

Thomas Max Safley

Understanding uncertainty: Reflections on insolvency, bankruptcy and 'risk' and the entanglement of state, capital and labor in the sixteenth century

1. Introduction

In April 1531, the creditors of the bankrupt Ambrosius Höchstetter posed the first of what would be a long series of questions about the great merchant's bankruptcy: «given his great success as a merchant, what did Ambrosi imagine he was doing, bringing ruin not only on himself, but on his colleagues and their city?» Despite a warning that any falsehood would be punished, Höchstetter insisted that «he knew nothing other than that his business was flourishing as it had for the past 30 years; had he foreseen bankruptcy, he would have ceased business long before 1527 ... he did not know his affairs were so precarious ...».¹ How could one of Europe's most successful merchants, with whom «princes, counts, noblemen, burghers, peasants, servants and maids deposited such money as they had», as the Augsburg chronicler and Höchstetter contemporary Clemens Sender put it (Sender 1894, 219), not know his business was failing? This terse proclamation of ignorance and the question it raises highlight three themes I wish to examine in this paper: first, the 'uncertainties' of enterprise in late medieval and early modern economic life; second, the 'entanglement' of state, capital and labor in the perception and management of those uncertainties; third, the connection between the management of those uncertainties and the resolution of insolvency and bankruptcy.

Sender saw a failed attempt to create a worldwide mercury monopoly – «Höchstetter had bought up mercury in all kingdoms and lands at a higher price than was commonly asked ... 200,000 *Gulden* worth of mercury» – as one of the most important causes for the collapse of the Höchstetter firm (Sender 1894, 220). Modern scholars have largely followed his lead (Kern 1935, 31; Klinkert 1983, 24). It was not the only cause, however. A perfect storm of near-simultaneous events contributed as well: high-seas piracy, highway robbery, principal-agent problems and simple incompetence. «Yet, all of these misfortunes would not have damaged him, had his own son and his brother's son behaved in an upright manner and seen properly to their own, and had old Ambrosius Höchstetter taken an annual accounting and concerned himself with these things» (Sender, 1894, 220-21). Neither fate nor fortune, so Sender, but foible determined the outcome.

¹ Stadtarchiv Augsburg (StAA), Literaliensammlung, Höchstetter-Selekt I, Ambrosi Höchstetter der Älter Verhörprotokolle, Urgichten 13 Aprilis 1531.

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Höchstetter's creditors, especially his peers, prominent and well-informed merchants, such as Anton Fugger, Hans II Paumgartner and Hans I Herwart, heard the rumors of misfortune and knew what to do. Their demands for repayment forced Höchstetter to liquidate capital assets that Sender valued at 400,000 *rheinische Gulden* (hereinafter fl) in one year. The rest, whom Sender described as «heedless ... of whom there were some 300» (Sender 1894, 221) had no recourse but to lodge a complaint of insolvency before the Augsburg City Council. On 1 July 1529, Ambrosius Höchstetter, his son Ambrosius II and two of their partners appeared before the council and swore an oath to cease business and cooperate with the creditors. Yet, Augsburg had no bankruptcy law, only «ancient custom» to regulate the proceedings. Chaos resulted. That chaos stemmed not exclusively from the lack of bankruptcy regulation; it also arose from the causes of that bankruptcy, which had to do with the uncertainties of commerce and production . especially as related to mercury . and the Höchstetters' attempts to manage them.

2. Risk, uncertainty and the ecology of production at Idrija

The agents we study lived in an age when most people understood their interests and enterprises to be truly in the hands of God, subject to His providence. They held events and outcomes, therefore, to be largely unpredictable and uncontrollable. Moreover, they lived in an age before the invention of probability, making those events and outcomes unquantifiable or, at least, not subject to quantitative analysis.² In this context, I prefer the term 'uncertainty', «[t]he quality of a business risk which cannot be measured and whose outcome cannot be predicted or insured against» (OED 2023; Gould, Lester 2018, 606). This should not be taken to mean that something like risk in its broader sense did not exist before the mid-seventeenth century or that premodern merchants, manufacturers and workers were incapable of assessing their exposure to it. Rudimentary forms of insurance and uncertainty-sharing were well established. Uncertainty management, however, relied more likely on 'learning by doing', the hard-won intuition and experience of business practice, rather than calculation based on theory. It also extended beyond individual merchants or firms to include the entire political economy by virtue of the 'entanglements' that existed among state, capital and labor. Learning-by-doing was a social phenomenon.

That the perception and management of uncertainty might be learned through experience over time suggests that such learning occurred within the real, material constraints of specific enterprises. For the Höchstetters, those constraints arose from the production and sale of mercury, specifically the mercury produced at Idrija, a town located in the former Duchy of Carniola – then part of the Archduchy of Austria, now part of the state of Slovenia.

² The mathematical methods of probability arose from the investigations of Gerolamo Cardano in the 1560s (not published until 100 years later), and in the correspondence Pierre de Fermat and Blaise Pascal (1654) on such questions as the fair division of the stake in an interrupted game of chance. Christiaan Huygens (1657) gave the first comprehensive treatment of the subject. See (Hacking 2006).

Mercury was discovered at Idrija in the late-fifteenth century (Ferber 1774, 62). At that time, the region was little more than a remote corner of Europe, located in the Kars, a spur of low, wooded mountains marked by limestone ridges with numerous caves and underground rivers. This rugged topography had several effects: first, it limited agriculture to herding and forestry, so that grain and other foodstuffs had to be imported (Valentinitsch 1981, 236); second, it constrained population density, making settlements and, more importantly, marketplaces sparse and distant; third, it restricted local access to two trade routes, accessible only to porters and pack animals (Hassing 1976; Tremel 1954).

These conditions directly affected the workforce at Idrija. Essential consumables, production resources and other necessities had to be imported; the workers could not provision themselves. The same applied to miners; they had to be brought from outside, forming an immigrant community apart from the indigenous Slavic population. The resulting isolation left the miners open to exploitation by the masters who paid and provisioned them.

The rugged topography and sedimentary geology also affected the work process at Idrija: it raised the difficulties and costs of mining, which made profits less certain and investment more insecure. In consequence, production at Idrija remained primitive, relying on the simplest hand-held tools and techniques, long after a variety of wind- and water-powered machines had become commonplace elsewhere. The refining methods used at Idrija were likewise extremely crude by the standard of the day and so inefficient that as much as 50 percent of the mercury contained in raw ores was lost (Kirnbauer 1976; Valentinitsch 1981, 25-26). Finally, the mercury itself posed a hazard that complicated work. Miners so feared its toxicity that they often refused to work at all and, when they worked, could not «work more than 18 weeks in the year and ... stay 'on ore' longer than 14 days without being replaced by others», as state inspectors reported.³

Here is the essence of what I have elsewhere referred to as the «ecology of production» (Safley 2018).⁴ The phrase attempts to suggest how the interaction of unique physical environments, work processes and social relations with market forces, regulatory systems and economic institutions shaped production in workshops and factories. At Idrija, the ecology of production influenced what I would call the 'uncertainty capacity' of all parties, that is, the ability of state, capital and labor to tolerate uncertainty.

The relationship between economic uncertainty and economic success is not straightforward, however. The uncertainties faced by state, capital and labor were entangled, each affecting the other. Hence, the success or failure of their attempts at management directly affected all parties, leading in the latter instance to crises of production and bankruptcies of companies. Bankruptcy opened new sets of uncertainties among magistrates, defaulters and creditors. Attempts to manage those

³ Österreichisches Staatsarchiv, Hof- und Finanzkammerarchiv, Innerösterreichische Miscelle und Brief (OeStA, HfKA, IÖMuB) 134/1, Bericht der Jdrjanischen Amtsleut, 20. Augusti 1561.

⁴ Though historians have begun to discuss ecology in various contexts, my usage of the term grows out of decades of conversation with my friend and colleague, the noted labor historian, Leonard N. Rosenband. I wish to acknowledge his contribution to my usage here and my thinking overall.

uncertainties affected the course of bankruptcy proceedings, including attempts at settlement in specific cases and the development of bankruptcy law in general. This paper examines the contingent choices made to manage uncertainty within the ecology of mining at Idrija and its entanglement with bankruptcy resolution and law in the city of Augsburg.

3. The uncertainties of commerce at Idrija

Between 1525 and 1575, those choices assumed a standard form predicated upon the organization of extractive industry at the time. The right to exploit minerals was considered *regalian*, a privilege of the regent, who exercised it by distributing shares (*Kuxen*) to certain favorites, making them *Gewerke*, who became shareholders. The state extracted revenue by levying two taxes on production, the *Fron und Wechsel* (Strieder 1914, 295, f2)⁵, while the *Gewerke* profited from the production and sale of the minerals. They delegated daily operation to a manager (*Verweser*), who supposedly followed their instructions but in fact acted as a free agent – another consequence of the mine’s isolation – with control over work and workers. Lacking the resources and the experience to promote the mine’s profitability, these parties recognized the need for merchant-bankers to mobilize the investment capital, international connection and commercial savvy necessary to underwrite production and sales of the minerals. During the period in question, four firms, all based in the city of Augsburg, took control of the mercury trade at Idrija. The terms of the contracts they signed reveal much about the perception and management of uncertainty.

On 1 January 1525, Archduke Ferdinand ratified an agreement with the *Gewerke* and the firm «Ambrosius and Hans, the Brothers Höchstetter, and Associates». According to its terms, the Höchstetter company would become the sole purchaser of all Idrijan mercury and cinnabar over the ensuing four years, up to a total price of 300,000 fl. It set unit prices of 30 fl and 35 fl for each Viennese hundredweight (hereinafter cwt)⁶ of mercury and cinnabar respectively.⁷ Payment would occur according to a fixed schedule of installments and in places to be specified by the archduke. The Höchstetters would take delivery at Idrija and «transport away at their own risk»⁸ as was the customary practice (Schmidt 1839, 114). They would also pay all the customary tolls and duties, although Ferdinand promised not to increase these taxes during the life of the contract. He would prohibit the importation or transportation of non-Idrijan mercury in all Habsburg crown lands, essentially

⁵ *Fron und Wechsel* were taxes on mineral production, common in most Habsburg territories. The *Fron* denoted a fixed amount of mined ore, usually one-tenth, and the *Wechsel* referred to a fixed amount of refined mineral, usually one-quarter, both charged against gross production. *Gewerke* or operators usually rendered these *in natura*, although the payment of cash equivalents was also known. Strieder notes that the 1524 contract between Ferdinand, the *Gewerke* and the Höchstetters set the *Wechsel* at one penny or hundredweight of mineral in four, a burdensome 25 percent of the gross amount of refined mercury produced at Idrija.

⁶ In the Middle Ages and the early Modern period, the *Viennese hundredweight* was a standard unit of weight in use far beyond the boundaries of Austria. It equaled approximately 56 kg or 124 lbs.

⁷ Fuggerarchiv Dillingen (FA), Gemeiner Handel und Auslösung, 2.2.1 ½, V-17.

⁸ Ibid.

granting the H \ddot{o} chstetters privileged access to the mercury market in Venice, and he promised to protect them against any prosecution and to indemnify them in case of losses that might arise from such prosecution.⁹ In all their dealings with the state and the *Gewerke*, the H \ddot{o} chstetters promised to conduct their business «truly and honestly with good integrity and loyalty, as they did previously with the late Emperor Maximilian ... in similar and other commercial commitments». Once the contract ceased, the H \ddot{o} chstetters would receive the right of first refusal for any new one. The 1525 contract became the model for those that followed until the state assumed direct control of operations in 1575 (Valentinitsch 1981, 2).

The modern observer might find several elements particularly striking. Foremost, the contract instituted a monopsony, that is, a single purchaser.¹⁰ The argument in favor of monopsony or monopoly posited that a sole purchaser or seller created an orderly market, one undisturbed by competition, one that regularized sales and profits supposedly to the benefit of all parties. Also worthy of note in this context is the repeated reference to past practice. Path dependence served as a barrier against uncertain outcomes through a reliance on familiar patterns and agency constraints (Penrose 1959). Yet another feature that acknowledged potential uncertainties and sought to limit them was the resort to fixed costs and regular schedules. The contract partially insulated the H \ddot{o} chstetters from unwanted fluctuations in the supply of mercury or cinnabar, and it assured state and *Gewerke* a stable income.

The contract defined obligations and fixed prices, but it could not regulate the market for mercury or the merchants who trafficked in it. After a remarkable series of reverses that included a failed attempt to take control of the great mercury mine at Almadén and achieve a monopoly position in the mercury trade, the H \ddot{o} chstetter firm abandoned the agreement in 1528 and ceased payment in 1529. The result was a crisis at Idrija. Sales declined drastically.¹¹ Profits decreased, indeed disappeared. The workforce shrank by more than half. The *Gewerke* appealed for tax relief; the state gave them a new monopsony.¹²

When Hans II Paumgartner became the sole purchaser of Idrijan mercury on 1 August 1539, the condition of the mine had become so bad that the *Gewerke* initially offered him complete control and operation of the mines in return for a fixed rent. When he refused, they accepted his offer to purchase 100,000 fl worth of mercury and cinnabar over a five-year period at prices per cwt of 26 fl and 30 fl respectively. The *Gewerke* also granted him 687 cwt of mercury and 166 $\frac{2}{3}$ cwt of cinnabar, for which he would pay nothing. The contract explained this ‘gift’ in terms of «the present times and conditions [that were] so dangerous and difficult» as well as «the earlier profitable sales in Algiers and Constantinople that Paumgartner carried out at

⁹ Ibid.

¹⁰ As Georg Ilsung, a financial councilor to Ferdinand and frequent negotiator of Idrijan sales contracts, explained to his master, «It means a great deal to any merchant that he have sufficient time to sell his goods, such that no one can do him harm». OeStA, FHKA, IÖMuB. 134/2, fol.1230r-1235r. Brief des Georg Ilsungs an Ferdinand, 30 March 1562.

¹¹ OeStA, FHKS, IÖMuB, 134/1, Bericht der Commission zu Idrija com 25. April 1536 zum 2. Februar 1537.

¹² Ibid.

considerable cost» (Strieder 1914, 314). Beyond these concessions to capital, all of which can be explained in terms of the Höchstetter bankruptcy and its consequences, the contract offered capital every possible security and lowered every conceivable cost, while placing the uncertainties and costs almost entirely on the regent, the *Gewerke* and the workers. In 1543, when negotiations began to renew Paumgartner's agreement, the *Gewerke* emphasized the increased costs of operation «especially due to the depth of the galleries and shafts, such that in the future and daily still higher costs and greater disadvantage for the *Gewerke* are to be expected» and again proposed to sell or lease mining rights to him (Müller 1955, 94-97). Again, he demurred, and a new, five-year monopsony agreement emerged that took effect in February 1544.¹³ It contained virtually identical terms to those that applied in 1539, including the same *douceur*.¹⁴

The desperate state of the mine and its finances constrained the state and the *Gewerke* to offer such generous considerations in return for a sales agreement. Yet, despite this advantage, Paumgartner may have faced constraints of his own. Correspondence reveals that he closely tracked market conditions in Venice, not only mercury prices but also transportation costs, customs duties and even customary bribes, to 'make a market' in mercury, that is, to set bid and ask prices – the highest price a buyer is willing to pay (bid) and the lowest price a seller is willing to accept (ask) – for that commodity (Müller 1955, 307). Making a market requires a high level of 'uncertainty tolerance', because it forces the maker to hold large amounts of the commodity. It also requires an ability to forecast competition and thus anticipate the possibility of bid fluidity. Hence his 'uncertainty' linked to that of the *Gewerke* and the state. The *Gewerke* had to increase production levels and produce on demand. The state had to fulfill its commitment to limit competition within its boundaries. In light of these entangled uncertainties, Paumgartner's conservative contracts become understandable.

Yet, nothing worked entirely as planned, even when no failure occurred. Surviving sources suggest that the mercury trade proved less profitable than anticipated and that the Paumgartners wanted to pursue other interests. Paumgartner passed his business to his sons, Hans Georg and David, in 1548, a year before the expiration of his contract.¹⁵ The same year, they vacated their exclusive right to purchase mercury at Idrija to the Augsburg merchants, Hans Paul and Hans Heinrich Herwart.¹⁶ They could not know the opportunity they would miss.

On 26 April 1548, the brothers Herwart signed and sealed a contract to assume monopsony control of mercury and cinnabar sales at Idrija.¹⁷ Over five years, they would purchase no less than 3,605 cwt of mercury at 29.25 fl per cwt and 1,041 cwt of cinnabar at 33.25 fl per cwt, yielding a total sales price of 140,059 fl. In addition,

¹³ OeStA, HFKA, IÖMuB 134/1, Abschriften des 39 und 44 jährigen Vertrags des Quecksilber und Zinober Kauffs des Perkhwerchs Jdria mit Herrn Hannsen Paumgartner beschehen. Datum 14. Februarii 1544.

¹⁴ OeStA, HFKA, IÖMuB 134/1, Bericht der Jdrianischen Ambsleut, 20. Augusti 1561.

¹⁵ Ibid. See also (Müller 1955, 235).

¹⁶ Ibid.

¹⁷ Ibid.

they would receive 860 cwt of mercury and 210 of cinnabar «for which they and their heirs would not be guilty of payment».¹⁸ In all other respects, the terms of this agreement would be applied «as they were to Hans Paumgartner». Like its predecessors, this contract created a futures transaction, in which the Herwarts paid a large sum of money for commodities that had not yet been produced, the sale of which might or might not turn a profit. This necessitated mining further, deeper into the earth, which increased costs for the *Gewerke* and dangers for the miners without any certainty of increased yields or profits. The fixed unit prices and payment schedules and the myriad protections against competition reflect these uncertainties. Yet, no one could predict with certainty whether extended mining would yield sufficient mercury, and no one could predict with certainty whether that mercury would generate sufficient revenue.

Nor could anyone predict the external shocks that would utterly transform the global market for mercury (Strieder 1914, 318-22). First, in 1550, a fire broke out at Almadén, stopping production there until 1563 (Häbler 1897, 103-04). Second, in the mid-1550s, the patio-process, which uses mercury to refine monetary gold and silver, entered production in the New World. As the supply of mercury on western markets shrank and the demand for it grew, prices soared.¹⁹ For nearly 13 years, Idrija became the most important source of mercury for western consumers, and the Herwarts its principal supplier. There can be little doubt that the Herwart did a «brilliant business» (Strieder, 1914, 318). They would seize the moment by renewing their agreement in 1554²⁰ and again in 1559.²¹ In most particulars, these agreements adhered «in all measures and form ... to the most recent purchase».²² Clearly, demand far outran supply; the Herwarts earned profits as high as 250 percent (Strieder 1914, 325; Valentinitsch 1981, 291).

This windfall was not lost on the state and the *Gewerke*, who wanted a greater share for themselves. Their efforts to alter the terms of their agreements created uncertainties for the Herwart, who responded that the fundamental institution of international and contract law applied to princes and producers alike: *pacta sunt servanda* (Hyland 1994).²³ They were prepared to proceed at law to protect their contractual agreement.²⁴ Any changes not only jeopardized their ability to fulfill forward sales that they had contracted but also constituted a violation of the

¹⁸ Ibid.

¹⁹ How high becomes clear in a letter written in June 1558 by Christoff Raiser that reported the price of mercury in New Spain had risen from 60 to 150 Ducats in a single year. OeStA, HFKA, IÖMuB 134/1, Copia, 5 June 1558. Also cited in (Strieder 1914], 319, f3).

²⁰ OeStA, HFKA, IÖMuB 134/1. Romischer Khu. Mt. und der Gwerkhen in Jdria Vertrag mit den Herwarten umb ain Queckhsilber- unnd Zinoberkauf, 8. Octobris Anno 1554.

²¹ OeStA, HFKA, IÖMuB 134/1. In simili Vertrag des neu aufgerichteten Jdrianischen Queckhsilber und Zinober Kauffs, 28. Febuar 1559.

²² Ibid.

²³ «Agreements must be kept.» The brocard has been attributed to the thirteenth-century canonist, Cardinal Hostiensis.

²⁴ Strieder believed that the initiative came from the Spanish side. See (Strieder 1914, 328).

credibility and creditworthiness (*Trauen und Glauben*) of all parties.²⁵ Their trading partners would sue for breach of contract, damaging their ability to conduct business in the future, and Ferdinand would cease to find lenders, worsening his already dire financial situation.

These warnings proved sufficient to prevent any arbitrary action on the part of the state. Not only did it lack the authority and power to force the issue, but the business community would not cooperate. As reported from Augsburg, no merchant-banker would enter into a mercury agreement, because they feared the Herwarts, who were established in the trade and possessed sufficient reserves of mercury to undersell any competition.²⁶ They refused even to lend money. Credit markets had tightened considerably in response both to the decline of extractive industry across Europe since the 1540s and to a series of state defaults that began in the 1550s. In 1563 and 1564, a wave of major failures washed over the merchant community in Augsburg: «The current trend is such that one will soon be unable to do any business at all».²⁷

The Herwarts retained their contract until its expiration in 1564, though attempts to supplant them continued. In February of that year, the firm of Melchior Manlich provisionally agreed to purchase 5,000 cwt of mercury at a unit price of 100 fl. an enormous increase, suggestive of an asset price bubble.²⁸ Manlich backed away within months, however.²⁹ Finally, in 1566, after years of renewed crisis at Idrija, the Augsburg firm of «David Haug, Hans Langnauer and Associates» committed to purchase 5,000 cwt of mercury between 1566 and 1571 at 70 fl per cwt.³⁰ The total sales value of 350,000 fl would be divided: 227,397.5 fl to the state, 122,062.5 fl to the stakeholder. The state now seized the larger share, supplementing its tax revenues with a variety of fees and honoraria that radically decreased the share of the *Gewerke*.

I cannot yet determine how profitable this contract proved, but the firm agreed in 1571 to purchase another 7,500 cwt Idrijan mercury. Strieder claims they had already purchased 5,333 cwt by April 1574, despite the worsening market for mercury, when another crisis struck the Augsburg merchant community (Strieder

²⁵ The phrase defies easy translation but corresponds to *bona fides* or good faith. In premodern commercial life, it appears almost universally as an indication of sincerity and trust, an absence of opportunistic intent, the basis upon which exchange became possible. In modern contract law it continues explicitly to play a central role. According to § 242 of the German *Bürgerlichen Gesetzbuches* (BGB), the notion of '*Treu und Glauben*' specifies that all contractual obligations must be fulfilled in a manner that corresponds to standards of honor, trust and fairness.

²⁶ OeStA, HFKA, IÖMuB 134/2, fol. 1262r-1289r. Georgen Jlsungs Landvogts Relation, Bericht und Guetebedunckhen aller Handlung, so er von wegen des Queckhsilberkauffs mit den Herwarten zu Augspurg gepflegen, 26 Aprillis 1562.

²⁷ OeStA, HFKA, IÖMuB 134/3. Georg Jlsungs Bericht an der romischen kaiserlichen auch zu Hungern unnd Bechaim königlichen Maiestaet unnd unnserm allergenedigisten Herrn, 6 Mai 1564.

²⁸ OeStA, HFKA, IÖMuB 134/3. Verzeichnus der Artiel darauf jch Georg Jlsung um den 23. Tag Februari Anno 1564 den neuen Queckhsilberkauff mit Herrn Melchior Manlich und Mitverwandten doch unverpündlich abgeredt hab, 23 Februar 1564.

²⁹ OeStA, HFKA, IÖMuB 134/3. Brief des Georg Jlsung an Kaiser Ferdinand, 22 Mai 1564.

³⁰ OeStA, HFKA, IÖMuB 134/3. Queckhsilbers Kauffvertrag mit David Haugen unnd Hannsen Lanngenawer und jren Mitverwandten umb 5,000 Centen Queckhsilber unnd Zinober jnen dieselben in fuennff Jarn vom 8. Aprillis Anno 66 anzuraitten gegen 350,000 fl zu lifern, 8 Octobris 1566.

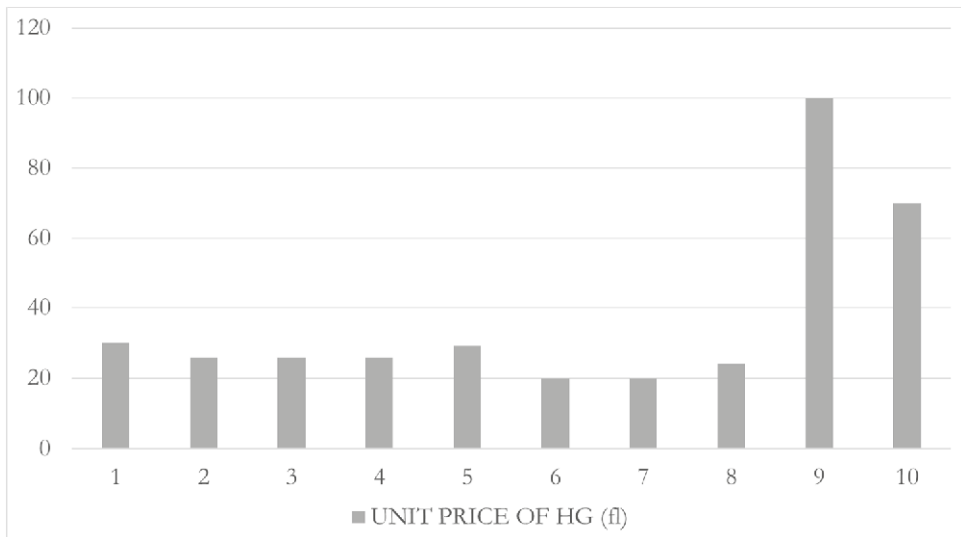
1914, 350). Scholars, once again, see a second series of state defaults, that of Spain above all, as cause for a severe contraction in credit markets and liquidity problems for many Augsburg firms, especially those engaged in state finance. Among those that ceased payment were Paumgartner, Herwart and Manlich. «David Haug, Hans Langnauer and Associates» defaulted as well.

Over the course of the sixteenth century, four mercantile companies from the city of Augsburg signed exclusive contracts to purchase and sell mercury extracted from the mines at Idrija. All four suffered insolvency and three collapsed in bankruptcy. The uncertainties of extractive industry or mineral markets alone did not cause their failures, but the merchants learned from their cumulative experience in the trade, acted to manage those uncertainties and, thus, altered trajectories and affected their companies. They all depended, at least in part, on the sale of mercury for their success, but so too did the state and the producers. Without regular transactions of mercury and cinnabar, the government, the *Gewerke* and the miners faced irregular revenue, unsafe conditions and periodic unemployment, all of which affected their capacity to produce commodities for sale. Their uncertainties were, therefore, entangled with those of capital.

4. The uncertainties of production at Idrija

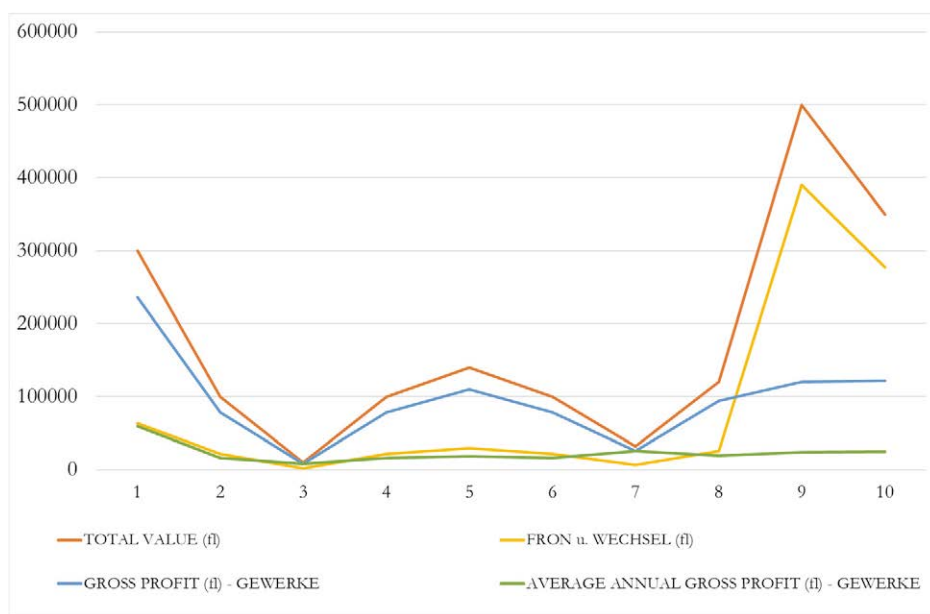
What did the producers – *Gewerke* and workers – do to manage the uncertainties of extractive industry? At the risk of over-simplification, one could render the impact in terms of unit prices and total payments. The price per cwt remained relatively stable until Melchior Manlich agreed to pay 100 fl per cwt in the 1564 sales contract. (Graph 1).

Graph 1. Unit price of mercury (fl)



The unit price comes as a surprise, given the weakening market: Spain had erected substantial trade barriers against the importation of foreign mercury; and the mercury mine at Almadén had resumed substantial production. It seems likely that Manlich knew of these circumstances; information traveled easily within the merchant community of Augsburg. Indeed, his ultimate withdrawal from the agreement resulted from the unwillingness of his trading partners in Antwerp to hazard the uncertainty of commerce with Spain. The state and the *Gewerke* were as well informed. They had begun to push for a larger share of the profit somewhat earlier, as part of the Herwarts' last contract in 1559. (Graph 2). Discounting the Höchstetter contract of 1525, which ended badly for all parties, an essential stability in contract values also becomes apparent until 1559. In that period, from 1525 to 1559, most of the proceeds from sales . the total value of each contract . flowed to the *Gewerke*. The state siphoned off roughly one-third in *Fron* and *Wechsel*. Thereafter, in 1564 and 1566, the relationship was reversed with the state appropriating the lion's share of the profit.

Graph 2. Relative distribution of revenue from mercury sales, 1525-1566 (fl)

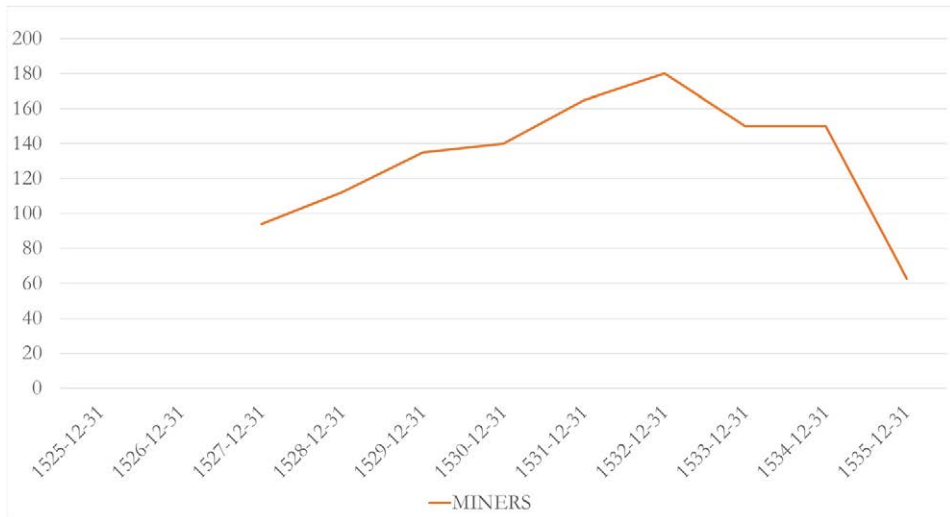


Tax rates didn't change; state and capital agreed to a variety of honoraria (*Verehrungen*) and other extraordinary payments that deprived the producers of income. Clearly, the state was less willing to hold to traditional practices and accept financial constraints. The agreements it reached with merchant-financiers did not generate greater profits but did impact production relations at the mine.

To understand the reaction of producers in terms of the uncertainties they perceived and the measures they adopted, one must bear the production ecology in mind. Idrija suffered from geographical disadvantages; its isolation and inaccessibility raised transaction costs, burdened the social relations of production and complicated labor recruitment. Its geological characteristics posed specific challenges to both production and productivity; sedimentary rock rendered extraction relatively easy but increased the dangers of flooding; highly toxic minerals further thwarted labor recruitment and necessitated complicated shift organizations. The work process remained primitive and inefficient throughout and beyond the sixteenth century; every step in extraction and refinement was carried out by hand, without the benefit of such technical advances as were commonplace in other mines. In consequence, rising costs and falling returns hindered investment as mining proceeded deeper, a classic low-level equilibrium trap. Monopsony contracts guaranteed income but did not solve the problem.

Those contracts generated income streams that the *Gewerke* viewed consistently as insufficient. Instead of investing in new mining and refining technologies, which would have improved production efficiency, they pleaded for tax relief. It is hard not to view their mentality as rentier. Caught thus between the requirement of their contracts to deliver minerals on demand and the constraints of inefficient production that increased the uncertainty of doing so, the *Gewerke* increased yields by altering the workforce. (Graph 3) .

Graph 3. Workers employed at Idrija, 1525-1535



In response to the 1525 contract with the Höchstetter firm, the number of workers at Idrija doubled in size. The abrupt declines that followed 1532 and 1534 capture their response to the Höchstetter bankruptcy. Employment did not rise

above c. 60 workers for the remainder of the century. Production declined as well, but production costs rose. (Graph 4).

Graph 4. Productivity at Idrija, 1525-1535 (cwt)

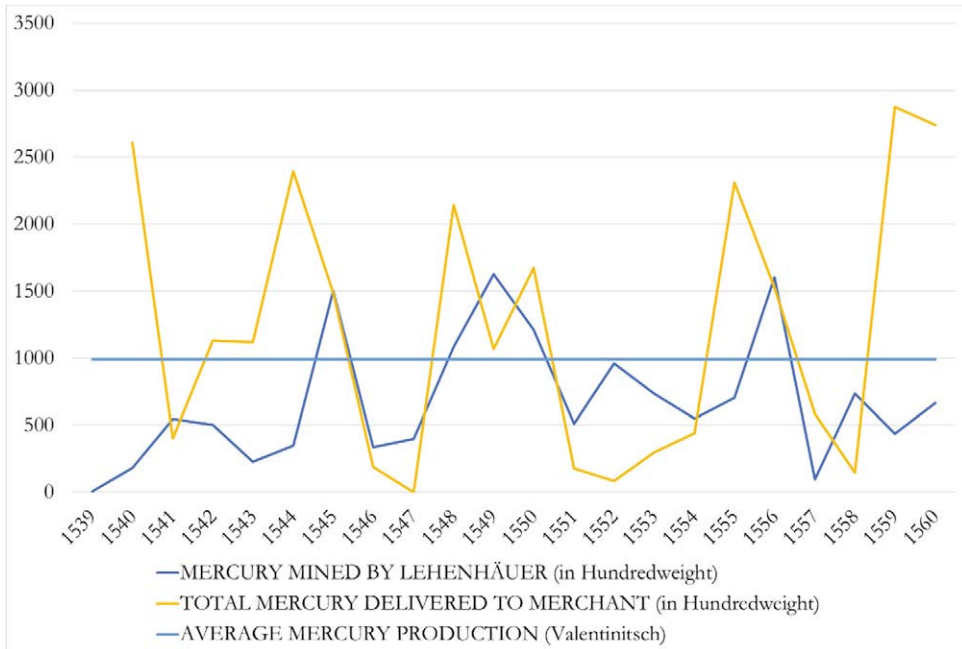


Despite the enlarged workforce that persisted until 1532, the sudden reduction in productivity can be explained in terms of the technical challenges that resulted from the Höchstetters' contract. A commission report of 1537 referred repeatedly to the increasing depth of the mines and the increasing uncertainties posed by flooding, which could not be addressed without greater revenue. The cost of mercury production fell marginally during the Höchstetter tenure, which might reflect economies of scale, but it rose steadily thereafter. As mining proceeded below the water table, the efforts of the workforce could not raise as much workable ore to the surface.

Rather than invest in the methods and machines that might have improved and regularized productivity and production, the *Gewerke* claimed they had spent «40,000 fl more than they earned ... especially due to the depth of the galleries and shafts, such that in the future and daily still higher costs and greater disadvantage for the *Gewerke* are to be expected» (Müller 1955, 94-97). Nearly half the total workforce simply pumped out flood water. The remainder contended with poisonous fumes that limited the time they could spend mining and refining ore (Müller 1955, 94-97). Everyone understood that such conditions resulted in slimmer margins, irregular production and greater uncertainty for all.

Hans Meder's well-known *Handelbuch* of 1558 offers an optimistic view of production at Idrija, where «about 70 miners work and refine», producing «1,500 to 2,000 cwt of quicksilver ... in a year» at an annual cost, including wages and transportation, «of 3,600 fl».³¹ Not surprisingly, it obscures the quotidian reality of production.³² Usually, the mine yielded far more modest totals. (Graph 5).

Graph 5. Mercury produced and delivered, 1539-1560 (cwt)



Meder's assertion that it could produce «much more than it does at present» stands in stark contrast to the producers' assertions about the challenges of mining. These limited the efforts of workers – «even when [they] get to work, they may produce nothing over the course of a week».³³ Meder's notion that merchants could expect to sell 1,537 cwt per year contradicts the pronounced irregularity of production and delivery. Noteworthy peaks in 1540, 1544, 1548, 1550, 1555 and 1559 correspond roughly to the initial years of the contracts. Merchants consistently sought and accepted large quantities of mercury at the beginning of each contract,

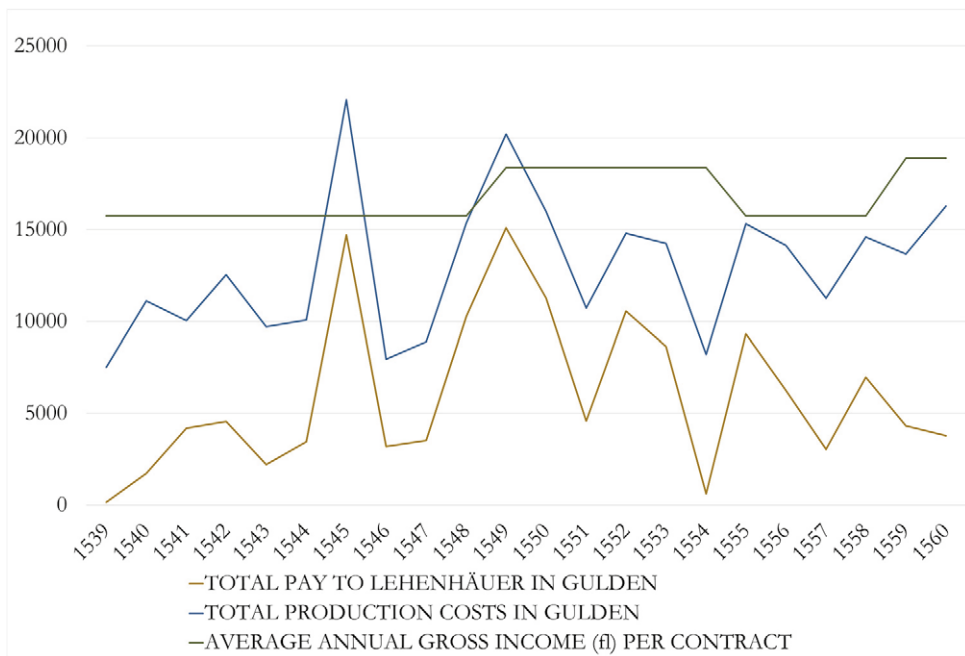
³¹ Stadt- und Staatsbibliothek Augsburg (SuStBA), 2 Stw 218. Lorenz Meder, *Handelbuch, darinn mitgezeygt wird, welcher gestalt inn den fürnehmsten Hendelstetten Europe, allerley Wahren anfencklich kaufft, dieselbig wider wie nutz verkaufft, wie die Wechsel gemacht, Pfund, Ellen unnd Müntz überal verglichen und zu welcher zeit die Merckten gewönlich gehalten werden.* (Nuremberg 1558) fol. 46v-47v.

³² OeStA, HFKA, IÖMuB. 134/1, Bericht der Jdrianischen Ambsleut, 20 Augusti 1561. The following graphs summarize the content of this official report.

³³ Ibid.

often taking in a single year all or nearly all the volume required for the entire life of the contract. This practice enabled them to maintain sufficient supplies to make a market and to spread their costs over four to five years. After those initial deliveries, their reliance upon production at Idrija declined. The practice had harrowing consequences for producers. Not only did the mine deliver finished products long before receiving payment, but they confronted the possibility of under-employment or even unemployment after the first year. Given the annual variation in production and delivery, it comes as no surprise that production costs varied starkly from – and usually far exceeded – Meder’s 3,600 fl per year. (Graph 6).

Graph 6. Total production costs and *Lehenhäuer* wages, 1539-1560 (fl)



Apart from a general inflation that saw costs rise over 50 percent between 1540 and 1561³⁴, the most notable factors in the cost of production was the resort to sub-contracted workers, *Lehenhäuer*, which became the single largest expense (Valentinitsch 1981, 177, 191-92, 358-64; Mitterauer 1974, 234-315; Safley 2019, 205-06; Safley 2023, 33-35; Westermann 2009, 63-99).³⁵ A *Lebenschaft* took the form of a

³⁴ Ibid.

³⁵ As at other Central- and East-Alpine mining centers, miners at Idrija earned their wages under three distinct regimes: *Herren-* or *Zeitlohnarbeit*, *Gedinge-* or *Akkordarbeit* and *Lebenschaftsarbeit*. The sources refer to the majority of wageworkers as *Knechtslöhner*, or as *Herren-* or *Zeitlohnarbeiter*, skilled laborers who engaged in a variety of tasks for a basic, weekly remuneration. The *Gedinge-* or *Akkordarbeit*, which resembled a piece-rate rather than time-rate of payment, involved payment according to a specific

subcontracting arrangement: miners sub-contracted by paying a fee to the *Verweser* for the privilege of extracting mercury from a specific slag heap or mine shaft, usually one deemed less productive. At Idrija, they provided their own tools and labor and committed to sell whatever they produced to the *Verweser* for a fixed price. They bore all the costs of production and all the uncertainty of work that might yield little or no profit. *Lebenschaft* transferred costs and uncertainties to the workers, who valued it nonetheless, because it gave them control over their labor and supplemented their income.

The ecology of production and the demands of capital constrained producers – *Gewerke* and workers alike. These took the form of uncertain production, increasing costs and diminishing returns. The *Gewerke* responded by seeking tax relief from the state and offering sub-contracted work to labor. Forced to borrow large sums to maintain mining operations and rewarded insufficiently for doing so, they sought to lease the mine and escape the burden in return for a fixed rent. Miners and refiners at Idrija had the fewest options, but they exercised those they had. Work stoppages were not unknown, and *Gewerke* complained that individuals refused to work, when they thought the conditions too dangerous. Yet, they readily opted to sub-contract, when it was available. Their tactics reverberated up the economic stream, influencing the ability of capital to purchase goods and make markets in a timely manner, forcing it to alter strategies. The uncertainties of one entangled another and, on occasion, resulted in bankruptcy.

5. Uncertainty and bankruptcy

As noted, four firms assumed control of the purchase and sale of Idrijan mercury over the course of some 50 years. All suffered insolvency and/or bankruptcy. The mercury trade did not figure directly in every case, but their varied fates hinged in part on their capacity to manage the uncertainties of that mineral's production and sale and in part on the legal formalities of bankruptcy resolution.

Those formalities existed in vestigial form when Ambrosius Höchstetter stood accused of default. The earliest codification of local law, the *Augsburger Stadtbuch* of 1276 served as the point of departure for an evolution of official procedures that had at best uneven influence in cases of default (Birnbäum 2014; Liedl 1958; Kießling 1971, 54-57, 67f; Meyer 1872; Zeller 1916).³⁶ It prescribed an entitlement to pledge and surety in satisfaction of legitimate debts. As recorded in the *Stadtbuch*, the process was probably intended for cases in which a single creditor confronted a single defaulter (Hellmann 1905, 20). Multiple creditors created a situation in which they sued not only the debtor, but also one another, fostering opportunism, conflict and violence. This is precisely the situation that erupted after the Höchstetters' declaration of insolvency. Years of argument and counterargument, petitions and appeals, incarceration and interrogation followed, all of which turned on questions

amount and quality of mineral mined, washed, crushed or refined and tended to pay more than 50 percent better than wage labor.

³⁶ Bayrisches Hauptstaatsarchiv München (BHStA), Reichsstadt Augsburg Literalien, Lit. 32. See also (Meyer 1872; Schmidt 1976, 80-179).

of uncertainty awareness, assessment and management. The bankrupts pled the contingency of business and the limits of certainty; their creditors provided evidence of the bankrupts' certain knowledge and fraudulent intent. The creditors were divided among themselves, some willing to settle for partial repayment of the money owed to them, some insisting upon nothing less than payment in full. The bankrupts clung to the principle of an orderly cession of goods that would allow them to remain in business.

Situations of this sort forced the magistrates to develop formal bankruptcy procedures. Rather than treat all claims separately, granting advantage to certain claimants over others, the magistrates enjoined the appointment of one or more *curatores litis et bonorum*, persons charged with representing all creditors in bankruptcy proceedings and administering the bankrupt's property to their joint benefit (Hellmann 1905, 74). The creditors had to swear to accept representation by the curators and cease all individual actions against the bankrupt. Although the principle of 'first come, first served' seems initially to have determined the priority of payment (Birnbaum 2014, 5), Augsburg magistrates began in the late-fifteenth century to grant equal right to proportional payment for all those who registered their claims on the same given day, a proceeding known as a *Genett* (Hellmann 1905, 43, 66; Safley 2020, 141-49). Such common proceedings may have helped to promote the equality of all creditors, but they failed to establish the equality of their claims. Nor did they place foreign creditors on an equal footing; the *Gewerke* at Idrija failed to stake their claim to the 70,000 fl owed them. The implicit tension between priority and equality remained unregulated in Augsburg throughout the sixteenth century and prevented final settlement of the Höchstetter bankruptcy.

By the time the Höchstetter bankruptcy had passed into local lore, such practices had become common occurrences but not yet required procedures in Augsburg. The cessation of payments by the crowns of Spain, Portugal and France in the mid-sixteenth century prompted the collapse of numerous merchant companies in the city, some 39 between 1559 and 1580, the Paumgartner, Herwart and Haug-Langnauer bankruptcies among them (Hildebrandt 1977, 154; Strieder 1969, 44; Warnemünde 1956; Zorn 2001, 262).³⁷ Though an acute shortage of credit might explain the rapaciousness of some of creditors, the four cases presented in brief here also resulted from principal-agent problems, personality flaws, market forces and *force majeure*. All these causes supposedly reflect what Reinhard Hildebrandt called the «exceedingly high willingness to entertain risk among Augsburg merchants» (Hildebrandt 1977, 216). Yet, the wave of high-profile failures that swept Augsburg also reflects the lack of effective mechanisms to manage defaults by ensuring at least partial repayment of all creditors in an orderly manner.

³⁷ Certainly, Augsburg merchant-financiers extended substantial credit to these and other princes, but this monocausal explanation for a large series of bankruptcies appears to rest on little more than chronological coincidence. That creditors called debts and capital markets tightened notably in the second half of the sixteenth century is not open to question. Proof would require a close analysis of accounts, however, which has not occurred in most cases.

On 7 May 1564, the City Council drew upon this experience to pass Augsburg's first, formal Bankruptcy Ordinance (*Fallitenordnung*).³⁸ To prevent loss, damage and disorder, the Council henceforth required the bankrupt to cede all property (the *cessio bonorum*).³⁹ It also proscribed the independent collection of debt, requiring all creditors to act in common and to register their claims and pursue payment through approved curators. It thus formalized as procedures practices in use since the fifteenth century.

Yet, these ordinances achieved mixed results. Legal statutes that prescribe a common procedure in cases of bankruptcy cannot anticipate the contingency of circumstances and characters that make each bankruptcy unique. Augsburg merchants understood this fact very well; while they paid lip-service to such laws, they continued to assess their own interests – and uncertainties – and pursue their own ends.

The bankruptcy of Hans Georg Paumgartner offers a case in point. Much evidence suggests that his father aspired to high political preferment and social status for his sons. They appear to have shared this ambition. In 1553, his brother David left the firm to engage in politics, fueled by high-stakes speculation and large-scale borrowing. Within a decade he was insolvent and descended into alchemy, conspiracy and, finally, treason. He was beheaded in 1567. Hans Georg, who had provided surety for his brother's debts, was cited as a defaulter in 1565 (Krag 1919, 116). Rather than settle, he defied the prescripts of the city's first formal bankruptcy ordinance, refused to uphold his *Trauen und Glauben* as guarantor of his brother's debts and swore no oath to cooperate with the creditors. Seized and imprisoned on 5 March 1565, he resisted settlement for five years (Krag 1919, 117). Settlement finally occurred on 7 January 1570 (Müller 1955, 249-50). He surrendered his citizenship and died a broken man in the following September.

The bankruptcies of the late 1560s and early 1570s prompted the City Council of Augsburg to issue a new bankruptcy ordinance on 3 July 1574 to «prevent as much as possible resulting damage to the citizenry and to interested parties domestic and foreign». ⁴⁰ The act repeated the measures of 1564 but with sharper sanctions and tighter controls, a signal that the earlier measure proved insufficient. It set the parameters for proceedings against Hans Paul Herwart, who declared insolvency in 1575. Unlike the Höchstetters and Paumgartners, he settled voluntarily with his creditors (Herwarth von Bittenfeld 1882, 147-57). Herwart opened his accounts to a group of 47 creditors, represented by *curatores litis et bonorum*. They agreed that his wife would retain all property brought by her to her marriage, that Herwart would retain the estate of Hohenburg including its furnishings and rents and that all other capital would be applied to payment of the total debt. The 'bankruptcy estate' would be

³⁸ StAA. Ordnungen und Statuten. Fallitenordnung, 1564, 1570, 1574, 1580. See also (Häberlein 1998, 323-37; Hellmann 1905], 72).

³⁹ Introduced into Roman Law by Caesar Augustus, the *lex Julia* sought to mitigate the violence and disorder of bankruptcy by declaring whoever became insolvent through no personal fault and declared bankruptcy could cede all her or his property without exception (a *cessio bonorum*) to the creditors and, by so doing, avoid further penalty and dishonor.

⁴⁰ StAA, Ratsprotokolle 38, 1574-1575, Fallitenordnung, 3 July 1574. Reproduced in (Haßler 1928, 52-3).

invested at 5 percent interest by the curators and the interest paid *pro rata* to the individual creditors until such time as all debts were paid in full. With the signing of this agreement, all conflict and hostility were declared ended. Herwart surrendered his citizenship and emigrated to Bavaria.

Yet, the 1574 ordinance proved less effective in the bankruptcy of «David Haug, Hans Langnauer and Associates».⁴¹ The company had struggled with financial problems for some time, when, in 1574, Hans Langnauer attempted to address these problems by mortgaging 3,000 cwt of Idrijan mercury to the Fugger company. This prompted the «Katzbeck und Manlich Company», which held a 37.5 percent interest in those goods, to petition the Augsburg city council to declare the company bankrupt (Haßler 1928, 30-32). The City Council ordered the immediate arrest of Ludwig and Anton Haug and appointed curators to lead the initial negotiation (Haßler 1928, 32-34; Strieder 1914, 350-51). News of the default spread quickly, and creditors began to seize the property of the bankrupts, despite the new bankruptcy ordinance. To prevent further plunder, the curators petitioned for access to the firm's chancellery and the accounts that would provide an overview of its assets. Negotiations began in January 1575. By December 1576, the curators had to admit that further talks would serve little purpose, and the creditors petitioned to have the bankrupts questioned under torture. Ludwig finally confessed to the fraudulent alteration of his firm's founding charter. His brothers were released, but he died in chains in 1580. Formal proceedings ended in 1576, but lawsuits continued into the seventeenth century.

What becomes clear upon examination of these case records is that the magistracy responded to – the city's bankruptcy ordinances emerged from – the quotidian necessities and practices adopted by economic agents to confront the uncertainties of their situations (Safley 2008). Many of the initiatives and adaptations attributed to the magistracy emerged as private-order solutions to commercial problems, customary practices that were only gradually fixed as legal regulations in the sixteenth century (Hellmann 1905). Merchants and authorities alike learned by doing.

What does this reveal about uncertainty and bankruptcy? First, it reminds us that all bankruptcies are not alike: they result from different causes; they proceed along distinct courses; they conclude with a variety of consequences. To group them together under a single rubric, as if they were uniform, obscures this contingent quality and the uncertainty that results from it. The contingency and uncertainty of bankruptcy proceedings limit the effectiveness of regulations, which prescribe a set procedure but rarely proceed according to prescription. Second, the uncertainties that become visible in bankruptcy are distinct from but related to those that characterize commercial enterprise. Investors, depositors and creditors become uncertain about the reliability of their debtor, his «*Trauen und Glaubens*», but they have little means to manage that uncertainty apart from past performance and established reputation, another form of path dependency. Borrowers and debtors, by contrast, confront the uncertainty that arises from the degree of leverage their companies bear

⁴¹ StAA, Stadtgericht, Schuld-, Klag- und Appellationssachen, Teil 2, Karton XI-XIII. Konkurs on Haug-Langnauer-Linck, 1570er; Stadtgerichtsakten, 87, 122, 171, 172, 188.

and how to manage repayment. Settlement or composition depend more on the management of these uncertainties than on state intervention and regulation.

6. Conclusion

Mercury production and trade at Idrija can be written in terms of managing economic uncertainties. Merchant-capitalists bargained for monopsony privileges and regulatory protections that would enable them to make a market in the commodity and avoid the uncertainties that attended commerce in the sixteenth century. Producers sought to mitigate the uncertainties of mining and refining through agreements that guaranteed sales, profit and employment through fixed volumes and prices. The state sought to avoid economic and fiscal instability through long-term agreements that offered tax revenue and market access.

Yet, none of these negotiations proved perfect instruments of management or impervious to external shocks. The collapse of the Höchstetter company, the ambitions of the Paumgartner family, the fire at the Almadén mine and the defaults of territorial states are cases in point. Nor could they prevent the internal shocks that weaken family firms, to which three of the companies presented here all fell victim: when membership in the family does not align perfectly with ownership or management of the firm; when family membership leads to the promotion of less qualified owners or managers; when emotional ties among family member results in poor or biased decision-making; when an informality of business procedures encourages inefficient, unprofitable or dishonest business conduct. Indeed, the very notion of ‘shocks’ emphasizes their unpredictability.

Of course, those shocks resulted in bankruptcies, for which state laws and regulations were a similarly imperfect remedy. These cases demonstrate that customs – to say nothing of the regulations that articulate them – emerge, function and evolve according to conscious decision-making over time (Commons 1931; Commons 1936; Dewey and Malcolm 2008; Hamilton 1919). Negotiation frequently veered beyond prescribed principles and procedures; opportunism occurred in defiance of legal or social norms. This is not to suggest that institutions have no role in economic life. Far from it. At the center of all four cases stood ancient and hallowed principles of legal thought and economic life: *Tranen und Glauben; pacta sunt servanda*. Yet, despite their apparent simplicity, they left fundamental questions unanswered: What constitutes an obligation or agreement; how should it be kept; how should a breach be amended? The answers emerged over time. By the end of the sixteenth century, Augsburg’s bankruptcy ordinances prescribed (I wish to emphasize this word, because practice rarely followed prescription) an orderly, efficient settlement of bankruptcy that varying and complex perceptions of uncertainty often rendered ineffective.

The hiving off of capital and labor, of institutions and behaviors, have created an artifice that obscures the real workings of premodern capitalism and the premodern economy. Historians and economists insist with near unanimity that laws – open-access institutions – improve market function in the first place by preventing

opportunism and limiting uncertainty in economic relations. While economic life cannot be fully understood in ignorance of them, I would argue that it can be obscured by over-reliance on them.⁴² Adam Smith famously wrote of «the propensity to truck, barter and exchange one thing for another» that he understood to be «common to all men» ([1776] 1994, 14). Yet, those men also steal and seize. Agreements must be kept – customs observed, laws obeyed, debts paid – but, as these cases demonstrate, only if they serve one’s interest. In economic life the unforeseen occurs, opportunism persists and effective measures to manage them remain elusive. Scholars need to think of opportunism as normal rather than aberrant. They need to recall Albert Hirschman (1977) as well as Douglass North (1990); they need to consider the passions and the interests as well as the institutions and the organizations; they need to consider how uncertainty persists, even in the age of risk.

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⁴² Herbert Simons argued in an early critique of institutional economics that institutions cannot and should not be understood purely in terms of market mechanisms and neoclassical economics. (Simons 1991, 25.44).

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