Bank i Kredyt 56(2), 2025, 139-162

BANK I KREDYT
BANK & CREDIT

The Law of Copernicus in Poland, from early 16th century to late 18th century

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Submitted: 11 September 2024. Accepted: 20 January 2025.

DOI: 10.5604/01.3001.0055.0679

Abstract

The law according to which bad money drives out good money was coined by Nicolaus Copernicus around 1518. His contributions to economic thought went beyond this law to deal with issues related to debasement. It was a bizarre coincidence that approximately 200 years after Copernicus' death his native land was the setting for his theories to be turned into practice on a massive scale. This coincidence was a side effect of economic processes that began with the discovery of silver in the Spanish American Empire. As a result of all this silver, and later gold, Central and Eastern Europe struggled to control its money and made little progress in constructing a modern state. In particular, the Polish-Lithuanian Commonwealth was the key target for unethical monetary policies pursued by Frederick the Great during the Seven Years War (1756–1763). The Prussian state sponsored counterfeiting, which aggressively debased the Commonwealth's coins and amplified all the negative effects stemming from Copernicus' law. Action undertaken by the Prussian king made the economic division of Europe into the wealthy west and the poor east even stronger. And it was not until the turn of the last and current centuries, when this gap slowly started to reverse.

Keywords: debasement, coinage, seigniorage, gold (silver), mint

JEL: N13, N23, N33, N43, N53

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The views expressed in this paper are those of the authors and do not represent official views of either the Federal Reserve Bank of Atlanta, the Federal Reserve System or Narodowy Bank Polski.

1. Introduction

Nicolaus Copernicus coined his famous law somewhere around 1519, according to which bad money drives out good money. At the time, Copernicus was focused on the debasement of the coinage of Prussia, and he likely would have been surprised to learn that Poland, along with most of Europe, would also prove unable to avoid his law. Worse still, the greatest debasement in Poland would be intentionally perpetrated by Prussia in full exploitation of the process Copernicus wrote to prevent.

For over a century after Copernicus, Poland's coinage deteriorated despite favorable conditions. Poland enjoyed a commodity export boom, while a river of silver and then gold began to flow across Western Europe and into Poland. The situation brought large stocks of valuable coins into Poland, but the kingdom was unable to reliably convert the inflows into domestic coins. Worse, debasements by neighbors leached out the better coins.

The process flipped around 1660, when Poland became desperate. Invasions, especially by Sweden, caused Poland to commit aggressive debasement, with the typical Copernican result of bad coins followed by inflation. In a twist, however, Poland neither restored her coinage to regional norms nor pushed debasement further. Instead, Poland shut her mints and allowed foreign coins, especially Dutch gold ducats, to dominate her monetary stock.

At first her neighbors ignored the situation, but eventually Saxony and Prussia experimented with supplying poor versions of the coins Poland no longer produced. The start of the Seven Years War in 1756 inspired Frederick the Great to aggressively debase counterfeit Polish coins with the purpose of using the Law of Copernicus to extract good coins out of Poland. For Frederick, the great debasement worked well and materially supported Prussia's survival. For Poland, the process brought a massive depletion of the nation's wealth, ferocious inflation, and a monetary mess for the post-war regime to fix.

In this text, we focus on Frederick's intentional process of phasing out good money in exchange for bad money. To illuminate how this massive exchange occurred, this paper first reviews Copernicus' writings and certain historical events following near-contemporaneous (early sixteenth-century) geographical discoveries. Next, the paper explains the divergence between the east and the west that gathered momentum in the seventeenth century. Some countries like the Dutch Republic and England experienced a shift toward the creation of a developed debt market coupled with the creation of modern central banking. Other countries, like Poland, could not move beyond an economic system relying on serfdom until the second half of nineteenth century. Such divisions created ample room for economic exploitation and misery. These would be augmented by belligerent conflicts (of both an internal and external nature), which may have laid down the basis for many hostilities to be experienced in this part of the world for centuries to come, with the climax occurring during the two perhaps cruelest conflicts in the history of mankind.

2. Copernicus 1526

In 1516, Nicolaus Copernicus began to administer a church estate for the Diocese of Warmia in West Prussia and was there introduced to the deplorable state of the local coinage (Czartoryski 1985, p. 167).[1] In the years to follow, Copernicus wrote and revised an essay on how to stabilize Prussia's coinage. At the time, Copernicus warned that new coins would not successfully circulate alongside old coins because, "the old coinage will spoil the value of the new coinage" (Copernicus 1526). His essay, however, included much more than the insight that bad coins could drive out good coins.[2] Copernicus also reviewed the history of Prussian debasements, and, in the process, demonstrated how Prussia, Poland, and many other European states struggled to stabilize their systems of coinage.

To begin, Copernicus stressed that coins were units of account, that is they acted as, "a common measure of values" (Copernicus 1526). He noted that this common measure was the value of a whole coin as assigned by regulation, what he called the estimated (*estimatio*) value, rather than the value of the precious metal within a coin. As a result, the purchasing power of a coin would diminish with an excessive supply of coins: "Hence [arises] that widespread and incessant complaint: gold, silver, food, household wages, workmen's labor, and whatever is customary in human consumption soar in price." (Copernicus 1526). Going further, Copernicus noted that when the silver in a coin became worth more than the coin's assigned value, people had an incentive to melt the coin, "until it recovers its par value and becomes more desirable than silver" (Copernicus 1526). This process was modeled by Sargent and Velde (2002).

According to Copernicus, what created the excess of bad coins was debasement. For example, after defeat by Poland at the Battle of Grunwald in 1410, the Teutonic Order made each new shilling smaller and reduced its share of silver. The new shillings, "not only spoiled the old coinage but, so to say, swept it away!" (Copernicus 1525). Copernicus feared that bad old coins would ruin the circulation of good new coins because, a century earlier, bad new coins had displaced good old coins.

But Copernicus went on to review other ways for coins and units of account to interact. After the debasements, Teutonic Prussia attempted to restore the quality of its coinage by introducing new shillings that had twice the silver content of the debased ones.[3] Rather than treat the coins as good and bad versions of the same type of coin with the same assigned value, the Prussians used different values, "with only 6 pence being exchanged for 1 old shilling, but 12 pence for 1 new shilling" (Copernicus 1526). What Copernicus did not recall was whether the reduction to 6 pence was directed by regulation or emerged through use in defiance of regulations. That distinction, whether an assigned value binds or not, has motivated the modern theoretical literature on the process (Rolnick, Weber 1986; Selgin 1996; Velde, Weber, Wright 1999; Li 2002; Sargent 2019).

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[1] West Prussia was also called Royal Prussia. After Poland defeated the Teutonic Order in the Thirteen Years War (1454–1466), Prussia was split into two parts. West Prussia became a semi-autonomous part of the Kingdom of Poland, while East Prussia remained under the Teutonic Order as a vassal of Poland. In 1525, the Order of Teutonic Knights was dissolved, and East Prussia converted to Lutheran. The territory became a duchy of Poland. In 1618, the Hohenzollern Georg Wilhelm, Elector of Brandenburg, also became the Duke of Prussia. In 1657 the Hohenzollerns displaced Poland as sovereign over East or Ducal Prussia. In 1701, Brandenburg-Prussia became the Kingdom of Prussia.

[2] Copernicus wrote four decades before Thomas Gresham presented his *Memorandum for the Understanding of the Exchange* to Queen Elizabeth I in 1559.

[3] Copernicus assigns the debasement to Teutonic Grand Master Heinrich von Plauen (1410–1413) and the new shillings to "Michael Rusdorf", but subsequent leaders were Michael Küchmeister von Sternberg (1441–1422) and Paul von Rusdorf (1422–1441).

But the Prussian story was not yet done, because the dual shilling system was not stable. After the return of West Prussia to Poland in 1466, some local mints began to again debase the old-style light shillings and drive out new-style heavy shillings, as inflation caused the heavier coins to contain 15 pence worth of silver. To Copernicus, West Prussia then overreacted and raised the assigned value of heavier shillings from 12 to 18 pence each, which was another kind of debasement, and "through its false and unfair estimation it dragged down the dignity of the shilling." (Copernicus 1526). To obfuscate the adjustment, West Prussia also renamed the heavier coins as groats. With that trick, Prussia had over the course of a century demonstrated the four types of debasement described by Redish (2000, pp. 61–62): a reduction in size, a reduction in fineness, an increase in face value, and the introduction of a new coin type that included a combination of the other three techniques.

According to Copernicus, during the 1400s, the Prussian shilling had lost over 80% of its silver content.[4] The author bemoaned that debasement had reduced Prussian coins to mostly copper and asked, "what foreign merchant will want to exchange his goods for copper coins?" (Copernicus 1526). Yet he did not directly state what all knew, that Prussia's governments had initiated rounds of debasement to create profits called seigniorage.[5] Debasement made a profit because, "money increased in quantity, though not in quality". For Copernicus, the solution was to reset the standard, to remove all old coins, to stop collecting seigniorage, and to centralize production. The Polish Sejm, however, implemented an alternative plan, "principally due to the guarantee of mint seigniorage for the Treasury" (Wójtowicz, Wójtowicz 2005, p. 80).

In summary, Copernicus explained how debasement manipulated the relationship between physical coins and their assigned price. He implied that the short-term gain was seigniorage and argued that the long-term costs were monetary destabilization and inflation. These events occurred in Prussia, the same area where Frederick the Great would realize seigniorage targeted at Polish coinage two centuries later. But first, both Poland and Prussia had to pass through more monetary instability.

3. Jan III Sobieski 1685

Copernicus focused on debasement, but coinage could also suffer from the opposite situation, a stable quality that was not being produced. That situation produced neither seigniorage nor supplied new quantities of reliable coins. In Poland, an extreme version occurred under the reign of King Jan III Sobieski (1674–1696), the hero of Vienna. Sobieski detested the low-quality coinage in circulation at the start of his reign. At the same time, Sobieski could not afford to re-mint the coins to a higher silver content, so he gave up and closed down the mints of the Polish-Lithuanian Commonwealth in 1685 (Wójtowicz, Wójtowicz 2005, p. 103).

What was unusual at the time was that Polish coins were in worse shape than the coins of other states in the region. While each state had its own mint ordinances, the rules were intentionally related to each other, because a state's coins gained legitimacy by cohering with a pan-European system (Volckart 2017, p. 760). For example, Copernicus had been trying to influence a new mint ordinance that unified Polish and Prussian coinage in 1528. It assigned the weight, fineness, and markings of

[4] Before 1410, 149.33 shillings contained one mark of fine silver while 1,800 shillings contained "hardly [2 marks] of silver" circa 1526.

[5] The closest Copernicus got was that cheap money, i.e. debasement, "will be applauded by those who were heretofore granted the right to coin money and were deprived of the hope of profit, and perhaps not the merchants" (Copernicus 1526).

coins such as the penny (denar), shilling (szeląg), groat (grosz), dollar (thaler), and ducat (Wójtowicz, Wójtowicz 2005, p. 82). Those types of coins were common across Europe, and Table 1 translates the main categories into English, German, Dutch, and Polish. This coordination improved the ability of each state's coins to circulate far, but it also made it easier for foreign coins to take these roles in each domestic system.

Table 1
Terms for common types of coins

English	German	Dutch	Polish
shilling	Schilling	schelling	szeląg
penny	Pfennig	penning	denar
dollar	Thaler	daalder	talar
ducat	Dukat	dukaat	dukat
groat	Groschen	groot	grosz
guilder	Gulden	gulden	złoty

Sources: Spufford (1988, p. 34); authors' translation.

After Copernicus, Poland experienced a relatively peaceful century and prospered with routine trade surpluses through exports of grains and forestry products as European urbanization increased demand for food and shipping. Poland's terms of trade rose from 100 in the decade from 1550 to 1560 to approximately 191 in the last decade of the 16th century (Topolski 1977), as Poland specialized in grain export. This rising monoculture prevented a shift towards industrial growth, and Poland suffered a form of the "Dutch Disease" (Małowist, Batou, Szlaijfer 2009, p. 257; Piątkowski 2013). The surpluses brought in foreign coins created from the inflows of silver from Spanish America (TePaske, Brown 2010). The spectacular discovery of the Potosí (Peru) silver lode in 1545 was followed by other gold and silver strikes in Mexico, Peru, and Brazil. Coins minted from these sources served as globally valued safe assets, whose liquidity allowed Western Europe ready access to trade goods from other regions (Palma, Silva 2021). Silver coins dominated for the first 150 years after the Potosí strike.

Poland's neighbors, however, suffered wars that caused their coinage quality to deteriorate, and some of those debased coins flowed into Poland. For example, the Thirty Years War (1618–1648) pushed many German states into aggressive debasements called Die Kipper und Wipperzeit (Sadowski 1962, p. 25). Sweden also had periods of debasement (Edvinsson 2011). Poland responded with major new mint ordinances in 1580, 1623, and 1650 (Wójtowicz, Wójtowicz 2005, pp. 84, 95, 100). The ordinances reduced Polish standards to re-align Polish coins with neighbors within the pan-European framework. The revisions protected Poland from merchants, speculators, and foreign rulers who profited from melting a good Polish coin and coining a new one of inferior quality, with the difference ending in their pockets (Rutkowski 1946). Again, this was a common concern across Central Europe (Volckart 2017).

After Sweden invaded in 1655, however, Poland became the desperate state that initiated debasement. The five years of the "Swedish Deluge" halved Polish grain production and reduced

Poland's population by more that 40%.[6] In 1659, Poland replaced silver shillings with copper, and people called the new coins "boratynkas"[7] after the mint master, Titio Livio Burattini, who introduced them. In 1663, Poland turned to larger coins and created a new guilder (złoty) coin with much less silver than the old standard. Those coins were called "tymfs" after their mint master, Andrzej Tymf (Andreas Tympf). They were also the origin of the ironic Polish saying, "A good joke is worth a tymf" (Dobry żart tymfa wart).

Through this aggressive debasement, the Polish Treasury gained funds and the new "bad" coins displaced the old "good" coins. Eventually, however, inflation in Poland caught up enough to discourage further production of the debased coins, and the temporary advantage created by debasement disappeared. The process left Poles stuck with coins that no one wanted. These were the coins that Jan III Sobieski hated and refused to mint.

4. Dutch ducats 1700

How did Poland function for decades without new coins? Poland did suffer as the stock of domestic coins wore down, but that stock was supplemented by inflows of foreign coins, especially Dutch gold ducats (gouden dukaten). According to Mikołajczyk (1980, p. 77), "The circulation of gold coins in the Polish-Lithuanian Commonwealth in the 17th and 18th centuries was definitely dominated by Dutch ducats, with which no other foreign issues, let alone domestic ones, could compete in terms of quantity." That reality was the result of a related processes.

As an agricultural exporter, Poland routinely ran trade surpluses with Western Europe. Shipments of Polish grain through the Danish sound were indispensable, because a reliable source of grain was necessary to sustain populations, the Dutch Republic especially (De Vries 2019). Poland's exports of grain, timber, and other goods were increasingly balanced by imports of luxury goods from Asia, the Mediterranean and the New World, but Western Europe's residual trade deficit with Poland and other Baltic jurisdictions was settled by eastward flows of coins (Attman 1986). Over time, silver and gold accumulated in Poland.

The types of coins favored for these international payments were called trade coins. The coins were large, had high fineness, and fit into the pan-European categories in Table 1. For example, most silver crossed the Atlantic in the form of Spanish dollars (pesos) produced in Mexico and Peru, but the Dutch had their own version (rijksdaalder), as did the Germans and the Poles (Speciesthaler). These various dollars weighed around 28 grams each and were about 90% fine.[8] In Poland, foreign trade coins gained legitimacy because they were similar to the official domestic coins.

In the competition for usage, Dutch trade coins had certain advantages in Polish and other Baltic ports, which a modern economist might describe as "exorbitant privilege". This was because Dutch coins, by virtue of their perceived safety and liquidity, traded at values beyond what fundamental factors (intrinsic metallic value) would dictate. As is the case with the US dollar today, exorbitant

[6] It was in the northern city of Poland, Malbork (Marienburg) on 30 November 1656 in the headquarters of the Swedes, when the Swedish King Charles X Gustav issued a decree establishing the first Swedish bank, the Stockholms Banco. The decrees specified under what conditions Johan Palmstruch could form the nucleus of Swedish banking. Palmstruch was apparently inspired by the case of the Amsterdam Wisselbank and wanted to imitate the Dutch experiment in Sweden.

[7] A plural of boratynka in Polish is boratynki.

[8] For the Polish thaler, see Wójtowicz and Wójtowicz (2005, p. 100) for the Dutch rijksdaalder, see Polak (1998, p. 70).

privilege gave rise to resentment. Writing in 1749, the mint master of Brunswick (later, Prussia), Johann Philipp Graumann, condemned Baltic merchants' use of the Dutch dollar, which he saw as blatantly overvalued: "We have seen [the rijksdaalders'] price holding at eight percent above their value in Dutch current money, and four percent above their value in the money of the Bank of Hamburg… [The] Dutch really have an eight percent advantage [in the Baltic trade] and your lordships see why." (Graumann 1749, p. 14).

After 1700, the metal favored in trade coins production shifted with the discovery of new sources of gold in Brazil. As more Brazilian gold showed up in Europe, the market gold-silver ratio fell, but legal ratios were slow to adjust. This situation created an incentive for merchants to export "overpriced" gold ducats instead of "underpriced" silver dollars in exchange for agricultural products. Gold coins became increasingly commonplace and comprised 40% of New World precious metals production by the mid--eighteenth century (Palma 2022, p. 1605).

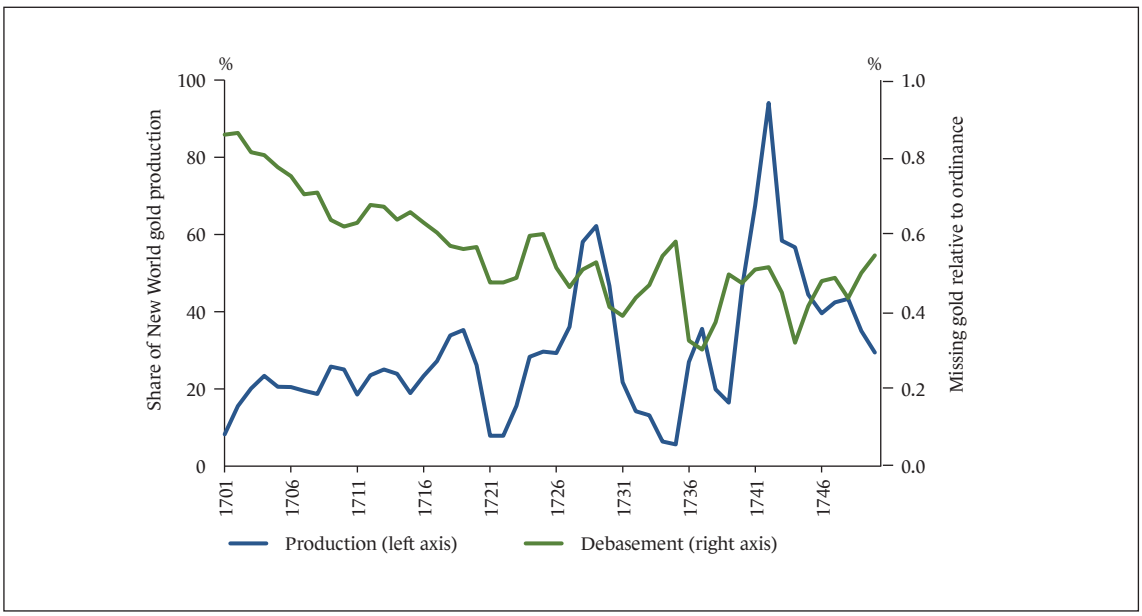
The coin that came to dominate that bimetallic transition was the Dutch ducat, because of the exorbitant privilege enjoyed by Dutch commerce and finance. It was often Dutch merchants who arrived in Gdansk and desired to purchase Polish grain. Besides dollars and ducats, Dutch merchants could just as well offer up paper money – a bill of exchange, often drawn on a merchant bank in Amsterdam. The bill would not be payable in coin, but through a giro transfer of funds held in the Bank of Amsterdam (Amsterdamsche Wisselbank), a ledger-money municipal bank whose account balances existed as fiat money (Quinn, Roberds 2023). Bank of Amsterdam funds could then be used to purchase coins or goods from Amsterdam counterparties, or to redirect money to elsewhere in Europe via the Amsterdam bill market (Flandreau et al. 2009). Also, the Bank of Amsterdam accepted Dutch trade coins as collateral but not the coins of Central Europe states, so Dutch dollars and ducats could return with liquidity to Amsterdam if needed. It also helped that the ducat's golden rival, the French Louis d'Or, suffered years of debasement after the death of Louis XIV in 1715 (Velde 2003, pp. 23–24). The popularity of Dutch trade coins, often alluded to in the historical literature, has been confirmed by modern numismatic evidence: hoarded Dutch dollars and ducats have been found throughout Poland (Mikołajczyk 1980, p. 76).

Figure 1 plots annual production of gold ducats in the Dutch Republic from 1701 to 1750. Production was persistent and even surged around 1729 and 1742. The average amount was 3.5 metric tons of fine gold per year. To put that into context, Figure 1 divides ducat production by the total amount of gold that crossed the Atlantic that year. The average over five decades was 30%. While Europe converted a substantial amount of gold into Dutch ducats, the coins had no assigned value in the Republic and were rarely used in the domestic economy. The coins were produced for export to the Baltic, as well as with the Levant and Asia (van Dillen 1964, p. 261).

Dutch ducats were also a controversial product. The coins were unmilled until 1750, when reforms were introduced following diplomatic protests from Prussia (van Dillen 1925, pp. 382, 408). The coin's variable quality encouraged clipping and culling, bad practices that were exacerbated by Dutch mint masters' habit of paying "commissions" (kickbacks) to people bringing gold into the mints. Mint customers were queried as to the destination of the coins to be minted (Graumann 1762, p. 128). If they answered "Poland," the customer received a kickback, most likely in the form of coins of reduced weight and fine content. This phenomenon, in combination with endemic clipping and culling, gave rise to so-called "light ducats," which were rarely seen within the Dutch Republic, but were common elsewhere (van Dillen 1970, p. 593). By 1749, prevailing commissions on gold ducats had reached

the scandalous level of 7/8% (van Dillen 1964, p. 263). Legislation by the States General (the Dutch national assembly) prohibiting this corrupt practice was then passed, but had to be withdrawn two years later, following a collapse in the mints' business (van Dillen 1925, p. 387).

Figure 1
Annual gold ducat production by Dutch mints, 1701 to 1750



Source: Polak (1998) and TePaske and Brown (2010).

If light coins were common, then the mints were not caught in the act. Figure 1 reports the amount of missing gold discovered by Dutch mint inspectors. Over the half century, the average amount of absent gold was 0.5%. That level was within the coin's legal tolerance, and few mints were penalized for light ducats.[9] The inspections also found that the quality of ducats improved after 1700, and that occurred because production shifted towards Holland's provincial mint in Dordrecht, which consistently produce the heaviest coins. If commissions were common, then mints paid the kickbacks to attract business and paid for them through less profit per coin.

Overall, the combination of Poland's trade surpluses, the surge in American gold outflows, and the popularity of Dutch coins, resulted in the accumulation of ducats in Poland over the first half of the eighteenth century. While these high-denomination coins did increase Poland's monetary stock, the coins did not ameliorate the lack of small change for retail transactions exacerbated by the closure of Poland's mints.

[9] Tolerances were 0.00352 for fineness and 0.00625 for weight relative to ordinance (Polak 1998, p. 67). Those were tested separately and could combine for a total tolerance of up to 1%.

5. Frederick II 1740

The ability of Dutch mints and merchants to create liquidity seemingly out of thin air was nonetheless resented by informed observers such as Graumann, and by at least one ambitious ruler, Frederick II of Prussia (later known as Frederick the Great). After coming to the Prussian throne in 1740, Frederick quickly engaged in two wars (the First and Second Silesian Wars) that depleted the financial reserves accumulated by his father (Gumowski 1948, p. 423). Frederick's persistent need for military funds increased his interest in seigniorage as a revenue source (Schrötter 1908, pp. 13–14). The Silesian wars also drew in Saxony, depleting its financial reserves and increasing its ruler's interest in seigniorage. The Saxon king was Frederick August II, who, under a personal union, also ruled the Polish-Lithuanian Commonwealth as Augustus III Wettin.[10]

Frederick's initial attempts to earn seigniorage were naïve and inept. Prussia's coins, excepting those in East (Ducal) Prussia, were produced at a standard common to all jurisdictions within the Holy Roman Empire, known as the Leipzig standard (Schrötter 1908, p. 39). Under this standard, large silver coins were to be produced at a mint equivalent of 12 currency units (thalers) to the mark fine, and gold coins were to be produced at a 15:1 gold-silver ratio. Both specifications were unrealistic, the market silver price being closer to 13 thalers/mark and the market gold-silver ratio closer to 14.5. What few Prussian silver coins were produced were soon swapped for foreign gold coins such as the Dutch ducat or French Louis d'or, and similar arbitrages also displaced Prussian gold. Small-value Prussian silver coins, produced at a fineness below the Leipzig standard, remained in circulation but exerted constant upward pressure on market silver prices (Schrötter 1908, p. 50).

Confronted with almost complete failure of his coinage operations, Frederick next resorted to coercion. Silver for Prussia's mints was traditionally obtained from Jewish merchants (known as "mint Jews") operating at trade fairs in Leipzig (Saxony) and Frankfurt/Oder (Prussia); these merchants in turn purchased silver from Jewish merchants trading in Poland (Schrötter 1908, p. 108; Gumowski 1948, p. 423). The ultimate source of silver provided was of course, pre-1685 Polish imprint coins or other high-quality silver coins; what was traded for these were likely Dutch gold coins.

In 1744, it was decided to scrap this informal supply arrangement in favor of fixed delivery quotas that were imposed on all Jewish communities within Prussia. Only a limited number of Jews were allowed to legally reside within Prussia, and delivery quotas were set according to the number of each city's permitted Jewish residents. A price of 12 thalers/mark fine (identical to the Leipzig standard) was paid for silver deliveries, which was however a submarket price. Actual amounts of silver supplied through this oppressive system were inconsequential, 0.69 tons in its most active year of 1748 (Schrötter 1908, pp. 108–109).

Frederick took a similar, top-down approach in dealing with the problem of Dutch gold ducats. A February 1749 royal edict instructed all residents of Prussia to deliver any substandard coins (a code term for Dutch gold ducats) to Prussian mints for immediate recoinage (Schrötter 1908, p. 58). The futility of this measure was illustrated by a petition the king received from merchants in Königsberg: outlawing Dutch ducats would only shift their business to Gdansk, Elbląg, and Russia; would His Majesty please reconsider? (Schrötter 1908, p. 63).

[10] Poland's two Saxon kings were Augustus II Wettin (1697–1706 and 1709–1733) and his son Augustus III Wettin (1733–1763). A 1717 coinage ordinance under Augustus II aligned Poland's coins with Saxon counterparts (Wójtowicz, Wójtowicz 2005, 110–111). Events under the reign of Augustus III, which are described below, would further integrate the monetary systems of the two countries.

6. Johann Philipp Graumann 1750

Repeated failure of Prussia's coinage policies did not diminish Frederick's appetite for seigniorage. After his overtaxed mint master committed suicide in 1749, Frederick hired a more ambitious manager in the person of Johann Philipp Graumann, who had worked as mint master in Brunswick (Schrötter 1908, pp. 25, 32). In modern terms, Graumann believed that the Dutch Republic's success in coinage derived from a simple network effect: everyone around the Baltic Sea used Dutch trade coins because everyone else did. To replicate the Dutch success, Prussia had only to mint sufficiently large volumes of coin. Privately, Graumann suggested that Prussia could mint over 300 tons of silver equivalent each year, easily double the contemporary Dutch mint output (Volz 1913b, pp. 124–125).

Graumann's new coinage standard was announced in May 1750. To ensure brand recognition, Prussia's flagship silver coin, the Reichsthaler or Imperial Dollar, would now be produced at a higher, more realistic mint equivalent of 14 (Reichs)thalers per mark fine (Koser 1900, p. 12). Unusually for the time, each coin was imprinted with a face value, "One Imperial Dollar," implying validity over the entirety of the Holy Roman Empire and equal prestige with the Dutch dollar. The value of Prussia's flagship gold coin, the Friedrichsdor, was set at a 13.8 gold-silver ratio, substantially below the 14.5 market ratio, perhaps in anticipation of a significant liquidity premium.[11] Graumann also dismissed the idea of sourcing precious metals from Poland as inadequate to the grand scale of his plan. Instead, he contracted with former mint Jews, other Jews with court connections, and a few Christian bankers to purchase bulk quantities of precious metal in leading markets such as Amsterdam, London and Hamburg (Stern 1971, p. 232). Purchases were to be made on credit, using the mint suppliers' good names, and were to be settled with newly minted Prussian coins.

We note that Graumann's scheme, as compared with later Prussian policies, did not embody particular malice towards Poland. Instead, Graumann viewed Prussia, Poland, and nearby jurisdictions as victims of Dutch "dollarization". Due to evident monetary incompetence (Graumann: "little in the way of understanding or appropriate facilities"), Poland and its neighbors were driven to transact in overvalued foreign coins. Graumann believed these nations could just as well use coins of Prussian imprint as coins of Dutch imprint, with no loss to them and large gain to Prussia (Schrötter 1908, p. 406).

Graumann's plan was as foolhardy as it was daring. Coins issued by an authoritarian, underdeveloped state such as Prussia were unlikely to carry the same liquidity premia as the coins of the commercially advanced Dutch Republic. Bulk purchases of precious metal by Graumann's agents in Amsterdam soon attracted the attention of Dutch traders (van Dillen 1925, p. 387); Dutch mint commissions were reauthorized; metals prices and exchange rates adjusted accordingly. By 1753, Prussian mints were paying 13.84 thalers per mark of silver delivered, leaving only a tiny gross margin on 14-thaler-fineness coins (Schrötter 1908, p. 482). Graumann's unrealistic gold-silver ratio also meant that few Friedrichsdor were produced (Rachel, Wallich 1967, pp. 242–243). Once again confronted with policy failure, Frederick fired Graumann in 1755 as mint master, but kept him on salary to prevent his working for another prince (Schrötter 1908, p. 139).

[11] Graumann specified that 35 five-thaler Friedrichsdor coins were to be produced per gold mark, with a fineness of 21 carats, 9 grains, implying a mint equivalent of 193 thalers per mark fine gold (Schrötter 1908, p. 83).

7. Polish-style coins 1753

The few coinage successes experienced by Prussia during the Graumann period (1750–1754) occurred in its eastern provinces: in Ducal Prussia (East Prussia), which had a mint in Königsberg, and in Silesia, which had a mint in Breslau (Wrocław). Operations at the remote eastern mints differed from those of their western counterparts in several key respects. First, silver for coinage was still obtained from Jewish traders in Poland, rather than from urban markets in Western Europe. Second, the mint suppliers were more involved in the minting process, to the extent that they ultimately took full responsibility for the mints' operation. Last, but not least, coins produced at these mints were imitations of Polish coins.

Ducal Prussia, a Prussian "island" within the Polish-Lithuanian Commonwealth, needed coins that were familiar to Polish merchants. Accordingly, coins minted in Königsberg were facsimiles of legitimate Polish coins: tympfs, szóstaki, dydki (commonly known under the name of trojaki/Düttchen), but bore the stamp of Frederick II. The supply of silver to the mint was contracted to Moses and Abraham Fränkel, Jewish merchants known at the Prussian court (Schrötter 1908, pp. 249–252). Königsberg produced coins at a lower fineness than the Graumann standard, at 16 thalers per fine mark. At this standard, its suppliers could easily afford to pay market prices for silver (about 14 thalers) and the mint returned modest but consistent profits. This favorable track record led to minting of similar Polish-facsimile coins at Prussian mints in Breslau and, more controversially, in Stettin (Szczecin).

Prussia's first Polish-facsimile coins could not yet be considered counterfeits, as they were recognizably of Prussian imprint (Gumowski 1948, p. 429). Indeed, the eastern mints' first attempts to imitate Polish coinage can be compared to other, relatively benign coin imitations, one example being the United States' 1792 decision to start minting slightly downgraded versions of Spanish silver dollars, known as US dollars (Hamilton 1790, pp. 2–3; Greenfield, Rockoff 1995, p. 1089). As Prussia's Polish coins were notably less fine, however, than those specified under Jan III Sobieski – still the legal standard in Poland despite lack of production since 1685 – their circulation within Poland already constituted a de facto debasement.

From 1752, Prussia's success with pseudo-Polish coins was constrained by competition from Saxony (Gumowski 1948, p. 430). Königsberg's success inspired Augustus III to set up a special mint near Leipzig to produce coins for Poland. Silver coins produced in Saxony were more popular in Poland than Prussian-imprint coins because they had higher fineness (12 thaler/mark fine) and bore the likeness of the Saxon/Polish king. These coins were still of questionable legality, since the 1685 closure of the mints remained in effect, and the Saxon coins were never authorized by the Sejm (Gumowski 1948).

The appearance of Saxon imprint coins in Poland provoked an aggressive response from Prussia. In 1753, Frederick authorized a new mint in Stettin, in the province of Pomerania (Schrötter 1908, p. 227). This mint was successful, but controversial from the start. Mint operations were turned over to its silver suppliers, the merchants Moses Isaac and Daniel Itzig. Tasked with producing Prussian coins, Isaac and Itzig quickly discovered there was more profit in producing Polish coins, both under a Prussian stamp (as in Königsberg and Breslau) and as outright counterfeits of coins originating in Leipzig. To add insult to injury, Isaac and Itzig outbid other Prussian mints for silver supplies and circulated their counterfeit coins not only within Poland, but Prussia itself. These last actions so infuriated Frederick that he closed the Stettin mint in 1754 (Gumowski 1948, p. 434).

By early 1755, Frederick's coinage policies were at an impasse. His ambitious mint master had been dismissed, Prussian-imprint silver coins were unprofitable to produce and its gold coins almost

non-existent. On the eastern front, Prussian Polish-facsimile coins had returned some profit, but these were now struggling against competitive Saxon coins, both in Poland and in places such as Breslau (Gumowski 1948, p. 438). Once again confronted with policy failure, Frederick responded with a modern solution: outsourcing. In early 1755, Frederick concluded a series of secret contracts that handed over operations of his eastern mints (Königsberg and Breslau) and mints in outlying western provinces (Aurich and Cleve) to Moses Fränkel and his brother-in-law, Nathan Veitel Heine Ephraim (Gaettens 1955, p. 151). In these contracts, the mint suppliers were given a new title: "entrepreneurs" (Schrötter 1908, p. 519).

8. Entrepreneurs 1755

It was against this background of failure, and the impending threat of war with three larger powers (Austria, France, and Russia), that Frederick undertook an incognito trip to Amsterdam in June 1755 (Rödenbeck 1840, p. 275). There, he met with Isaac de Pinto, a retired banker and acknowledged expert in matters of finance. What advice Frederick received from de Pinto is not known, but soon after his return to Berlin, Frederick turned over all minting operations to a subordinate, General Wolf Frederick von Retzow. Retzow fired Fränkel and Ephraim and concluded a new contract with a consortium of three entrepreneurs: Isaac and Itzig, the duo who had caused so much trouble at the Stettin mint, who formed a partnership with Herz Moses Gumperts (Schrötter 1910, pp. 239–246). Gumperts, the senior partner, had done much business with the Prussian court and took a lead role in the consortium.

The contract with the Gumperts consortium was both ambitious and favorable to the Prussian Crown: 100 tons of silver was to be coined over a year's time and seigniorage of 5.2% was to be paid in quarterly installments. The entrepreneurs, like Graumann, knew that such mass quantities of silver were readily available only in advanced markets such as Amsterdam. Unlike Graumann, however, they also knew that simply wading into these markets and making bulk purchases was an invitation to be front run. To avoid this problem, the entrepreneurs exploited an advantage unavailable to Graumann, which was access to a network of small-time Jewish merchants, known euphemistically as "purchasers", who could range freely over Poland and neighboring countries to exchange coins.[12] Both the purchasers and the entrepreneurs realized that within Poland were large quantities of Dutch and other trade coins, held by the nobility and other parties, and potentially available for purchase under the right terms. What was missing was a vehicle for connecting Poland's stores of trade coins, especially gold, to Amsterdam silver.

The entrepreneurs, perhaps drawing on Isaac and Itzig's earlier experience in Stettin, proposed the circulation of counterfeit Polish coins as the perfect vehicle for their scheme. In a memorandum to Prussian mint officials, dated 20 October 1755, Gumperts laid out the entrepreneurs' strategy in no uncertain terms: "Because much gold and silver are still present in Poland, we are therefore able to exchange this for Prussian-Polish monies, so it is not necessary to enrich the English, Dutch, and Hamburgers by pushing gold and silver prices and the exchange rate." (Schrötter 1910, p. 248).

[12] At this time, most Jews could not become citizens of countries where they resided. Because they were viewed as "aliens", traveling Jewish merchants could easily cross national borders even during times of war. In many places, these merchants were legally constrained to trade only in used clothing and small household items. These constraints did not prevent the merchants from exchanging coins as a side business.

By "Prussian-Polish monies", Gumperts did not mean coins such the tympfs that still bore a Prussian stamp. Rather, as Frederick explained to Retzow in a letter dated 6 November 1755, new coins would be created, debased but so closely resembling the Saxon originals, "that the two cannot be distinguished from one another" (Bahrfeldt 1913, pp. 102–103). In other words, Prussia would now engage in state-sponsored counterfeiting. Counterfeit coins could then be dispersed by purchasers within Poland and exchanged, at nominal value, for higher-quality coins such as Dutch gold ducats. The latter could then be used by entrepreneurs to acquire silver, either by purchasing bills on advanced markets such as Amsterdam, or by settling bills drawn by their agents in these markets.

A problem with this strategy was that Saxony was still producing Polish coinage that could outcompete coins produced by the entrepreneurs. This difficulty was overcome when Frederick, in a pre-emptive move against his enemies, invaded Saxony in August 1756. Saxony quickly capitulated, and by late 1756, the Saxon mints had been outsourced to the formerly discredited entrepreneur Ephraim (Koser 1900, p. 13). Ephraim, now in possession of the original dies for Saxon-Polish coinage, was in an even better position than the Gumperts consortium to produce convincing counterfeits, also debased. Poland would soon be subjected to two streams of counterfeit coins, one emanating from the Gumperts-managed Prussian mints and another from Ephraim-managed Saxon mints.

We can only speculate as to why Frederick, having rejected counterfeiting of Polish coins as recently as 1754, now accepted it as the centerpiece of his monetary policy. Wartime fiscal desperation certainly must have been a factor, but part of the answer was that Frederick believed that Prussia was exempt from the law of Copernicus. Gumperts' original deal with Retzow allowed for counterfeit coins to be minted only in Prussia's eastern mints (Königsberg and Breslau), and then only for circulation within Poland, Courland, Livonia, and Bohemia (Hoensch 1973, p. 126). Similar restrictions applied to the conquered Saxon mints. The apparent hope was that somehow, a form of monetary apartheid could be maintained, under which only legitimate, full-weight (14 thaler/silver mark) coins would circulate within Prussia, while Poland would be overrun with coins that were counterfeit and debased (18 thaler/mark or higher).

It is doubtful that the entrepreneurs, well-schooled in the practicalities of eighteenth-century money, believed that Prussia could escape Copernicus' logic, yet they wisely did not discourage Frederick's magical thinking. Indeed, Gumowski (1948, p. 441) suggests that the entrepreneurs' true intentions were the opposite of magic: "Their goal was the monetary unification of Poland, Prussia and Saxony in the sense that Saxon and Polish coins would circulate freely in Prussia, just like Prussian ones in Poland and Saxony." Ironically, this was the monetary unification that Graumann had envisioned in 1750, one that would draw Dutch coins out of Poland. The realization of that vision, as implemented by the entrepreneurs over the next seven years, would not be a reputable one.

9. The Seven Years War 1756–1763

Frederick II's 1756 invasion of Saxony began a protracted war in which Prussia suffered repeated military defeats, but was nonetheless able to outlast its enemies. This unlikely outcome surprised many contemporary observers, not in the least Frederick himself, who termed his survival a "miracle" (Blanning 2016, p. 259).

The true miracle may have been a fiscal rather than military one. Frederick famously acknowledged fiscal primacy with the quip, "… the best peace treaty will go to the one with the last Thaler in his pocket" (Buchner 1862, p. 343). In truth, his funding options were limited. Prussia had no bond market, no central bank, a primitive taxation regime, an underdeveloped banking sector, and no access to state credit. An exhaustive investigation (Koser 1900) yielded the following breakdown of Prussia's extraordinary wartime revenues (Koser 1900, p. 43): 42% of the war budget was funded by "contributions" (tribute) from conquered territories, 16% came from subsidies received from Prussia's ally, Britain, and 17% (= 29 million thalers) derived from inflation (seigniorage).

To frame this last figure, an advanced modern economy (the United States during the Second World War) was only able to fund 19% of its war budget through inflation (Hall, Sargent 2021).[13] Moreover, Gaettens (1955, p. 166) argued that Koser's estimate of wartime seigniorage was too cautious, the true figure being closer to 49 million thalers.[14] Most of this seigniorage was not extracted from Prussia. Hoensch (1973, p. 134) estimated that the total cost of the war to Poland, a neutral country in the war but the target of repeated Prussian debasements, may have been as high as 35 million thalers.

Gaining large revenues from inflation, without the benefit of paper banknotes or a central bank, required some ingenuity on the part on Prussia's mint entrepreneurs. From the literature, their technique can be described as a four-stage process that amounted to a virtual printing press of inflationary finance. The four stages were:

1. The purchase of large amounts of silver, a necessary material to create great quantities of debased coin.[15] Ironically, much of the entrepreneurs' silver appears to have originated from the Bank of Amsterdam, seen at the time as a pillar of monetary stability. As the war ground on, the entrepreneurs may have become less reliant on foreign markets and instead sourced silver from debased coin already in circulation.

2. The transport of purchased silver to mints operated by the entrepreneurs, either in Prussia or in conquered Saxony, where debased coins were created. Minting specifications were governed by contracts with the Prussian crown, which however were imperfectly enforced. A certain amount of silver was diverted at this stage to pay contracted amounts of seigniorage to the Prussian crown.

3. The dispersal of debased coins, via a network of purchasers, who ranged throughout Poland and neighboring countries. Value was created when purchasers exchanged debased coins for higher-quality coins held by local residents. This technique allowed the entrepreneurs to evade the front-running encountered by Graumann.

4. In the final stage of the process, the entrepreneurs used the coins obtained by the purchasers to either pay bills of exchange drawn in the first stage, or to purchase more bills on Amsterdam or Hamburg, so as to purchase yet more silver.

The operation of the virtual printing press depended on deception. Frederick's contracts with his mint entrepreneurs were concluded in secret and most were destroyed after the war. The entrepreneurs' purchases of silver in Amsterdam and Hamburg were spread over numerous counterparties, in order to obscure their true magnitude. The entrepreneurs' debased coins, largely of Saxon/Polish imprint,

[13] The US was also able to fund about half of its World War 2 expenditure via the issue of debt. By contrast, mid-eighteenth-century Prussia was seen as too risky for any creditor, foreign or domestic, to lend to it. An unexpected advantage of Prussia's subprime status was that it finished the Seven Years War with no debt burden.

[14] Gaettens' estimate corresponds to Frederick's own claim of having collected seven million thalers per year in seigniorage for the duration of the war (Volz 1913a, p. 184).

[15] However, one of the entrepreneur-operated mints (Dresden) was supplied from silver mines in Saxony.

were minted with false dates (e.g., 1753) to enhance their fungibility with prewar coins. These acts of concealment were so successful that many aspects of the Seven Years War debasement remain unclear, more than 250 years after the fact.

Of the third stage, the purchasers' transactions, little is known other than that these occurred primarily in Poland. What evidence exists is anecdotal and circumstantial. Most coins produced by the entrepreneurs were of Saxon/Polish imprint, obviously targeted at Poland. As noted above, Poland had accumulated substantial stores of foreign trade coins, gold ducats especially. Schrötter (1908, p. 102) suggests that Polish nobles were frequent customers of the purchasers, having both stocks of hoarded trade coins, but also substantial debts, which could be more cheaply discharged with debased war coins. In their 1761 negotiations with the Prussian crown, the entrepreneurs Ephraim and Itzig boasted of having pulled out more than "50 million [thalers] in gold from Poland, Hungary, Russia, etc., using light money, especially Tympfs" (Hoensch 1973, p. 111). At prewar parity, the entrepreneurs were claiming to have extracted an astonishing 60 tons of gold from eastern markets.[16] Annual world gold production at this time was roughly 25 tons (Soetbeer 1879, p. 110), indicating the massive scale of the entrepreneurs' operations. As Hoensch (1973) notes, a more realistic, yet still impressive figure may have been half the claimed amount.

The historiography of the Prussian debasement, including the classic studies by Schrötter (1910) and Gumowski (1948), has largely focused on the second stage of the printing press. Although many of the relevant documents were purposefully destroyed at war's end, much activity has been reconstructed through painstaking analysis of surviving materials. A broad summary of this literature is as follows (cf. Quinn, Roberds 2023, p. 217). New coinage contracts were negotiated with mint entrepreneurs during each year of the war. In the first years (1756–1758), two groups of entrepreneurs (Gumperts et al. and Ephraim) were commissioned to mint Prussian silver coins at 14 thalers/mark fine and Saxon/Polish coins at 16–19.64 thalers/mark. The two groups of entrepreneurs merged in 1759 following the death of Gumperts, and contracted mint equivalents were then raised to 19.75 thalers/mark for Prussian and 30 thalers/mark for Saxon/Polish imprint coins. The latter figure was raised yet again in 1761, officially to 40 thalers/mark fine and in reality much higher.

This impressive body of research has not uncovered all the details of the entrepreneurs' operations, however. Notably missing are data on the prices the entrepreneurs paid for the key raw material, silver. Their effective silver price during the last three years of the war would have been at least 21 thalers/mark fine (Quinn, Roberds 2023, p. 219) and probably closer to 30 thalers/mark (Schrötter 1910, p. 51). At such prices, there would have been little incentive to produce Prussian-imprint coins and much incentive to remint these into highly debased tympfs, coins known as efraimki in Poland (Wójtowicz, Wójtowicz 2005, p. 112) and Ephraimiten in Prussia (Schrötter 1910, p. 37), after the name of the lead entrepreneur. As the efraimki pushed more respectable coins out of circulation, they became equally prevalent and thoroughly hated in both countries. This Copernican outcome accomplished the monetary unification envisioned by Graumann, though hardly on the terms he imagined.

The missing price data also makes it difficult to accurately determine the quantity of silver processed by the entrepreneurs. A very rough estimate can be obtained by taking contractual terms (seigniorage amounts and mint equivalents) at face value and applying a conservative gross margin

[16] Cf. note 11. The entrepreneurs' focus on gold suggests that the main coins acquired by the purchasers would have been gold trade coins common in Poland: Dutch ducats and French Louis d'or. For perspective, 60 tons was a decade (1744–1755) of robust pre-war ducat production and one-fifth of all Dutch ducats ever produced up to 1760 (Polak 1998).

of 20% to each round of coinage. Applying this method yields an estimate of around 800 tons processed over the course of the war (Quinn, Roberds 2023, p. 217). Because the entrepreneurs' actual profit margins were probably much higher than 20%, 500–600 tons may be a more realistic estimate. Even this lower figure would have constituted a globally significant monetary impulse, as annual world silver production at this time was about 530 tons (Soetbeer 1879, p. 110).

Some of the best data on the virtual printing press may come from its first stage. The most convenient source of silver for the entrepreneurs would have been Amsterdam, due to the sheer amount of metal available and Amsterdam's absence of export controls (van Dillen 1964). Silver trade coins were held at the Bank of Amsterdam under an arrangement resembling a repo facility (Quinn, Roberds 2023, p. 178). A Bank customer could sell trade coins to the Bank, receiving credit in their account as well as an American option (known as a receipt) to repurchase the coins within six months, at a small cost. By using receipts, Bank customers could maintain leveraged long positions in trade coins and easily mobilize the same coins as profit opportunities arose.

The Seven Years War was the high point of the Bank of Amsterdam. Its archives for this period record about one million ledger transactions and 550 tons of silver flowing through its quasi-repo facility (Dehing 2012, p. 82; Quinn, Roberds 2023, p. 241). Many of these transactions can be matched to the activities of Prussia's mint entrepreneurs. Two of Ephraim's relatives, for example, are recorded as removing 35 tons of silver coin from the Bank over the course of the war (Quinn, Roberds 2023, pp. 221, 229). The main suppliers of the entrepreneurs, however, were likely not relatives, but Amsterdam's premier merchant banks. During two peak years of the Prussian debasement (1758 and 1760), small groups of merchant banks collectively mobilized almost 100 tons of silver, a burst of activity unequalled in the history of the Bank (Quinn, Roberds 2023, p. 226).[17]

The tsunami of war coins flooding over Poland was not confined to silver coins, but also included gold coins. The raw material for the gold coins did not originate from the entrepreneurs, but from subsidies paid to Prussia by Britain in four payments of £670,000 (about 4.9 tons of gold) over 1758–1761.[18] Gold shipments to Prussian mints were handled by prominent merchant banks in Amsterdam and Berlin.[19] Most of the gold received was minted into counterfeit, debased Saxon/Polish coins (augustdor), and the debasement of the augustdor proceeded at the same rate as Saxon/Polish silver coins, so as to gain maximum value and to discourage arbitrage (Schrötter 1910, pp. 55, 80; Rachel, Wallich 1967, p. 220).

The upshot of these developments was that by early 1763, much of central Europe was awash in monetary junk – counterfeit war coins of Saxon/Polish imprint. Modern monetary statistics do not exist for this era, but if one assumes, for example, a prewar standard of about 16 thaler/mark fine for coins circulating in Poland, by war's end the de facto standard was 40 thaler/mark or higher, suggesting a tripling of prices during the war.[20] In addition, the silver content of the efraimki and similar coins was so reduced (to 40% or less) that it was not always obvious that they contained any amount

[17] The firms involved were Andries Pels en Zonen, George Clifford en Zonen, Raymond & Theodor De Smeth, and Gebroeders De Neufville.

[18] A portion of the 1758 subsidy was paid in silver, the rest entirely in gold.

[19] The Amsterdam banks involved in Prussia's gold supply chain were that city's three largest firms: Hope, Clifford, and Pels (Quinn, Roberds 2023, p. 230). The Berlin banks were Splitberger & Daum and F.W. Schütze (Koser 1900, p. 24).

[20] The balance sheet of the Prussian treasury, prepared at war's end, paints a revealing picture of the state of money in central Europe at the time (Koser 1900, p. 37). Out of the treasury's 14.2 million thalers in assets, only 2 million were in somewhat respectable coin (Dutch ducats and moderately debased Polish gold), but more than 8 million were in highly debased, "junk" war coin.

of precious metal (Justi 1765, p. 39; De Jong Keesing 1939, p. 51; Zappey 1982, p. 198). Extracting what precious metal remained was expensive and technically demanding, hindering recoinage. The resulting confusion is reflected in wartime edicts issued by Poland's Treasurer, which assigned a wide range of official values to the efraimki, ranging from 7½ to 38 grosz, depending on their date of issue (Wójtowicz, Wójtowicz 2005, p. 113). These coins, disconnected from any stable unit of account and useless as stores of value, resembled lottery tickets more than money.

Poland's Saxon king Augustus III died in October 1763, leaving his successor, Stanisław August Poniatowski, to deal with the postwar monetary chaos. An important step forward was for Poland to establish a credible national unit of account, independent of Prussia's coinage system; this was accomplished by a 1766 mint ordinance that linked the złoty to Austria's Convention Standard (Wójtowicz, Wójtowicz 2005, p. 114). More practical challenges were to convince people to quit using war coins, and to produce sufficient native varieties of coin to allow the economy to function in a normal fashion. To this end, new mints were set up in Kraków and Warsaw, but these soon encountered the same difficulties as experienced in Prussia before Graumann. Expensive precious metal had to be acquired abroad, and any high-quality coins produced tended to be exported (Wójtowicz, Wójtowicz 2005, p. 114).

10. Afterwards and conclusions

The events described in this article have greatly obscured the economic legacy of the reign of the two Saxon rulers, making any judgement of this period in the monetary history of Poland challenging. However, the task of this article is not to evaluate the entire Saxon legacy but to focus on the "great debasement" along with all its consequences. The latter proved to be dire and they contributed to the eventual partition of Poland by Prussia, Austria and Russia, despite heroic efforts undertaken by Poles to prevent this outcome.

During the reign of Stanisław August Poniatowski, in the last three decades of the Poland-Lithuanian Commonwealth, a domestic mint was established, efforts were made to strengthen the national currency, and some steps were even undertaken to establish a central bank. The idea of the latter was raised twice, initially by Stanisław Konarski in 1763 in his publication *About an Efficient Management* (*O skutecznym rad sposobie*), and later by Kapostas, published as *About the Polish National Bank to be Established* (*O banku narodowym w Polszcze ustanowić się mającym*) during the four-year diet (Sejm Czteroletni) of 1788 to 1792 (Jezierski, Leszczyńska 2001). The realization of these proposals was undermined by strong internal divisions among factions that were often backed by neighboring powers. A banking crisis in the early 1790s further slowed reform.

Poland's partition in October 1795 affected the status quo in Europe in an irreversible manner. Any assessment of the partition's immediate economic and monetary impact is obscured by the outbreak of the Napoleonic Wars and their subsequent shift to Central and Eastern Europe only ten years after the final partition. Territorial claims on former Polish territories were one of the key factors behind the resulting military actions. These conflicts led to widespread destruction of Polish lands and imposed deep economic and humanitarian costs. The extreme scale of the pauperization of Polish society is evidenced by cases of cannibalism, documented in the territories belonging to Austria following the final partition (Jezierski, Leszczyńska 2001). Minimal progress toward abolition

of still-prevalent serfdom (in Austria and above all in Russia) was another important reason for the serious economic regression observed in Polish lands during the first half of the nineteenth century. Protectionist measures – pursued above all by the Congress Kingdom of Poland in a semi-autonomous part of the Russian empire – encumbered trade links between former territories of Poland (Jezierski, Leszczyńska 2001). Moreover, belonging to the three different empires did not aid in halting Poland's general decline.

The scale of the economic disaster from the early nineteenth century has been well documented in research conducted by Berend (2012) and supported by data elaborated by Bairoch (1976). In GPN per capita (in 1960 US dollars) in Eastern Europe in 1800 amounted to 180 dollars and represented aproximately 84% of Western European level at that time, 30 years later it fell to less than 69%. After a further three decades (in 1860) it fell to about 55% and remained at that level until the outbreak of WWI. Subsequently, the economic gap between the west and the east of Europe remained until now.

A positive aspect of the post-Napoleonic situation was that the Polish people (depending on the region) gained limited autonomy, which was immediately used to establish the first prototype of a central bank, Bank Polski. This bank was created under the auspices of Prince Franciszek Ksawery Drucki-Lubecki who, despite not having a theoretical background, was entrepreneurial enough to foster economic activities in the Congress Kingdom of Poland. The idea of Bank Polski was not only to grant credit, but to issue currency as well (Kalwat 2018). However, the fortunes of this newly created institution were subject to ups and downs in the complex relationship involving the Polish people and the Tsar. The two Polish revolts (1830 and 1863) significantly diminished the role of this bank. It lost its issuance rights in 1870, its notes ceased to be legal tender in 1875, and in 1885 it was converted into simply another branch of the Russian state bank (Jezierski, Leszczyńska 2001).

The economic performance of the partitioned territories improved somewhat from the 1860s, but much of this improvement was confined to the Polish territories in Prussia, where the growth rate of domestic GNP per capita from 1860 to 1910 was 1.39%, well above the European average of 0.96%. In contrast, the Austro-Hungarian empire and Russia had growth rates close to the average.

Unfortunately, this reversal in Polish economic fortunes proved to be short lived. Poland's reemergence on the map in 1918, following 123 years of partition, was preceded by the military defeat and political collapse of the three partitioning empires. Their sudden disappearance left monetary order in a disarray, thus paving the way to hyperinflation. Once again, the political division mentioned in the introduction of this work (made worse by the lack of significant central banking experience) became evident. The 20-yearlong interwar period exposed Central Europe (and Poland in particular) to hyperinflation first, followed 10 years later by a sharp and detrimental deflation – a direct effect of a prolonged peg to gold.

Furthermore, the name złoty itself means "golden" in Polish, implying a close link to this precious metal. The latter was also important during the Polish People's Republic (1944–1989), even if until 7 November 1956, possessing gold could result in the death penalty (especially when it was proven that it was the subject of trading activity). Tensions lasting throughout the entire Cold War period helped gold preserve its magic splendor among Poles.

Scrutinizing economic activities in Poland in the last 35 years following the end of the centrally planned economy, it becomes evident that Poland's spectacular performance cannot be attributed to the amount of official gold (with Poland being one of the key purchasers in the last couple of years), but above all to a well-functioning central bank and the central bank's ability to conduct monetary

policies tailored to the needs of the domestic economy. This favorable experience contrasts with Poland's economic misfortunes over the last 300 years of the previous millennium, which were initiated by the activities described in this text. The debasement launched by Frederick the Great would provide an extreme example of the Law of Copernicus, a traumatic one that would haunt the Polish economy for the next two and half centuries. If Frederick's highly debased efraimki had a silver lining, it would consist in an incentive for Poles to create a properly working central bank – a dream which would only be realized at the turn of the twentieth and twenty-first century.

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Acknowledgements

The authors would like to express their sincere gratitude to Prof. Cecylia Leszczyńska from the University of Warsaw and Taco Tichelaar, historian of the Dutch Golden Age, for their valuable hints and advice which have made the process of writing this article much easier.

Prawo Kopernika w Polsce od początku XVI w. do końca XVIII w.

Streszczenie

Prawo, zgodnie z którym zły pieniądz wypiera dobry, zostało sformułowane przez Mikołaja Kopernika około 1519 r. Wkład największego polskiego astronoma w myśl ekonomiczną był jednak większy i obejmował także kwestie związane z deprecjacją pieniądza. W swoich badaniach Kopernik skupiał się na deprecjacji ówczesnej monety pruskiej i zapewne byłby zaskoczony, gdyby dowiedział się, że Polska, tak jak wiele innych krajów Europy, nie będzie w stanie uchronić się przed skutkami działania tego prawa. Ironią losu jest, że około 200 lat po śmierci Kopernika jego ojczyzna stała się główną sceną wspomnianej deprecjacji. Co gorsza, deprecjacji polskiego pieniądza – za sprawą przebiegłych działań Fryderyka Wielkiego – dokonano, w pełni wykorzystując proces, przed którym Kopernik za pomocą swoich rozległych badań starał się swój kraj uchronić.

W artykule skupiamy się na działaniach Fryderyka Wielkiego polegających na stopniowym wycofywaniu dobrych pieniędzy w zamian za złe. Aby wyjaśnić, w jaki sposób doszło do tej masowej wymiany pieniądza, najpierw dokonano przeglądu pism Kopernika i niektórych wydarzeń historycznych wynikających z niemal współczesnych mu odkryć geograficznych (początek XVI w.). W kolejnej części artykułu wyjaśniono rozbieżności gospodarcze między wschodem a zachodem Europy, które zaczęły się bardzo szybko pogłębiać w XVII w.

W efekcie wyżej wspomnianego procesu w niektórych krajach, np. w Holandii i Anglii, na przełomie XVI i XVII w. zaczęto tworzyć rozwinięty rynek długu oraz nowoczesną bankowość centralną. W tym samym czasie inne kraje, m.in. Polska, nie mogły wyjść poza system gospodarczy oparty na pańszczyźnie, który utrzymał się aż do drugiej połowy XIX w. Takie podziały stwarzały pole do wyzysku ekonomicznego niektórych wschodnich części kontynentu przez jego lepiej rozwiniętą zachodnią część. Eksploatacji gospodarczej towarzyszyły różnego rodzaju napięcia zarówno o charakterze wewnętrznym, jak i zewnętrznym. Stały się one przyczyną wielu wojen, których doświadczyła ta część świata w nadchodzących stuleciach, a kulminacją były dwa być może najokrutniejsze konflikty w historii ludzkości.

Opisując działania podjęte przez rosnące w siłę Prusy na przełomie XVII i XVIII w., koncentrujemy się przede wszystkim na tych, za sprawą których w ostatecznym rozrachunku doszło do upadku I Rzeczypospolitej. Wiele z nich wynikało ze słabości gospodarczej naszego kraju, której przyczyny zostały pokrótce przez nas opisane. Paradoksalnie, ojczyzna Kopernika na skutek wspomnianych już odkryć geograficznych – mimo późniejszych niekorzystnych skutków tego podziału – początkowo wydawała się ich beneficjentem. Procesy społeczne zachodzące w zachodniej części kontynentu, polegające na porzucaniu przez miejscową ludność obszarów wiejskich na rzecz miejskich, generowały silny popyt na produkty rolne z Polski. W efekcie szybko rozwijała się wymiana handlowa między Polską a Zachodem (przede wszystkim z Holandią), która generowała dla Polski ogromne nadwyżki w handlu zagranicznym.

Niestety, silna pozycja zewnętrzna Polski na przełomie XVI i XVII w. nie sprzyjała odejściu od struktury feudalnej w kierunku bardziej kapitalistycznej. Z analizy polskiej gospodarki w tamtych czasach wynika, że można ją uznać za pierwszą dużą gospodarkę dotkniętą przez to, co obecnie określa się mianem „choroby holenderskiej". Jednym ze skutków tego zjawiska był brak bodźców do przyspieszenia wzrostu gospodarczego. Spowodowało to, że do Polski nie docierały rozwijające się w ówczesnych Niderlandach czy Anglii innowacje, które doprowadziły do przyspieszenia wzrostu gospodarczego w tych krajach. Najważniejszą z nich był rynek długu, bez którego uruchomienie instytucji odpowiedzialnej za jakość pieniądza było praktycznie niemożliwe. Z tego względu normy oraz procesy monetarne w Europie Środkowej i Wschodniej niewiele różniły się od standardów średniowiecznych. Taki stan rzeczy jedynie pogłębiał podział Europy na coraz szybciej bogacący się Zachód oraz pozostający w tyle Wschód. Co gorsza, intensyfikacja tego zjawiska prowadziła do wyzysku gorzej rozwiniętej wschodniej części kontynentu przez lepiej rozwinięty Zachód.

Ten „miękki" wyzysk zmienił charakter wraz z pogorszeniem się geopolitycznej sytuacji Rzeczypospolitej. O ile w pierwszej połowie XVII w. udało nam się uchronić przed wieloma wyniszczającymi konfliktami (przede wszystkim przed wojną trzydziestoletnią), o tyle w jego drugiej połowie sytuacja zmieniała się na niekorzyść Polski. Szereg konfliktów, z których najbardziej szkodliwy okazał się potop szwedzki (1655–1660), podkopało fundamenty gospodarcze naszego kraju. Nadejście XVIII w. nie poprawiło sytuacji – wręcz przeciwnie. Prowadzone wojny przyspieszyły upadek Polski zarówno pod względem politycznym, jak i gospodarczym. W tym samym czasie w wyniku słabości Polski sąsiednie Prusy zaczęły stopniowo wyrastać na potęgę militarną.

Wzrost potęgi Prus był nierównomierny, co niestety w żaden sposób nie uchroniło Polski przed ich destrukcyjnymi działaniami. Siła polityczna, a przede wszystkim militarna Prus kontrastowała z ich słabo rozwiniętą gospodarką, która na początku stulecia doświadczała wielu podobnych problemów jak Rzeczpospolita Obojga Narodów. Główna różnica między tymi krajami wynikała jednak z poglądów ich władców. Rządzący Prusami rozumieli pilną potrzebę wzmocnienia fundamentów gospodarczych kraju. Najwybitniejszym z nich był Fryderyk Wielki. Do osiągnięcia tego celu potrzebny był jednak czas, którego Fryderyk nie miał. Ponadto jego mocarstwowe ambicje okazały się zbyt dużym obciążeniem dla stosunkowo prostego pruskiego systemu podatkowego ze słabo rozwiniętym sektorem bankowym oraz brakiem dostępu do kredytu państwowego.

W tych okolicznościach Fryderyk Wielki zaczął się interesować zyskami z renty menniczej, które mogłyby się stać ważnym źródłem przychodów. Źródłem inspiracji były dla niego rozwiązania holenderskie. W tamtym czasie Holendrzy mieli to, co nazywa się ponadproporcjonalnym przywilejem (*exorbitant privilege*) i dziś odnosi się do dolara USA. Król pruski potrzebował jednak sporo czasu, aby zrozumieć, że naśladowanie Holendrów wymaga nie tylko silnej gospodarki, ale przede wszystkim instytucji takiej jak Bank Amsterdamski (Wisselbank), a tych warunków nie był w stanie spełnić.

Wobec dość słabej pozycji wyjściowej Fryderyk Wielki musiał wymyślić własne rozwiązania. Być może punktem zwrotnym była jego podróż incognito do Amsterdamu, gdzie najprawdopodobniej zrodziła się strategia mająca daleko idące konsekwencje dla całego regionu. W głównej części artykułu szczegółowo opisano działania podjęte przez Fryderyka Wielkiego, które de facto sprowadzały się do zalania Polski pieniądzem gorszego sortu.

Deprecjacja zapoczątkowana przez Fryderyka Wielkiego może uchodzić za skrajny przykład działania prawa Kopernika. Poczynania pruskiego władcy – jak wspomniano – przesądziły o losach Polski i jej gospodarki przez następne dwa i pół wieku. Dotyczyło to również powrotu do podziału Europy na bogaty Zachód i zacofany Wschód. Gdyby trzeba było szukać jakiejkolwiek jasnej strony działań Fryderyka Wielkiego, to może nią być zachęcenie wielu Polaków do stworzenia prawidłowo funkcjonującego banku centralnego. Marzenie to zrealizowano dopiero na przełomie XX i XXI w.

Słowa kluczowe: obniżenie wartości pieniądza, bicie monet, renta mennicza, złoto (srebro), mennica