

Gian Rinaldo Carli (1720-1795): an early monetary expert

1. Introduction

“Some mathematicians maintain that money is like water, which flows and swirls around until it finds its equilibrium again; the matter is totally different, especially in Italy” (Carli 1751: 164-165). This quotation from one of Gian Rinaldo Carli’s main works, *Dell’origine e del commercio della moneta e dei disordini che accadono nelle alterazioni di essa* (*On the origin and trade of money, and the disruptions that occur in its alterations*) (1751), makes it clear that Carli focused on the monetary disorder that would shape concrete systems and institutions, in Italy at least, and on attempts to restore a monetary stability - or equilibrium, as he repeatedly said. Monetary disorder was not just an increase in prices. It was something broader and more complex that concerned the workings of money as a means of intermediation.

Gian Rinaldo Carli was a monetary economist who lived in the 18th century, in an economic environment revolving around national and international trade. Belonging to a community of scholars who lived in a sort of golden age of pre-classical studies on money, Carli stood out for his insistence on the need to intervene to contain monetary debasement, seen as a serious impediment to the expansion of trade and economic dynamism. Carli wanted to rebalance monetary values and proportions, mainly by adopting specific political measures capable of ensuring that the legal value of a currency would correspond to its intrinsic value. It was on this premise that coins could be accepted, used for trade, and not hoarded. Carli thought money could have a scientific basis. Monetary relationships could be objective, based on numbers, not subject to the moods of rulers. In developing this objective view of money, he saw himself as an expert on money, or “doctor” (1754: 296), who intervenes on the strength of given certainties deriving from a thorough, erudite knowledge of the world of coins. For Carli, being a money doctor meant introducing certain relationships in the political world that would limit operators’ discretionary freedom and abuse.

In a time of lively monetary debate, it was after meeting Ludovico Muratori (1672-1750) that Carli became interested in a political or, rather, an administrative approach to monetary issues. Muratori had written: “This subject [monetary matters] is one of the most intriguing that public government deals with, and which is not inferior to metaphysics and geometry” (1749: 379). Such a suggestion that money be considered from a political as well as a theoretical point of view perfectly matched the impressions coming from the area where Carli lived (Northern Italy), where he could see the difficulties deriving from currencies circulating at legal rates variously proportional to their intrinsic

value. In his environment, it was widely accepted that theory should be at the service of the governors of institutions,¹ as subsequently shown by two other important monetary thinkers, Pietro Verri (1728-1797) and Cesare Beccaria (1738-1794). Together with Carli and others, Verri and Beccaria formed a group that cultivated economics as a science of administration. Ferdinando Galiani (1728-1787) also saw money as part of a political constitution, but in more abstract, less operational terms.

So what can we expect from reading Carli's numerous texts on monetary problems? An accurate analysis of the complex phenomena that demand monetary policy measures, i.e. a first attempt at monetary policy.² Carli's analysis was theoretical in its depth, but with political action and initiatives in mind. It could be seen as a science-based policy, as the practical activity of money doctors, reformers or politicians acting on scientific grounds. The rhetorical figure of the 'doctor' applied to money and economics was intended to mean an effort to unite science and politics. Let us see if Carli's proposal was successful.

The paper is organized as follows. Section 2 contains some biographical background on Gian Rinaldo Carli. Section 3 suggests some coordinates for placing Carli in the monetary debate of his time. Section 4 analyzes Carli interpretation of monetary disorder, explaining why he considered coin debasement a risky practice for a country's whole national economy. Section 5 presents the structural and specific remedies devised by Carli to reduce monetary disorder. Section 6 describes how Carli applied his monetary tools to reform the Milan monetary system. Section 7 adds some final considerations.

2. Living to be an encyclopedic expert

Carli was born at Koper (now in Slovenia) in 1720 into a modest bourgeois family, but his education brought him into contact with the more advanced Italian culture of his time. As a teenager, he was a pupil of the abbot Giuseppe Bini, who introduced him to the work of Ludovico Muratori. This man of letters was famous both for his erudite method and for his ideas about Italian unification, and on both these aspects he was an important figure in Carli's life and work. Muratori was also the author of an interesting essay entitled *Della pubblica felicità (On Public Happiness)*, published in 1749, which revealed him as an exponent of that moderate Enlightenment spreading in Italy after the election of Prospero Lambertini as Pope Benedict XIV in 1740.³

¹ On this topic, see Quadrio Curzio and Scazzieri,

² See Marcelli 1955: 50

³ See J.I. Israel, 2006, and particularly the chapter "Italy, the Two Enlightenments, and Vico's 'New Science'": 513 ff.

In 1739, Carli obtained a grant from the Koper local authority that enabled him to move to Padua and enroll at the Faculty of Law (the alternative was the Faculty of Arts, which was attended by philosophers, physicians and theologians). He soon swapped studying law for the experimentalism and classicism of his new friends: the naturalist and biologist Antonio Vallisneri (1661-1730); the physicist and engineer Giovanni Poleni (1683-1761), who was one of the first to be given a teaching post at Padua University to lecture on experimental physics; and the poet, Latinist and writer Jacopo Facciolati (1682-1769), who taught logic (see Aphi 1973).

Carli's interests included theater, poetry and history, which he condensed in his erudite reflection on *Della spedizione degli Argonauti in Colco* (*About the Argonauts' shipping to Colco*), published in 1745. Going against his father's expectations, who wanted him to follow a law career, in 1749 Carli was appointed by the university to teach *Theory of the nautical arts* (a topic of interest to Venice) with the support of Poleni and Marco Foscarini, a man of letters and future *doge* of the Venetian Republic. Taking a more practical than theoretical approach, Carli wrote an essay entitled *Intorno alla declinazione e variazione della calamita* (*On the declination and variation of the magnet*), which goes to show his interest in practical matters.

After that his marriage to a young heiress, Paolina Rubbi, in 1748, solved all his financial problems, Carli was able to turn towards the topics that really interested him. Once he had become a "prince" (or president) (1748-50) of the *Accademia dei Ricovrati* in Padua (later renamed as the *Accademia galileiana di scienze, lettere ed arti*), he broadened his horizons to social and economic topics. In 1747, in his *Parere sull'impiego del danaro* (*Opinion on the use of money*), he supported Scipione Maffei (1675-1755), another important scholar of the time, who claimed that loans with interest were lawful.

In 1749, on the sudden premature death of his wife, Carli came into a sizeable inheritance. His economic standing allowed him to take part in the public debate on theater, witches, and so on, in which he always took a moderate stance. His new financial situation also enabled him to leave the chair of nautical arts at the university in 1750, bringing to an end an academic career that he had never really sought. Carli produced his early works on money at around the same time. In 1751, he published *Dell'origine e del commercio della moneta e dei disordini che accadono nelle alterazioni di essa* (*On the origin and trade of money, and the disruptions that occur in its alterations*), followed in 1754 by *Digressione su la proporzione media fra i metalli monetati* (*Digressions on the average proportion between monetized metals*), and in 1764 by *Del valore e della proporzione dei metalli monetati con i generi in Italia prima delle scoperte dell'Indie col confronto del valore e della proporzione de' tempi nostri* (*On the value and proportion of metals monetized in Italy before the discovery of the Indies, with a comparison of the value and proportion of our times*). These

works established his as an “expert” on monetary issues, and it became clear that Carli was interested in the practical management of money.

After his second marriage to Anna Maria Lanfranchi Chiccoli (Sammartini’s widow, who came from a noble family in Pisa), Carli left the Republic of Venice for places he saw as having a more reforming approach, where his services as a money technician would be more appreciated. The new destinations of this well-travelled thinker (by Italian standards) were Turin, Tuscany and Milan, and Carli had the opportunity to work with several important people of his time, like Pietro Verri.

Between 1754 and 1760 he published other important books (mainly in Tuscany), including the *Saggio politico ed economico sopra la Toscana (Political and economic essay on Tuscany)* (1757). His publications did not yield the expected outcome in terms of appointments, however, and he was obliged to go back to Koper, partly to sort out some inheritance issues after his father’s death. The shift in his scientific interests towards local history coincided with some attempts to set up some businesses, which failed miserably, negatively affecting his financial situation. His marriage also became a problem, leading to a lengthy legal battle over the maintenance of his second wife.

In 1764, Carli moved first to Emilia Romagna, and then to Lombardy, where he succeeded in obtaining a post as technical money consultant when the Empress Maria Theresa of Austria, appreciating his talent and independence, appointed him president of the new Supreme Council of Economics, and Councilor of the New Deputation for Studies in the Duchy of Milan. Throwing himself headlong into his new assignments, he published several interesting reports, including: *Osservazioni preventive al piano intorno alle monete di Milano (Preventive observations on the plan regarding the money of Milan)* (1766); the *Saggio sull’economia pubblica (Essay on the public economy)* (1769); and *Nuove osservazioni sulla riforma delle monete (New observations on money reform)* (1770). These were the years of ideological and human conflict with Pietro Verri, fueled by the preference that the Empress and Chancellor Kaunitz accorded to the moderate Carli over the innovator Verri.

In the second half of the 18th century, Carli was cited as the money “technician” who could “face the difficult subject of the monetary crises of the time, remedy them with reforms, or even just understand them” (Marcelli 1955, 46). These were the years when he published: *Breve ragionamento sopra i bilanci economici delle nazioni (Brief considerations on the economic budgets of nations)* (1770); *Relazione del censimento dello stato di Milano (The Milan census)* (1770); *Del commercio dei grani (On the grain trade)* (1771); and the controversial *Meditazioni sull’economia politica del Verri (Meditations on Verri’s political economy)* (1771). He also found a renewed interest in education, writing: *Nuovo metodo per le scuole pubbliche in Italia (New method for public schools in Italy)* (1774).

New family conflicts with his divorced wife, and then with his son too, combined with a gradual decline in his authority as a technical reformer to drive him towards increasingly conservative positions, and a greater interest in politics.

In 1779 he published *L'uomo libero* (*Free man*), taking a stance in opposition to Rousseau's and revealing an increasingly convinced justification of absolute power that is expressed in his *Lettere americane* (*American letters*), which he began publishing in 1780. Meanwhile, the arrival of Joseph II on the throne in Vienna put a stop to his career as a reforming consultant, with serious repercussions on his financial situation. He rejected a post as consultant to the Republic of Venice to devote himself to researching and writing on history and other subjects, including medicine. This led to the publication of *Delle antichità italiane* (*Italian antiquities*) (1788-1791), and *Ragionamento sulla disegualianza* (*Considerations on inequality*) (1792). Carli died near Milan in 1795.

3. Looking for a place in the monetary debate of the time

Carli was not particularly original in his analysis of monetary issues. He did not pull a rabbit out of a hat like Bernardo Davanzati (1529-1606) a century before him, when he spoke of the value-in-use of money.⁴ Carli's contribution was more concerned with policy, and with monetary instruments.

Carli put the price of coins, not goods, at the center of his research, convinced that the former influence the latter. For example, raising the prices of coins by law would induce foreign partners to refuse payments in domestic currency, prompting an increase in the import prices of gold and silver too. Carli focused on the part played by currency as the intermediary in an exchange. Money malfunctions could lead to inflation, and to a worsening trade balance, so Carli anchored his theory of prices to his analysis of money disorder, suggesting political measures to reduce the latter. He considered himself a policymaker, certainly not an "economist" without any qualifying adjective, as he defined the then French physiocrats (1771: 106 and *passim*).

Carli was aware that he was tackling a new and thorny topic: "To date, as far as I know, there has been nobody who has dared to raise the curtain to reveal this mysterious stage [money disorder], for which various comedies were written, and on which not a few tragedies were presented" (1751: 197). Then it took only a short step to start presenting monetary disorder like a plague, a step made

⁴ See Marget 1938: 14

easier by ample recourse to the medical metaphor (quite common at the time), which also gave birth to the idea of ‘monetary doctor’.⁵

How did Carli fit his idea of focusing on monetary disorder in the European debate? Discussion on the debasement of coins had been around for a long time. Carli anchored his appeal to solve the debasement problem to the writings of John Locke (1632-1704), and Nicolas Dutot (1684-1781). While Carli frequently mentioned Dutot’s analysis⁶ of how the devaluation of international coins was transmitted to domestic prices (1754: 278), he explicitly complained about the lack of an Italian Locke and an Italian Newton (1954: 263) capable of raising and solving the problem of monetary decline. He was likely thinking of the controversy that had pitted Locke against William Lowndes (then a Treasury official charged with planning the recoinage of silver coins), who suggested increasing the value of official silver coins by 25 percent - precisely the sort of idea that Carli rejected. Lowndes was practically ignoring John Locke’s earlier warning that raising the coins’ legal value would not prevent people from continuing to melt them to sell the silver in bullion because the value of silver would have remained above the mint.⁷ Carli did not mention Lowndes’s monetary reform of 1695, but we imagine he disagreed with the idea of reducing the weight of the shilling to the level it had been worn down to in use (see also Rist 1938: 106). Carli would have preferred to adopt the market price of the coin.

Carli’s interest in the link between debasement and inflation re-emerged when he was dealing with the consequences on prices of European gold imports. In this case, his target was Jean Bodin (1530-1596), variously quoted in Carli’s works, but only to emphasize his opposition to some of Bodin’s most important statements. True to traditional quantity theory, Bodin said: “c’est l’abondance qui cause le mépris”. He came to this conclusion after accepting that gold and silver imports from the New World were causing inflation (Bodin 1568). As we will see, Carli firmly opposed this view, that he saw as the French scholar’s most important message. To be fair, we should remember that France was experiencing a severe inflationary process at the time, particularly during the second half of the 16th century.⁸

⁵ Carli was not the first monetary scholar to use the rhetorical figure of the “doctor” to indicate a monetary expert. The book *Discourse on Common Weal* published in 1581 (and possibly authored by John Hales) contains a dialogue involving a doctor expert on money matters. See Dewar 1966.

⁶ Carli cited Dutot’s work, *Réflexions politiques sur le finances et le commerce* (1738). On Dutot, see Velde 2012.

⁷ See Kleer 2004: 539.

⁸ See Parsons, 2009: 107.

Like Davanzati, Carli always took a relative attitude to quantities, never considering them in absolute terms.⁹ This prevented him from absolutizing the effects of greater stocks of gold and silver on prices. Carli treated money as a source of organization because it enabled exchanges. Although they are inaccurately anchored to silver and gold, and therefore to a concrete value, precious metals were ultimately considered a source of transparency to allow a better organization of commercial and economic relations.

This view helps us to understand why Carli was vague about the role of paper money, which he frequently associated in his writings with the name of John Law. Carli remained loyal to metal money, taking his opposition to paper money almost as a given.

For Davanzati, Geminiano Montanari (1633-1687) and many others, the economic arena was not local or national, but international. In an age when states defined their international as well as their national roles in political terms, the international monetary system was a topic of pivotal concern in their analyses. Carli, on the other hand, retained a national view of economics, although he grounded his monetary analysis on international trade. In a logical sequence that linked the proportions between the precious metal (and especially silver) coins used in international exchanges and the base metal coins used in his home country, Carli retained a national or domestic perspective on the effectiveness of monetary measures. In actual fact, the relationship between the noble coinage and the low (or small) coins used within a country did not always reflect their legally-declared proportions. Carli spoke explicitly of two values and two measures being applied (1754: 274). This implicitly means that the two coins do not necessarily go in the same direction: the low coin may depreciate while the noble one remains unchanged. (1754: 277)

Functional to the central role attributed to economic policy, the state re-emerges as the supreme protagonist of economic initiatives. Proof of this comes from the fact that, in the 18th century, neither British nor Italian scholars' monetary analyses could be isolated from the eudemonological purposes of the state. The aim of the economy and politics was to assure citizens the greatest possible overall well-being. This could be seen with Francis Hutcheson (1694-1746) in Great Britain, and then with Antonio Genovesi (1713-1769), Cesare Beccaria, and Pietro Verri (among others) in Italy. Even Muratori dedicated his book to *public happiness*. Carli was heading for the same goal, public well-being, in a slightly different way. He wrote: "The condition of the people becomes better when discipline and order are established though the power of a sovereign; that is, when the parts that make up society are in harmony; and this harmony can only be sustained by

⁹ Carli showed a thorough knowledge of the quantitative approach that Davanzati sketched in his *Lezione delle monete*, 1581. See Davanzati 1588(1804).

means of opinions”, but opinions scientifically based on numbers and proportions (Carli 1779: 171). This explains much of the rigor he promoted in dealing with monetary issues.

Since there is no doubting that Carli saw political economy as a “science of administration”, this naturally raises the question of his conception of wealth. Like agriculture and the grain trade, the arts are also a source of wealth, given that a surplus produced in manufacturing expands investments in agriculture. It was in 1771 that Carli, in commenting on Galiani’s *Dialogo sul commercio dei grani* (*Dialogue on the grain trade*) (1770), downsized the importance of the international trade in wheat, and emphasized the role of manufacturing. Carli could not have been clearer: “The land undoubtedly gives us food, but - if I am not mistaken - man-made industry is the only one to produce true wealth” (1771: 120). This completed Carli’s perspective on the national economy.

4. Scrutinizing monetary disorder

Scrolling through Carli’s publications, it is impossible to find a particular section or chapter in which he outlines the analytical essence of his monetary proposal – in short, his theory. It must therefore be extracted bit-by-bit from his vast opus in order to be able to interpret his numerous historical and empirical analyses. Once the relationships he saw between money and prices have been schematized, we can understand his insistence on pointing the finger at what he called “money altering” and his explanation for the great inflation that raged in Europe between 1500 and 1700.

4.1 *From the value of coins to the price of goods*

Carli’s reading of monetary disorder can be understood by considering the three values that a coin made of a noble metal could take. First, it had a *decreed* or *legal* value, also defined as *imaginary* money (1766: 45),¹⁰ which was essentially the coin’s value as stated by the authorities. Second, it had an *exchange* value, which was the *real* value of the coin calculated on a given price of its content in grams of fine gold and silver, which were in strict proportion to one another. Third, it had an *abusive* value, meaning the exchange value proposed by money-changers, lenders, and cashiers

¹⁰ Galiani wrote: “An imaginary coin is the one that does not have a whole piece of metal that corresponds precisely to its value” (1751: 152, T. III). Luigi Einaudi, an Italian economist, returned to this subject in a masterly essay, *Teoria della moneta immaginaria nel tempo da Carlomagno alla Rivoluzione Francese* (*Theory of imaginary money over time from Charlemagne to the French Revolution*) (1936). He said that imaginary money was “an abstract entity that peoples longed for and princes managed sometimes for profit and mostly for public benefit” (1936: 265). Carli considered legal tender as a modern version of the imaginary coin: “The theory of the imaginary came modernly, and it was the law men who - misunderstanding the feelings of their predecessors - strove to make people believe it was a universal sentiment of the jurists that the law has the power to make the imaginary real, and to make fourteen equal twenty-one, although *naturam mutare pecunia nescit*” (1754: 260).

(1766: 38). Skipping the third concept, the other two are useful when considering Carli's monetary theory.

Money had a decreed value because the authorities at the time would announce the legal value of a given coin (usually gold and silver, sometimes copper too) by decree. Carli described this value as *legal*, and sometimes as *imaginary*, to emphasize the fact that it might or might not coincide with the *commercial* or *real* value of the piece of metal employed as a coin. The legal value of a coin usually exceeded its real value because governments needed to recover the cost of minting it. If the value of the coin corresponded to the commercial value of the piece of metal, its legal value would include its intrinsic value plus an additional value justified by the work needed to make it and the ruler's right to seigniorage (1751:93-106). Taking all this into account, the decreed value of a coin was clearly going to be higher than the value of the precious metal it contained, but – providing it was kept within reasonable margins – this added value could even be necessary to prevent coins from being melted down and used for other purposes.

Problems could crop up if the use of decrees became pathological, i.e. when the authorities raised the legal value of a currency too frequently while leaving the quantity of metal unchanged. With the same quantity of noble metal, they could then mint a larger number of coins in order to reduce public debt, finance ongoing expenditure or increase the nominal value of gold reserves. This was the money altering much criticized by Carli, and amounted to a devaluation.

By disregarding its extrinsic value (seigniorage), a coin's legal value could be allowed to correspond to its commercial or intrinsic value. That was what Carli saw as the ideal condition, but it was not very common at the time. A coin could be overvalued too, if its legal value was lower than its commercial value, in which case it was destined to be hoarded and to disappear from the market. Carli recalled how this had sometimes happened to the Venetian *zecchino*.

It is worth emphasizing that the intrinsic value of a particular gold coin, or rather the price of gold, was not invariable, but depended on its mining and marketing. So, a solution had to be found to cope with the need to have an internationally-accepted invariable measure of the noble metal's value from which to establish the value of a given national currency. Carli's idea was that countries should agree on the price of a gram of fine gold or silver.

Briefly, given a coin's two values, one legal and the other real, the debasement so common in Carli's time defines any unjustified attempt to increase the legal value of money vis-à-vis its intrinsic or real value. Carli devoted most of his work on monetary matters to the consequences of this kind of meddling, and to the search for a remedy.

Before completing the picture with the prices, it should be noted that Carli did not seem to offer an organic theory on the prices of goods. He restricted himself to adding a comment here and there on the relationship between money and the price of goods. What follows is based on these hints.

In 1754 Carli wrote that the price of goods exchanged within a country was always decided by the low or petty currency, with a consequent different disbursement depending on which coins (noble or petty) were used (1754: 281). However, he left no room for doubt in 1766, when he wrote that “goods are always proportional to the real, and not to the imaginary value of money” (1766: 47). In other words, an unchanged quantity of gold, despite a higher legal value of the currency containing it, will always purchase the same quantity of goods as it did before the money’s value was altered. Similarly, a currency with the same legal value, but containing a smaller quantity of gold, will buy a smaller quantity of goods. The goods follow the gold (or silver) – and this can only happen if the prices of goods rise proportionally with any money debasement obtained either raising of the legal value of a currency or diminishing the content of precious metal in each coin.

But how can the quantity of purchased goods remain anchored to the real or intrinsic value of the currency? The most common answer, that Carli also gave, was based on an increase in the price of imports. As we will see in the next section, a devalued currency means more expensive imports, and a consequent increase in their prices. These increases will also affect domestic products exchanged for imported products.

But Carli said something else too. He spoke at length of the “discredit” resulting from raising the legal value of a coin (1751: 149 *passim*). People are always rationally able to attribute the market value to a commodity, and to discredit a currency whose value has been fictitiously raised as a result. Carli’s economy is reminiscent of the barter economy, where exchanges can only take place between goods that have the same market value. Since its purchasing power does not change, raising the legal value of a coin is useless for the purposes of enabling a greater expenditure – and that includes government expenditure, as Carli clearly recognized. It is easy to see why he reiterated several times that the only people to benefit from a coin’s debasement were the moneylenders and speculators who set an abusive value on it.

Only nominal effects, then? Not really. Several times in his works, Carli emphasized that the wages and remuneration of the less well-off classes of workers were not settled in noble currency, but in the local petty coinage, which in most countries was not adjusted to the trend of the noble currency. Since rising prices affected all goods, whether they were expressed in noble or base metal coins, wages and lower incomes lost purchasing power. In short, the end-result of a debasement, which caused an increase in prices while leaving wages unchanged, was an impoverishment of the less well-off classes of workers.

4.2 Currency debasement in a trading country

Carli's first important book on money, *On the origin and trade of money, and the disruptions that occur in its alterations* (1751[1804]), contains a detailed historical analysis of what can be seen as centuries of monetary disorder, and offers an interesting perspective on domestic and international monetary relations. These relations are crucial to understanding why Carli attributed so much importance to debasement, the effects of which derived precisely from the fact that noble metals have an international pricing.

In an autarchic country, altering the value of a currency by decree was not a problem. Although coins were made of metal, it was their validation by decree that enabled their proper circulation within the boundaries of the country. This is what happened in Ancient Rome and Sparta. Coins were made of iron, copper or other common metals, and were not related to the value of gold or silver. Most importantly, however, they did not need to be accepted by other countries. Any alteration of the value of metal coins, by decree or otherwise, made no difference to the degree of acceptance of the coins that continued to circulate. But that was a very long time ago.

The need to anchor coins to the value of gold and silver arose with increasing levels of international trade, and with armies occupying foreign territories. The legal validation of the Ancients' coins cannot be extended to foreign transactions. The coinage used for international transactions could not be imposed. They had to be accepted for their intrinsic characteristics.

Almost all of Carli's arguments against altering a coin's value are based on its consequences for international trade, which in turn had cascading effects on domestic exchanges too. Such alterations meant that the legal value of a coin was not consistent with its intrinsic value due to its noble metal content, and this could pose a problem of the coin's acceptance. A country wanting to pay for its imports with overvalued coins might see its payments refused or the amount due increased to balance the lower quantity of gold contained in its coins. This would make the price of its imports increase, prompting the same upswing in the price of these goods on the domestic market. Debasement makes prices rise.

On the other hand, a country with undervalued coins (that contain a quantity of gold worth more than the coins' legal value), could see its gold reserves diminishing because it would receive payments for its exports in coins containing less gold than those it used to pay for its imports.

Opinions on the matter were divided, however. Galiani,¹¹ among others, argued for the legitimacy of raising the legal value of a coin when this concerned not the relationship between the metals it contained, but its value as a whole. In this case, according to Galiani, there would be no “obstruction” to the movements of the currency”. He added that “the general raising is a gain made by the prince over his creditors, that is the wealthier people” (1751: 58, T. IV). This different interpretation actually reflects two opinions on government: Carli was very critical, Galiani much more compliant.

4.3 *The great inflation*

The crux of the matter for most scholars of monetary issues has been to establish the causes of inflation in their own times. Here we are speaking of the great inflation from the 16th to the 18th century. The most common explanations for the phenomenon based on exogenous money attributed the upward price trend to two factors: currency debasement and inflow of species.¹² Carli also applied himself to the question and tried to interpret the great inflation in the light of his theory on monetary debasement.

In arguing that centuries of devaluation leading to rising prices coincided in Italy with a gradual but continuous altering of the value of coins, Carli often referred to the works of Henri Poulain (1709), and Nicolas-François Dupré de Saint-Maur (1746), who came to similar conclusions for France (1762: 312; 1766: 25). Carli explicitly set his interpretation in opposition to David Hume’s quantitative theory of money, which interprets prices by relating the stock of money to the quantity of goods (1764: 332).

Carli went into more detail in his “seventh dissertation” *Del valore e della proporzione dei metalli monetati ...* (*On the value and proportion of monetized metals ...*), which first appeared in Lucca in 1764. His analysis focused on inflation from the 16th to the mid-18th century. As mentioned earlier, this was a popular topic at the time, but Carli had his own view on the rising prices in Italian states and Europe. He argued that they were not due to any increase in the amount of gold and silver in circulation – quite the contrary, since the mints stopped producing coins due to the scarcity of noble metals (1764: 324). Any inflation was due to other causes, and primarily to the debasement of the value of metal coins.¹³ This interpretation went against the ideas prevailing at the time, which

¹¹ Galiani published his *Della moneta* in 1751, at 23 years of age. Carli’s *Dell’origine e del commercio della moneta e dell’istituzione delle zecche d’Italia*, in which his monetary theory is almost complete, was published in the same year.

¹² See Arestis and Howells 2015: 187.

¹³ Among others, see Romano 1992.

attributed inflation to European countries importing gold and silver from the recently-discovered Americas. Carli's reasoning can be summed up as follows.

Instead of enriching the Italian states, the discovery of the New World had made them poorer because they suffered from the competition of the American products, and this worsened their trade balance. Italian states exported less, so their gold and silver revenue declined. The New World had reduced, not increased the quantity of species circulating in Italy. The output of the Italian states' mints was consequently reduced as a result of a shortage, not an abundance of precious metal.¹⁴ During the 17th century, the Italian states tried to compensate for the smaller amount of circulating coinage by reducing its intrinsic value but maintaining or increasing its decreed value: what Carli called the monetary pestilence (1764: 323). In the end, the debasement of the coins' value and the loss of competitiveness increased the cost of imports, pushing up domestic prices. In conclusion, the supposedly greater monetization of gold and silver in Europe did not weigh on Italian prices. Unfortunately, Carli did not dwell on the trends of the market prices of gold and silver as a consequence of the inflow from the New World.

In considering debasement more dangerous than the inflow of gold, Carli could be said to have sided more with Malestroit¹⁵ than with J. Bodin (1568),¹⁶ but what interests us here is that debasement not only inspired his precepts on monetary policy, but became the basis for his pricing theory. Without debasement and a greater tax burden, Carli says, assets would cost less in 1750 than in 1500.

In the background there is an attempt to prove that money has a sort of natural value, that countries reduce for reasons unrelated to the value of money per se, such as a diminished competitiveness. Carli ultimately aimed to demonstrate that the amount of gold and silver in Italy had not increased, but nor had any monetary impulse been placed on local currencies.

Carli was perhaps the only Italian scholar to support the theory that inflation did not depend on the stock of gold. Galiani wrote that the amount of wealth arriving from the new Indies was so great that everything had become more expensive. Galiani added, however, that the amounts of precious metals (especially silver) varied very little due to the passive trade balance with old India, which needed the metal (1751: 44-47). We know that the issue of the inflationary pressure from imported gold and silver is controversial. Later scholars tended to support Bodin's quantity-based explanation

¹⁴ It remains to be seen whether the monetization of gold and silver was a necessary condition for the entry of precious metals to generate inflation. Edo and Melitz think not (2019: 12)

¹⁵ There are many similarities between Malestroit's theory of 'real prices' and Carli's view on prices anchored to real values. See Tortajada 1987.

¹⁶ The well-known controversy was between Malestroit, who considered debasement the more important problem, and Bodin, who identified the increase in the amount of precious metal as the real issue. See, among others, O'Brien 2000.

for the great inflation (see Hauser 1932), but more recent studies have been inclined to supplement his interpretation by re-examining real variables, such as demographics.¹⁷

5. Searching for remedies

5.1 *The metallic standard*

Carli suggested a single solution to all national and international monetary problems. Clearly, it was the authorities who decided on any recourse to debasement, but Carli wanted to tie governments' actions to the international stage. He recommended fixing the value of a given quantity of precious metal (gold or silver), and anchoring the currencies used in international trade to that value. Basically, he sketched an early silver (and then gold) standard for currencies used to trade between countries, and said that domestic currencies should be related to the value of their respective silver coins. Let us look at the international and domestic factors that inspired Carli's proposal.

First, for a metal to become an international currency, it had to possess monetary *attraction* (1751: 160), which is a characteristic of gold and silver, simply because they have an intrinsic value and can be exchanged and put to various uses. That is why they are used for international collections or payments. But, to be used internationally, a precious metal coin should have an acknowledged value. Gold and silver currencies clearly have an intrinsic value that legitimizes their circulation, but they cannot circulate smoothly without a mutual acknowledgement of that intrinsic value when they are used for international payments.

Carli's metallic standard needed to be based on countries agreeing to the value of a gram of fine silver or gold. He wrote that countries should find "the common proportion of metals" (1751: 187). This applied to the small states in Italy and to the larger ones elsewhere in Europe. The only rule that interested Carli was respect for the proportions between currencies, without which there would immediately be negative effects on the trade balance. Once an agreement on the value of their respective coins had been reached, the countries could ratify the value of their domestic currencies by decree, while also allowing for recognized foreign money to circulate.

Carli wanted to give certainty to monetary exchanges by means of the agreement to take a gram of fine silver as a reference unit. He was nonetheless aware that the value of money anchored to a noble metal would not stay the same forever, partly because the value of the metal itself could change. Consistency of the decreed value with the intrinsic value of the metal thus became fundamental to ensuring the stable circulation of countries' currencies. A decreed value much

¹⁷ We limit to quote the recent Edo A. and J. Melitz 2019.

higher than the intrinsic value could lead to a currency being refused for the purpose of international payments. Carli recommended using decrees only to align a currency's value with the agreed commercial value of the metal used to mint the coins, not to arbitrarily raise their legal value. The price of a refined gram of silver should be the reference unit of measure. In turn, the weight-to-weight ratio of gold to silver defined the relationship forming the basis of the bimetallic system. Carli dodged the problems of the bimetallic standard by referring mainly to silver as the basis of his proposed standard. What is decidedly interesting is that the circulation of money, both at home and internationally, required decrees and agreements – in short, political action.

5.2 Monetary tables and the comparative balance

To help states agree on the proportional values of their respective currencies, depending on the quantity of noble metal they contained, Carli constructed two tables that he added to his *On the origin and trade of money, and the disruptions that occur in its alterations* in 1751, listing the exchange rates between currencies. His aim was to establish the ratios of gold to silver in the coins,¹⁸ postulating the shared value of a gram of fine gold or silver. Carli considered these ratios essential to improving trade and the wealth of the city-states and republics involved (Carli 1751: 206). Monetary order could not be left in the hands of the jurisconsults because they did not understand it. The value of money should be fixed according to the rule whereby the quantity and price of the metal in a coin decided its value, which was then made official by decree. In Carli's intentions, his tables could be used to solve trade and financial controversies.

Pompeo Neri (1706-1776), an important political advisor and professor of law in Pisa, appreciated Carli's tables of exchange rates, judging them a good starting point for reorganizing the exchange rates in the Italian peninsula (see Aphi: 127). Neri promptly reprinted the tables in his volume, *Osservazioni sopra il prezzo legale delle monete (Comments on the legal price of coins)* (1751). They were consequently adopted in negotiations on monetary relations between the cities of Turin and Milan underway at the time, and they continued to be used after Carli's death, as in Bologna in 1796, when the municipal government was dealing with a potential default (see Marcelli 1955: 46-47).

Stable exchange rates could also be seen as a premise for another, more pervasive kind of stabilization, i.e. Italian monetary unification. It is hardly surprising that Ludovico Muratori and Gian Rinaldo Carli, more than other monetary experts, voiced hopes of Italian unification (Marcelli

¹⁸ A ratio of 1 to 14, according to Carli (1754: 346)

1955: 62).¹⁹ After Muratori died in 1750, Carli published his *Della patria degli Italiani (On the Homeland of Italians)* (1766) and became the Italian monetary scholar most vehemently calling for national unity.

Returning to his tables, Carli's great intuition lay in his realization that, in an economic context characterized by international exchanges, one state's monetary decisions did not remain within its borders; it "infected" the others. The only way to avoid monetary contagion was to respect the proportions between the values of different coins, or in other words to anchor their legal value to their intrinsic value, calculating the latter according to the agreed price of noble metals.

Carli reversed the traditional mercantilist idea that trade determined countries' monetary stock. He saw their monetary conditions (the quality of their coins) as determining their trading trends. Precisely because of the need to carefully monitor these monetary conditions, Carli concluded his work of 1751 with a list of prescriptions summarizing the above-mentioned points: I. Identify and maintain the proportions between European precious metal coins, i.e. the ratio between gold and silver must correspond to a European average calculated by Carli;²⁰ II. Adjust basic coinage used on the domestic market to these proportions; III. Replace scarce or disproportionate coins. IV. Fix the value of foreign currencies that can be accepted on the basis of the established proportions (1751:225).

Looking at the relevance Carli attributed to international trade, the trade balance might seem to be the indicator of national wealth, but he had a different idea. As became clear from his *Brief considerations on the economic budgets of nations*, published in 1770, he considered imports necessary to increase national manufacturing but, disagreeing with the economists who favored a trade balance surplus, he called for a political pragmatism in evaluating the type and usefulness of imports (1770b: 340-45). Carli eventually claimed that even a commercial deficit can be useful temporarily, when needed to develop a country's activities. But it was the importance he attributed to international trade for a country's economic growth that explains his hostility towards practices such as debasement, which weakened trade.

To conclude on this point, Carli did not foresee any mechanism for automatically re-aligning the trade balance. He was inclined to link the inflow and outflow of silver or gold to the trend of the trade balance. It may be because he was aspiring to a modern interpretation of trade balance that he

¹⁹ Only partly sharing the cosmopolitan views of Pietro Verri and Cesare Beccaria revolving around the publication of "Il Caffè" in the 1760s, Carli was intrigued by the 'national' dimension of the political entities operating in the Italian peninsula in his time. See Carli 1765.

²⁰ The importance of this average value was reiterated by Cesare Beccaria (1770: 263). On this point, see also Quadrio Curzio and Scazzieri 2014: 226.

suggested replacing the bilateral trade balance with a multilateral, or *comparative* trade balance (1770b: 353), a document summarizing the outgoings and revenues with all partners. It was only by means of a multilateral trade balance, including all foreign transactions, that the prosperity or economic decline of a nation could be examined (1770b: 358).

5.3 The index number

Nowadays, the name of Carli as a scholar of monetary issues is only remembered for his index number. The origin of this statistical tool is associated with Carli's studies on inflation spanning centuries.

In his *On the value and proportion of metals monetized in Italy before the discovery of the Indies, with a comparison of the value and proportion of our times* (1764), Carli compared the prices of three representative goods - wheat, wine and olive oil - in the years 1450-1500 and in the mid-18th century (his own time), expressing them in liras (numeraire value), silver (intrinsic value), and gold (absolute value). He mainly considered cities and areas of Northern Italy and Naples, first analyzing the prices of the three goods separately, then calculating the mean prices of all three together. He concluded that the average prices (expressed in a common accounting unit, the *lira*) of the three goods had increased over the 250 years considered: in the 18th century, 7,466 liras bought the same amount of goods as 2,000 liras in the 15th century (1764: 353), so the lira's purchasing power had diminished by 270% in 250 years. The point Carli wanted to make was that the proportion of silver contained in a lira had diminished in the meantime by 111% (see Sackley 1965).

Carli added that the rise in prices was partly due to higher taxes on agricultural activities which had followed a drop in exports. He calculated that prices had increased by 15% due to this extra tax burden (mainly to finance the army). The 270% loss of purchasing power in 250 years was therefore attributable partly to the 111% lower content of silver in the currency, and partly to the increase in taxes on agricultural activities (up 15%). Then there was a worsening trade balance with an increase in the prices of imported goods that had to be taken into account as well. In short, the inflation caused by the inflow of gold and silver was lower than generally argued at the time.

Today we might question the reliability of the data drawn from cities' archives that Carli used, and the relevance of his historical series. There remains the fact that his diachronic analysis of prices led to Carli being celebrated as one of the first scholars to use an index number to measure changes in prices (see Mitchell 1921: 7).²¹ If N is the number of goods considered (wheat, wine and olive oil in

²¹ According to Schumpeter, Carli should be remembered as an econometrician '*ante-litteram*', who proposed an index number to measure the depreciation of money in 1764 (1954: 213, 292-3).

Carli's analysis), p is their price, and 0 and 1 identify the period examined, then the p_1/p_0 ratio presumably includes the recurrent inflation rate, and all other random variables influencing prices. Carli proposed an arithmetical mean of the price ratios, which became his index number (see Diewert 2007: 7):

$$P(p_0, p_1) = \frac{1}{N} \sum_{i=1}^N \frac{p_1^i}{p_0^i}$$

Widely used by the developers of index numbers (the *Economist*, among others), due mainly to its neatness - which was also its strength, as by Irving Fisher (1922: 29) recognized - this simple arithmetical mean of the N p_1/p_0 ratios, was gradually abandoned over subsequent years, as the same Fisher recommended on observing the ratio's upward bias (see Diewert 1995: 4). Carli failed to weigh up the prices. He nonetheless showed that he had a good understanding of a previous analogous attempt made by Dutot (1738: 370-73) to build a so-called "common price" after investigating the trend of 24 prices in 1508 and 1735. It matters little here whether Carli's index number was the first or came after similar attempts made by Dutot or others (see Chance 1966). What is important is the need for rigor that induced Carli to calculate the changes in prices over time in a way that, albeit with some limits, is adopted even today.²²

Studies on price trends in Italy from the mid-15th to mid-18th century led Carli to arrive at a sad diagnosis for the Italy of his time: the country was poorer than it had been some centuries earlier. His analysis was not a mere exercise in monetary comparisons. He saw it as a basis for political action, primarily to move towards some form of political unity for the Italian peninsula.

6. The money doctor

Carli's *Observations* of 1766 open with this incipit: "The analogy that passes between the human body and the political body is so great, that both defects and evils, and the method of convenient remedies to one may also be equally adaptable to the other" (1766: 9) It is at this point that we finally see why Carli considered himself as a money doctor of politics, not economics, even when the evils to cure were strictly economic.

His vast historical knowledge of monetary reality, from which he drew concepts and principles to which he could anchor his practical proposals, was based on this vision. Among such principles, establishing the right proportions between coins was the central point around which his

²² It is worth remembering that Carli's arithmetical index was used by the UK's Office for National Statistics as a retail price index until March 2013, when it was replaced by the Jevons index, based on a geometric mean. See Levell 2015.

interpretation of past and present monetary systems revolved: the proportion between the legal value of the coin and the price of a gram of fine gold or silver had to coincide with the quantity of noble metal the coin contained.

Postulating this simple rule for ensuring monetary stability, the expert had to diagnose the ills that disrupt it. One was what Carli called the ‘monetary pestilence’, balance of payments deficits was another, then there was the hoarding of precious coins, and so on. The figure more of the ‘money doctor’ than of the engineer was taking shape, as Carli’s expert needed to identify and diagnose a problem instead of concentrating only on finding a technical solution. That is why any comparison with the theoretical depth of Galiani makes little sense: Carli, like Cesare Beccaria and Pietro Verri, was interested in the political administration of money, and the procedures and methods that can mitigate disorders.

Carli saw himself as a ‘money technician’ who could cure society’s monetary ills, an expert capable of eradicating debasement (the pestilence of his time), which was a medieval legacy. Convinced of the value of his ideas, Carli offered his services to princes and governors (just as physicists and chemists did in their respective disciplines), also competing with other potential experts like Pietro Verri when he was on the Supreme Council in Milan. But Carli’s action proved to be much more political than technical, because the neutral technical intervention envisaged by Carli proved impossible to achieve.

Although Carli saw himself as a doctor isolating causes of disease, he always took a broad view of the workings of a national economy. The trend of the balance of payments could not be separated from demographic movement, land value, and changing interest rates (1770:333 and *passim*).²³ Carli concluded that: “The wise physician never oppresses nature [country], but helps it, nor does he believe that he can overcome diseases by means of remedies without its cooperation. The true politician is thus content to be a careful and calm observer of the state of the nation. He does not risk setting decisive rules, nor does he claim to do everything, and to be able to do everything, but he gradually proposes remedies proportional to the times, circumstances, nature and habits of the nation” (1770: 354-55). Such a view was novel for the time, and Carli the money doctor proved to be an audacious political reformer.

Carli was 45 when he started his reforming work in Lombardy in 1765, which he had to keep within the limits imposed by the Austrian Court. The organicity of his action reflects the organicity of his

²³ We can hardly ignore the fact that the recent debate on the origins of “great inflation” revolved around two factors: the arrival of precious metals from the New World and population growth. See Eco and Melitz 2019.

thought.²⁴ In 1766, he published his *Preventive observations on the plan regarding the money of Milan* that was the basis for implementing the city's monetary reform. Carli discussed the need to completely change the money circulating in the Duchy of Milan, proceeding with the issue of a new currency, going against Pietro Verri's proposal to limit the reform to incoming foreign money. Carli insisted on his idea, publishing his *New observations* in 1770, in which he argued for the need to make national currencies proportional to one another. This could be done by issuing a new coin, not by decree (which would only add to the confusion). Carli's (then secret) plan contemplated "the fusion of the coins of this state to better regulate their proportion" (see De Stefano 1942: 200). There was hot debate, and some feared that the increased circulation of the new currency would weigh on prices. The controversy persisted until 1778, when Carli's proposal was accepted and the minting of a new currency for the city-state of Milan was decreed. His dream of being the doctor to cure the age-old plague of currency debasement had somehow come true.

Carli's money doctor concept can be better understood by thinking of the group of other clever minds – Beccaria, Verri, and Neri – who, along with Carli, were asked to reform the administration of the city. These brilliant scholars and writers debated the measures needed to do so.²⁵ Carli wanted a technical role, but suddenly discovered that to be a money doctor he had to be a theorist and a politician. His proposed intervention met immediately with opposition. Carli was the most determined opponent of local monopolies and annuity contract positions in an effort to reduce the costs to both the emperor and the people of Milan.

One of the core elements of Carli's reform involved equalizing the fiscal contributions paid by the municipalities that made up the Duchy of Milan. The census (the subject of the book *The Milan census*) (1770c) had to provide the information needed to operate tax collections equitably without the tax authorities suffering as a result. One way was to eliminate or reduce ecclesiastical and secular exemptions – a measure opposed by the clergy and the nobility. Carli's fiscal intervention was wide-ranging and complex, and – once approved in 1768 – it resulted in considerable savings for the administration. Carli's innovations also included revisions to the way financial statements were drafted, which became standardized to his comparative balance.

Carli's experience in the Duchy of Milan showed there was no room for a neutral reformer who could hope to convince the citizenry of the goodness of reforms on the strength of objective

²⁴ See De Stefano 1942: 175

²⁵ The *Accademia dei Pugni* (*Academy of Fists*), which brought together the main exponents of the Milanese reformist Enlightenment at Pietro Verri's house between 1761 and 1766, owes its name to the animosity of the discussions over participants' contrasting ideological, methodological, and political views. They all shared the desire to be rid of Austrian despotism, however, and it is from that experience that the *Il Caffè* magazine was born.

numbers. The money doctor intent on curing monetary evils had to make way for the political reformer battling against vested interests. In the light of his experience with the Supreme Council of Economics, even changing the currency must have seemed to Carli more like a political action, just as his proposals for a metallic standard, monetary reform, and especially tax reforms, were political.

7. Conclusion

Carli was a clear, logical, and passionate writer, but he wrote about everything, thereby “scattering the strength of his ingenuity over the surface” perhaps (Pecchio1829: 93). His apparent superficiality could more appropriately be regarded as maintaining a historical perspective, however. It had a precise meaning because it was perfectly suited to its purpose: political action. In Carli’s works, his analyses were never disjointed from political action, as we can see from the tools he proposed - the table of monetary proportions, the comparative balance, and the index number. This explains why Carli ultimately wanted to crystallize his conception of the political economist in the figure of the monetary doctor, symbolic of a way of doing economics that distinguished him from such contemporaries as Galiani and the French physiocrats.

His works were not manuals for political initiatives, however. They were theoretical texts, as Carli ultimately based the action on the theory. His monetary doctor was to be a policymaker and a theorist rolled into one. In a nutshell, the idea of economics as a science of administration, which he shared with Beccaria and Verri, was about scientifically-based political action. The objectivity of science was to be the strong point of the political proposal: who could ever support a scientifically-demonstrated monetary evil?

Did Carli manage to become a monetary doctor, a reformer whose proposals could only be contradicted scientifically, not politically? Certainly, the (albeit laborious) implementation of his monetary reforms in the Duchy of Milan was a success. But that experience showed him that monetary policies – and economic and fiscal policies even more – are issues that have to contend with conflicting interests, struggles between different economic and power groups, and individual ambitions, before they can be a matter of calm and objective scientific reflection.

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