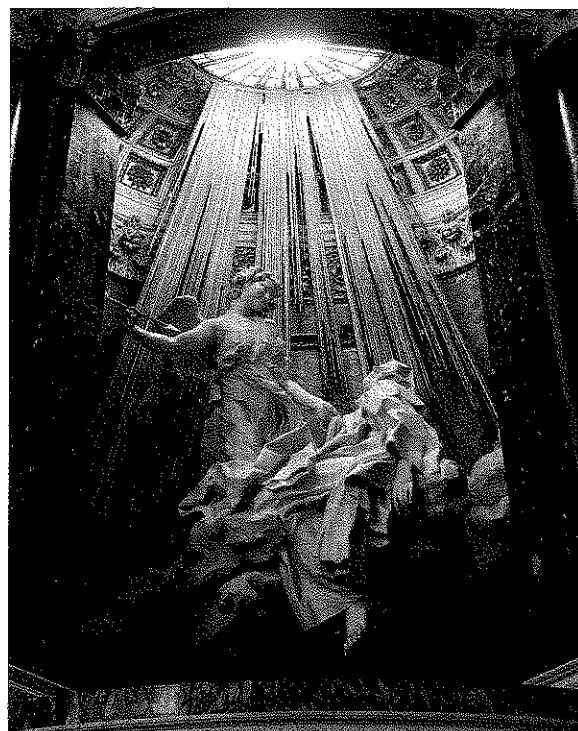
## The Catholic Reformation

Partly in response to the Protestant Reformation, Roman Catholic authorities undertook an enormous reform effort within their own church. To some extent their efforts represented a reaction to Protestant success. Yet Roman Catholic authorities also sought to define points of doctrine so as to clarify differences between Roman and Protestant churches, to persuade Protestants to return to the Roman church, and to deepen the sense of spirituality and religious commitment in their own community. Taken together, their efforts constituted the **Catholic Reformation**.

**The Council of Trent** Two institutions were especially important for defining the Catholic Reformation and advancing its goals—the Council of Trent and the Society of Jesus. The **Council of Trent** was an assembly of bishops, cardinals, and other high church officials who met intermittently between 1545 and 1563 to address matters of doctrine and reform. Drawing heavily on the works of the thirteenth-century scholastic theologian St. Thomas Aquinas, the council defined the elements of Roman Catholic theology in detail. The council acknowledged that abuses had alienated many people from the Roman church, and it took steps to reform the church. The council demanded that church authorities observe strict standards of morality, and it required them to establish schools and seminaries in their districts to prepare priests properly for their roles.

**St. Ignatius Loyola** While the Council of Trent dealt with doctrine and reform, the **Society of Jesus** went on the offensive and sought to extend the boundaries of the reformed Roman church. The society's founder was **St. Ignatius Loyola** (1491–1556), a Basque nobleman and soldier who in 1521 suffered a devastating leg wound that ended his military career. While recuperating he read spiritual works and popular accounts of saints' lives, and he resolved to put his energy into religious work. In 1540, together with a small band of disciples, he founded the Society of Jesus.

**The Society of Jesus** Ignatius required that members of the society, known as Jesuits, complete a rigorous and



Under inspiration of the Catholic Reformation, many devout individuals sought mystic union with God. One of the most famous of the mystics was St. Teresa of Avila (in Spain), who founded a strict order of nuns and often experienced religious visions. A famous sculpture by the Italian artist Gianlorenzo Bernini depicts St. Teresa in an ecstatic trance accompanied by an angel.

advanced education. They received instruction not only in theology and philosophy but also in classical languages, literature, history, and science. As a result of that preparation—and their unswerving dedication to the Roman Catholic church—the Jesuits made extraordinarily effective missionaries. They were able to outargue most of their opponents and acquired a reputation for discipline and determination. They often served as counselors to kings and rulers and used their influence to promote policies that benefited the Roman church. They also were the most prominent of the early Christian missionaries outside Europe: in the wake of the European reconnaissance of the world's oceans, Jesuits attracted converts in India, China, Japan, the Philippines, and the Americas, thus making Christianity a genuinely global religion.

## Witch-Hunts and Religious Wars

Europeans took religion seriously in the sixteenth century, and religious divisions helped to fuel social and political conflict. Apart from wars, the most destructive violence that afflicted early modern Europe was the hunt for witches, which was especially prominent in regions such as the Rhineland where tensions between Protestants and Roman Catholics ran high.

Like many other peoples, Europeans had long believed that certain individuals possessed unusual powers to influence human affairs or discover secret information such as the identity of a thief. During the late fifteenth century, theologians developed a theory that witches derived their powers from the devil. According to that theory, witches made agreements to worship the devil in exchange for supernatural powers, including the ability to fly through the night on brooms, pitchforks, or animals. Theorists believed that the witches regularly flew off to distant places to attend the “witches’ sabbath,” a gathering that featured devil worship, lewd behavior, and the concoction of secret potions, culminating in sexual relations with the devil himself.

**Witch-Hunting** Although the witches’ sabbath was sheer fantasy, fears that individuals were making alliances with the devil sparked an intensive hunt for witches. Witchcraft

## Thinking about TRADITIONS

### The Creation of New Traditions

Until the early sixteenth century, most of Europe was culturally united by the common practice of Roman Christianity. As a result of the Reformation, however, European peoples formed new identities and traditions based on their practice of either reformed Roman Catholicism or the various Protestant faiths. What makes it possible for well-established traditions to change over time, and how are new traditions created?

became a convenient explanation for any unpleasant turn of events—failure of a crop, outbreak of a fire, an unexpected death, or inability to conceive a child. About 110,000 individuals underwent trial as suspected witches during the sixteenth and seventeenth centuries, and about 45,000 of them died either by hanging or by burning at the stake. As a rule, church courts tried large numbers of witches, but they usually imposed nonlethal penalties such as excommunication or imprisonment. It was secular courts that condemned and executed the vast majority of witches.

**Witches and Gender** Gender played an important role in the **witch-hunts**. Men were among the victims, and in places such as Finland they actually exceeded the number of women accused of witchcraft. Most convicted witches were women, however. Indeed, women may have accounted for 85 percent or more of the condemned. Many of the



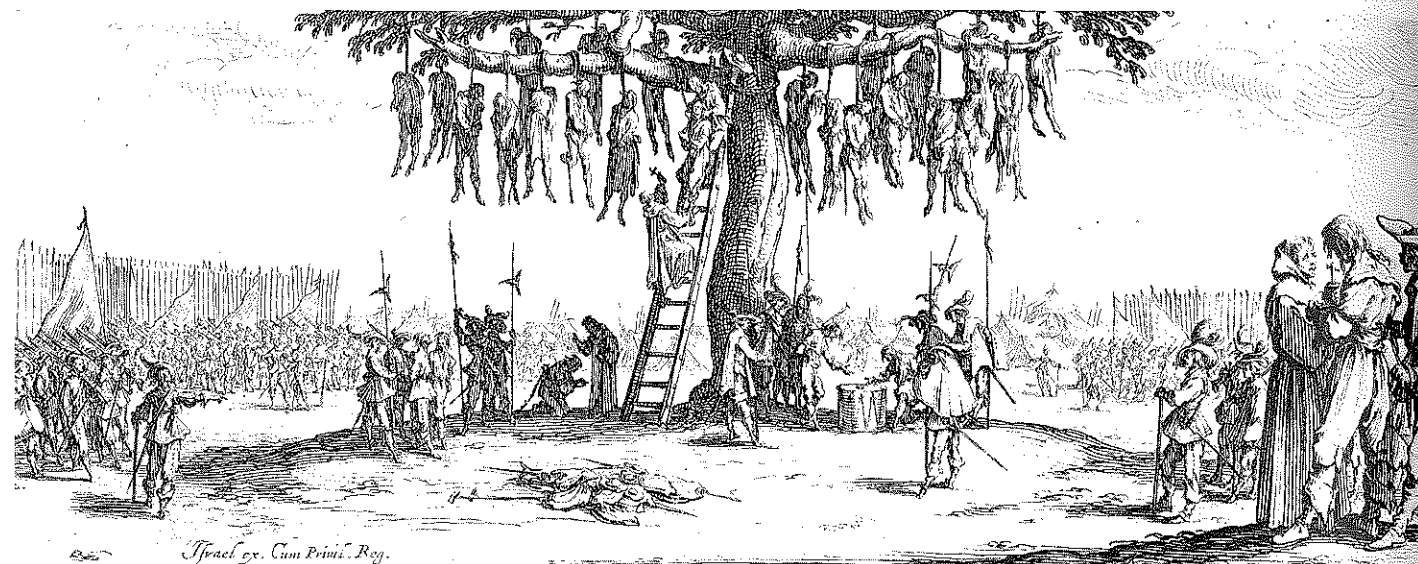
Henry Fuseli's 1783 painting offers a dramatic depiction of three witches. The painter based his image on the three witches who appear in William Shakespeare's play *Macbeth*. He titled his painting “The Weird Sisters” or “The Three Witches.” Which physical features identify these women as “weird” witches?

women were poor, old, single, or widowed—individuals who lived on the margins of their societies and were easy targets for accusers, since they had few protectors.

By 1700 the fear of witches had largely diminished. Accusations, trials, and executions occurred only sporadically thereafter. The last legal execution for witchcraft in Europe took place in Switzerland in 1782. For the better part of two centuries, however, the intermittent pursuit of witches revealed clearly the stresses and strains that afflicted European society during early modern times.

**Religious Wars** Religious tensions even led to outright war between Protestant and Roman Catholic communities. Religious wars racked France for thirty-six years (1562–1598), for example, and they also complicated relations between Protestant and Roman Catholic states. In 1588 King Philip II of Spain (reigned 1556–1598) attempted to force England to return to the Roman Catholic church by sending the Spanish Armada—a huge flotilla consisting of 130 ships and 30,000 men—to dethrone the Protestant Queen Elizabeth. The effort collapsed, however, when English forces disrupted the Spanish fleet by sending blazing, unmanned ships into its midst. Then a ferocious gale scattered Spanish vessels throughout the North Sea.

Religious convictions also aggravated relations between the Netherlands and Spain by fueling the revolt of the Dutch provinces from their overlord, the king of Spain. In 1567 Philip sent an army to tighten his control over the provinces and to suppress the Calvinist movement there. Resistance escalated into a full-scale rebellion. By 1610 the seven northern provinces (the modern Netherlands) had won their independence and



*Israël de Cum Primi. Reg.*  
*A la fin ces Voleurs infames et perdus, Comme fruits malheureux a cet arbre pendus*  
*Monstrant bien que le crime (horrible et noire engeance) Est luy mesme instrumēt de honte et de vengeance.*  
*Et que cest le Destin des hommes vicieux Desprouver tost ou tard la iustice des Cieux.*

The Thirty Years' War offered abundant opportunity for undisciplined mercenary soldiers to prey on civilian populations. Only rarely, as in the mass hanging depicted in this engraving of 1633, did soldiers receive punishment for their criminal acts.

formed a republic known as the United Provinces, leaving ten southern provinces (modern Belgium) under Spanish and later Austrian rule until the late eighteenth century.

**The Thirty Years' War** The religious wars culminated in a massive continental conflict known as the **Thirty Years' War** (1618–1648). The war opened after the Holy Roman emperor attempted to force his Bohemian subjects to return to the Roman Catholic church, and the main battleground was the emperor's territory in Germany. Other parties soon entered the fray, however, and by the time the war ended, Spanish, French, Dutch, German, Swedish, Danish, Polish, Bohemian, and Russian forces had taken part in the conflict.

The motives that prompted these states to enter the war were sometimes political or economic, but religious differences complicated the other issues and made them more difficult to resolve. Regardless of the motives, the Thirty Years' War was the most destructive European conflict before the twentieth century. Quite apart from violence and brutalities committed by undisciplined soldiers, the war damaged economies and societies throughout Europe and led to the deaths of about one-third of the German population. The destructiveness of the Thirty Years' War raised questions about the viability of Europe as a region of strong, independent, well-armed, and intensely competitive states.

**Carolingian** (kar-uh-LIHN-jee-uhn)

## THE CONSOLIDATION OF SOVEREIGN STATES

Although fundamentally a religious movement, the Reformation had strong political implications, and centralizing monarchs readily made use of religious issues in their efforts to strengthen their states and enhance their authority. Ruling elites had their own religious preferences, and they often promoted a Protestant or Roman Catholic cause out of personal conviction. Religious controversies also offered splendid opportunities for ambitious subordinates who built power bases by appealing to particular religious communities. Over the long run, centralizing monarchs profited most from religious controversy generated by the Reformation. While the Holy Roman Empire fell into disarray because of political and religious quarrels, monarchs in other lands augmented their revenues, enhanced their authority, and created powerful sovereign states. After the devastation of the Thirty Years' War, rulers of these states devised a diplomatic system that sought to maintain order among the many independent and competitive European states.

### The Attempted Revival of Empire

After the dissolution of the **Carolingian** empire in the ninth century C.E., there was no effective imperial government in western Europe. The so-called Holy Roman Empire emerged in the tenth century, but its authority extended only to Germany and northern Italy, and even there the emperors encountered stiff opposition from powerful princes and thriving cities.

During the early sixteenth century, it seemed that Emperor Charles V (reigned 1519–1556) might establish the Holy Roman Empire as the preeminent political authority in Europe, but by midcentury it was clear that there would be no revival of empire. Thus, unlike China, India, and Ottoman lands in southwest Asia and north Africa, early modern Europe developed as a region of independent states.

**Charles V** After 1438 the Habsburg family, with extensive dynastic holdings in Austria, dominated the Holy Roman

Empire. Through marriage alliances with princely and royal families, the **Habsburgs** accumulated rights and titles to lands throughout Europe and beyond. **Charles V** inherited authority over the Habsburgs' Austrian domains as well as the duchy of Burgundy (including the wealthy provinces of the Low Countries) and the kingdom of Spain (including its possessions in Italy and the Americas). When he became emperor in 1519, he acquired authority over Germany, Bohemia, Switzerland, and parts of northern Italy. His empire stretched from Vienna in Austria to Cuzco in Peru.

**Imperial Fragmentation** In spite of his far-flung holdings, Charles did not extend his authority throughout Europe or even establish a lasting imperial legacy. Throughout his reign

### MAP 23.1

#### Sixteenth-century Europe.

Note the extent of Habsburg territories and the wide boundaries of the Holy Roman Empire.

*With such powerful territories, what prevented the Habsburgs from imposing imperial rule on most of Europe?*



Charles had to devote much of his attention and energy to the Lutheran movement and to imperial princes who took advantage of religious controversy to assert their independence. Moreover, Charles did not build an administrative structure for his empire but, instead, ruled each of his lands according to its own laws and customs. He was able to draw on the financial resources of wealthy lands such as the Low Countries and Spain to maintain a powerful army. Yet Charles did not have the ambition to extend his authority by military force, but used his army mostly to put down rebellions.

**Foreign Challenges** Foreign difficulties also prevented Charles from establishing his empire as the arbiter of Europe. The prospect of a powerful Holy Roman Empire struck fear in the kings of France, and it caused concern among the sultans of the Ottoman empire as well. Charles's holdings surrounded France, and the French kings suspected that the emperor wanted to absorb their realm and extend his authority throughout Europe. To forestall that possibility, the French kings created every obstacle they could for Charles. Even though they were staunch Roman Catholics, they aided German Lutherans and encouraged them to rebel. The French kings even allied with the Muslim Ottoman Turks against the emperor.

For their part, the Ottoman sultans did not want to see a powerful Christian empire threaten their holdings in eastern Europe and their position in the Mediterranean basin. With the encouragement of the French king, Turkish forces conquered Hungary in 1526, and three years later they even laid siege briefly to Vienna. Moreover, during the early sixteenth century Ottoman forces imposed their rule beyond Egypt and embraced almost all of north Africa. By midcentury, Turkish holdings posed a serious threat to Italian and Spanish shipping in the Mediterranean.

Thus numerous domestic and foreign problems prevented Charles V from establishing his vast empire as the supreme political authority in Europe. His inability to suppress the Lutherans was especially disappointing to Charles, and in 1556, after agreeing that imperial princes and cities could determine the religious faith observed in their jurisdictions, the emperor abdicated his throne and retired to a monastery in Spain. His empire did not survive intact. Charles bestowed his holdings in Spain, Italy, the Low Countries, and the Americas on his son, King Philip II of Spain, while his brother Ferdinand inherited the Habsburg family lands in Austria and the imperial throne.

## The New Monarchs

In the absence of effective imperial power, guidance of public affairs fell to the various regional states that had emerged during the middle ages. The city-states of Italy were prominent because of their economic power: since the eleventh century they had been Europe's most important centers of trade, manufacturing, and finance. The most powerful European states, however, were the kingdoms of England, France, and Spain. During the late fifteenth and sixteenth centuries, rulers of these lands,

known as the "new monarchs," marshaled their resources, curbed the nobility, and built strong centralized regimes.

**Finance** The new monarchs included Henry VIII of England, Louis XI and Francis I of France, and Fernando and Isabel of Spain. All the new monarchs sought to enhance their treasuries by developing new sources of finance. The French kings levied direct taxes on sales, households, and the salt trade. A new sales tax dramatically boosted Spanish royal income in the sixteenth century. For fear of provoking rebellion, the English kings did not introduce new taxes, but they increased revenues by raising fines and fees for royal services. Moreover, after Henry VIII severed ties between the English and Roman churches, he dissolved the monasteries and confiscated church wealth in England. This financial windfall enabled Henry to enhance royal power by increasing the size of the state and adding to its responsibilities. After the English Reformation, for example, the state provided poor relief and support for orphans, which previously had been responsibilities of churches and monasteries.

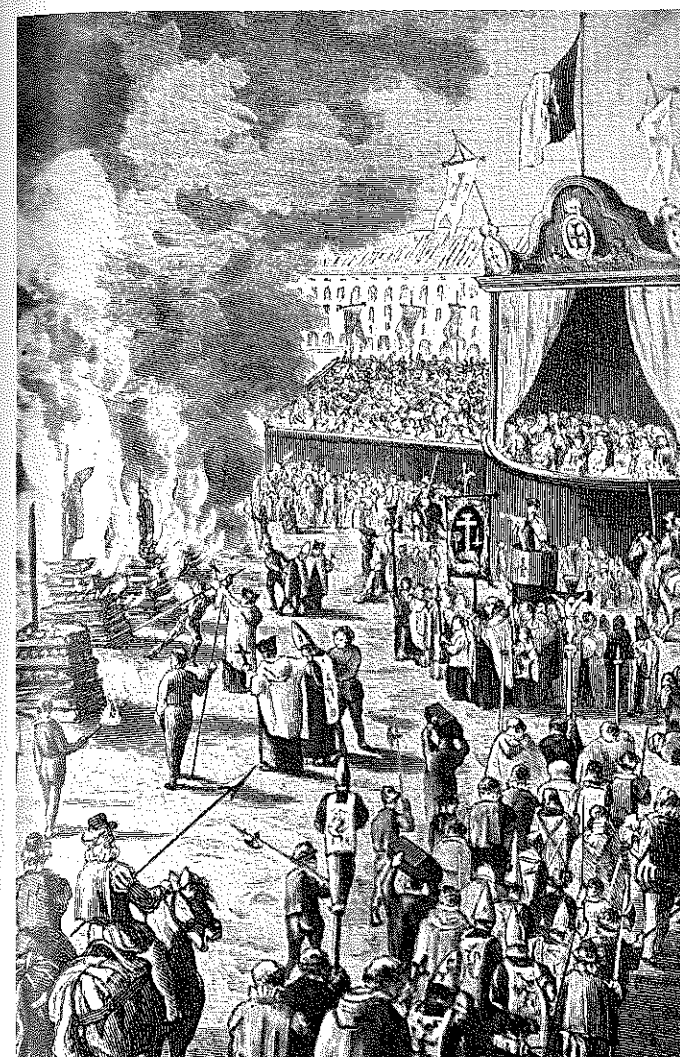
**State Power** With their increased income the new monarchs enlarged their administrative staffs, which enabled them to collect taxes and implement royal policies more reliably than before. The French and Spanish monarchs also maintained standing armies that vastly increased their power with respect to the nobility. Their armies with thousands of infantrymen were too large for individual nobles to match, and they equipped their forces with cannons that were too expensive for nobles to purchase. The English kings did not need a standing army to put down the occasional rebellion that flared in their island realm and so did not go to the expense of supporting one. Yet they too increased their power with respect to the nobles by subjecting them to royal justice and forcing them to comply with royal policy.

The debates and disputes launched by the Protestant Reformation helped monarchs increase their power. In lands that adopted Protestant faiths—including England, much of Germany, Denmark, and Sweden—rulers expropriated the monasteries and used church wealth to expand their powers. That option was not open to Roman Catholic kings, but Protestant movements provided them with a justification to mobilize resources, which they used against political as well as religious adversaries.

**The Spanish Inquisition** The **Spanish Inquisition** was the most distinctive institution that relied on religious justifications to advance state ends. Fernando and Isabel founded the Spanish Inquisition in 1478, and they obtained papal license to operate the institution as a royal agency. Its original task was to ferret out those who secretly practiced Judaism or Islam, but Charles V charged it with responsibility also for detecting Protestant heresy in Spain. Throughout the late fifteenth and sixteenth centuries, however, the Spanish Inquisition served political as well as religious purposes. Moreover, its reach extended well beyond the Iberian peninsula. Just as

the fear of witchcraft crossed the Atlantic Ocean and inspired witch-hunts in England's North American colonies, concerns about heresy also made their way to the western hemisphere, where inquisitors worked to protect Spanish colonies from heretical teachings.

Inquisitors had broad powers to investigate suspected cases of heresy. Popular legends have created an erroneous impression of the Spanish Inquisition as an institution running amok, framing innocent victims and routinely subjecting them to torture. In fact, inquisitors usually observed rules of evidence, and they released many suspects after investigations turned up no sign of heresy. Yet, when they detected the scent of heresy, inquisitors could be ruthless. They sentenced hundreds of victims to hang from the gallows or burn at the



This engraving, *Judgment Scene at Spanish Inquisition*, depicts an *auto-da-fé*, or "act of faith," involving the execution of Jews by burning at the stake. An *auto-da-fé* more specifically was the ritual of public penance and punishment of condemned heretics. In 1492, the Catholic monarchy of Spain ordered the expulsion of Jews from Spain, effectively ending such acts against Jews.

stake and imprisoned many others in dank cells for extended periods of time. Fear of the inquisition intimidated many into silence, and a strict Roman Catholic orthodoxy prevailed in Spain. The inquisition deterred nobles from adopting Protestant views out of political ambition, and it used its influence on behalf of the Spanish monarchy. From 1559 to 1576, for example, inquisitors imprisoned the archbishop of Toledo—the highest Roman Catholic church official in all of Spain—because of his political independence.

## Constitutional States

During the seventeenth and eighteenth centuries, as they sought to restore order after the Thirty Years' War, European states developed along two lines. Rulers in England and the Netherlands shared authority with representative institutions and created constitutional states, whereas monarchs in France, Spain, Austria, Prussia, and Russia concentrated power in their own hands and created a form of state known as absolute monarchy.

**Constitutional States** The island kingdom of England and the maritime Dutch republic did not have written constitutions specifying the powers of the state, but during the seventeenth century they evolved governments that claimed limited powers and recognized rights pertaining to individuals and representative institutions. Their **constitutional states** took different forms: in England a constitutional monarchy emerged, whereas the Netherlands produced a republic based on representative government. In neither land did constitutional government come easily into being: in England it followed a civil war, and in the Netherlands it emerged after a long struggle for independence. In both lands, however, constitutional government strengthened the state and provided a political framework that enabled merchants to flourish as never before in European experience.

**The English Civil War** Constitutional government came to England after political and religious disputes led to the **English civil war** (1642–1649). From the early seventeenth century, the English kings had tried to institute new taxes without approval of the parliament, which for more than three centuries had traditionally approved new levies. While royal financial policies generated political tensions, religious disagreements aggravated matters further. As Anglicans, the kings supported a church with relatively ornate ceremonies and a hierarchy of bishops working under authority of the monarchs themselves. Meanwhile, however, many of the boldest and most insistent voices within parliament belonged to zealous Calvinists known as Puritans because they sought to purify the English church of any lingering elements, such as ornate ceremonies and a hierarchy of bishops, suggestive of Roman Catholic Christianity. By 1641, King Charles I and parliament were at loggerheads, unable to cooperate or even communicate effectively with each other. Both sides raised armies. In the conflicts that followed, parliamentary forces



In this contemporary painting, the executioner holds up the just-severed head of King Charles I of England. The spectacle of a royal execution overcomes one woman, who faints (at bottom). How does the image of a beheaded king reflect the ongoing political changes in Europe?

under the leadership of Oliver Cromwell (1599–1658) captured Charles, tried him for tyranny, and in an act that shocked all of Europe, marched him up on a platform and beheaded him in 1649.

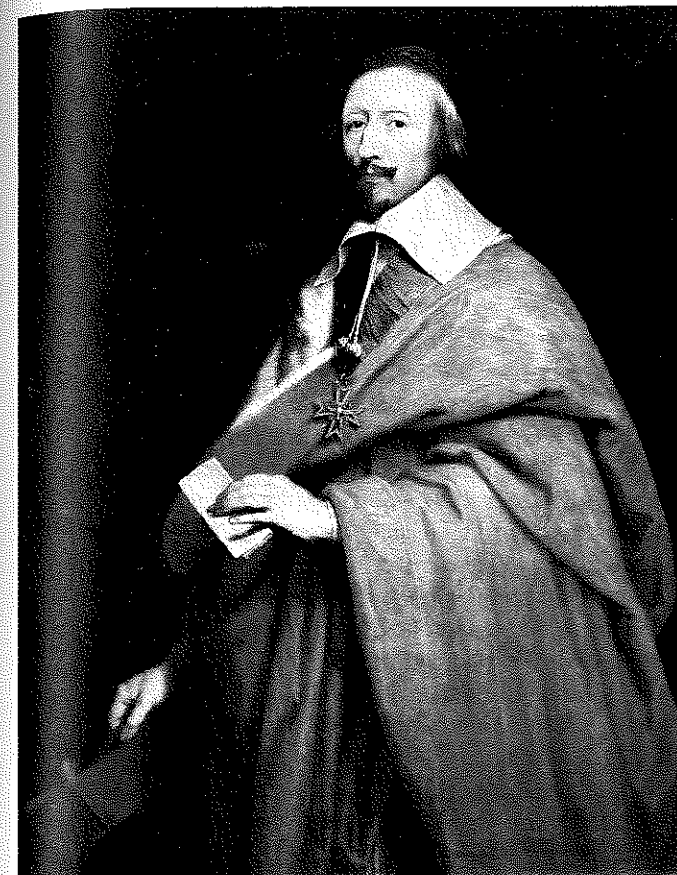
**The Glorious Revolution** In the absence of a king, Cromwell's Puritan regime took power but soon degenerated into a disagreeable dictatorship, prompting parliament to restore the monarchy in 1660. King and parliament, however, soon resumed their conflicts. The issue came to a head in a bloodless change of power known as the **Glorious Revolution** (1688–1689), when parliament deposed King James II and invited his daughter Mary and her Dutch husband, William of Orange, to assume the throne. The resulting arrangement provided that kings would rule in cooperation with parliament, thus guaranteeing that nobles, merchants, and other constituencies would enjoy representation in government affairs.

**The Dutch Republic** As in England, a potent combination of political and religious tensions led to conflict from which constitutional government emerged in the Netherlands. In the mid-sixteenth century, authority over the Low Countries, including modern-day Belgium as well as the Netherlands, rested with King Philip II of Spain. In 1567 Philip, a devout Roman Catholic, moved to suppress an increasingly popular

Calvinist movement in the Netherlands—a measure that provoked large-scale rebellion against Spanish rule. In 1579 a group of Dutch provinces formed an anti-Spanish alliance, and in 1581 they proclaimed themselves the independent United Provinces. Representative assemblies organized local affairs in each of the provinces, and on this foundation political leaders built a Dutch republic. Spain did not officially recognize the independence of the United Provinces until the end of the Thirty Years' War in 1648, but the Dutch republic was effectively organizing affairs in the northern Low Countries by the early seventeenth century.

In many ways, the constitutional governments of England and the Dutch republic represented historical experiments. Apart from the Roman republic in classical times and a few Italian city-states of the medieval and Renaissance eras, European peoples had little experience with representative government. In their responses to political crises, popular leaders in both England and the Netherlands found it possible to mobilize support by appealing to the political and religious interests of broad constituencies and making a place for them in the government. The result was a pair of states that effectively harnessed popular support and used it to magnify state power.

In both England and the Dutch republic, merchants were especially prominent in political affairs, and state policy in



Although best known as Louis XIII's "first minister," Cardinal Richelieu also gained fame for his patronage of the arts. Most notably, he founded the Académie Française, the learned society responsible for matters pertaining to the French language.

both lands favored maritime trade and the building of commercial empires overseas. The constitutional states allowed entrepreneurs to pursue their economic interests with minimal interference from public authorities, and during the late seventeenth and eighteenth centuries, both states experienced extraordinary prosperity as a result of those policies. Indeed, in many ways the English and Dutch states represented an alliance between merchants and rulers that worked to the benefit of both. Merchants supported the state with the wealth that they generated through trade—especially overseas trade—while rulers followed policies that looked after the interests of their merchants.

### Absolute Monarchies

Whereas constitutional states devised ways to share power and authority, absolute monarchies found other ways to increase state power. **Absolutism** stood on a theoretical foundation known as the divine right of kings. This theory held that kings derived their authority from God and served as "God's

lieutenants upon earth." There was no role in divine-right theory for common subjects or even nobles in public affairs: the king made law and determined policy. Noncompliance or disobedience merited punishment, and rebellion was a despicable act tantamount to blasphemy. In fact, absolute monarchs always relied on support from nobles and other social groups as well, but the claims of divine-right theory clearly reflected efforts at royal centralization.

The most conspicuous absolutist state was the French monarchy. The architect of French absolutism was a prominent church official, Cardinal **Richelieu**, who served as chief minister to King Louis XIII from 1624 to 1642. Richelieu worked systematically to undermine the power of the nobility and enhance the authority of the king. He destroyed nobles' castles and ruthlessly crushed aristocratic conspiracies. As a counterweight to the nobility, Richelieu built a large bureaucracy staffed by commoners loyal to the king. He also appointed officials to supervise the implementation of royal policy in the provinces. Finally, Richelieu attacked French Calvinists, who often allied with independent nobles, and destroyed their political and military power, although he allowed them to continue observing their faith. By midcentury France was under control of a tightly centralized absolute monarchy.

**The Sun King** The ruler who best epitomized royal absolutism was King **Louis XIV** (reigned 1643–1715), who once reportedly declared that he was himself the state: "*l'état, c'est moi*." Known as *le roi soleil* ("the sun king"), Louis surrounded himself with splendor befitting one who ruled by divine right. During the 1670s he built a magnificent residence at **Versailles**, a royal hunting lodge near Paris, and in the 1680s he moved his court there. Louis's palace at Versailles was the largest building in Europe, with 230 acres of formal gardens and 1,400 fountains. Because Louis did not want to wait years for saplings to grow, he ordered laborers to dig up 25,000 fully grown trees and haul them to Versailles for transplanting.

The sun king was the center of attention at Versailles. Court officials hovered around him and tended to his every need. All prominent nobles established residences at Versailles for their families and entourages. Louis strongly encouraged them to live at court, where he and his staff could keep an eye on them, and ambitious nobles gravitated there anyway in hopes of winning influence with the king. Louis himself was the arbiter of taste and style at Versailles, where he lavishly patronized painters, sculptors, architects, and writers whose creations met with his approval.

While nobles living at Versailles mastered the intricacies of court ritual and attended banquets, concerts, operas, balls, and theatrical performances, Louis and his ministers ran the state. In effect, Louis provided the nobility with luxurious

**Richelieu** (RISH-uh-loo)  
**Versailles** (vehr-SEYE)



The French painter Hyacinthe Rigaud, renowned for his portrait paintings of the royalty and nobility of Europe, created this vision of Louis XIV. Louis' reign, from 1643 to his death in 1715, lasted seventy-two years, three months, and eighteen days, and is the longest documented reign of any European monarch.

accommodations and endless entertainment in exchange for absolute rule. From Versailles, Louis and his advisors promulgated laws and controlled a large standing army that kept order throughout the land. They also promoted economic development by supporting the establishment of new industries, building roads and canals, abolishing internal tariffs, and encouraging exports. Finally, they waged a series of wars designed to enlarge French boundaries and establish France as the preeminent power in Europe.

**Absolutism in Russia** Louis XIV was not the only absolute monarch of early modern Europe: Spanish, Austrian, and Prussian rulers embraced similar policies. The potential of absolutism to increase state power was particularly conspicuous in the case of Russia, where tsars of the Romanov dynasty (1613–1917) tightly centralized government functions. (*Tsar*, sometimes spelled *czar*, is a Russianized form of the term *caesar*, which Russian rulers borrowed from Byzantine emperors, who in turn had borrowed it from the classical Roman

empire to signify their imperial status.) The **Romanovs** inherited a state that had rapidly expanded its boundaries since the mid-fourteenth century. Building on the foundation of a small principality around the trading city of Moscow, by 1600 Russia had become a vast empire extending from the Arctic seas in the north to the Caspian Sea in the south, with an increasing presence in the tundra and forests of Siberia as well.

**Peter I** Most important of the Romanov tsars was Peter I (reigned 1682–1725), widely known as **Peter the Great**, who inaugurated a thoroughgoing process of state transformation. Peter had a burning desire to make Russia, a huge but underpopulated land, into a great military power like those that had recently emerged in western Europe. In pursuit of that goal, he worked to transform Russia on the model of western European lands. In 1697–1698 he led a large party of Russian observers on a tour of Germany, the Netherlands, and England to learn about western European administrative methods and military technology. His traveling companions often behaved crudely by western European standards: they consumed beer, wine, and brandy in quantities that astonished their hosts, and King William III sent Peter a bill for damages done by his entourage at the country house where they lodged in England. (Among other things, Peter had ruined the gardens by having his men march through them in military formation.)

Upon return to Moscow, Peter set Russia spinning. He reformed the army by offering better pay and drafting peasants who served for life as professional soldiers. He provided his forces with extensive training and equipped them with modern weapons. He ordered aristocrats to study mathematics and geometry so that they could calculate how to aim cannons accurately, and he began the construction of a navy with an eye toward domination of the Baltic and other northern seas. He also overhauled the government bureaucracy to facilitate tax collection and improve administrative efficiency. His transformation of Russia even involved a cosmetic makeover, as he commanded his aristocratic subjects to wear western European fashions and ordered men to shave their traditional beards. These measures, which were extremely unpopular among conservative Russians, provoked spirited protest among those who resented the influence of western European ways. Yet Peter insisted on observance of his policies—to the point that he reportedly went into the streets and personally hacked the beards off recalcitrants' faces. Perhaps the best symbol of his policies was St. Petersburg, a newly built seaport that Peter opened in 1703 to serve as a magnificent capital city and haven for Russia's fledgling navy.

**Catherine II and the Limits of Reform** The most able of Peter's successors was Catherine II (reigned 1762–1796), also known as **Catherine the Great**. Like Peter, Catherine sought to make Russia a great power. She worked to improve governmental efficiency by dividing her vast empire into fifty administrative provinces, and she promoted economic development in Russia's towns. For a while, she even worked to improve the

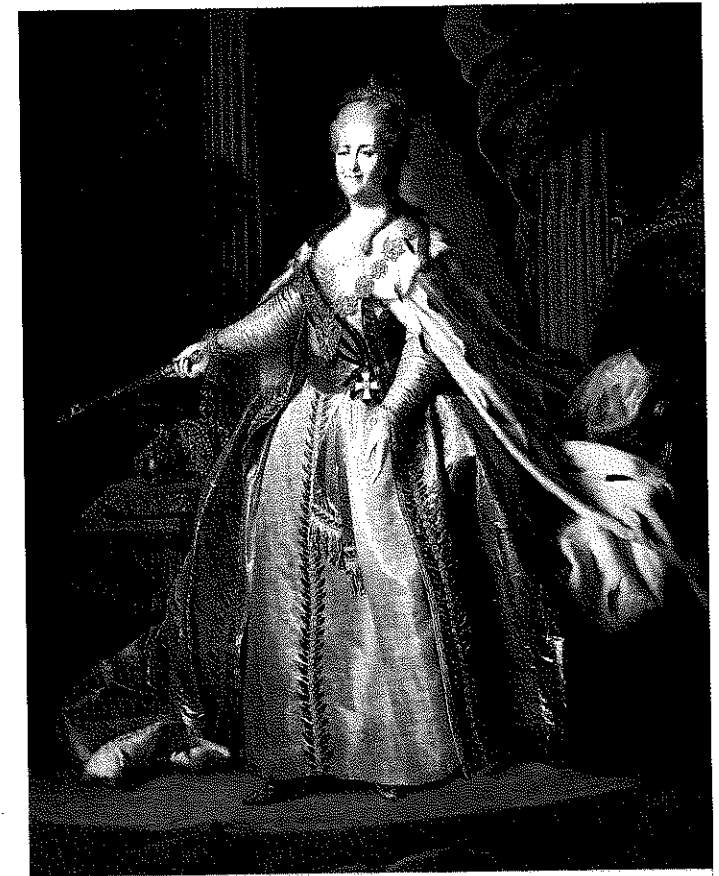
conditions of Russia's oppressed peasantry by restricting the punishments that noble landowners could inflict on the serfs who worked their lands. She sought to eliminate common penalties such as torture, beating, and the mutilation of individuals by cutting off their noses, ears, or tongues.

Yet her interest in social reform cooled rapidly when it seemed to inspire challenges to her rule. She faced a particularly unsettling trial in 1773 and 1774, when a disgruntled former soldier named **Yemelian Pugachev** mounted a rebellion in the steppe lands north of the Caspian Sea. Pugachev raised a motley army of adventurers, exiles, peasants, and serfs who killed thousands of noble landowners and government officials before imperial forces crushed the uprising. Government authorities took the captured Pugachev to Moscow in chains, beheaded him, quartered his body, and displayed his parts throughout the city as a warning against rebellion. Thereafter, Catherine's first concern was the preservation of autocratic rule rather than the transformation of Russia according to western European models.

Thus, in Russia as in other European lands, absolutist policies resulted in tight centralization and considerable



Tsar Peter the Great, with a pair of shears, readies himself to remove the beard of a conservative noble. Peter had traveled widely in Europe, and he wanted to impose newer European customs on his subjects. That included being more cleanly shaved. Nobles wishing to keep their beloved beards had to pay a yearly tax to do so.



This is a regal Russian portrait of the German-born empress of Russia, Catherine II. Although admired by many Russians as a source of national pride, she is also remembered as a ruthless ruler who affirmed autocracy and extended serfdom on a large scale.

strengthening of the state. The enhanced power that flowed from absolutism became dramatically clear in the period 1772 to 1797, when Austria, Prussia, and Catherine II's Russia picked the weak kingdom of Poland apart. In a series of three "partitions," the predatory absolutist states seized Polish territory and absorbed it into their own realms, ultimately wiping Poland entirely off the map. The lesson of the partitions was clear: any European state that hoped to survive needed to construct an effective government that could respond promptly to challenges and opportunities.

### The European States System

Whether they relied on absolutist or constitutional principles, European governments of early modern times built states much more powerful than those of their medieval predecessors. This round of state development led to difficulties within Europe, since conflicting interests fueled interstate competition

**Yemelian Pugachev** (yehm-eel-ian puh-gah-chehf)

and war. In the absence of an imperial authority capable of imposing and maintaining order in Europe, sovereign states had to find ways to resolve conflicts by themselves.

**The Peace of Westphalia** The Thirty Years' War demonstrated the chaos and devastation that conflict could bring. In an effort to avoid tearing their society apart, European states ended the Thirty Years' War with the **Peace of Westphalia** (1648), which laid the foundations for a system of independent, competing states. Almost all the European states participated

in drafting the Peace of Westphalia, and by the treaty's terms they regarded one another as sovereign and equal. They also mutually recognized their rights to organize their own domestic affairs, including religious affairs. Rather than envisioning imperial or papal or some other sort of supreme authority, the Peace of Westphalia entrusted political and diplomatic affairs to states acting in their own interests. European religious unity had disappeared, and the era of the sovereign state had arrived.

The Peace of Westphalia did not bring an end to war. Indeed, war was almost constant in early modern Europe. Most conflicts were minor affairs inaugurated by monarchs seeking to extend their authority to new lands or to reclaim territories seized by others, but they nevertheless disrupted local economies and drained resources. A few wars, however, grew to sizable proportions. Most notable among them were

**MAP 23.2**

**Europe after the Peace of Westphalia, 1648.**

Compare this map with Map 23.1.

*How have the boundaries of the Holy Roman Empire changed, and why?*



the wars of Louis XIV and the Seven Years' War. Between 1668 and 1713, the sun king sought to expand his borders east into Germany and to absorb Spain and the Spanish Netherlands into his kingdom. That prospect prompted England, the United Provinces, and Austria to mount a coalition against Louis. Later, the Seven Years' War (1756–1763) pitted France, Austria, and Russia against Britain and Prussia, and it merged with conflicts between France and Britain in India and North America to become a global war for imperial supremacy.

**The Balance of Power** These shifting alliances illustrate the principal foundation of European diplomacy in early modern times—the balance of power. No ruler wanted to see another state dominate all the others. Thus, when any particular state began to wax strong, others formed coalitions against it. Balance-of-power diplomacy was risky business: it was always possible that a coalition might repress one strong state only to open the door for another. Yet, in playing balance-of-power politics, statesmen prevented the building of empires and ensured that Europe would be a land of independent, sovereign, competing states.

**Military Development** Frequent wars and balance-of-power diplomacy drained the resources of individual states but strengthened European society as a whole. European states competed vigorously and sought to develop the most expert military leadership and the most effective weapons for their arsenals. States organized military academies where officers received advanced education in strategy and tactics and learned how to maintain disciplined forces. Demand for powerful weapons stimulated the development of a sophisticated armaments industry that turned out ever more lethal products. Gun foundries manufactured cannons of increasing size, range, power, and accuracy as well as small arms that allowed infantry to unleash withering volleys against their enemies.

In China, India, and Islamic lands, imperial states had little or no incentive to encourage similar technological innovation in the armaments industry. These states possessed the

forces and weapons they needed to maintain order within their boundaries, and they rarely encountered foreign threats backed up with superior armaments. In Europe, however, failure to keep up with the latest improvements in arms technology could lead to defeat on the battlefield and decline in state power. Thus Europeans continuously sought to improve their military arsenals, and as a result, by the eighteenth century European armaments outperformed all others.

**EARLY CAPITALIST SOCIETY**

While the Protestant Reformation and the emergence of sovereign states brought religious and political change, a rapidly expanding population and economy encouraged the development of capitalism, which in turn led to a restructuring of European economy and society. Technologies of communication and transportation enabled businessmen to profit from distant markets, and merchants and manufacturers increasingly organized their affairs with the market rather than local communities in mind.

Capitalism generated considerable wealth, but its effects were uneven and sometimes unsettling. Economic development and increasing prosperity were noticeable in western Europe, particularly England, France, Germany, and the Netherlands. Yet eastern Europe experienced much less economic ferment, as Poland and Russia increasingly became suppliers of grain and raw materials rather than centers of trade or production. Even in western Europe, early capitalism encouraged social change that sometimes required painful adjustments to new conditions.

**Population Growth and Urbanization**

**American Food Crops** The foundation of European economic expansion in early modern times was a rapidly growing population, which reflected improved nutrition and decreasing mortality. The Columbian exchange enriched European diets by introducing new food crops to European fields and tables. Most notable of the introductions was the potato, which during the sixteenth and seventeenth centuries enjoyed the reputation of being an aphrodisiac. Although potatoes probably did not inspire much romantic ardor, they provided a welcome source of carbohydrates for peasants and laborers who were having trouble keeping up with the rising price of bread. From Ireland to Russia and from Scandinavia to the Mediterranean, cultivators planted potatoes and harvested crops that added calories to European diets. American maize also made its way to Europe. Maize, however, served mostly as feed for livestock rather than as food for human consumption, although peasants sometimes used cornmeal to make bread or porridges like polenta. Other American crops, such as tomatoes and peppers, added vitamins and tangy flavor to European diets.

**Reverberations of The Columbian Exchange**

In Europe, the Columbian exchange introduced new food crops that provided vital nutrition to ordinary people, which in turn helped fuel an impressive round of population growth across the region at precisely the same time indigenous American societies were devastated by European diseases. Yet European reliance on certain American food crops—especially the potato—would, over time, result in a dangerous dependency that led to famine when the crop failed, as it did in Ireland in 1845. Consider the ways that the exchange of items as seemingly mundane as new food crops can help shape historical developments over the long term, in both positive and negative ways.



While recently introduced American crops improved European diets, old diseases lost some of their ferocity. Smallpox continued to carry off about 10 percent of Europe's infants, and dysentery, influenza, tuberculosis, and typhus claimed victims among young and old, rich and poor alike. Yet better-nourished populations were better able to resist those maladies. Bubonic plague, a virulent epidemic killer during the fourteenth and fifteenth centuries, receded from European society. After its initial onslaught in the mid-fourteenth century, plague made periodic appearances throughout the early modern era. After the mid-seventeenth century, however, epidemics were rare and isolated events. The last major outbreaks of plague in Europe occurred in London in 1660 and Marseilles in 1720. By the mid-seventeenth century, epidemic disease was almost negligible as an influence on European population.

**Population Growth** Although European birthrates did not rise dramatically in early modern times, decreasing mortality resulted in rapid population growth. In 1500 the population of Europe, including Russia, was about 81 million. During the sixteenth century, as Europe recovered from epidemic plague, the population rose to 100 million. The Thirty Years' War—along with the famine and disease that the war touched off—led to population decline from about 1620 to 1650, but by 1700 European population had rallied and risen to 120 million. During the next century it grew by an additional 50 percent to 180 million.

**Urbanization** Rapid population growth drove a process of equally rapid urbanization. Some cities grew because rulers chose them as sites of government. Madrid, for example, was a minor town with a few thousand inhabitants until 1561 when King Philip II decided to locate his capital there. By 1600 the population of Madrid had risen to 65,000, and by 1630 it had reached 170,000. Other cities were commercial and industrial as well as government centers, and their numbers expanded along with the European economy. In the mid-sixteenth century, for example, the population of Paris was about 130,000, and London had about 60,000 inhabitants. A century later the population of both cities had risen to 500,000. Other European cities also experienced growth, even if it was not so dramatic as in Madrid, Paris, and London: Amsterdam, Berlin, Copenhagen, Dublin, Stockholm, Vienna, and others became prominent European cities during the early modern era.

### Early Capitalism and Protoindustrialization

**The Nature of Capitalism** Population growth and rapid urbanization helped spur a round of remarkable economic development. This economic growth coincided with the emergence of **capitalism**—an economic system in which private parties make their goods and services available on a free market and seek to take advantage of market conditions to profit from

their activities. Whether they are single individuals or large companies, private parties own the land, machinery, tools, equipment, buildings, workshops, and raw materials needed for production. Private parties pursuing their own economic interests hire workers and decide for themselves what to produce: economic decisions are the prerogative of capitalist businessmen, not governments or social superiors. The center of a capitalist system is the market in which businessmen compete with one another, and the forces of supply and demand determine the prices received for goods and services. If businessmen organize their affairs efficiently, they realize handsome profits when they place their goods and services on the market. Otherwise, they incur losses and perhaps even lose their businesses.

The desire to accumulate wealth and realize profits was by no means new. Ever since the introduction of agriculture and the production of surplus crops, some individuals and groups had accumulated great wealth. Indeed, for several thousand years before the early modern era, merchants in China, southeast Asia, India, southwest Asia, the Mediterranean basin, and sub-Saharan Africa had pursued commercial ventures in hopes of realizing profits. Banks, investors, and insurance underwriters had supported privately organized commercial ventures throughout much of the eastern hemisphere since the postclassical era (500–1500 C.E.).

**Supply and Demand** During early modern times, however, European merchants and entrepreneurs transformed their society in a way that none of their predecessors had done. The capitalist economic order developed as businessmen learned to take advantage of market conditions by building efficient networks of transportation and communication. Dutch merchants might purchase cheap grain from Baltic lands such as Poland or Russia, for example, store it in Amsterdam until they learned about a famine in the Mediterranean, and then transport it and sell it in southern France or Spain. Their enormous profits fueled suspicions that they took advantage of those in difficulty, but their activities also supplied hungry communities with the necessities of life, even if the price was high.

Private parties organized an array of institutions and services to support early capitalism. Banks, for example, appeared in all the major commercial cities of Europe: they held funds on account for safekeeping and granted loans to merchants or entrepreneurs launching new business ventures. Banks also published business newsletters—forerunners of the *Wall Street Journal* and *Fortune* magazine—that provided readers with reports on prices, information about demand for commodities in distant markets, and political news that could have an impact on business. Insurance companies mitigated financial losses from risky undertakings such as transoceanic voyages. Stock exchanges arose in the major European cities and provided markets where investors could buy and sell shares in joint-stock companies and trade in other commodities as well.

**Joint-Stock Companies** **Joint-stock companies** were especially important institutions in early capitalist society. Large



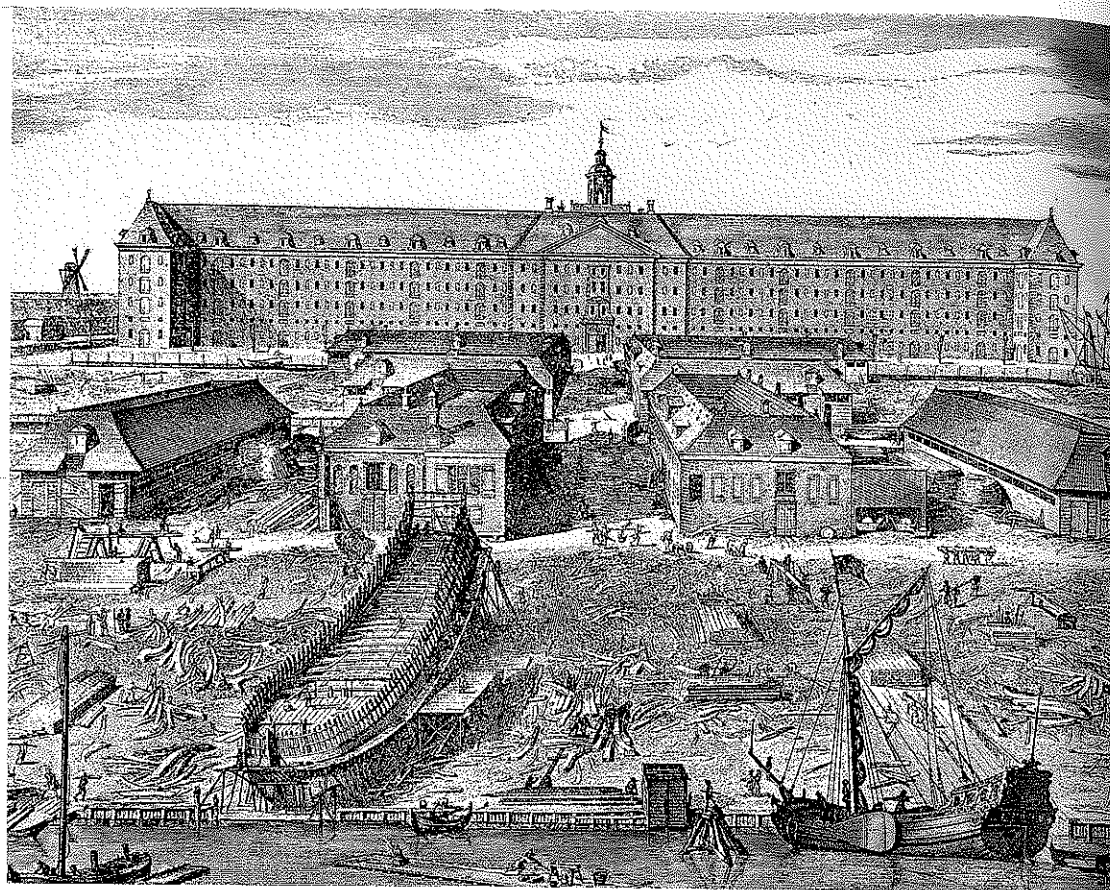
The Old Stock Exchange of Amsterdam, depicted here in a painting of the mid-seventeenth century, attracted merchants, investors, entrepreneurs, and businessmen from all over Europe. There they bought and sold shares in joint-stock companies such as the VOC and dealt in all manner of commodities traded in Amsterdam.

trading companies such as the English East India Company and its Dutch counterpart, the Vereenigde Oost-Indische Compagnie (VOC), spread the risks attached to expensive business enterprises and also took advantage of extensive communications and transportation networks. The trading companies organized commercial ventures on a larger scale than ever before. They were the principal foundations of the global economy that emerged in early modern times, and they were the direct ancestors of contemporary multinational corporations.

**Politics and Empire** Capitalism did not develop in a political vacuum. To the contrary, it emerged with the active support of government authorities who saw a capitalist order as

the one best suited to their individual and collective interests. Merchants were especially influential in the affairs of the English and Dutch states, so it is not surprising that these lands adopted policies that were most favorable to capitalist enterprises throughout the early modern era. The English and Dutch states recognized individuals' rights to possess private property, enforced their contracts, protected their financial interests, and settled disputes between parties to business transactions. They also chartered joint-stock companies and authorized some of them to explore, conquer, and colonize distant lands in search of commercial opportunities. Thus early capitalism developed in the context of imperialism, as European peoples established fortified trading posts in Asia

An anonymous engraver depicts activity in a Dutch shipyard where workers build a massive, oceangoing sailing ship. In the seventeenth century, Dutch ships were inexpensive to operate, yet they accommodated abundant cargoes. What kinds of cargoes were Dutch ships likely to carry in this period?



and colonial regimes in both southeast Asia and the Americas. Indeed, imperial expansion and colonial rule were crucial for the development of capitalism, since they enabled European merchants to gain access to the natural resources and commodities that they distributed so effectively through their transportation networks.

Quite apart from its influence on trade and the distribution of goods, capitalism encouraged European entrepreneurs to organize new ways to manufacture goods. For centuries, craft guilds had monopolized the production of goods such as textiles and metalwares in European towns and cities. Guilds fixed prices and wages, and they regulated standards of quality. They did not seek to realize profits so much as to protect markets and preserve their members' places in society. As a result, they actively discouraged competition and sometimes resisted technological innovation.

**Putting-out System** Capitalist entrepreneurs seeking profits found the guilds cumbersome and inflexible, so they sidestepped them and moved production into the countryside. Instead of relying on urban artisans to produce cloth, for example, they organized a "putting-out system" by which they delivered unfinished materials such as raw wool to rural households. Men and

women in the countryside would then spin the wool into yarn, weave the yarn into cloth, cut the cloth according to patterns, and assemble the pieces into garments. The entrepreneur paid workers for their services, picked up the finished goods, and sold them on the market. During the seventeenth and eighteenth centuries, entrepreneurs moved the production of cloth, nails, pins, pots, and many other goods into the countryside through the putting-out system.

Because rural labor was usually plentiful, entrepreneurs spent relatively little on wages and realized handsome profits on their ventures. The putting-out system represented an early effort to organize efficient industrial production. Indeed, some

## Thinking about ENCOUNTERS

### Capitalism and Overseas Expansion

In the early modern era, Europeans consolidated previous economic developments into a new and profitable system of capitalism, where the central organizing force became the market. Capitalism provided the key tools for more efficient forms of overseas expansion. What were the signal capitalist institutions that underpinned overseas endeavors? How in turn did imperial expansion promote the further growth of capitalism?

historians refer to the seventeenth and eighteenth centuries as an age of **protoindustrialization**. The putting-out system remained a prominent feature of European society until the rise of industrial factories in the nineteenth century.

## Social Change in Early Modern Europe

Capitalist economic development brought unsettling change to European lands. The putting-out system, for example, introduced considerable sums of money into the countryside. Increased wealth brought material benefits, but it also undermined long-established patterns of rural life. The material standards of rural life rose dramatically: peasant households acquired more cabinets, furnishings, and tableware, and rural residents wore better clothes, ate better food, and drank better wine. Individuals suddenly acquired incomes that enabled them to pursue their own economic interests and to become financially independent of their families and neighbors. When young adults and women began to earn their own incomes, however, many feared that they might slip out of the control of their families and abandon their kin who continued to work at agricultural tasks.

The putting-out system did not become a prominent feature of production in eastern Europe, but early capitalism prompted deep social change there as well as in lands to the west. Eastern Europe had few cities in early modern times, so in expansive agrarian states such as Poland, Bohemia, and Russia, most people had no alternative to working in the countryside. Landlords took advantage of this situation by forcing peasants to work under extremely harsh conditions.

**Serfdom in Russia** Russia in particular was a vast but sparsely populated empire with little trade or manufacturing. Out of a concern to retain the allegiance of the powerful nobles who owned most of Russia's land, the Romanov tsars restricted the freedoms of most Russian peasants and tied them to the land as serfs. The institution of **serfdom** had emerged in the early middle ages as a labor system that required peasants to provide labor services for landowners and prevented them from marrying or moving away without their landlords' permission. After the fifteenth century, serfdom gradually came to an end in western Europe. In eastern Europe, however, landowners and rulers tightened restrictions on peasants during the sixteenth century, and in Russia the institution of serfdom survived until the nineteenth century. In effect, the Romanovs won the support of the Russian nobles by ensuring that laborers would be available to work their estates, which otherwise would have been worthless. In 1649 the government promulgated a law code that provided for tight state control over the Russian labor force by establishing a rigid, castelike social order that sharply restricted both occupational and geographic mobility. The law of 1649 did not turn serfs into chattel slaves, but during the late seventeenth and eighteenth centuries, landlords commonly sold serfs to one another as if they were indeed private property. Under those conditions,

landlords operated estates with inexpensive labor and derived enormous incomes from the sale of agricultural products on the market.

These arrangements played crucial roles in the emergence of capitalism. In the larger economy of early modern Europe, eastern European lands relied on serfs to cultivate grains and provide raw materials such as timber for export to western Europe, where merchants and manufacturers were able to employ free wage labor in building a capitalist economy. Already by the early sixteenth century, consumers in the Netherlands depended for their survival on grains imported from Poland and Russia through the Baltic Sea. Thus it was possible for capitalism to flourish in western Europe only because the peasants and semifree serfs of eastern Europe provided inexpensive foods and raw materials that fueled economic development. From its earliest days, capitalist economic organization had implications for peoples and lands far removed from the centers of capitalism itself.

**Profits and Ethics** Capitalism also posed moral challenges. Medieval theologians had regarded profit-making activity as morally dangerous, since profiteers looked to their own advantage rather than the welfare of the larger community. Church officials even attempted to forbid the collection of interest on loans, since they considered interest an unearned and immoral profit. But profit was the lifeblood of capitalism, and bankers were not willing to risk large sums of money on business ventures without realizing returns on their investments in the form of interest. Even as it transformed the European economy, capitalism found advocates who sought to explain its principles and portray it as a socially beneficial form of economic organization. Most important of the early apostles of capitalism was the Scottish philosopher Adam Smith (1723–1790), who held that society would prosper when individuals pursued their own economic interests.

Nevertheless, the transition to capitalist society was long and painful. When individuals abandoned the practices of their ancestors and declined to help those who had fallen on hard times, their neighbors readily interpreted their actions as expressions of selfishness rather than economic prudence. Thus capitalist economic practices generated deep social strains, which often manifested themselves in violence. Bandits plagued the countryside of early modern Europe, and muggers turned whole sections of large cities into danger zones. Some historians believe that witch-hunting activities reflected social tensions generated by early capitalism and that accusations of witchcraft represented hostility toward women who were becoming economically independent of their husbands and families.

**The Nuclear Family** In some ways, capitalism favored the nuclear family as the principal unit of society. For centuries European couples had mostly married late—in their mid-twenties—and set up independent households. Early capitalism offered opportunities for these independent families to

## Sources from the Past

### Adam Smith on the Capitalist Market

*Adam Smith devoted special thought to the nature of early capitalist society and the principles that made it work. In 1776 he published a lengthy book titled An Inquiry into the Nature and Causes of the Wealth of Nations, a vastly influential work that championed free, unregulated markets and capitalist enterprise as the principal ingredients of prosperity. Smith's optimism about capitalism sprang from his conviction that society as a whole benefits when individuals pursue their own economic interests and trade on a free market.*

**Every individual is continually exerting** himself to find out the most advantageous employment for whatever capital he can command. It is his own advantage, indeed, and not that of the society, which he has in view. . . .

As every individual, therefore, endeavours as much as he can both to employ his capital in the support of domestic industry, and so to direct that industry that its produce may be of the greatest value, every individual necessarily labours to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good. It is an affectation, indeed, not very common among merchants, and very few words need be employed in dissuading them from it.

What is the species of domestic industry which his capital can employ, and of which the produce is likely to be of the greatest

value, every individual, it is evident, can, in his local situation, judge much better than any statesman or lawgiver can do for him. The statesman, who should attempt to direct private people in what manner they ought to employ their capitals, would not only load himself with a most unnecessary attention, but assume an authority which could safely be trusted, not only to no single person, but to no council or senate whatever, and which would nowhere be so dangerous as in the hands of a man who had folly and presumption enough to fancy himself fit to exercise it.

To give the monopoly of the home market to the produce of domestic industry, in any particular art or manufacture, is in some measure to direct private people in what manner they ought to employ their capitals, and must, in almost all cases, be either a useless or a hurtful regulation. If the produce of domestic industry can be brought there as cheap as that of foreign industry, the regulation is evidently useless. If it cannot, it must generally be hurtful. It is the maxim of every prudent master of a family, never to attempt to make at home what it will cost him more to make than to buy. The tailor does not attempt to make his own shoes, but buys them of the shoemaker. The shoemaker does not attempt to make his own clothes, but employs a tailor. The farmer attempts to make neither the one nor the other, but employs those different artificers. All of them find it for their interest to employ their whole industry in a way in which they have some advantage over their neighbours, and to purchase with a part of its produce, or, what is the same thing, with the price of a part of it, whatever else they have occasion for.

#### For Further Reflection

- To what extent do you think Adam Smith's analysis reflected the experiences of his own times, and to what extent did they represent universally valid observations?

Source: Adam Smith. *An Inquiry into the Nature and Causes of the Wealth of Nations*. Edinburgh: 1863, pp. 198–200.

## TRANSFORMATIONS IN SCIENTIFIC THINKING

While experiencing religious, political, economic, and social change, western Europe also underwent intellectual and cultural transformation. Astronomers and physicists rejected classical Greek and Roman authorities, whose theories had dominated scientific thought during the middle ages, and based their understanding of the natural world on direct observation and mathematical reasoning. During the seventeenth and eighteenth centuries, they elaborated a new vision of the

increase their wealth by cultivating agricultural crops or producing goods for sale on the market. As nuclear families became more important economically, they also became more socially and emotionally independent. Love between a man and a woman became a more important consideration in the making of marriages than the interests of the larger extended families, and affection between parents and their children became a more important ingredient of family life. Capitalism did not necessarily cause these changes in family life, but it may have encouraged developments that helped to define the nature and role of the family in modern European society.

earth and the larger universe. Scholars relied on observation and mathematics to transform the natural sciences in a process known as the scientific revolution. The results of early modern science were so powerful that some European intellectuals sought to overhaul moral, social, and political thought by adapting scientific methods and relying on reason rather than traditional cultural authorities. Their efforts weakened the influence of churches in western Europe and encouraged the development of secular values.

### The Reconception of the Universe

**The Ptolemaic Universe** Until the seventeenth century, European astronomers based their understanding of the universe on the work of the Greek scholar Claudius Ptolemy of Alexandria. About the middle of the second century C.E., Ptolemy composed a work known as the *Almagest* that synthesized theories about the universe. Ptolemy envisioned a motionless earth surrounded by a series of nine hollow, concentric spheres that revolved around it. Each of the first seven spheres had one of the observable heavenly bodies—the sun, the moon, Mercury, Venus, Mars, Jupiter, and Saturn—embedded in its shell. The eighth sphere held the stars, and an empty ninth sphere surrounded the whole cosmos and provided the spin that kept all the others moving. Beyond the spheres Christian astronomers located heaven, the realm of God.

Following Ptolemy, astronomers believed that the heavens consisted of matter unlike any found on earth. Glowing like perfect jewels in the night skies, heavenly bodies were composed of a pure substance that did not experience change or corruption, and they were not subject to the physical laws that governed the world below the moon. They followed perfect circular paths in making their revolutions around the earth.

**Planetary Movement** Although theoretically attractive, this earth-centered, or geocentric, cosmology did not mesh readily with the erratic movements of the planets—a term that comes from the Greek word *planetes*, meaning “wanderer.” From the vantage point of the earth, the planets often followed regular courses through the skies, but they sometimes slowed down, stopped, or even turned back on their courses—motions that would be difficult to explain if the planetary spheres revolved regularly around the earth. Astronomers went to great lengths to explain planetary behavior as the result of perfect circular movements. The result was an awkward series of adjustments known as epicycles—small circular revolutions that planets made around a point in their spheres, even while the spheres themselves revolved around the earth.

**The Copernican Universe** As astronomers accumulated data on planetary movements, most of them sought to reconcile their observations with Ptolemaic theory by adding increasing numbers of epicycles to their cosmic maps. In 1543,

however, the Polish astronomer **Nicolaus Copernicus** published a treatise, *On the Revolutions of the Heavenly Spheres*, that broke with Ptolemaic theory and pointed European science in a new direction. Copernicus argued that the sun rather than the earth stood at the center of the universe and that the planets, including the earth, revolved around the sun.

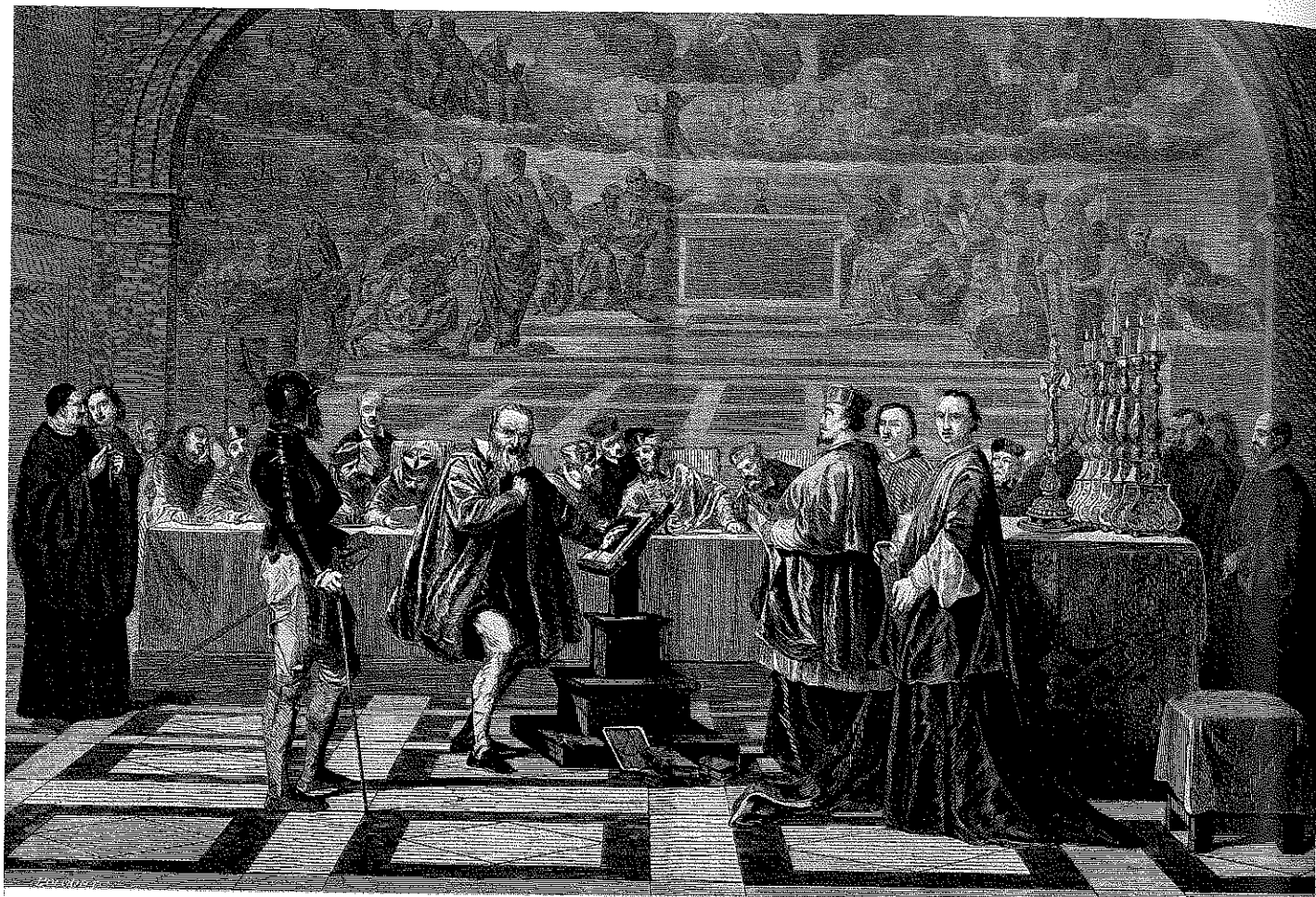
Compared with Ptolemy's earth-centered universe, this new sun-centered, or heliocentric, theory harmonized much better with observational data, but it did not receive a warm welcome. Copernicus's ideas not only challenged prevailing scientific theories but also threatened cherished religious beliefs. His theory implied that the earth was just another planet and that humans did not occupy the central position in the universe. To some it also suggested the unsettling possibility that there might be other populated worlds in the universe—a notion that would be difficult to reconcile with Christian teachings, which held that the earth and humanity were unique creations of God.

### The Scientific Revolution

Although it was unpopular in many quarters, Copernicus's theory inspired some astronomers to examine the heavens in fresh ways. As evidence accumulated, it became clear that the **Ptolemaic universe** simply did not correspond with reality. Astronomers based their theories on increasingly precise observational data, and they relied on mathematical reasoning to organize the data. Gradually, they abandoned the Ptolemaic in favor of the Copernican model of the universe. Moreover, some of them began to apply their analytical methods to mechanics—the branch of science that deals with moving bodies—and by the mid-seventeenth century accurate observation and mathematical reasoning dominated both mechanics and astronomy. Indeed, reliance on observation and mathematics transformed the study of the natural world and brought about the **scientific revolution**.

**Galileo Galilei** The works of two scientists—**Johannes Kepler** of Germany and **Galileo Galilei** of Italy—rang the death knell for the Ptolemaic universe. Kepler (1571–1630) demonstrated that planetary orbits are elliptical, not circular as in Ptolemaic theory. Galileo (1564–1642) showed that the heavens were not the perfect, unblemished realm that Ptolemaic astronomers assumed but, rather, a world of change, flux, and many previously unsuspected sights. Galileo took a recently invented instrument—the telescope—turned it skyward, and reported observations that astonished his contemporaries. With his telescope he could see spots on the sun and mountains on the moon—observations that discredited the notion that heavenly bodies were smooth, immaculate, unchanging, and perfectly spherical. He also noticed four of the moons that orbit the planet Jupiter—bodies that no human being had ever before observed—and he caught sight of

**Ptolemaic** (TAWL-oh-may-ihk)



In this seventeenth-century engraving, Galileo Galilei faces the Inquisition, a Roman Catholic institution that prosecuted individuals accused of a wide variety of crimes related to heresy. At a trial in 1633, the Inquisition found Galileo "vehemently suspect of heresy," forced him to recant Copernicanism, and placed him under house arrest for the remainder of his life.

previously unknown distant stars, which implied that the universe was much larger than anyone had previously suspected.

In addition to his astronomical discoveries, Galileo contributed to the understanding of terrestrial motion. He designed ingenious experiments to show that the velocity of falling bodies depends not on their weight but, rather, on the height from which they fall. This claim brought him scorn from scientists who subscribed to scientific beliefs deriving from Aristotle. But it offered a better explanation of how moving bodies behave under the influence of the earth's gravitational pull. Galileo also anticipated the modern law of inertia, which holds that a moving body will continue to move in a straight line until some force intervenes to check or alter its motion.

**Isaac Newton** The new approach to science culminated in the work of the English mathematician **Isaac Newton** (1642–1727), who depended on accurate observation and mathematical

reasoning to construct a powerful synthesis of astronomy and mechanics. Newton outlined his views on the natural world in an epoch-making volume of 1687 titled *Mathematical Principles of Natural Philosophy*. Newton's work united the heavens and the earth in a vast, cosmic system. He argued that a law of universal gravitation regulates the motions of bodies throughout the universe, and he offered precise mathematical explanations of the laws that govern movements of bodies on the earth. Newton's laws of universal gravitation and motion enabled him to synthesize the sciences of astronomy and mechanics. They also allowed him to explain a vast range of seemingly unrelated phenomena, such as the ebb and flow of the tides, which move according to the gravitational pull of the moon, and the eccentric orbits of planets and comets, which reflect the gravitational influence of the sun, the earth, and other heavenly bodies. Until the twentieth century, Newton's universe served as the unquestioned framework for the physical sciences.

## Sources from the Past

### Galileo Galilei, Letter to the Grand Duchess Christina

The Italian physicist and astronomer Galileo Galilei (1564–1642) was one of the most important European scientists in the early 1600s. His staunch defense of Nicolaus Copernicus's theory of a sun-centered universe threatened Catholic clergy, who were worried that such a theory threatened the authority of both the Bible and the Church. In 1615 Galileo, himself a devout Catholic, defended his scientific beliefs in a published letter to Christina, the grand duchess of Tuscany. Although the Church forced Galileo to publicly renounce his scientific beliefs in 1632, over the long term his writings contributed greatly to the reconception of the universe using the new scientific methodology.

Some years since, as Your most Serene Highness well knoweth, I did discover many particulars in Heaven that had been unseen and unheard of until this our Age; which, as well for their Novelty, as for certain consequences which depend upon them, clashing with some Physical Propositions commonly received by the Schools, did stir up against me no small number of such as professed the vulgar Philosophy in the Universities; as if I had with my own hand newly placed these things in Heaven to obscure and disturb Nature and the Sciences: who forgetting that the multitude of Truths contribute, and concur to the investigation, augmentation, and establishment of the Arts, and not to their diminution, and destruction. . .

They persisting therefore in their first Resolution, Of ruining me and whatsoever is mine, by all imaginable waies; and knowing how that I in my Studies of Astronomy and Philosophy hold, as to the Worlds Systeme, That the Sun, without changing place, is situate in the Centre of the Conversion of the Celestial Orbes; and that the Earth, convertible about its own Axis, moveth it self about the Sun: And moreover understanding, that I proceed to maintain this Position, not only by refuting the Reasons of Ptolomy and Aristotle, but by producing many on the contrary; and in particular, some Physical pertaining to Natural Effects, the causes of which perhaps can be by no other way assigned; and others Astronomical depending upon many circumstances and encounters of new Discoveries in Heaven, which manifestly confute the Ptolomaick Systeme, and admirably agree with and confirm this other Hypothesis: and possibly being ashamed to see the known truth of other Positions by me asserted; different from those that have been commonly received; and therefore distrusting their defence so long as they should

continue in the Field of Philosophy: for these respects, I say, they have resolved to try whether they could make a Shield for the fallacies of their Arguments of the Mantle of a feigned Religion, and of the Authority of the Sacred Scriptures, applied by them with little judgment to the confutation of such Reasons of mine as they had neither understood, nor so much as heard.

This therefore being granted, methinks that in the Discussion of Natural Problemes, we ought not to begin at the authority of places of Scripture; but at Sensible Experiments and Necessary Demonstrations: For, from the Divine Word, the Sacred Scripture and Nature did both alike proceed; the first, as the Holy Ghosts Inspiration; the second, as the most observant Executrix of Gods Commands: And moreover it being convenient in the Scriptures (by way of condescension to the understanding of all men) to speak many things different, in appearance; and so far as concerns the naked signification of the words, from absolute truth: But on the contrary, Nature being inexorable and immutable, and never passing the bounds of the Laws assigned her, as one that nothing careth whether her abstruse reasons and methods of operating be, or be not exposed to the Capacity of Men; I conceive that, concerning Natural Effects, which either Sensible Experience sets before our eyes, or Necessary Demonstrations do prove unto us, ought not, upon any account, to be called into question, much less condemned upon the testimony of Texts of Scripture, which may, under their words, couch Senses seemingly contrary there to; In regard that every Expression of Scripture is not tied to so strict conditions, as every Effect of Nature: Nor doth God less admirably discover himself unto us in Nature's Actions, than in the Scriptures Sacred Dictions. Which peradventure Tertullian intended to express in those words: (c) We conclude, God is known; first, by Nature, and then again more particularly known by Doctrine: by Nature, in his Works; by Doctrine, in his Word preached.

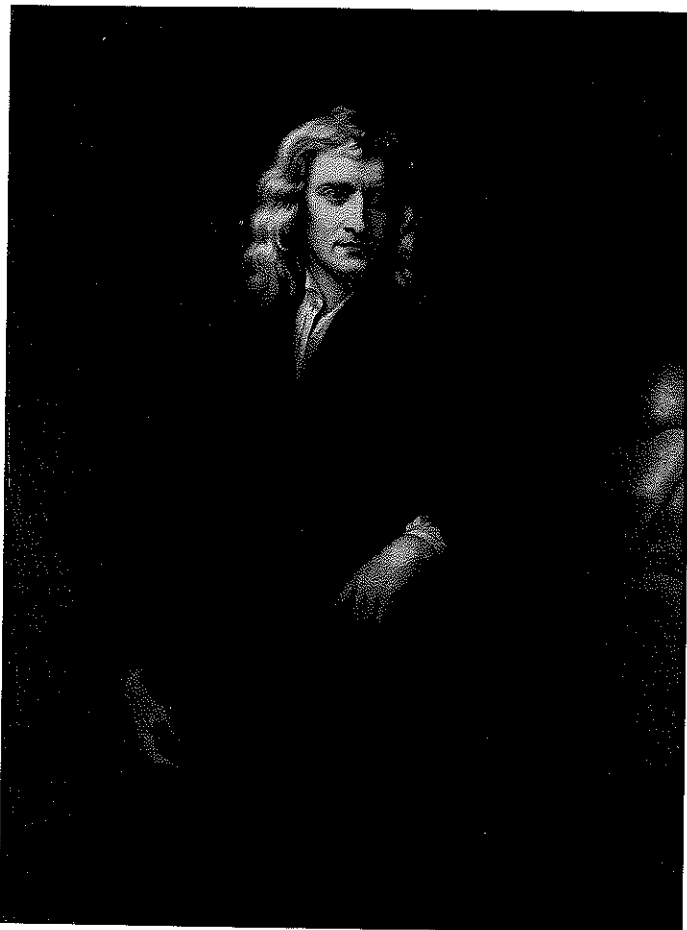
#### For Further Reflection

- Why did Galileo's critics, mentioned in the passage above, find fault with his scientific observations?

Source: Galileo Galilei, "Letter to the Grand Duchess Christina," trans. Thomas Salusbury, *Mathematical Collections and Translations* 1667. Retrieved from The Archimedes Project [http://archimedes.mpiwg-berlin.mpg.de/cgi-bin/toc/toc.cgi?step=thumb&dir=salus\\_mathe\\_040\\_en\\_1667](http://archimedes.mpiwg-berlin.mpg.de/cgi-bin/toc/toc.cgi?step=thumb&dir=salus_mathe_040_en_1667).

Newton's work symbolized the scientific revolution, but it by no means marked the end of the process by which observation and mathematical reasoning transformed European science. Inspired by the dramatic discoveries of astronomers and physicists, other scientists began to turn away from classical authorities and to construct fresh approaches to the

understanding of the natural world. During the seventeenth and eighteenth centuries, anatomy, physiology, microbiology, chemistry, and botany underwent a thorough overhaul, as scientists tested their theories against direct observation of natural phenomena and explained them in rigorous mathematical terms.



A portrait of Sir Isaac Newton (1642–1727) by Sir Godfrey Kneller (1646–1723), the leading portrait painter in England during the late-seventeenth and early-eighteenth centuries. Although commonly hailed as one of the most influential scientists of all time, Newton was more humble when judging his own achievements, writing to a fellow scientist: “If I have seen further it is by standing on the shoulders of giants.”

## Women and Science

In the sixteenth and seventeenth centuries, Europe’s learned men challenged some of the most hallowed traditions concerning the nature of the physical universe and supplanted them with new scientific principles. Yet, when male scientists studied female anatomy, female physiology, and women’s reproductive organs, they were commonly guided not by scientific observation but by tradition, prejudice, and fanciful imagination. William Harvey (1578–1657), the English physician who discovered the principles of the circulation of human blood, also applied his considerable talents to the study of human reproduction. After careful dissection and observation of female deer, chickens, and roosters, he hypothesized that women, like hens, served as mere receptacles

for the “vivifying” male fluid. According to him, it was the male semen—endowed with generative powers so potent that it did not even have to reach the uterus to work its magic—from which the unfertilized egg received life and form. Anatomy, physiology, and limited reproductive function seemed to confirm the innate inferiority of women, adding a “scientific” veneer to the traditionally limited images, roles, and functions of women. With the arrival of printing, men were able to disseminate more widely those negative conclusions about women.

**Émilie du Châtelet** Despite prevailing critical attitudes, some women found themselves drawn to the new intellectual currents of the time. **Émilie du Châtelet** (1706–1749) established her reputation as a scientist with her three-volume work on the German mathematician Gottfried Leibniz (1646–1716) in 1740. Her crowning achievement, however,



Émilie du Châtelet was perhaps the most exceptional female scientist of the eighteenth-century. Although she had to contend with the conventional demands on women, she remained committed to her study of Newton and science.

was her translation of Isaac Newton’s monumental work *Principia Mathematica*, which has remained the standard French translation of the work. She did not simply render Newton’s words into another language, however; rather, she explained his complex mathematics in graceful prose, transformed his geometry into calculus, and assessed the current state of Newtonian physics. She finished her work in the year

of her death, at age forty-three, six days after giving birth to a child. Underscoring the difficulty of reconciling a woman’s reproductive duties with her intellectual aspirations was her lover Voltaire’s commentary. He declared in a letter to his friend Frederick II, King of Prussia (reigned 1740–1786), that du Châtelet was “a great man whose only fault was being a woman.”

## CHRONOLOGY

1473–1543	Life of Nicolaus Copernicus
1478	Foundation of the Spanish Inquisition
1483–1546	Life of Martin Luther
1491–1556	Life of Ignatius Loyola
1509–1547	Reign of King Henry VIII
1509–1564	Life of John Calvin
1517	Publication of the <i>Ninety-Five Theses</i>
1519–1556	Reign of Emperor Charles V
1540	Foundation of the Society of Jesus
1545–1563	Council of Trent
1556–1598	Reign of King Philip II
1564–1642	Life of Galileo Galilei
1571–1630	Life of Johannes Kepler
1588	Spanish Armada
1618–1648	Thirty Years’ War
1642–1727	Life of Isaac Newton
1643–1715	Reign of King Louis XIV
1648	Peace of Westphalia
1706–1749	Life of Émilie du Châtelet