Business Tools and Outlooks:

The Culture of Calculation in the Iberian Atlantic

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ABSTRACT

Iberian merchants writing manuals on commercial arithmetic, bookkeeping, and trade systematized exchange into a viable taxonomy of paperwork, accounts, and accounting books. These manuals define economic rationality as an epistemic practice and the object of knowledge of early modern Iberian capitalism. Technical authors suggest that quantitative thinking belongs to a higher domain of abstraction, where numbers promote habits of reasoning, creditworthiness, and objective neutrality. These empirical, organizational, and ethical advantages crystallize in double-entry bookkeeping. Discussions focus on the cognitive process of calculation, the arithmetic logic of commodification, and the merits of practical knowledge. Traders, business agents, computors, and accountants are men of experience who understand reality in terms of figures, are aware of real problems, and offer viable solutions. These experts see capitalism as a mode of organizing and conveying knowledge. Their heuristic approach sheds light on the pragmatic ethics and ambiguous legal notions late-scholastic moral theologians pondered as they sought to theorize an international system of acquisition and exchange.

Sixteenth- and seventeenth-century Iberian merchants and arithmeticians, writing textbooks on the multiple applications of the arts of commerce, conceptualized the economy as an object of knowledge based on epistemic practice.[1] In addition to businessmen, this community of experts included professions that intersected with far-reaching trade as well as ordinary exchange. Authors hailed from the market place, the counting house, the printshop, the school, the administration, and the church. Business manuals provided training, self-help, and daily reference to a wider audience. In

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contrast, more advanced textbooks, under the rubric of arts of commerce—*arte mercantivol*, *arte mercantesco*, or *arte de contadores*, also referred to as *arithmética práctica*—specialized in all branches of trade, devoting extensive space to sets of rules to perform calculations specific to exchange, companies, banking, and finance.

To assure their readers, these business manuals all exhibited their author's expertise in exchange, calculation, and accounting. They regarded commercial arithmetic as a genuine branch of empirical knowledge that merged the language of numbers and facts with commerce and trade. Commercial arithmetic manuals approached economic rationality as an assemblage of techniques, methods, and principles that made visible the interdependent laws of economic reality by subduing the chaos of exchange with recognizable taxonomies of price, accounts, cost-profit, and ledgers.[2]

Traders, business agents, computers, and accountants rationalized global Iberian capitalism as a matrix of numerical relations interlacing economic and moral codes in overlapping layers of value. They all saw that quantitative thinking and creditworthiness were inextricable. They also claimed that their mercantile ethos, expertise, and sound economic habits advanced trade, established the foundations of a well-ordered society, and increased the prosperity of republics. Naturalizing capital accumulation as the result of rational calculation isolated global trade from the violence and the juridical exceptions of colonialism under which capitalism thrived.[3] This emphasis on facts, numbers, and accounts created an island of neutrality amid the tidal wave of free-for-all profit seeking.

Traders, along with their business agents and other employees, dealt in goods and finances, did accounts, classified all sorts of operations, and taught others their bookkeeping methods. They praised the demonstrable character of the techniques of calculation for their capacity to disentangle genuine truth from a maze of numbers and accounts. Double-entry bookkeeping (DEB) soon became the standard and required method in mercantile practice. It provided a paradigm for statistical computation that codified the economy into a web of goods and money connecting multiple agents.[4] It also created a template for accumulating value that would justify both gains and losses as ordinary economic events that directly answered to mastering or neglecting these skills.

The spread of the arts of commerce in both manuscript and print form through the Mediterranean and Atlantic trade, along with the increasing fiscal needs of the colonial administration, suggest a general concern with

calculation that responded less to ethical imperatives aligned with the Protestant Reformation than to multiple capitalist goals. These regimes of calculation assured operational stability and reliable access to data amid the contingencies of trade, fluid transactions involving goods, shipping, and finance, and the ever-shifting value of exchange.

The pivotal role of Iberian expansion in the genesis of global capitalism suggests that the technologies and discourses of calculation were common practices. The arts of commerce wove worldwide patterns of exchange, kept counting houses and trade firms humming, and provided the template for recording and organizing fiscal and financial information. These techniques supported the administrative and institutional mechanisms the colonial state deployed to systematize dispossession, organize labor, and extract wealth.

As Daniel Nemser discusses, colonial authorities resolved the dispersion and decimation of indigenous communities by resettling them in centralized and ordered towns that facilitated Christianization, together with the orderly extraction of labor and tribute.[5] Gary Urton suggests that the colonial state applied mathematics as a politics of knowledge, without which these regimes of power could not have functioned. He studies the convergence of Andean and Western notions and procedures of political arithmetic in colonial state accounting. Both the practices of alphanumeric double-entry bookkeeping (DEB) and *khipu* record-keeping in *Tawantinsuyu* constituted effective strategies for exercising social control. Urton maintains that mathematics links state power and governmental legitimacy. Indeed, it represents the most effective exercise of power, taking shape as individuals and groups become complicit with and participate in a variety of branches of accounting, censuses, and other regulatory institutions.[6] This calculus was also the basis for collecting indigenous population records to supply the labor needs of mining and colonial infrastructures. A case in point is the census data used to chart the labor needs of *repartimientos de minas*, which took the form of a *Visita general* ordered by viceroy Francisco de Toledo in the 1570s, or the *Numeración general* taking place in 1633–1634.[7]

The importance of calculation in Iberian capitalism reveals how internal and external forms of colonialism intersect. In relation to modern theories of Europe that have marginalized the continent's own southern region, the Eurocentric-Catholic rationalities that enabled the consolidation of capitalism become irrational.[8] During the sixteenth and seventeenth centuries the

characteristics separating the Dutch and British regimes that rose to challenge the Iberian empires underscore this impasse by distinguishing polities driven by profit and economizing from those invested in territorial acquisition and evangelization.[9]

Yet this focus oversimplifies, among other issues, the widespread practice of emulation in the terrains of trade. It also neglects the specificities of the Iberian territories as political entities organized in interlinked centers interacting with each other and the crown.[10] Considering the dynamics of unified states as the norm results in the familiar narrative of economic backwardness, which emphasizes that absolutism promotes the obsession with treasures rather than science of trade. Then the wealth of commercial manuals and economic treatises across the Spanish territories during this period is neglected. This corpus is rendered invisible by the widely accepted notion that the Protestant Reformation brought about the system of ideas that accelerated capital accumulation.

Recent works in Iberian economic and social history have examined the integrative components of early commercial societies. In their original study, Alejandra Irigorin and Regina Grafe suggest that the Spanish empire was a nominal absolutist state constantly bargaining with stakeholders in order to survive. In this paper empire merchants, magistrates, and landed entrepreneurs all held a stake while seeking and creating opportunities for the Spanish Atlantic economy to flourish. *Consulado* merchants across the empire were key economic players as were city councilmen, district magistrates, town officials, guild artisans, and native nobles holding key positions in *Repúblicas de Indios*. They all pushed for protectionist policies as they vied to promote their own mixed financial interests in a regime that lacked strong coercive powers.[11]

John Tutino, author of *Making a New World*, stresses the imbricated components of production and trade that articulated manifold relations with law, custom, and government. His analysis of the silver economy in Zacatecas shows how a commercial, patriarchal, Catholic society emerged as mining, cloth making, and irrigated agriculture increased, and social and ethnic inequities and religious debates escalated. Tutino reformulates the Braudelian notion of capitalism as a global historical process by contesting its Eurocentric profile and examining the breadth of its endless combinations, driven by predatory dynamics deploying diverse controls of resources, finances, exchanges, and labor.[12]

Should we presume that the rules of tradition, influence, and imitation forging an international republic of commerce, based on methods and practices to produce money and credit, were tangential to the business ventures connecting the Peninsula to New Spain, Peru, and the Philippines?[13] In the Catholic commercial society undergirding Iberian merchant capitalism, these questions immediately identify the specialized vocabulary and techniques that the community of experts in the arts of commerce routinely employed to do business, calculate cost profit, and record and report the data of all transactions.

My intervention retraces the practices of commercial arithmetic back to the counting house and business office, or *escritorio de mercaderes,* and the textbooks teaching these skills. I consider how the arts of commerce define economic rationality as the object of knowledge of Iberian merchant capitalism; how the historical basis of business tools and outlooks challenges the assigned values of capitalist modernity;[14] and, finally, how these questions invite us to understand economic rationality as an epistemic practice that denotes the socially organized ways that experts seek to legitimize knowledge. This focus on Iberian early modern business math and paper technologies sees rationality in instrumental terms, as *techné*. I suggest that examining the Iberian colonial economic past through the lenses of commercial arithmetic sheds light on the fruits of economic knowledge—such as data, accounts, and ledgers—and the ways in which this utilitarian knowledge was produced, acquired, and demonstrated.

The importance of calculation in Iberian capitalism reveals how internal and external forms of colonialism intersect. It signals an important counterpoint to the narrative of linear economic development, at the core of discussions examining the techniques and production of capitalism in Britain and North America from the seventeenth to the twentieth century. The New History of Capitalism looks at the rise of the quantifying age of capitalism as a matrix of computational technologies, practical numeracy, and basic mathematical education in order to study the history of markets, the people who operated them, and the techniques they required.[15] Historians pay meticulous attention to business instruction either in its own regard or in relation to those that originated in Renaissance Italy before they were perfected in Britain and the Netherlands. This focus simplifies, among other issues, the abundant proliferation of business practices and economic theories that Iberian global expansion produced.

A similar hindrance is visible in earlier debates. Braudel addresses the expanding boundaries of an international republic of commerce that stemmed from shifting concentrations of financial and commercial power in Lisbon, Seville, and Genoa, to Amsterdam, London, and Hamburg. Here the intense engagement of Habsburg monarchs with German and Genoese credit conveys the difficulty of placing early modern Spain within the very cultural and economic dynamisms of early modern capitalism.[16]

The production of Iberian economic knowledge as social practice provincializes the origins and nature of Western capitalism. Early modern Spanish business manuals and writing clearly established an early wave of quantifying techniques. From the 1510s onward, technical authors in Castile, Aragon, Mexico, and Lima systematized the arithmetic methods and taxonomy of accounts that were routinely employed in trade and finance. With the close entanglement of mercantile circles and the state, the arts of commerce spread and became entrenched in public and private institutions, alongside mercantile and civil law. Multiple editions of these publications also indicate the increasing demand for skilled *contadores, caxeros, escribanos* in a growing credit economy that witnessed the rapid expansion of global trade and the increasing bureaucracy of the colonial state.

The massive corpus that sixteenth-century moral theologians, such as Domingo de Soto, Luis Azpilcueta Navarro, Tomás de Mercado, and Luis de Molina, produced to conceptualize money, exchange, and a system of global trade clearly theorizes the Catholic origins of capitalism.[17] How can we presume, then, that the world of trade and commerce they examined was isolated from the methods and practices organizing the smooth operation of exchange? If the arts of commerce reached everywhere across the Hispanic world, what we can learn about the methods, assertions, and balancing acts of businessmen and arithmeticians?

I suggest that technical aspects of commercial arithmetic go unnoticed when the logic of calculation is considered as participating in the logic of salvation. In Weber's analysis, credits and debits constitute the grounds for conceptualizing financial expectations and their realization. The intriguing transformation of the Protestant uncertainty of salvation into methods of capitalist accumulation comes after he compares and contrasts the promise of forgiveness and the dilemma of salvation. He contends that Catholicism gives pride of place to confession over business pursuits, while Protestantism thrives on the affinity of its ethos and rational capitalist accumulation.[18] This

argument surfaces in studies on the sociology of accounting in Catholic merchant societies, which emphasize the interdiction of usury and the hindrance of pastoral power at the expense of other important organizational and technique-centered factors that rationalized economic life.

In his pioneering work exploring the impact of religion on the development of accounting, James Aho looks at this tension between method and religious practice by noticing that business narratives began to assume an apologetic, justifying discourse akin to that used in confession.[19] Hans Derks, on the other hand, considers that the enduring legacy of Weber's controversial ideas has created a kind of circular argument. By stressing that DEB was essential to the development of monetization and banking, he points out the diligent involvement of religious orders, especially the Franciscan order, in these activities. He argues that the mathematical concepts of balance and proportion that these techniques conceptualize also ground the pragmatic Catholic ethics of capital and commerce.[20]

The former stresses the notion of pastoral oversight and conduct.[21] The latter, on the other hand, emphasizes the formation of economic behaviors, as well as the influential role of Aristotelean ethics, Franciscan economic thought, and scholasticism in conceptualizations of economic life. Although mindsets and methods go hand in hand, cultural analysis renders the arts of commerce invisible, even though they are the mundane and inconspicuous formations of the everyday life of capitalism. The techniques of calculation, nonetheless, represent operative categories of study. They illustrate the making of practical knowledge together with the social foundations of the new business practices and economic experiences that far-reaching trade and finance brought about. Examining these epistemic practices articulates a bottom-up approach to the analysis on novel forms of banking and credit, the pragmatic ethics, and ambiguous legal notions that late-scholastic moral theologians proposed to examine the emergence of global networks of mercantile relations.

The technique that frames my discussion here is commercial arithmetic, which encompasses two complementary branches of study: arithmetic and accounting. As a field of empirical knowledge, commercial arithmetic is the foundation of the arts of commerce or *mercancía*, also *mercaduría*, which is synonymous with *contratación* and the science of trade, the incipient model of political economy.

Cuenta y razón, or accounting describes the general term, whereas the method known as, *libro de caxa y manual*, *cuenta con caxa*, *debe y ha de haber* or *uso de mercaderes*, all translate as double-entry bookkeeping. I explore *libro de caxa* as an aggregation of calculation techniques driving the logic of commodification through a profusion of paperwork molded at once by profit, legal requirements, and economic discourses. I argue that technical authors naturalize capitalism by creating a space of impartiality detached from capitalist goals that stresses methodical rules over the contingencies of trade and the uncertainties of exchange. Their apologies of commerce and capital inextricably bind business calculation and the organization of data, together with expertise and professional reputation in the science of trade.

The specificities of capitalism as a sum of epistemic practices during the early modern period are complex. Historically, the logic of confession and penance prominently demonstrated a rational calculus toward salvation. During the commercial revolution of the thirteen and fourteenth centuries, the calculating mentality that valued time in terms of money gave rise to the notion of purgatory and to a complex system of spiritual investments, such us indulgences, suffrages, and donations. From this increasingly capitalist point of view, salvation poses the mathematical problem of how to reckon the magnitude and duration of alms necessary for the expiation of sin.[22] Translating grace into the familiar terms of exchange aligns the biblical tradition of God as divine bookkeeper with more mundane representations of Christ as exemplary merchant and perfect accountant.

Following earlier formulations in popular religious texts by Francisco de Osuna and Fray Luis de Granada, Pedro Calderón de la Barca dramatizes the logic of salvation in his own historical time of universal trade, and a credit economy intersecting markets with finances and obligations of debt. In the religious play *La nave del mercader* (1677), Calderón spins Matthew's parables of the rare pearl and the five talents into an intricate plot of loans, books of account, insolvency, and commercial enclaves spread through the Mediterranean and the Americas.[23]

Christ is the wealthy merchant willing to pay Hombre's [Man's] debt with the holy wheat loaded in his ship. Held in debtor's prison, the indulgent and carefree individual enhances the virtues of the diligent and truthful merchant. As Tiempo [Time] enters the stage to demand payment with a portable desk, pen, documents, and book of accounts, the initial question about free will, the

immortal soul, and redemption takes an arithmetic turn. The rest of the allegorical characters wonder whether Hombre can govern his own affairs when his rational capacity to reason has been compromised by using Memory, Understanding, and Will as collaterals for the loan.

The group of allegorical characters demonstrates the interdependence of the soul, mind, and the senses in the cognitive process of abstraction, quantification, and calculation. Early modern Spanish mercantile culture assimilated these notions in secular terms through reflections on the cognitive process of quantifying thinking. Juan Pérez de Moya's *Arithmética práctica y speculativa* (Salamanca 1562) includes a preface by humanist Alexo Venegas de Bustos, who contends that mathematical reasoning is the cognitive function that best illustrates the essence of the reasoning mind. He contends that the *ratio*, Latin translation of calculation or *cuenta*—which also defines percentage, fraction, quotient, and the quantitative relation between two amounts—best defines rationality. Man, he writes, can reason because he can count and work with numbers—"[decir] que el hombre es un animal racional, es tanto como decir que sabe de cuenta" [to say that man is a rational animal amounts to saying that he knows how to count] ("Carta al lector").[24] This thinking process engages thought and speech before it materializes on paper, every time we appraise, calculate, or keep accounts. Working with numbers comprises multiple tasks to organize financial data in the taxonomic categories of costs, profits, debits, and credit in order to produce summaries of accounts (*carta cuenta*) before classifying data in accounting journals and ledgers. Sixteenth- and seventeenth-century business manuals document the skills and expertise at work at the business office as well as the best methods to keep up with the endless flow of paper and the constant transferring of data.[25]

Desk and Paper

In the heyday of the Iberian Atlantic trade, paper was the silent partner in all sorts of financial transactions. At the *escritorio de mercaderes*, agents, employees, and apprentices kept this paper machine running. Business writing encompassed not only bills of exchange, but also all sorts of financial contracts in banking, trade, and speculation as well as registers, orders, and maritime insurance. In his long address to aspiring computors and accountants, Valencian businessman Miguel Gerónimo de Santa Cruz, author of the best-selling

manual *El dorado contador: arithmética especulativa y práctica* (*The Golden Accounting Handbook: Speculative and Practical Arithmetic*) (Madrid 1594), imagines his most advanced student-readers producing paperwork and diligently entering data in the ledgers at the counting house of prominent merchants, to such a perfection that they might even become become business agents or *factores* in a short future:

> Los buenos contadores pueden hacerse camino en la vida, ganar buena hacienda cuando trabajan con Mercaderes, enriquecerse, y casar con las hijas de los que no pensaron y entrar de tal suerte en las casas de los Mercaderes, que se quedan por yernos los que entraron por criados, viniendo a gozar aquellas haciendas solo por este principio de saber contar.[26] (Prólogo al lector)

> Good computors and bookkeepers get ahead in life. They can make a good living when they work for merchants. Under their employer's wing, they can double their income, and even marry one of their boss's daughters. Those willing to learn will see that even if they enter as servants, soon they will become the son-in-law of wealthy merchants and enjoy, thanks to their expertise in arithmetic, wealth and position.

Factores for *Consulado* merchants in Nombre de Dios (Panama), and junior traders operating from and in Mexico, Lima, or Seville, spent long hours writing down the endless numerical relations created by exchange. Take Martín de Zubizarreta, a Basque merchant in Nombre de Dios, corresponding with his senior partners in Seville in 1526, at a time when Pizarro and Almagro were exploring the coast line of the South Sea. His letter provides a summary of all the transactions to be recorded later in the company books. The young business agent is in a hurry to reach Panama to collect five hundred uncoined gold *pesos* on the goods Almagro's soldiers bought on credit. His plan is to arrive before ten thousand gold *pesos* that Almagro has seized in booty are melted down and royal taxes are extracted. His letter mentions a balance of a total of 296 *pesos* and two grains he is sending with Juanes de Astigarraga. Zubizarreta adds that they are making a good profit on the gold because he received sixteen-carat instead of twelve-carat in exchange for merchandise. He explains what goods are in demand and what prices they can

fetch, including four African slaves, common linen and fine serge, loose nails, cattle bells, hampers, and packing-needles. He reminds his senior partners in Seville that they will find everything detailed in the company books in order to estimate his share and the advance they should send to his wife.[27]

In his first chapter of *Capital*, Marx discusses price as an abstraction worth juxtaposing to the figures that mathematicians generate. The accountant hat he often wears in the initial chapters of *Capital, Vol. I* brings him back to his earlier reflections in *Grundrisse*'s chapter on money, in which Marx briefly isolates the interrelated but unnoticed moves implicit in the logic of commodification.[28] We actively engage in quantification, abstraction, and calculation when we transform commodities into symbols of values. The discursive means we employ to obscure the natural qualities of commodities suggests how closely the factual and the interpretative are intertwined. The thinking process is neither neutral nor objective. Rather, it alternates between the noninterpretative and interpretative, to use Mary Poovey's words, between what is verifiable in relation to number—exchange value, market price, and money of account—and verbal classifications replacing the innate qualities of things—and even human beings and lifted ideals—with concepts of utility, scarcity, labor, and labor time.[29]

In *Grundrisse*, Marx illustrates this seamless logic with concrete examples from the slave trade. In the enclaves of the West African coast, a person becomes a commodity by virtue of an equation that establishes her monetary value—3 slaves = x-1, x-2, x-3—expressed as a number of copper bars, the main West African currency. Marx at once elucidates the inherent violence of this calculation as well as the thinking process that veils such an act of dispossession: "The commodities are first transformed into bars in the head and in speech before they are exchanged for one another. They are appraised before being exchanged, and in order to appraise them they must be brought into a given numerical relation to one another" (142). With this clarification, what emerges, as Marx writes in 1857, is the making of the market itself. His train of thought continues a few lines below: "On paper, in the head, this metamorphosis proceeds by means of mere abstraction; but in the real exchange process a real mediation is required, a means to accomplish this abstraction . . . money" (142). Before people could produce things for exchange, a system had to be in place to establish the structures through which commodities come together and become fungible. Marx observes that, with exchange, these habits of mind become so naturalized that it is difficult to dissect them. The

interface among abstraction, quantification, and calculation operates in the head and speech before it crystalizes on paper. The common expression in Iberian slave trade that conveys the transformation of persons of African origin into commodities is *cabeza de Indias*, which replaces innate humanity and actual violence with a unity of quantity and value to be recorded and paid.[30]

The business matrix of conventions and technologies that arithmetic, bookkeeping, and penmanship represent defines both the logic of capitalism and the paper technologies that shape, disseminate, and materialized the metamorphosis of everything—even the priceless—into a cypher. In the contract between Juan de Savarrieta, a retailer selling goods on commission in Potosi, and the wholesaler Juan de Márquez, written in April 1585, the former agrees to sell everything according to the price tags that Márquez had calculated, keeping precise records of all sales, organized by merchandise, and by transactions, following the *caxa* or *uso de mercaderes* method.

> Reciberé las mercaderías que me entregare y las beneficiaré y venderé por el orden que vos el dicho Juan Márquez me dieredes . . . que así de los precios en que las venderieres os daré cuenta por géneros y con pago a uso de mercaderes, teniendo para ello mi libro [de] *cuenta y razón*.[31]
>
> I will receive the goods from Juan Márquez, and I will sell them following his orders. I will record and report all the transactions and their prices by organizing by types of merchandise indicating when payments are received in the manner that merchants keep books of account, using for that purpose my own accounting book.

For Savarrieta, as for Zubizarreta, up-to-date and accurate records secure earnings and demonstrate profits, leading him to expect higher commissions.

The complexities of commercial transactions in an economy dominated by credit made good bookkeeping essential. Without knowledge of accounting principles and a fixed habit of applying them, business owners could easily find themselves lost in a sea of credits and debits, unaware of impending financial weakness. This is not the case of Manoel Batista Peres, one of the most prominent slave traders in Lima in the in the 1620s and the 1630s, who maintained agents in Upper Guinea, Cartagena, and Panama. His business ventures linked partners in Lima, Lisbon, Seville, and the western African

coast. According to the Inquisition records that historian Linda Newson has analyzed, Peres acted as business agent for a number of small investors before he entered in a partnership with his uncle Diogo Rodrigues de Lisboa, while continuing to trade small amounts on behalf of a number of relatives.

These ventures took two to three years and involved various kinds of commodities as well as African slaves. In Lima, slaves were a dear commodity bought on credit to be paid over several years. Peres kept his accounts in three different currencies. The outgoing cargoes assembled in Seville were paid in Portuguese *réis*, whereas on the coast of Upper Guinea accounts were kept in cotton cloth or *panos*. Finally, in the Americas, the imported slaves, wax, and other staples were valued in *pesos* and *reales*, while the remittances to the Iberian Peninsula took the form of silver bars. Managing these ventures required separate accounts for the distinct exchanges taking place at different phases of the trade. In a journal, Peres recorded chronologically the expenditure transactions on the journey. But he used DEB or *livros de há y há de haver* in Africa and Lima to keep accounts concerning both his business agents in the Upper Guinea Coast and the trade network of family members and associates in Lima.[32] Peres had 150 books in his library; among them there were three best-selling business manuals: Juan Pérez de Moya's *Aritmética práctica y especulativa* [Practical and Speculative Arithmetic] (Salamanca 1562); A later edition of Miguel Gerónimo de Santa Cruz's *Libro de aritmética especulativa y práctica intitulado El Dorado Contador* [Book of Speculative and Practical Arithmetic titled The Gilded Accountant] (Seville 1603); and Juan de Hevia Bolaño's *Laberinto de comercio terrestre y naval* [Labyrinth of Land and Maritime Commerce] (Lima 1617, Madrid 1619).[33] Peres also owned textbooks on penmanship, legal procedure, and archiving, such as Pedro Maradiaga's *Libro subtilísimo intitulado honra de escribanos* (*The Most Refined Book Titled the Penmen's Pride*) (Valencia 1565), and bookkeeping, such a Salvador Bartolomé de Solórzano's *Libro de caxa y manual de cuentas* (*The Merchant's Ledger and Journal Bookkeeping Method*) (Madrid 1590).

Thinking in Numbers

Businessmen wore multiple hats, including those of the arithmetician, the bookkeeper or *caxero*, and the scribe. Specialized texts in business arithmetic trained wholesalers, bankers, and large merchants as well as young men aspiring

to work for commercial firms, bankers, the public administration, and private estates. In appealing to their professional experience in law, commerce, and administration, technical authors such as Juan de Icíar, Gerónimo Cortés, and Bartolomé Salvador de Solórzano commend the advantages of embracing merchant practices to improve the operation of a large-scale administration and the prosperity of the state. Merchants such as Pedro Luis de Torregrosa and Duarte Gomez Solis also praise the arts of calculation as a source of moral worth and trustworthiness. This construction of the economy as a sum of techniques demonstrates and nurtures the civic virtues of prudence, diligence, and fairness delineating the art of good government.[34]

The preliminary materials in business manuals are most intriguing. They explore the language of numbers as a prose narrative that inserts exchange and finance within a genealogy of practical knowledge, where arithmetic sustains all the disciplines, in addition to the art of government and war.[35] These aspects construct traders, business agents, computers, and accountants as accountable subjects—individuals of weight and measure, reason and accountability who can understand reality in terms of figures.

The emphasis on individual industriousness and accountability pervades the many sections teaching the rules of company—from credit sales involving simple and compound interest to mortgage loans and the buying and selling of silver. Arithmetician and printer Juan de Icíar assures readers that studying the properties of numbers strengthens our capacity for abstract thought, accuracy, and attention to detail. Thanks to arithmetic, he writes, we compute quantities, weights, and measures, and audit accounts, which constitute the linchpin of civilized and well-governed republics. In a parallel argument, Gerónimo Cortés, a businessman from Valencia and author of *Arithmética práctica de Gerónimo Cortés, muy útil y necessaria para todo génro de tratantes y mercaderes* [The Practical Arithmetic of Gerónimo Cortés, highly useful and necessary for all manner of traders and merchants] (Valencia 1609), defines arithmetic as the general science of numbers and wealth:

> De suerte, carísimo lector, que el fundamento principal de los demás usos y tratos humanos, es el número, sin el cual no puede haber concierto . . . ni método en las artes, ni orden en las letras, ni destrezas en las armas, ni gobierno en las repúblicas, ni paz en los tratantes, ni razón en las cobranzas. ("Al lector")

> Dear reader, numbers constitute the main foundation of all expertise, exchange, and dealings people need to create methods of knowledge and good government in letters, armies, government, commerce, and exchange.

In Cortés's address to the reader, government means the administration of income and resources as well as the method and skills necessary to accomplish that end. Arithmeticians stressed this meaning to motivate readers to learn how to perform calculations accurately to avoid discrepancies and even fraud. But their concern with method, which they frequently referred to as *orden* or rules, belongs to a general discussion about transforming the intricate labyrinth of trade and exchange into clarity and order. The author of *Tratado de Cuentas* (*A Treatise of Account*) (Salamanca 1522), lawyer Diego del Castillo, anchors clarity, precision, and certainty in the systematic arrangement of things, words, and numbers. Similarly, the author of the manual on the *debe y ha de haber* method or double-entry bookkeeping, titled *Libro de caxa* (Madrid 1590), merchant Bartolomé Salvador Solórzano, suggests that numbers are the conceptual basis of a transparent language of exact words and certain facts.

Are numbers objective aids to describe and understand the world? Certainty in mathematics relates to a perception of truth that trusts numbers as embodiments of objectivity. Equations and figures are the prime movers of value. Their logic banks on the promise of future profit that axiomatic data and the standardized practices of commercial arithmetic create as fact. Then the chaos of exchange morphs into quantifiable categories that convey balance, proportion, and impartiality.

These notions had considerable ideological value in merchant capitalism. Placing truth and trust, rather than profit, at the core of capital accumulation took various detours. In the sixteenth century, technical authors used their address to the reader to trace the mulitple applications of these techniques in trade, the household, and political life, from Pythagoras to Plato, Plutarch, and Aristippus to the economy of credit and global trade they witnessed and documented.[36] Arithmeticians complemented the classical legacy with a variety of rules pertaining to all sorts of transactions and business operations whose scientific character had the ability to uncover the facts within a blizzard of figures. Many of these rules for calculating prices, interests, cost, or shares provided versions of "the 'rule of three' or proportion." This simple method for establishing an unknown value from three known interrelated

items was used to solve problems involving many more variables such as price, distance, and time, including currency exchange, and discount—the percentage deducted from the face value of a bill of exchange when it changes hands before the due date.[37]

Even as they taught multiple applications of the rule of three, arithmeticians stressed the art of calculation over the art of trading. Trade was a source of instability and evoked individual ambition and clear financial expectations. Conversely, the certainty of arithmetic rules made bookkeeping resistant to the risks of trade and perils of exchange. This ethics of balance and proportion resonates with older debates on exchange reacting to the commercial revolution during the thirteenth and fourteenth centuries. Joel Kaye argues that, in *Nicomachean Ethics*, Aristotle proposes that numbers aid in the description, analysis, and measurement of real phenomena. They also articulate his distinction between two complementary forms of justice. Corrective justice considers that liability reflects the injustice inflicted by one person on another, and requires compensation. Distributive justice entails the distribution of goods and property in proportion to merit. In this mathematical way of thinking, proportion implies that greater services receive proportionally greater reward.[38]

Kaye observes that Franciscan economic thinkers Pierre Olivi and Bernardine of Siena, writing respectively in the thirteenth and fourteenth centuries, incorporated these notions in order to theorize exchange as a mechanism of equalization that organized numerical relations pertaining to profits, loss, and capital independently of the intention of sellers and buyers.[39] Socioeconomic historian Hans Derks maintains that these notions are central to the twenty-seven-page description of DEB method—"Particularis de Computis et Scripturis"—that Pacioli included in his *Summa de Arithmética, Geometria, Proportioni et Proportionalita* [Complete Work on Arithmetic, Geometry, Proportion, and Proportionality] (Venice 1495). Here, the conceptual basis of DEB is balance: assets must equal liabilities.

Method and Balance

In Spain, the use of *libro de caxa y manual* (DEB) by bankers and merchants goes back to the fourteenth and fifteenth centuries, first in Aragon and later in Castile. Earlier manuals such as Diego del Castillo's *Tratado de cuentas*

(Burgos 1522, Salamanca 1542) focus on the legal aspects of accounting. Both Gaspar de Texeda's *Suma aritmética práctica y de todos las mercaderías con la orden de contadores* (*Summary of Practical Arithmetic including All Commodities and Accounting Methods*) (Valladolid 1546), and Antich Rocha's *Arithmética* (Barcelona 1564) inserted chapters discussing bookkeeping, following Luca Pacioli's model. Publication dates closely relate to mercantile innovations and government legislation that established *cuenta con caxa* (DEB) as the standard accounting practice in trade. In 1538, the *Consulado de Burgos* (merchant guild) was the first institution to demand the use of the *debe y ha de haber* (DEB) method. Soon the state followed. The royal pragmatics of 1549 and 1552 required all banks, merchants, and other businessmen, including foreigners doing business in Spain, to use this system of accounting and write their books in Spanish.[40] This legislation also frames the extended use of this professional accounting method by religious institutions such as the Jesuit order,[41] religious brotherhoods,[42] and cathedrals chapters.[43] Yet despite its extensive use, the *caxa* method was not fully committed to a textbook until the publication of *Libro de caxa y manual de cuentas de mercaderes* (Madrid 1590) by merchant Bartolomé Salvador de Solórzano.

Balance conveys symmetry as a trope of truth and fairness. Both Pedro de Maradiaga and Salvador Bartolomé de Solórzano in their respective books *Libro subtilísimo intitulado honra de escribanos* and *Libro de caxa y manual* demonstrate the practices that Zubizarreta, Savatierra, and Peres followed in their respective businesses to record transactions and payments. Maradiaga registers the pen as the best calculation tool and *libros de caxa* as the superior technology in business administration. His "Diálogo IV" tells the story of a Milanese merchant who failed to keep his ledgers in order, only for his widow to discover the true and alarming state of his finances.[44] The expertise and reputation of Valencian businessman Pedro Luis de Torregrosa operating in Spain and Italy provides the opposite example. The interlocutors Petronio and Velgara propose that the pen, as the tool for numbers and words, is the most useful instrument of trade. They claim that those who cannot work with numbers and do paperwork will see how their money dissolves into sand. On the contrary, those who excel in these skills, are prudent, and keep books will transform anything into gold. Velgara adds that, after Torregrosa learned these techniques in Valencia, he got rich doing business in Italy, where he was famous for his good judgment, expertise, prudence, reputation, and generosity.[45]

Libro de caxa or double entry bookkeeping consists of a set of three books for data entry: the waste book (*librete de memoria, diario*), journal (*manual*), and *ledger* (*libro de caxa*). Every piece of financial data is recorded twice in the company's account books, as debit and credit, in order to track the impact of each transaction on the business's overall balance of assets and liabilities. For instance, the merchandise sold to a customer would be entered as profit in the debit to the left side of the ledger (*Caxa, Debe*), and the goods sold would be placed as credit (*Ha de haber crédito*). The tallies of profit or loss are then calculated. Once the two columns have been balanced and the transaction is closed, the bookkeeper draws a line through them. Profit and loss are known at all times. The organizing principle is that the assets controlled by a firm or organization are always equal to the claims on those assets held by creditors and owners. DEB's most valuable advantage is to demonstrate to investors how their capital had been employed and the profits it generated. It also supported the infrastructure of commerce and effective administration that, by periodically balancing accounts, enabled businesses and customers to inspect records and keep fraud at bay.[46]

The affinity among financial expectations, method, and capitalist accumulation organizes the thirty chapters comprising Bartolomé de Solórzano's *Libro de caxa y manual*. The manual describes the formalities, taxes, customs, and strategies that merchants had to consider in carrying out their transactions.[47] It uses detailed practical examples to illustrate the theoretical issues concerning the relationship between assets and sources of finances (understood as capital and liabilities), the effect of transactions on the assets belonging to the business, and the effect of transactions on the relationship between the business, on the one hand, and the providers of the finances, on the other.[48]

A businessman and bookkeeper, Bartolomé de Solórzano describes, step by step, the procedures Max Weber would later synthesize. When Weber considered the organizational aspects of this technique, he theorized a rational and methodical capitalist behavior based on repetition and the pragmatic order of time.[49] The arithmetic and data-writing components suggest an endless routine of compiling transactions as they happen in waste books before they are assembled and calculated in the manual book or journal, before everything is entered in the *caxa* book or ledger. Bartolomé de Solórzano distinguishes the use of *librete de memoria* as a practice so ordinary that it requires no explanation; the opposite is true for *libro manual* and *libro de caxa*, which represent a two-tier system of classifying the value of transactions in terms of

credits and debits. He affirms that entering data in the two facing columns indicating liabilities and profit is not a mere formality. Rather it exemplifies an objective method for checking the accuracy and completeness of the ledger and to systematically record the interaction of capital and liabilities:

> [Fue] forzoso inventar . . . dos libros intitulados, el uno de Caxa, y el otro su Manual, para escribir en ellos todas sus cuentas, porque teniéndolas por esta orden se suman y averiguan con facilidad, y ven los dueños de ellas lo que les deben, y ellos deben, y todo lo demás que pretenden saber de lo que en ellos está escrito. . . . Es mucha importancia a todo género de gentes, asi de mercaderes tratantes de todas mercaderías, como a otras personas que tienen cantidad de hacienda [activos], porque teniendo buena cuenta y razón de ella, entiendese con mucha facilidad, y saben lo que deben, y lo que les deben, y la hacienda [capital] que tienen, y lo que pueden gastar conforme a la calidad de sus personas, y con esto saben como viven, y de otra manera es confusion. (Prólogo al lector).

> In order to write all their accounts, [businessmen] had to create two books, the ledger and the journal, so that they could add easily all the amounts. In this way the ledger owners could easily trace and find out what other parties owe them, their outstanding debts, and other important recorded information. Both books are extremely valuable not just to merchants, but to all sorts of people who have assets and income. Through this method proprietors can easily learn what charges are pending, what are the payments they should receive, how much money they have, and how much they can spend in reference to both the quality of their persons, and their stock. In this way, they avoid confusion while learning how to live within their means.

He stresses the importance of continuously engaging this process in accounts still in progress in order to detect inconsistencies and establish a clear picture of the business or enterprise in terms of liabilities, assets, and opportunities (fols. 41–42). The sequence of these rules revolves around the calculation of balance. He employs the Italian name *hazer abanço*, which helps the owner of the books to ascertain his capital and use the ledger to create a summary of accounts to estimate profits and losses (fols. 23–25).

The last chapter considers how merchants dealing in Spain, the Indies, and other European markets can efficiently keep their businesses afloat with this method. As an experienced merchant and business agent with operations in Panama and Peru, the author excuses the discussion of the myriad enterprises of Atlantic trade. He notices, though, the need to employ *caxeros* or bookkeepers and other persons who could be trained to manage the assembly line of paperwork and the avalanche of calculations tracing distinctive ventures until all the data is assembled into the company books. After this preamble, the chapter explains the many steps leading to this goal, including advice on how to increase gains and avoid debt (fols. 49–50).

When Max Weber approaches the problem of calculation as a technique in *The Protestant Ethic*, he reaches a similar conclusion. He indicates that the contrast between debits and credits constitutes grounds for conceptualizing financial expectations and their realization: "At the beginning of the enterprise, an initial balance, before every individual decision, a calculation to ascertain its probable profitableness, and at the end, a final balance to ascertain how much money was made" (6). As he stresses the repetitive nature of this method, he theorizes a rational and methodical capitalist behavior based on the pragmatic and detailed ordering of time, most recognizable in the Puritan conduct of life Benjamin Franklin so famously exemplified. Interestingly, his conclusion distinguishes the Puritan conduct of life that directed rational capitalist accumulation from the less productive use of these techniques in Catholic societies, where, he suggests, accounting as the means to generate value was much limited by the authoritarian guidance of confessors (77).

Bartolomé de Solórzano claimed that the *libro de caxa y manual* method represented the international language of commerce that came into perfection through the experiences of many traders, rather than from the expertise of one person. In his praise for the book, Pedro Luis de Torregosa writes that large merchants, who understand this method well, venture into great undertakings that benefit the republic, thereby proving that not only businessmen, but also sovereigns, princes, and great lords should become versed in this art.

Torregrosa was a successful Valencian merchant based in Seville. From 1559 to 1562, he served as a business agent or *factor* at the House of Trade where he increased and systematized the use of *libro de caxa y manual* in this institution. By petition to Philip II, he extended this task to the exchequer

and created the office of the General Book of Royal Finances. By the early 1600s, Torregrosa kept state ledgers managing the royal accounts for moneys distributed and received for royal services.[50] His initiative intersects with the project of creating public banks that Luis Valle de la Cerda, the exchequer of the Consejo de la Santa Cruzada, proposed in his *Fundación de los erarios publicos y montes de Piedad* (*On Establishing Public Banks and Pawn Agencies*) (1593). The project, or *arbitrio*, praises the advantages of efficient cost-accounting before mentioning the urgency of convincing the royal exchequer to implement *debe y ha de haber* as a general practice (fol. 35).[51]

The increasing interest in DEB provided a preamble to the reorganization of the royal exchequer in the Americas as well. In his fiscal treatise *Gazophilatium Regium Perubicum* (*The Royal Treasury of Peru*) (Madrid 1647), Creole jurist Gaspar de Escalona y Agüero designs a system of multilayered infrastructures with several interrelated branches of accounts and record books, alongside various levels of training for efficiently managing the royal treasury in Peru and its networks of *caxas reales*.[52] *Gazophilatium* organizes multiple networks of account books in concentric layers to ensure the accountability of officers who would manage the growing volume of reports, or *carta cuenta*, sorting out accounts on taxes paid in kind or specie, the set of conversions employed to render all values in *pesos* as the unit of account, and to detect fraud.

Juan de Hevia Bolaño's famous mercantile law compendium, *Laberinto de comercio terrestre y naval* (Lima 1617), describes the *caxa* method in terms of a minutely detailed writing form that merged the methodical descriptions of Solórzano's manual with the particulars of legal procedure in mercantile and civil law. Everything is pertinent and precise in order to produce legal proof: using blank books with specific page size and format; organizing entries properly; entering page numbers and owner's names in the right page position; and using a prescribed template for laying out all the pertinent financial information. Bookkeepers must record the following data for each entry: the day, month, and year; the amounts involved; a notation as to whether these amounts were in goods or money, moneys of account; the exchange rate for foreign trade; the reason for the transaction; and, finally, the parties involved and their addresses.[53]

By noting in detail what actions may have tampered with original entries, such as crossed-out errors, erasures, additions, emendations, interlineations, and reductions, these instructions make clear when accounts might be

deemed fraudulent. Blank pages must be avoided, and all have to be signed and numbered to prove that no pages were torn. The aim was to create a perfect document that displays skill and accuracy in order to report transactions, recount evidence, record information, and constitute legal proof. In civil law, Castilian jurisprudence held that accounting records pertaining to banking and government finance could serve as complete proof of the transactions they represented. This high degree of probative capacity also characterized the records that public notaries introduced as evidence in legal proceedings.[54]

For Portuguese merchant and mercantilist economist Duarte Gomez Solis, the subtle rules of commercial arithmetic are combined with those of navigation and the lived experience of trade. The analogy of navigation he proposes integrates the multiple uses of applied arithmetic in matters of trade into a larger discipline. If the arts of commerce provide the techniques for the smooth working of exchange, navigational charts as well as trigonometric, latitude, and magnetic variation tables make access to markets possible. In his *Discurso de comercio de las dos Indias: donde se tratan materias importantes de estado y de guerra* (*Discourse of Trade in the Two Indies Discussing Important Matters of State and War*) (Madrid 1622), Gómez Solis examines important concerns of Iberian trade during a time of intense debate over international law and freedom of trade in the context of increasing competition from Dutch ventures in both the Atlantic and the Pacific. This is also a time of intensifying engagement by Portuguese bankers and merchants in the monopolies and tax management of the Spanish crown, especially in relation to the African slave trade. His discussion on matters of sovereignty and war looks at trade with China and the central role of Portuguese merchants in reversing the flow of silver.

Solis's treatise establishes an interdependent relationship between trade as the prerogative of the state and a commonplace justification of commerce praising calculation and accounting. He argues that these skills ground the twin pillars of trust and truth sustaining genuine trade with reputable and creditworthy merchants:

> Los mercaderes son hombres de cuenta y razón, peso y medida . . . y como la mercancía está fundada sobre el crédito, y el crédito sobre la verdad (fol 109).

> Merchants are men of substance and reputation, learned in accounting and arithmetic, for trade is based on credit, and credit is based on truth.

Traders, then, become the stakeholders of a new conception of the economy as a system of forces based on expert knowledge and direct experience. Theoretical knowledge, Gomez Solis implies, lacks an understanding of real problems and practical solutions.[55] This understanding reflects the emergence of political economy in a larger context in which Spanish authors such as Greogorio González de Cellorigo (*Memorial de la política necesaria y útil restauración de la república de España* [Memorial on the Politically Necessary and Useful Restoration of the Spanish Republic]; Madrid 1600) and Sancho de Moncada (*Restauración política de España* [Political Restoration of Spain]; Madrid 1619) stand next to British Thomas Mun (*A Discourse of Trade*; London 1621) and Edward Misselden (*Free Trade, or the Means to make Trade Flourish*; London 1622).[56]

In matters of trade, he recommends beginning with the subtleties of arithmetic and the technologies of paper in order to understand the interdependent and integrated components of the economy and their specific laws, and to study them scientifically. For this purpose, he recommends examining the experiences of trade through the lenses of recorded data to enquire into the present and anticipate the future. Gomez Solis also proposes the creation of a university specializing in the arts and science of trade in order to prepare merchants, high-ranking government officials, and even rulers.

> Todas las ciencias y artes liberales tienen las teorías y prácticas, mas esta de la mercancía, quién más piensa que sabe de ella, menos tiene alcanzado y sabido, porque requiere tanta continuación y especulación, de salir todos los días a la plaza a preguntar que hay de nuevo, que de una hora a otra con los avisos de la tierra, y de las armadas del mar . . . Es la mercancía por su naturaleza prudentísima, porque no solamente se contenta con gobernarse en lo presente con los ejemplos pasados, sacando por unas cosas las otras, pero están siempre discurriendo, para prevenir las cosas futuras, como se fueran presentes. (fol. 16)

> All sciences and techniques combine theory and practice, especially the science of trade. Those who regard themselves as experts in this science are foolish. The science of trade demands constant study to understand its

> rules and order through experience and abstraction. For each day, traders have to enquire and ponder the news in the marketplace, such as the letters and dispatches about all the events unfolding in land and the wars waged at sea . . . . The science of trade is the most discerning. It seeks to understand the present with past examples, and it is constantly analyzing their interconnections, in order to prevent potential situations in the future as if they were unfolding actually in the present.

Looking closer at the world that trade created, Gomez Solis visualizes the trade routes linking Acapulco to Manila and from Panama and Havana to Seville as a great river of silver encircling the world, along with flow of credit from Lisbon, Madrid, and Seville to Amsterdam (fols. 51–52). The series of enclaves combining mining regions, exchange fairs, markets, and commercial centers describes the multiple commercial territories that integrated the Iberian polycentric monarchies, and the theaters of war they confronted with the powers that rose up to challenge them.

Gomez Solis scrutinizes the competition that Manila galleons posed to Portuguese merchants operating in East India; the threat of war over Indian and Chinese trade routes with the Netherlands and Britain; and the urgent need to build an *armada* to wage war against them.[57] His project suggests that, in the symbiotic relationship between trade and the colonial state, gunpower is ancillary to trade and merchants are the major stakeholders in the geopolitics of trade. Trade or *mercancía*, he writes, is the most necessary of the liberal arts. Similarly, merchants are men of reasoning and reckoning, given their skillful knowledge of the rules of arithmetic and accounting.[58]

Assimilating the science of trade to arithmetic and bookkeeping provided stability amid the vagaries of trade and the ever-shifting value of exchange. The risks inherent to the flow of goods, shipments, and credit seemed less threatening when trade and traders were imagined in terms of their skills. Thus, Gomez Solis protrays merchants as men of weight and measure. Their substance and reputation are determined by their lived experience and their knowledge of commercial arithmetic as a twofold method for reckoning and reasoning.[59]

Only by constantly referring to a set of up-to-date ledgers could businessmen gain an accurate reading as to the position of their enterprises. In order to depict the movement of trade, and monitor the amount, presence, and absence of goods, and the flow of credit and stock over time, merchants needed

a technique that combined the data already written down with constant updates of business information. The threefold-book structure that *Libro de caxa*, or DEB, employed (diary, journal, and ledger) made possible the overwriting and amending of existing data that could be stored rather than deleted, and conceived of each correction and deletion as a movement in an intricate mosaic of transactions.[60] Similarly, the corpus of accounts could be dissected and reassembled to trace back any missing detail, should doubt arise. Without the knowledge of accounting principles and a fixed habit of applying them, as Zubizarreta, Savarrieta, and Peres demonstrate, traders and business owners could easily find themselves lost in a sea of credits and debits, on the verge on impending bankruptcy.

Conclusion: Techniques and Modes of Representation

Late-scholastic thinkers closely observed the business practices and financial operations that facilitated long-distance trading. In addition to analyzing the explosion of prices and novel forms of banking and credit, they ideologically and conceptually constructed an international system of acquisition and exchange based on the free use of private rights. Their interpretations of the law of nations and natural law, along with their instrumental understanding of money and capital, theorized the conditions under which global capitalism flourished. This framework of pragmatic ethics, ambiguous legal notions, and juridical exceptions established moral principles to solve problems of conscience, while at the same time undermining them as befit the global market.

In comparison, the arts of commerce constituted the mundane and inconspicuous formations of the everyday life of capitalism. In the early 1900s, social theorists proposed a critique of capitalism in ethical and cultural terms, looking behind these monotonous skills in order to examine thought-provoking worldviews and forms of economic organization that might explain ways of thinking and cultural attitudes that made capitalism flourish. Werner Sombart explores these questions by proposing a theory of causality that links technology, thought, and the secular culture of religious ethnicities. Max Weber, on the other hand, looks at particular conjunctions of material and spiritual conditions that might, or might not, have lasting economic effects.[61]

Sombart notices the shared concern with usury and excessive riches that the Judaic, Catholic, and Protestant traditions held in common.[62] But he sees the invention of DEB as a device that gave the concept of capital an objective

form. He suggests that by reducing production and distribution to sets of calculations, the idea of capital was detached from all want-satisfying objectives of stakeholders in a firm, leading directly to the formulation of economic rationalism. His argument is in substance semantic. For Sombart, "capitalism" requires the notion of "capital" that DEB provides.[63]

Sombart and Weber fueled an increasing interest in examining the cultures of calculation as valuable tools to historicize the economic past. Attention to the important influence of merchants' empirical methodologies has broadened to include textbooks printed in the Netherlands, France, Britain, and the United States. As social and cultural historians study the spread of capitalism in these northern regions, they look at long-term commercial change, the rise of state accounting and political economy, and the direct links among global trade, descriptive commercial discourse, and scientific investigation.[64] They also consider the history of financial instruments, and what they reveal about economic life and the political economy that capitalism forged.

In this visible pattern of economic emulation, a clear division between North and South comes into view where matters of belief displace the technical aspects of calculation. In Europe's Catholic meridional regions, the promise of forgiveness hinders economic risk-taking. In contrast to this traditional form of capitalism, modern capitalism transforms the uncertainty of the afterlife into lucrative methodical moneymaking. Such a perspective entwines religious orthodoxy and absolutism without ever taking into account that what it is deemed as a moral economy had a pivotal role in the rationalization of economic life. The interdiction of usury in Iberian society, in fact, was the concern of canon law and moral philosophy. Paradoxically, it spurred debates that favored the spread of finance, theorized exchange as the expression of individual freedom, and conceptualized the international system of trade. These academic discussions run alongside the systematization of the arts of commerce and the secular habits of mind these skills fostered.

Historians of mathematics and accounting focusing on Spain and Latin America have documented the significance of applied mathematics and the arts of commerce as they evolved into a popular component of the early modern book trade. They also have examined the legislation promoting the standard use of double-entry bookkeeping, its extended application along with other models of accounting, and the ordinary use of these computing and recording techniques in the Atlantic trade.[65] But these studies tend to isolate applied mathematics as independent rather than a constitutive

element within the multiple interactions that Iberian early modern capitalism generated.

The central role of economic calculation makes the materiality of paper and the weight of numbers in business correspondence and dusty ledgers irresistible as an integrative component of a larger narrative about markets, merchants, and capital in the Iberian world. The set of calculation tools and apologies of trade that technical writers taught and discussed examine capitalism as a material and symbolic means of production. Although violent dispossession and capitalist accumulation are two sides of the same coin, this dialectical relationship becomes unilateral as soon as exchange is conceptualized as a set of arithmetical rules and numerical relations.

Compared to the actual exchange unfolding in the market-place, exchange fairs, banking benches, and *escritorio de mercaderes*, business manuals offer an idealized economic space in which the market emerges as a mechanism of equalization, balance, and proportion. Business documentation provided a compass in the labyrinth of operations and equations. For Pedro de Maradiaga, Pedro Luis deTorregrosa, Salvador Bartolomé de Solórzano, and Juan de Hevia Bolaños, among others, books of account remained a taciturn business partner that accepted and ratified any sort of transactions.

The author of *Libro de caxa*, Bartolomé de Solórzano, reminds us that this method is the result of trial and error, as well as pragmatic data-tinkering. He claims that *libro de caxa* is the universal language of trade. His mentor, Torregrosa, conceives that great undertakings cannot be formulated and envisioned without journals and ledgers, credits and debits. For lawyer Hevia Bolaños, these documents are key to demonstrating the probative capacity of accounts in mercantile and civil law, and to producing evidence concerning relationships of credit and debt, and property. For government bookkeepers Luis de la Cerda and Gaspar de Escalona Agüero, great advantages for the benefit of the republic stem from using this art to improve the fiscal health of the treasury. Bartolomé de Solórzano claims that the most valuable benefit is to record and lay out how capital has been employed and the profits it generated. For Gomez Solis, all these possibilities publicize the most useful mnemonic device that easily puts data on view to evaluate trade as a matter of fact and experience through the lenses of the past, present, and future.

Method and experience are the foundations of the science of trade. Both aspects rest on these templates for storing and circulating information. These

are the tools that allow merchants to discern and understand the interdependent laws and integrated components of the economy. Gomez Solis assimilates these aspects into the flow of commodities through the rivers of silver and credit encircling the globe. He holds that the arts of commerce are the techniques and modes of representation that secure the accumulation of value and anchor the accountability of merchants.

This essay has engaged the long-lasting debate over double-entry bookkeeping and the rise of capitalism from the perspective of commodification, as understood in sixteenth-century Spanish business manuals and commercial practice. I have proposed that the interface between exchange, written, and printed business culture makes tangible capitalism as a mode of organizing and conveying knowledge. In this respect, double entry represents the conceptual crucible within which goods and transactions can be broken down and reconstituted in terms of commensurable units of quantitative value.

The ledger, or *libro de caxa*, and the technologies of calculation from which it emerges disclose not only that commodification is a fundamentally representational act, but also how its logic conveys persuasive ways of thinking, speaking, and writing that historically have produced multiple sets of hierarchies. The data in balance sheets and ledgers reveal the power of routine and the ascending chain of supervision that make accountable the very persons who embrace the regulatory regimes they employ and disseminate.[66] These regimes of calculation veil the economic inequalities and other forms of violence implicit in the reproduction of class, race, and gender divisions. Accounting records rarely give voice to forced laborers, slaves, and indigenous populations, yet they provide an archive of the very acts of violence mediated by exchange and capital accumulation.[67]

In sum, reorienting early modern Iberan capitalism means reexamining the creation and organization of economic knowledge as an epistemic practice, in light of the techniques that constitute capitalism as a sum of business methods, instruments, and practices. These tools of economic rational calculation highlight the instrumental understanding of money and capital and its pervasive influence in early Iberian commercial society—from scholars theorizing colonial expansion and the universal system of trade, to business agents, merchants, lawyers, administrators, and technical authors. These economic actors also invite us to consider how their utilitarian knowledge equipped them to grasp the new economic and business experiences of the

credit economy and global trade. Finally, they also ask us to consider capitalism as a recurrent phenomenon that makes new histories look old and the classical divide framing the economic rise and fall of nations doubtful.

NOTES

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1. This epistemology consists of the techniques and methods of practitioners. Pamela O. Long argues that epistemic knowledge stems from men and women who either work with their hands in craft production, or carry out complex practical tasks in a range of occupations. Epistemic practices also indicate the socially organized knowledge that communities of experts legitimize.

2. This is a sample of commercial textbooks written by both clerics and merchants. Well-known titles written by clerics include Juan Ortega, *Suma de arithmética y geometria pratica utilissima* (Lyon, 1512); Juan Andrés, *Sumario breve de la práctica de la arithmética* (Valencia, 1515); Gaspar de Tejada, *Suma de arithmética pratica y de todas mercaderias; con la horden de contadores* (Valladolid, 1546); and Juan Díez Freyle, *Sumario compendioso de las cuentas de plata y oro* (Mexico, 1556). Textbooks written by merchants includes: Marco Aurel, *Libro primero, de arithmética algebratica, en el qual se contiene el arte Mercantiuol* (Valencia, 1552); and Salvador Bartolomé Solórzano, *Libro de caxa y manual de mercaderes* (Madrid, 1590). Gerónimo Cortés, *Arithmética práctica muy útil y nessaria para todo género de tratantes y mercaderes* (Valencia, 1604). For a discussion on the demand for tables to reckon silver, see Vilches's "Trade, Silver, and Print Culture in the Colonial Americas."

3. See Nemser's "Primitive Spiritual Accumulation and the Colonial Extraction Economy" and More's "From Lines to Networks: Carl Schmitt's Nomos and the Early Atlantic System."

4. See Roncaglia 493.

5. See Nemser, *Infrastructures of Race*, 20–21.

6. See Urton's "Mathematics and Accounting in the Andes before and after the Spanish Conquest," 17–8, 29. See also his study "Sin, Confession" and Bishop's "Western Mathematics: The Secret Weapon of Cultural Imperialism."

7. See Bakewell; Dell; and Evans.

8. See Dainotto.

9. See Arrighi 81, 159.

10. The received notion that capitalism and the Iberian world are historically antithetical has dominated economy history. Economic historians have typically argued that the dynamics of the absolutist state constricted production and trade ventures in Spain and Colonial Latin America. In "Polycentric States: The Spanish Reigns and the Failures of Mercantilism" Regina Grafe argues that this historiographical tradition dismisses the fact

that compared with Britain and the Netherlands, Spain was a composite state that fostered a complex geometry of multilateral negotiations in all aspects of trade (242–47). See also De Luca.

11. Grafe and Irigoin argue that the Spanish Empire was self-financing as it continued to expand territorially. These were private initiatives that sustained the system by the cooptation of regional mercantile elites (612). For a discussion on the materiality of paper as the most visible tool of empire, see Piedra and Sellers-García.

12. See Tutino 12–14.

13. See Braudel 565–70.

14. See Vitkus.

15. See recent studies on the new history of capitalism by Rockman; Deringer; Rosenthal and Zakim's "Producing Capitalism" and "Bookkeeping as Ideology."

16. See Braudel 570–72.

17. See Koskenniemi; Schüssler; and Decock.

18. See Weber, *The Protestant Ethic* 6, 75–77.

19. See Aho 28–29.

20. See Derks 204–06.

21. See Foucault 108–10. For further discussion about notions of rationality intersecting across the works of Weber and Foucault, see Colliot-Thèléne.

22. See Le Goff; and Dameron.

23. See Franciscan friar Francisco de Osuna, *Abecedario espiritual* (published through 1527–1554), and Luis de Granada's *Libro de la oración y la meditación* (Antwerp, 1558). On the dissemination of applied mathematics in early modern Spanish culture, see Vilches's "Figures of Arithmetic."

24. Juan Pérez de Moya's *Arithmética práctica* (Salamanca 1562) was used as textbook well into the eighteenth century, with a total of thirty editions. The mathematician addressed this work to crown prince Charles (1545–1568). The author describes the table of contents in his address to the reader. The preliminary materials also include a letter to the benevolent and devout reader by Alexo Venegas, the preceptor of Madrid's grammar school, El Estudio de la Villa. Pagination begins in the first chapter.

25. See Salavert and Müller.

26. *Dorado Contador* was approved by Pedro Ambrosio de Ondériz, the director of the Academy of Mathematics in Madrid. Pagination numbers start in the first chapter.

27. See Lockhart 20–21.

28. See Marx *Grundrisse*. R. A. Bryer argues that the principles of political economy Marx studies in his works align with the notions of accounting that were commonplace in Britain through the nineteenth century.

29. See Poovey "For Everything Else."

30. See Vega Franco.

31. See Choque Mariño and Ovalle 80.

32. See Newson 347.

33. See Guibovich Pérez. Pedro Rueda Ramírez identifies seventeen bookseller lists from Mexico and Lima, including Pérez de Moya's arithmetic textbook, and twelve for *Dorado contador*.

34. In "Arbitristas,"Anne Dubet and Gaetano Sabatini argue that Spanish mercantilist authors understood the art of government as a cumulative sum of wholesome individual economic practices converging in the ideal body politic that political economy nurtured to its optimal health.

35. See Cortés "Prefacio al lector," np.

36. See Andrés; Icíar; and Cortés.

37. See Caunedo del Potro and Salavert Fabiani.

38. Kaye 79–87. Francisco de Vitoria, Domingo de Soto, and Luis de Molina discussed commutative justice in correlation with *dominium*, or property rights, in political and economic terms ambiguously consistent with imperial and financial expansion. For further discussion, see Koskenniemi; Schüssler; and Alonso-Lasheras.

39. See Kaye 42.

40. See Hernández Esteve.

41. See Quattrone.

42. See Carmona; and López Majón.

43. See Villaluenga de Gracia.

44. See Maradiaga fols. 24–35; and Salvador Solórzano "Prefacio."

45. See Maradiaga fol. 34.

46. See Edwards.

47. See Donoso Anes.

48. Accounting historian and banker Esteban Hernández Esteve has documented that Salvador de Solórzano combined this commitment as business agent with his own successful ventures in the Indies, and that his book was very well received. Pedro de Madrigal printed 1500 copies of *Libro de caxa* in Madrid in 1590, and by the time the author traveled to Panama only 780 copies remained. Antonio de San Román, a bookseller in Medina del Campo (Valladolid), received 200 copies. The next year, Diego Felipe de Andino and Bartolomé Porras took 180 copies to New Spain and were trusted to remit the proceeds. Juan Malón de Echaide, administrator and business agent for the Leza and the Corso network, kept 400 unbound copies for sale and remitted the proceeds to the author, who had invested 87,210 *marvedís* to cover publication costs. *Libro de caxa* has no pagination for the preliminary materials.

49. Weber, *The Protestant Ethic* 22.

50. See Hernández Esteve "Pedro Luis De Torregrosa."

51. See also Dubet, "El arbitrismo como práctica política: el caso de Luis Valle de la Cerda (¿1552?–1606)."

52. See Tepaske and Klein.

53. See Hevia Bolaño *Laberinto de comercio*, Book 2, Ch. 8, Para. 5.

54. For discussions on legal culture and the materiality of paper, see Burns and Mills.

55. For the debate on the importance of expertise and hands-on training in early modern Spain, see Corteguera.

56. See Magnusson 25–27; and Wachtel.

57. See Gomez Solis fols. 13–14.

58. See Gomez Solis fol. 109.

59. See Gomez Solis fol. 109.

60. See Müeller 42–45.

61. Day and Gaido 390.

62. See Henaff 293–95. See also Sombart's *Quintessence of Capitalism* 103–182; Weber *The Protestant Ethics* 77; and *General Economic History* 223–76.

63. See Carruthers 36.

64. See Brenner; Poovey; Cook; and Soll. See also references included in note 7.

65. An example of major studies includes the works by Elena Ausejo, Betsabé Caunedo del Proto, and Jose María López Piñero. I have drawn from these studies and those on accounting by Hernández Esteve and Donoso Anes among other accounting historians to understand how business tools and outlooks worked together during this time period.

66. See Miller and O'Leary.

67. See Fleischman.

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