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Elvira Vilches

TRADE, SILVER, AND PRINT CULTURE IN THE COLONIAL AMERICAS

*The global reach of trade during the early modern period triggered a wave of commercial didactic publications. In the Americas the most popular commercial books, known as *reducciones o cuentas del oro y de la plata*, taught how to reckon the multiple varieties of unminted silver in circulation. Technical writers helped establish the conventions needed for markets to function by demonstrating skill and accuracy. Manuals typically included conversion tables and ready reckoners in order to expedite business and spread confidence among sellers, buyers, and consumers. Rather than considering money as a mere commodity and medium exchange, these manuals illustrate that money is embedded in a mesh of social rules, mechanisms, and institutions that establish notions of value, price list, credit, and trust.*

Keywords: American silver; monetary practices; business methods; ideologies of commerce; practical knowledge; print culture

The world that trade created during the long 16th century was entangled in a global silver web meshing forced labor with all sorts of commodities from American cochineal to Chinese wares, European finery and staples, and African slaves.¹ Compared to the role of violence in market formation and capital accumulation, mercantile culture may seem less relevant, yet it is impossible to imagine the traffic of goods, people, information, and revenue without the business methods, skills, and the conventions necessary for markets to function.² The relevance of these overlooked ordinary aspects of capitalism calls attention to the uneven relationship between the conceptual and material aspects of commerce, as well as the prerogative of the market over money.

This article examines the business practices that made possible the flow of goods and capital in the 16th and 17th centuries. I study the relationship between markets and money by looking at the intersection of trade and the history of the book. With the vigorous expansion of trade in the 16th century the arts of commerce reached everywhere across the Spanish empire. Arithmetic, accounting, bookkeeping, the central skills of *arte mercantil* spread not only through everyday trade practice but also by how-to business manuals published throughout Aragon, Castile, Mexico, and Lima.

In the Americas the most popular commercial handbooks were generally known as *reducciones* or *cuentas del oro y de la plata*. This segment of didactic publications offered readers practical information about all aspects concerning the exchange of unminted silver. I argue that the circulation of silver bars and wedges challenged the traditional basis of trust in money by shifting the ground of trustworthiness from the pledge of monarch to the faith in numbers and the demonstration of skill and accuracy in both

commercial publications and the routine of exchange. Being the yardstick of value, silver could circulate as either unrefined or refined metal. Known as *plata corriente* unassayed silver could be exchanged at a lower price because of its unknown fineness. However, in practice the distinction between both types was not so clearly established, neither was there assurance that the refining process was accurate, nor that purity and weight were properly reckoned, nor that subdivisions were accurately calculated when assigning a market value. Thus the problematic exchange of silver raised a constellation of questions. What was the process of putting an exact numerical value to a piece of plate? How did creditors and debtors grapple with inaccuracies and the likelihood of error? What was the procedure to establish the purity of unminted silver and how was it regulated? How did the producers of silver manuals establish their books' credibility? To what sources of authority did they appeal? All these questions suggest a general concern about what form money should take, what its meaning should be, and how its value should be reckoned.

Trade, money, and print culture

The economic treatises that proliferated from the 1540s onwards all viewed the merits and inequities of trade through the lenses of moral philosophy, international law, and political theory. Commerce was understood as the means to progress and sovereignty. But the practical manuals emphasized the commercial dimensions of political life, mastering mercantile law, and becoming skilled in the arts of commerce. Philosophers viewed commerce as the means to wealth as well as the source of inequality and change, and jurists examined the nuts and bolts of trade regarding markets and the community of nations. But the technical writers praised the advantages of commerce by demonstrating practical skills. They taught and disseminated the arts of commerce, the skills and tools that enabled exchange, and established the conventions markets need to function. This shift of focus from political and economic abstractions to actual mercantile practice entails a different appreciation of money.

Typically money is defined in terms of its functions as a medium of exchange, a means of payment, a unit of account, and store of value. From early economic writings to orthodox economic theory the capacity of money as medium of exchange has been considered as its most important function, from which the others simply follow (Ingham 2002). As pure exchange value, money is necessarily assumed to lack any specific meaning by virtue of neutralizing all possible distinctions between commodities, for in their money form all commodities look alike (Marx 1992: 111). Unlike any other known object money is free from quality and exclusively determined by quantity. This uncompromising objectivity makes money the most perfect means of economic calculation (Weber 1971: 331) that transforms the world into an 'arithmetical problem' (Simmel 1950: 412). By homogenizing all qualitative distinctions into an abstract quantity, money allows the 'equation of the incompatible' (Marx 1973: 163). At the heart of this logic lies the notion that monetary instruments are mere conventions that naturalize the power to make the world. Yet money does not exist in a vacuum but rather is central to a complex web of dynamic social structural conditions within which people act and interact (Ingham 1998).

Rather than considering money as a mere commodity and medium of exchange, commercial handbooks understood money as a social construct, continually negotiated among creditors and debtors. What mattered, then, was not the physical money stuff but rather the notion of a unit of account. The central function of money was to provide a unit of measurement for defining, recording, and comparing value. As an abstraction of value, money of account expresses debts and prices and in the process generates secure credit relations. Money of account, whatever its form (cacao beans, beads, shells, cloth, gold, silver, credits, or debits), is the pivotal element of monetary practice for it is the essential means by which price lists are constructed and multilateral and inter-temporal exchange is made possible (Ingham 2000).

Contrary to the narrative that views the market as the conclusion of a progressive evolution from barter to the minting of coins, monetary practice suggests that money is created and maintained by the social relation of credit and debt (Ingham 1998; Wray 2000; Graeber 2011; Desan 2014). Money is embedded in the development of specific social rules, mechanisms, and institutions that establish notions of value, price lists, and credit. These social relations are the cause rather than consequence of markets, exchange, and capitalist production itself. In fact, the interaction between creditors and debtors, issuers and users, creates the monetary space where exchange can take place. This social sphere is logically and historically anterior to the market (Ingham 2002).

The handbooks teaching how to reckon silver illustrate the monetary practices that regulated the circulation of unminted silver as a means of payment to clear debts and establish prices. They clarify that silver is indeed a medium of exchange, but that it only becomes money when its standard of fineness is fixed. The famous *real de a ocho*, or piece of eight, circulated 'by tale', that is, by a face value guaranteed by the issuing authority. But plate could not be exchanged or taxed without the possibility of error in measuring its weight, fineness, or market value.

The purity of the metal can only be achieved with great skill. Most often gold is mixed with silver, along with mercury and copper, while silver contains a larger portion of alloy in the form of lead and mercury. Goldsmiths and assayers regard the purity of metals as a whole broken into certain grades, according to the proportion of impurities found in the metal. If gold is divided into 24 equal parts called carats, silver is divided into 12 equal parts or degrees called *dineros*, which are in turn subdivided into *granos* or sterlings (Galiani 1977: 122). As *plata ensayada*, silver bars of 11 *dineros* and 4 *granos* carried the marks of purity from the assayer and the silver master, as well as tax stamps.

The market price of silver was reckoned in unit of account. Thus eight ounces of sterling silver (11 *dineros* 4 *granos*) was worth 2210 *maravedís*. Although this value was liable to fluctuate, it established the benchmark of any fiscal and commercial transaction. What was accounted for was the abstract value in unit of account in order to convey the purchasing power of silver. Without silver there is no trade, but without a *numeraire* or tradeable entity in terms of whose price the relative price of all other commodities are expressed there cannot be a market.

Money is a commodity, but it has to be constituted as money, according to an abstract money of account, before it becomes a commodity (Grierson 1977: 10). In this conception, money, regardless of its form or substance, is a socially constructed abstract value that expresses purchasing power in a money of account. In the Spanish renaissance kingdoms the unit of account was the *maravedí*, which, interestingly, was

never minted. After the royal pragmatic of 1497 the measure of value was grounded on the pound. Eight ounces (or one mark) was the unit of weight to mint gold and silver pieces and alloy fractionary coins. The Castilian bimetallic monetary system consisted of the gold coin *excelente* or *ducado*, and later the *escudo* worth 375 *maravedís*, the silver *real* of 34 *maravedís*, and *blancas*, small change coins made of a silver and copper alloy that were worth either 2 or 4 *maravedís*. The *maravedí* was established as the basic denomination together with the *ducat*, the money of account for larger sums (Gil Farrés 1959: 226–32).

In the Americas the *maravedí* coexisted with colonial units of account linked to assayed and unrefined silver. Inca Garcilaso de la Vega (1539–1616) gives us a sense of the complexities of a monetary space lacking coins but abundant in silver. He describes the various types of bullion in circulation, and the different terms used in Peru to indicate units of weight and price:

In my time, which lasted down to the year 1560, and for twenty years there was no coined money in the country. In its place Spaniards bought and sold by weighing gold and silver by the mark and ounce. As in Spain they speak of *ducats*, so in Peru they speak of *pesos* or *castellanos*. Each peso of silver or gold, reduced according to the correct rule, would be 450 *maravedís*. In reducing the *pesos* into *ducats*, every five pesos is worth six *ducats*. Thus the system of counting *pesos* in this history will cause no confusion. The system of counting the quantity of silver *pesos* in a peso of gold varies much, as it does in Spain; but the value is always the same. In exchanging gold for silver they give interest at so much percent. There is also interest charged in exchanging assayed silver for silver they call current [*corriente*], being that which is to be assayed. (2010: x–xi)³

The transactions Inca Garcilaso describes are not daily close-ended purchasing transactions, but rather delayed payments. Most transactions relied on credit and projected abstract value through time. Outstanding payments were made and debts cleared on books of account before they were eventually paid in bullion. Both gold and silver embodied characteristics of durability and scarcity that gave them universal appeal as recognizable centers of stable value. These characteristics were highly prized in a world where monetary circulation was basically metallic or in which letters of exchange were normally liquidated either by other bills or in currency.

The sociability of commerce

The blizzard of transactions and bookkeeping that merchants, clerks, and consumers had to sort out was overlooked in contemporary discussions about commerce and trade. Early modern economic thought approached commerce by tracing its history all the way from an imagined natural state previous to civil society, to ancient Greece, and the current situation at hand. This undertaking created a narrative consisting of a shift from reciprocity and collaboration to conflict caused by parallel changes in money from barter to currency, and from coin to credit. These thinkers understood that trade derived by convenience from the profitable exchanging of goods from nation to nation, and from place to place, as people found their neighbors possessed of what they

wanted, and themselves having to spare what their other countries did not produce. They also argued that this reciprocal configuration brought together peoples of distant lands advancing notions of civilization and commerce (Mercado 1569: fols. 2–5). This view of commercial society went hand in hand with notions of trade as the means of sovereignty and the terrain of conflict.

In early modern Spanish society there was a remarkable awareness of the global reach of trade and the interconnectedness of distant societies linked by commerce. In this context commerce was discussed as a twofold category that combined the Latin meaning of *commercium*, to generally convey communication, exchange, and interaction, with the modern notion of market trade and economic arrangements.⁴ In New World historiography both meanings surface in a rich vocabulary of material transactions contemplating all sorts of exchanges from the presenting of gifts, to bartering, bargaining, and purchasing (Vilches 2010: 96–117). The increasing recognition of multiple networks of exchange and valuables define the criteria for identifying relations of alliance and enmity among the peoples of the Americas as well as their notions of civility.

In addition to narratives of exploration and conquest, these notions were more fully developed in historical works seeking to demonstrate the progression of Indian society from a state of savagery to one of civilization. Fray Juan de Torquemada's *Monarquía Indiana*, for instance, established such a development by equating Moctezuma with Alexander the Great. But his parallel of forms of rule in Nahuatl and classical antiquity was articulated around the sociability of commerce in Mexican societies. Books 1 and 2 discuss to what extent the desire to interact with other nations and the ensuing rivalry for tribute and trading routes marked the coalitions and conflicts among Aztecs, Tlaxcalans, Xicalancans, and other peoples in the Chalco province (1615, 1713).

This sensibility to the sociability of commerce was central to cosmography as well. The idea of a universal community of humankind peacefully communicating across trade routes through continents and oceans is clearly conveyed by Martín Fernández de Enciso in his *Summa de Geographia* (Seville 1519) where the whole world becomes the object of the geographer's measurements and descriptions and the astrolabe the tool for global trade. The reckoning of altitude, trigonometric tables, studies of climate, physical geography, together with the description of ports and commodities, illustrate the expanse of commerce and its networks of trade as the icons of civilization and well-ordered societies. The consensus is that trade advances the progress, civility, and prosperity of nations by promoting the exchange of goods along with ideas, laws, and useful techniques.

The jealousy of trade

The view of humans as fundamentally commercial beings, engaged in exchange and interaction with other peoples beyond those of their society, became central to the ensuing debates about the legal and moral bases of imperial acquisition. In his lecture about the Spanish conquests of the Americas delivered in 1539, Francisco de Vitoria argues in favor of a right to engage in partnership and communication with others throughout the globe and across the oceans. He notes that open seas, rivers, and ports allowed anyone to visit and travel through any land he wished to, creating a certain kinship among all humans (1992: 276–78).

Yet with mercantilist discourse the notion of peaceful intercourse based on reciprocal exchange among nations morphs into concerns about rivalry and jealousy of trade. In the age of universal commerce, most mercantilist writers considered that prosperity could only be achieved by means of balanced trade. A few years after the conquest of Mexico in 1524 humanist Hernán Pérez de Oliva imagined that such an intense traffic would make pathways across the high seas. He observed that the real rivers of gold were not the ones in the Indies, but those rivers in Spain with ports selling their wares. 'For the Indies,' he wrote, 'is a bare land where there is no wine, no bread, but gold, in which power consists, and which has to be spent in order to acquire everything people need for their sustenance' (1801: 257–65). From the publication of Luis Ortiz's *Memorial del contador Luis Ortiz a Felipe II* (Valladolid 1558) onwards mercantile authors changed the scenario of galleons plowing the seas to that of weak trade by overstating the reliance of imported manufactures, and the concern that rivals could thrive on Spain's imports.⁵

Looking closer at the world that trade created, Portuguese merchant Duarte Gómez Solís, the author of *Comercio de las dos Indias* (Madrid 1622), imagined that the galleons sailing from Acapulco to Manila and from Panama and Havana to Seville, together with the circulation of credit from Lisbon, Madrid, and Seville to Amsterdam, all created a great river of silver encircling the world (*Comercio de las dos Indias* 1622: fols. 51–52). The series of enclaves combining mining regions, exchange fairs, markets, and commercial centers described not only the breadth of trade and the reach of commercial and financial networks, but also the multiple centers that integrated the Iberian polycentric monarchies.⁶

Thinkers also wondered whether the advantages of commerce were inseparable from its use as the means of political power. Discussions across Europe saw commerce as an act of collaboration and competition that brought people together while increasing the inequalities between them. The force of the argument from late scholastic theorists like Tomás de Mercado, to jurists like Fernando Vázquez de Menchaca, and Hugo Grotius, is that societies are not self-sufficient. Because natural resources have not been distributed equally over the world, people obtain the products they lack in exchange for the goods they possess in abundance (Brett 1997; Weindl 2009). Diplomat Diego Saavedra Fajardo summed up the tensions of overseas trade by noticing that navies nourish states with trade while defending their territories with gunpowder (1999: 775).

Markets and money

Arguments for international competition assimilated both trade and money to the body politic through anthropomorphic metaphors, such as Cicero's formulation of a large money supply as the 'sinews of war' (1903: speech 5, chapter 2). Alonso Carranza illustrates this notion by comparing money to the lives of men and muscle of armies (1629: 209). Similarly, Saavedra Fajardo stresses the conceptualization of the polity as organic whole by assimilating the vigor of the body politic to both iron and precious metals. Weapons, he writes, are the arms defending the republics, whereas treasures provide their blood and strength (1999: 783).

The subject at hand is not the nuts and bolts of buying and selling, but rather a more refined knowledge of trade. José Veitia Linage in his *Norte de contratación de las*

Indias occidentales (Seville 1672) sees trade as the prerogative of the state. The commissioner and treasurer of the *Casa de Contratación* explains that as all ships at sea are guided by the compass needle pointing to the north, so trade may be guided and directed by the volumes of legislation, ordinances, and documents he has compiled and assembled so that the Spanish global monarchy may thrive and strengthen with the fruits of commerce.

Viewed through this lens the market appears as the terrain of economic activity and money as the instrument of trade, the object of capital accumulation, and the means to power. This understanding places money in the background of the developments of world trade with its scenarios of competition and rivalry among emerging states.

Money and exchange

Compared with mercantilist authors, scholastic thinkers expressed more pragmatic concerns about the interrelationships between markets, exchange, debtors, and creditors. By considering money a commodity and exchange the ultimate source of value, Martín de Azpilcueta Navarro, one of the most salient of the Salamancan thinkers, contended that money's ultimate worth depended on the utility it brought to its possessor (Grabill 2007: 72). Economic scholars argued that the nature of money is that of a commodity. Money could be bought and sold like any other goods, and its estimation and price rose and fell with the demands of the market. What mattered, then, was not the stuff of money, but rather the notion of understanding money as a token of trust, dispersing confidence among sellers, buyers, and consumers. Anticipating Simmel's classical argument about money as a claim upon society, Tomás de Mercado explained that public confidence relied on the pledge of the prince, whereas the exchange of bullion relied on the sacredness of the metallic weight and assay mark as determined by custom and ratified by law (Simmel 2004: 177). He also explained that, although the weight and fineness of coins were the true measure of commerce and foundation of good government, their estimation would always be variable. For him the quantitative factors affecting money's value were the result of extensive networks merging money, commodities, laborers, commercial enclaves, and meshed webs of credit crisscrossing oceans (1569: fol. 59).

Mercado emphasized the notion of convention by suggesting that money on its own is worthless. What makes money valuable, he argued, is its function as a measure. He compared the coin with the clock in order to illustrate that currency required a comparable degree of exactitude, as both were the moral compasses of good government. A well-ordered republic, he wrote, depended on precise and reliable clocks to organize social life and relied on accurate, reputable, and trustworthy coins to guarantee fair exchange (*ibid.*).

Accounting for money

Rather than being unique to the realm of the merchant, the rudiments of numeracy, commercial arithmetic, currency exchange, and account keeping were the concern of a larger sector of society that had to develop cognitive spryness and quantitative

sophistication as growing Atlantic markets brought a vast amount of goods and currencies into their personal experience. In an era before effective national currencies or standard units of weight and measures, fluctuations in valuation and denomination existed from region to region and city to city.

If we were to travel back in time to the early modern period and send goods and money throughout the enclaves and financial hubs of Atlantic trade, we would have to become not only fluent in credit and insurance, but also good appraisers of currencies, weights, and measures. Accounts, bookkeeping, and credit contracts were the universal language of trade and so were numbers. But the wide range of currencies circulating in the Spanish renaissance kingdoms added layers of difficulty to the *lingua franca* of commerce. To appreciate the complexity and flexibility embedded in exchange we need to remember that in both the peninsular kingdoms and the Americas specie circulated along with bullion.

In Spain, Castile and Aragon had their own currencies and measures, the latter including the contrasting moneys of Barcelona and Valencia. In the Americas pieces of unminted silver of variable quality were the ordinary means of payment in mining and metropolitan areas. Smelted in the form of bars and wedges, silver of different degrees of purity circulated with other forms of commodity money such as cacao, cotton cloth, and yerba mate (Giráldez 2012; Gelman 1984).

With so much metal of varying quality in circulation proprietors, creditors, and debtors had to become experts in their evaluation. The worth of shares, revenue, and transactions was completely altered if the value of the metal was miscalculated. In this process those who were versed in the empirical method of assaying and had keen arithmetical skills stayed ahead.

Dealing with various types of monetary objects and units of account was an ordinary but cumbersome practice. In the Americas monetary practice combined assayed and unrefined silver, coins from peninsular and colonial mints, and multiple countable commodities, as well as colonial and peninsular units of account. Everyone had to become a skilled appraiser of goods and currencies and acquire the ability to calculate currency conversions and prices of large packets of goods. Everybody from settlers, laborers, clerks, to merchants had to master the rules of 'barter and allegation' for computing commodity prices and quantities expressed in compound numbers and different units, as well as the 'rule of three' to convert mixed values from one unit to another (Burdick 2009). These areas of practical knowledge define a mercantile culture that reckoned with commerce by becoming numerate and learning about all aspects of finance.

Commercial textbooks demonstrated how to become fluent in all areas of commerce.⁷ Using Hindu-Arabic numeration, arithmetic manuals taught the use of standard procedures for addition, subtraction, multiplication, and division of whole numbers, fractions, and compound numbers associated with quantities expressing weight, length, and volume. Authors of these treatises borrowed freely from each other both in the form of words used in explanatory texts and in the enunciation of problems.

The diverse currency and measurement systems of the Spanish kingdoms held a central place in these manuals. Calculation aids such as ready reckoners and tables of equivalencies for coins, weight, volume, and distance filled their first pages. Word problems ranged from money exchange and the reckoning of prices to the calculation

of interests and shares in any currency, bullion, or unit of account. Compound numbers were key to quantifying weight of all goods, including money in the form of either coin or bullion (López Piñero 1979).

The progression from basic to more sophisticated problems in these manuals suggests not only a diverse audience, but also the understanding that money fluctuates between the abstract and the concrete. The multiplicity of monetary forms required the capability of mentally converting different units and even commodities to the unit of account, typically the *maravedí* and, for large payments, the *ducado*. This process also entailed dealing with variations in value and denominations across Spanish kingdoms in the Old and the New Worlds.

Exchanging silver

The manuals for reckoning silver printed in Mexico and Lima from the 1550s onwards specifically address the circulation of a wide range of silver in a monetary space wherein the contrasting scales of the global and the local created a chronic scarcity of metallic specie. In the Viceroyalties of Mexico and Peru colonial administrators and rich merchants gathered large stocks of silver in preparation for the arrival of the treasure fleet in order to avoid delays and reduce cost. The latter had to have enough stock to buy large import cargoes at the great annual fairs held after the arrival of convoy ships from Spain or the Manila galleon. Powerful ecclesiastical institutions also accumulated important stocks through church taxes in order to subsidize future expenditures and ensure a continuous flow of credit investments (Marichal 2006: 43).

Silver circulated in the form of bars and wedges. In the colonial mints, owners could exchange these commodities for coin, yet most mining districts had no mint, and the scarcity of coin required that everyone had the skills to assess fineness and weight, assign a market value, and reckon how to pay taxes and how to pay for purchases, labor, and credit. Refining and minting combined government and private operations. Although the treasury charged assaying fees and levied a royal fifth, the government leased these positions as well as the colonial mints (Brown 2012: 23). The fact that assaying and minting did not operate at the same pace as business created the opportunity for yet another trade. The silver merchants provided faster service. The *mercaderes de la plata* dominated the credit hierarchy. They accepted unrefined silver at a discount rate in exchange coin, which they minted on a very large scale (Hoberman 1991: 83; TePaske and Brown 2010: 71).

These transactions entailed a constellation of arithmetical operations. The assay fee and the *quinto* took a total of 21.2 % of silver, and mine operators and refiners looked for ways to cut their costs. In Callao, Lima's port, merchants paid a fee of 4% of their silver to embark it unregistered. In Panama and Portobelo the rate was 2%, and 8 % was the fee that royal officers asked for removing silver from the official ledger, and the illegal transportation fee was 4 – 5% (Giráldez 2008: 28). *Plata ensayada* was exchanged at a premium, whereas *plata corriente* or unrefined silver had a lower market. These distinctions did not matter in trade. Mercado comments that in the 1550s merchants received payment in any form of silver because what mattered was volume rather than degrees of fineness (1569: fol. 58).

Both the government and the market regulated the price of silver by grain, the smallest unit of weight. A perfect mark of silver weighing 8 ounces was to hold 12 *dineros*, divided into 64 eighth parts, with each *dinero* consisting of 400 grains. Fine silver free from any alloy was said to have 12 *dineros* and be worth 2400 *maravedís*. Sterling silver was 11 *dineros* and 4 *granos* and was valued at 2210 *maravedís* (Veitia Linage 1672: 225). As the Marquis of Cadereyta, the Viceroy of New Spain (1635–1640), put it, ‘without silver, which is the only thing that gives value to foodstuffs and merchandise, there is no trade’ (Hoberman 1991: 71). The handbooks teaching how to reckon silver illustrate the monetary practices that regulated the exchange of silver as a means of payment to clear debts and establish price list. They clarify that silver was indeed a commodity, a medium of exchange, but it only became money when its price of a mark of sterling silver (11 *dineros* and 4 *granos*) was fixed at 2210 *maravedís*.

Given the multiple manifestations of silver and the wide range of quality, silver became a prominent topic in the print culture of the period. Compared with texts exploring the nature of metals and the best methods to refine silver, the most striking feature of the commercial handbooks generally known as either *tablas del oro y de la plata* or *reducciones del oro y de la plata* is the large amount of numerical information accounting for all the transactions described above.⁸ Silver is classified in terms of unit of account: 2400 *maravedís* identifies the highest degree of fineness, 2210 *maravedís* conveys sterling silver, with smaller figures establishing lower degrees. These values provide the basis for reckoning the remaining sum of sure money after paying refining fees and the royal fifth both for contracting and for keeping accounts. Tables also reckon the abstract value of pieces by listing all the imaginable ways in which a mark or 8 ounces of silver can be divided into smaller units. As in the former example the degree of purity is given in *maravedís* rather than *dineros*, the silver unit of weight comparable to carats in gold. Yet these benchmarks often fluctuated in a wide range of transactions between miners, owners, mints and silver merchants (Veitia Linage 1672: 226).

Other conversion tables compare the value of silver against other countable commodities like cacao beans, Chinese gold, and cotton cloth in Mexico, or against colonial and peninsular coins, such as Mexican *pesos de tepuzque*, the global *pesos de a ocho*, and Spanish *coronas* (Echegoyan 1603). The contrast between peninsular and colonial units of account is also addressed in these tables. The Americas had a parallel monetary system that combined what economic historians identify as an official branch of currencies comparable to those of Castile, with a colonial branch that, rather than following the 1497 ordinances of Medina del Campo, was the result of viceregal policies. The latter included a constellation of units of account such as *peso corriente*, *peso de tepuzque*, *peso ensayado*, *peso de nueve reales*, and unique currencies such as *peso de minas*, *peso de oro en polvo*, *tostones*, and *tejuelos*, among others (Noejovich Chernoff 1996: 204–10). Handbooks give prominence to those units that had a higher range of circulation such as the *peso de tepuzque* in Mexico and *real de a nueve* in Peru, producing calculating tables that would allow one to reckon small and higher figures to the tune of 25,000 *reales* (Echegoyan 1603; Belveder 1597). The thousands of figures these books contain made them difficult to produce accurately. Printers commented on their laboriousness, lack of types for fractions, and what types they used to make do (Echegoyan 1603).

In order to win the trust of their readers, technical authors appealed to years of experience in commerce and accounting, as well as the endorsement of high-profile colonial administrators such as *contadores mayores* and *oidores*, as well as recognized literary figures. The value and usefulness of arithmetic had a larger cultural significance that regarded arithmetic as the most excellent science that merged commerce, matters of state, true knowledge, and poetry. In colonial Lima, Chilean poet Pedro de Oña dedicates a sonnet to Juan de Garreguilla, the author of *Libro de la plata reducida* (Lima 1607). Oña held arithmetic to be the most excellent of all sciences because numbers give life to Mercury, the god of commerce, and Mars, the god of war. The poet compares Garreguilla to the sun whose bright light reveals the exactitude of arithmetic operations, while unveiling the wealth of the Indies.

Technical authors also promised to instruct those with limited commercial skills by sympathizing with the reader's fear of being cheated and the concern that appearing ignorant might result in being taken advantage of on a future occasion. Juan Díez Freyle, the author of *Sumario compendioso de las cuentas de la plata y oro que en los reinos del Perú son necesarias a los mercaderes y a todo género de tratantes* (Mexico 1556), notices that the volume of business did not allow for the time needed to do all the calculations carefully, and instead amounts and rates were rounded up.

Daily reckoners were essential business tools. Felipe Echegoyan, the Mexican author of *Tablas de reducciones de monedas . . . y de otras cosas necesarias y convenientes para las cuentas del trato y contrato de estos reinos* (Mexico 1603), claims that this small pocket book helps with transactions rife with fraud and questionable accounts. He describes his booklet as a humble but necessary work to understand current trade operations relying on false tales rather than accurate accounts: 'un obra humilde bien necesaria en estos reinos para las contrataciones que hoy se usan, sobradas de cuentos y faltas de cuentas'; while printer Henrico Martínez speaks highly of the many advantages of using precise tables to expedite business and protect property.

The variety of publications contested the superiority of methods, whether the operations for creating conversion tables were accurate, and what visual displays on the printed page were more useful and effective. Authors and readers found that the most precious information these manuals offered was the conversion and rate tables. In fact authors often commented on the ways their works would correct and improve on the manuals already published. Francisco Garreguilla, the author of a series of *libros de plata reducida* (Lima 1607), comments on inaccuracies found in Díez Freyle and Juan de Belveder, and the notion that time is money, and in doing business merchants required much-needed relief.

Earlier authors used Roman numerals (Díez Freyle 1556, 2008) that soon were displaced by Arabic numeration. The general approach consisted in introducing tables with a summary of the types of silver and units included in any specific table. In other cases this information was committed to the preliminary materials along with brief explanations about how to read these tables (Belveder 1597), while others used cut page thumbnails for improved functionality (Garreguilla 1607). Later titles produced in the eighteenth century even included a summary of assaying methods (García Caballero 1713). The sources of authority mentioned, the variety of operations described, and the portable format of these handbooks attest to a range of users that may have included clerks, merchants, refiners, and consumers.

Prefaces and preliminary materials include observations not only about the disparity of arithmetic skills among consumers and sellers, but also the ways of the market. The commercial activity they depict conveys the constant flow of everyday exchange ranging from refining, selling bars and wedges to the silver merchants, liquidating debts, and regular purchases. The course of these transactions sharply contrasts with the accelerated pace of business in the colonial fairs, notably Portobelo, and the arrival of exports to major commercial centers.

Authors mention the huge volume of transactions, their speed, the blizzard of operations, as well as the difficulties in putting an exact number to a large volume of silver changing hands. Writing in Lima in 1607, Francisco Garreguilla observed that at the Portobelo fairs in Panama, where deals were worth millions of *pesos*, what mattered the most was the pace of expediting business. A lot was at stake, and the variety of publications claimed to offer solutions by explaining clearly and simply how to reckon silver. Pedro de Saldías, the author of *Tablas para la reducción de barras de plata de todas leyes a maravedis, pesos ensayados y de a ocho reales* (Seville 1637), comments that the main purpose was to prevent individuals from losing money, being cheated in their transactions, and having their reputations questioned.

In their arguments technical writers agreed that such conventions as weights and measures are the expressions of conventional justice recognized by agreement and ratified by law. Thus these technical authors agreed with scholastic thinkers like Mercado, as they argued that the fluctuations of prices show that everything is exposed to change, yet measures need to be permanent because they constitute the standard and point of reference for notions of value and justice, as well as good government. They also agreed with economic thinker Juan de Mariana that in the absence of currency, weights and measures are the foundations of trust that enable commerce. Mariana commented that if most things are sold by weight and measure, everything is sold by money (Grabill 2007: 265). Both agree with Simmel that the pivotal role of money consists in the dispersion of trust among anonymous economic agents throughout all sectors of society. Thus they held that what really matters is the dynamics of monetary exchange, and more specifically the common trust that makes such an interaction possible. The greater the number of people willing to place trust in money, the greater is their interest in constructing a positive image of the anonymous other as a trustworthy trading partner (2004: 79).

In mining societies business relations are mediated by the routine of exchanges and the repetition of business relationships. Trust in this context represents both a community of economic agents and the methods needed to establish trustworthiness through accuracy and skill. The handbooks combine equivalence tables, brief accounts of assaying methods, and demonstration of arithmetic operations for reckoning silver. The demonstration of practical methods of accuracy indicates that trust is not a resolved question. Rather the demand for these handbooks seems to suggest that trust has no 'natural' guarantee and that mathematical skills can provide the best resource. These means of calculation also propose that private consent guided by method and learning rather than sovereign authority provides the ground for social obligations, agreements, and promises.

The proliferation of these handbooks shows the process through which money becomes the abstract expression of the community rather than simply a function of the state. Silver accounts also show that there is a process of abstraction that renders

actual silver pieces into pure quantity units that can express the value of any economic object. Obviously the social construction that makes possible such an abstraction is trust or the supposition that silver would be accepted in exchange by a third party. The utility of reckoning tables demonstrates that the heart of the matter was the dichotomy in the representation of exchange, which is both abstract and concrete. Abstraction took the form of numbers and arithmetic representation. As the divergence between the titles of practical manuals disseminating the arts of commerce and clarifying the practice of exchange, and those written to study commerce as a matter of thought, indicates, it is within this field of alphanumeric representation that the practices of money as unit of account were explicitly situated (Boyer-Xambeu and Deleplace 1994: 5).

These handbooks also suggest that the use of money as measurement of value does not result naturally from its use as a means of exchange. Money rather is created as a standard of value by institutions and the interaction of economic agents. In short, money precedes the market. It is trade, as economist Michel Aglietta suggests, that over time gives a unit of account its fiduciary quality. Honoring debts, clearing accounts, and making payments presupposes a reference value that is stable and known to all parties, who expect that each party will give and receive what was agreed upon at the outset (2002: 36).

Finally, establishing accuracy and numeric representation as the essence of trustworthiness indicates that the ordinary exchange of silver was problematic. Technical writers comment that merchants rounded up amounts, oversimplified the series of mathematical operations, and did not check their calculations. This conversation about precision and method extended to assaying handbooks reminding assayers and silver masters of the weights and measures established by law, the proper refining and assaying methods, and verifying fineness by reckoning the proportions of fine metal and alloy. These practices become more meaningful when considered in light of the constellation of business opportunities associated not only with far-reaching trade but also with the refining and minting of silver. As I mentioned earlier, the mints were leased to the highest bidder. The silver merchants also paid a handsome fee to operate their businesses (Hoberman 1991: 83).

The reckoning of silver shows that what mattered to proprietors, creditors, and debtors was not the metal, which they traded immediately, but rather its abstract value and purchasing power. With so much metal of varying quality everyone had to become an expert. The worth of shares, revenue, and transactions was completely altered if the value of the metal was miscalculated. In this process those who were well-versed in the empirical method of assaying and had keen arithmetic skills stayed ahead.

The handbooks for reckoning silver were a great aid to those who needed to brush up their mathematics to avoid losing money when doing business. They also provided the source of authority needed to establish foundations of trustworthiness required to honor debts and contracts. These texts teach how the past and future converged in the Americas as a distinctive geographical and economic entity whose specific monetary conditions allowed for the close examination of the process through which in the private sphere countable commodities morph into abstract units of account to be reckoned as debits and credits until accounts were eventually settled.

These questions also call attention to the partnership of commerce and money. Economic writings look at commerce as a matter of thought enmeshed in social and

political processes considering the emergence of civil society and the competition among polities vying for the rule of trade. These meta-political and economic aspects suggest that markets are the substance and money the form. In this argument the existence of money is explained as a spontaneous evolution from barter to market. Money illustrates the self-equilibrating dynamics of the market. Typically money is defined in terms of its functions of medium of exchange, means of payment, money of account, and store of value. The argument is that the most important function is that of a medium of exchange. The handbooks teaching how to reckon silver illustrate the confusion between money as a measure and bearer of abstract value. These texts reveal a different story as they map out the unique monetary spaces of the Americas.

What emerges behind the mere instrumentality of money is an engrossing story about how money does not consist of a thing but a promise to pay. This claim can take myriad forms such coins, book entries, bills of exchange, or pieces of silver. All these forms of money only become money when expressed in abstract money of account. Money, then, is a socially constructed abstract value that it is first establish by authority. Issuers establish the unit of value, its description, and what form it would take. Users establish relations of credit and debt and create the monetary space where exchange can take place.

Handbooks for reckoning silver, ready reckoners, and other commercial texts taught numeracy, all sorts of arithmetic rules, and financial transactions. The popularity of these commercial texts suggests first, that commercial practical knowledge reached beyond merchant circles, and, secondly, that the expanding global economy was not abstract, but rather quite concrete. The ubiquitous presence of converting tables for all sorts of weights, measurements, units of accounts, currency, and percentages suggests that the flow of goods and capital was perceived through the multiplicity of monetary forms and values.

The pivotal role of commercial methods reminds us that paper functioned as a crucial technology in capitalist development. Commercial handbooks are part and parcel of a host of business tools that emerged in the 15th and 16th centuries to facilitate long-distance exchange, manage risk, and encourage entrepreneurship. The arts of commerce required the mastery not only of merchandise—from cloth to metals, plants, spices, and slaves—but also of its valuation and measurements, together with accounting for the inventory stock and all transactions. These skills were reflected in an array of texts and paperwork that combined arithmetic texts, ready reckoners, merchandise descriptions, navigation information, and compilations of the laws and procedures of exchange and trade, as well as administrative archiving.

Business practice combined writing books with blank pages to record classified and itemized factual information and commercial handbooks teaching all aspects of commerce. These overlooked manuals give present-day readers a glimpse of the activities, goods, services, and transactions that formed the spine of society. Handbooks described methods, taught skills, and provided guided exercises, while prefaces, frontispieces, title pages, and introductory materials situate 21st-century readers in relation to the heuristic learning they provide.

The intersections between commerce and print culture reveal how colonial society grappled with issues of credibility, fairness, and trust concerning money. Putting an exact numerical value to convey either price or multiple equivalences among diverse commodities and units of account created the demand for popular commercial books teaching arithmetical rules and the use of conversion tables. Beyond illustrating the practices accounting for commerce and fiscal control over oceans, these manuals

disclose that making money consists of a mesh of social relations mediating economic connections between miners, assayers, merchants, investors, officials, laborers, and consumers.

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Notes

- 1 Silver served as both a commodity and a currency. Recent studies examining the environmental and human costs of silver mining, together with the production, commodification, and circulation of silver, include: [Robins's](#) *Human and Ecological Cost of Colonial Silver*; [Flynn and Giraldez's](#) ‘Cycles of Silver: Global Economic Unity through the Mid-Eighteenth Century’; [Marichal's](#) ‘The Spanish-American Silver Peso: Export Commodity and Global Money of the Ancient Regime, 1550–1800’; [Tutino's](#) *Making a New World: Founding Capitalism in the Bajío and Spanish North America*; and Brown's *A History of Mining in Latin America: from the Colonial Era to the Present*.
- 2 The role of violence in market formation is the focus of studies examining the historical, political, and theoretical scenarios framing the interrelationship between global capitalism and the extension of European sovereignty. Drawing from theories of Carl Schmitt and Carlo Galli, colonial scholars discuss the multiple ways in which the expansion of commercial enclaves mediates the relationship between European states and a colonial space through the absence of the rule of law in order to maximize the exploitation of resources, including people, by implementing regimes of war, terror, and oppression. These concerns are discussed in the 2014 issue of *Política Común* edited by [Ivonne del Valle and John Blanco](#). N.J. Thrift in *Globalization in Practice* suggests that these meta-political questions partially explore the complexities of the processes of

- globalization. The full understanding requires the integration of explorations of globalization from above ‘with those paying attention to the everyday life of capitalism, the not so little things that keep the “large” forces of globalization ticking over’ (14).
- 3 For the distinction of these types of silver see [Torres](#), Julio. ‘La implantación de la moneda en América.’ *Revista de Filología Románica* 11–12 (95:1994): 115–30, and [Burzio](#), Humberto F. *Diccionario de La Moneda Hispanoamericana*. 3 vols. Santiago de Chile: Fondo Histórico y Bibliográfico, 1956.
 - 4 The rise of early modern empires contested the notions that lay at the heart of modern political philosophy, such as trade, sovereignty, international justice, war, civilization and progress. For the study of conquest, commerce, and cosmopolitanism as articulated categories see [Muthu](#), Sankar, 2014. ‘Conquest, Commerce, and Cosmopolitanism in Enlightenment Political Thoughts.’
 - 5 For major mercantilist authors and the arguments they proposed see *New World Gold* chapters 5 and 6.
 - 6 [Pedro Cardim](#) and [Tamar Herzog](#) argue that the Spanish-controlled political and economic entities can best be understood as consisting of many different interlinked centers interacting not only with the crown but also with each other. This complex geometry created a political structure that was solid and durable, on the one hand, malleable and changing, on the other, where internal cohesion was not maintained by coercion alone, but by constant negotiation, contacts, and competition.
 - 7 This is a sample of commercial textbooks published in Castile and Aragon written by both clerics and merchants. Well-known titles written by clerics include Juan Andrés *Sumario breve de la práctica de la aritmética* (Valencia 1512); Juan Ortega, *Suma de arithmetica y geometria pratica utilissima* (Lyon 1512); and Juan [Díez Freyle](#), *Sumario compendioso de las cuentas de plata y oro* (Mexico 1556). A sample of textbooks written by merchants includes Gaspar de Tejada, *Suma de arithmetica pratica y de todas mercaderias; con la horden de contadores* (Valladolid 1546); Marco Aurel, *Libro primero, de arithmetica algebratica, en el qual se contiene el arte Mercantiul* (Valencia 1552); and Salvador Bartolomé Solórzano, *Libro de caxa y manual de mercaderes* (Madrid 1590).
 - 8 Scientific practitioners explored the metallurgical methods that silver mining developed in the Americas. Major works include: [Alonso Barba](#)’s *Arte de los metales, en que se se enseña el verdadero beneficio de los de oro y plata por azogue. El modo de fundirlos todos, y como se han de refinar, y apartar unos de otros* (Madrid 1639) and [Pérez de Vargas](#)’s *De re metallica, en el qual se tratan muchos y diversos secretos del conocimiento de toda suerte de minerales, de como se deven buscar ensayar y beneficiar, con otros secretos e industrias notables* (Madrid 1569). For studies exploring metallurgy and culture see Orlando [Bentancor](#)’s ‘Matter, Form, and the Generation of Metals in Alvaro Alonso Barba’s *Arte de los Metales*’ and Allison [Bigelow](#)’s ‘Lost in Translation: Knowledge Transfers and Cultural Divergences in Early Modern Spanish and English Silver Treatises’.

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