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Mario Biagioli. *Galileo's Instruments of Credit: Telescopes, Images, Secrecy.* Chicago: University of Chicago Press, 2007. 316 pp. $20.00 (paper), ISBN 978-0-226-04562-7.

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Galileo's Credit

Galileo's Instruments of Credit, Mario Biagioli's recent book, makes an important contribution to Galileo studies and the history of science more broadly. Over the course of the last twenty years, Biagioli has been one of the most important scholars working in these fields. In his *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (1993), Biagioli demonstrated how Galileo's scientific discoveries were driven by his experience in the Medici court and dependent on his exploitation of Florence's patronage system. This book builds on Biagioli's prior conclusions and uses terminology borrowed from economics–credit, monopoly, investors–to explicate Galileo's skilful manipulation of various systems of credit, both financial and interpersonal. According to the author, "instruments of credit" refers not only to compasses and telescopes but also to "techniques [Galileo] used to maximize the credit he could receive from readers, students, employers, and patrons" (p. 2). *Galileo's Instruments of Credit* addresses other issues as well: the use of visual evidence in Galileo's work, ideas about intellectual property in early modern Europe, and the tension between scientific and religious truth in Counter-Reformation Italy. It is also theoretical–one of the author's clear, but unstated aims is to deploy his considerable knowledge of Galileo's writings in order to analyze the origins of modern science. With such an ambitious goal, this book's tone, as well as some of its conclusions, is occasionally imposing. But readers more interested in history than theory will also find in Biagioli's book a series of claims, based on hard historical labor, that advance our understanding of Galileo and his fascinating world.

Chapter 1, "Financing the Aura: Distance and the Construction of Scientific Authority," introduces Galileo as a mathematics professor in Padua and explains his search for financial support from the Medici family for his new astronomical discoveries. Biagioli describes how the Medici invested in Galileo with only partial knowledge of his work, and suggests that the physical distance between the Medici in Florence and Galileo in Padua may have enabled rather than impeded their confidence in him. Most studies on the formulation of scientific ideas stress proximity as a facilitator for easy exchange of information and ideas; Biagioli turns this idea on its head and deftly points out that if the Medici had known more about Galileo's work they may not have risked patronizing him. This position could have been argued even more rigorously. For example, if Biagioli had told us more about networks of communication in early modern Italy and invoked data about how long news took to travel between various cities, it would have strengthened his argument. Biagioli dismisses this sort of information as "banal trivia," but including it would only have helped and not hurt his provocative claims (p. 22). This rich preliminary chapter also includes a comparison of Galileo's role in the Medici court with the professional structure of London's Royal Society. Even though Biagioli acknowledges the fifty-year time lag between Galileo's discoveries in 1610 and the Royal Society's charter of 1662, the juxtaposition between the two episodes is creative and compelling.

The second chapter, "Replication or Monopoly? The Medicean Stars between Invention and Discovery," explores how Galileo tried to create a monopoly on his telescope. Drawing on his exhaustive knowledge of Galileo's writings, Biagioli shows how protective Galileo was of his discoveries. For example, he tried to slow down potential imitators by withholding information on how to build a telescope–Biagioli underscores how different this was from most early modern inventors and how contrary to the spirit of early modern science. Chapter 3, "Between Risk and Credit: Picturing Objects in the Making," examines the crucial role pictorial tactics played in *Siderius nuncius* (1610). As Biagioli puts it, "most of Galileo's claims were constructed and presented through

images" (p. 143). The material included in this chapter, as well as some of Biagioli's glosses on it, suggest that Galileo excelled as a communicator, not just as a manipulator.

The fourth and final chapter, "The Supplemental Economy of Galileo's Book of Nature," consists of a close reading of Galileo's 1615 letter to Grand Duchess Christina of Lorraine. Biagioli proposes, based on convincing evidence, that its actual recipient was Robert Bellarmine, the Roman cardinal and inquisitor. Another subject of this chapter is the relationship between religion and science in Galileo's time. Biagioli occasionally exaggerates the rarity of Bible reading in sixteenth-century Italy. For example, because there were no authorized vernacular translations of scripture the author assumes that few Italians read the Bible in their native language. We know from the work of Gigliola Fragnito (*La Bibbia al rogo: la censura ecclessiastica e i volgarizzamenti della Scrittura* [1997]), whom Biagioli cites, as well as from other recent scholarship, that the vernacular Bible translations of Sancte Pagnini and Antonio Brucioli, for example, were frequently read in late sixteenth- and early seventeenth-century Italy. But apart from minor obfuscations such as this, Biagioli has a unique ability to offer crisp formulations about Galileo's position on matters of faith. He writes that "by presenting astronomy and theology as disciplines dealing with the same truth inscribed in two different but equally sacred books, Galileo tried to cast himself as respectful of the authority of divine books, not an atheist who put scientific evidence above scriptural teachings" (p. 233). And complementing the insightful work of Rivka Feldhay (*Galileo and the Church: Political Inquisition or Critical Dialogue* [1995]), who argued that Galileo developed some of his most controversial ideas while in dialogue with inquisitors, Biagioli explains how "the space [Galileo] tried to develop for astronomy was not carved away from that of theology but rather constructed through the features and discursive practices of that more authoritative field" (p. 221). These statements about the relationship between religion and science in early modern Europe are models for students and scholars who teach and write about these matters.

This book has one main drawback. It consists of four chapters, three of which previously appeared as articles. As such, transitions from one chapter to the next sometimes feel forced, and this volume lacks some of the coherence that characterized *Galileo, Courtier*. But in spite of this defect the book has many virtues. It blends theoretical reflection with historical analysis, incorporates visual evidence alongside textual proof, and forces alert readers to confront a series of assumptions concerning Galileo and early modern science that, over the years, have calcified into articles of faith. Perhaps most importantly, *Galileo's Instruments of Credit* possesses the ability to generate further scholarship. Both directly and indirectly Biagioli challenges his readers to stretch and test his ideas. For example, the comparison of Galileo and the Royal Society in chapter 1 teases readers to consider if the founders of London's Royal Society may have been influenced in any way by the model of Galileo at the Medici court. Similarly, Biagioli's reminder that "Kepler *confirmed Galileo's discoveries without having been able to see them himself*" prompts researchers to look more closely at epistolary exchanges and consider how the omission of information may have been as alluring as its inclusion (p. 37, emphasis in the original). Finally, the book contains ample evidence of Galileo's innovations as a writer and illustrator. Biagioli points out how *Siderius nuncius*, because it features elegant prose instead of technical figures, appealed to a broad spectrum of philosophically curious readers and not only professional astronomers. Indeed, the format of *Siderius nuncius* and its contents seem as important as the specific relationships he cultivated and manipulated. Future work in this field might draw inspiration not only from Biagioli but also from literary scholars, such as Eileen Reeves (*Painting the Heavens: Art and Science in the Age of Galileo* [1997]) and consider the intersections between art, economics, and literature to assess Galileo's virtues as a writer and merchant of ideas.

In sum, *Galileo's Instruments of Credit* is a welcome addition to historical scholarship. Readers curious about the theoretical foundations of modern science and the fiscal aspects of Galileo's career, as well as communication, interpersonal relationships, and book illustration in early modern Europe will find much of interest in Biagioli's most recent book.

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