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Abhandlungen

Monetary Instability, Lack of Integration, and the Curse of a Commodity Money Standard. The German Lands, c.1400–1900 A.D.

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Abstract

Currency debasement, defined as a loss of precious metal content (intrinsic value) of the circulating penny currencies over time, was a common feature in the monetary history of Europe, c. 1400–1900. Over the centuries the loss rate was sustained; between 1400 and 1900 A.D. the (south) German penny currencies lost close to 90 per cent of their intrinsic value. As prior to the twentieth century all circulating means of exchange derived their purchasing power from the value of the precious metal contained in them these debasements reflect considerable fluctuations in these coins' exchange value. Whilst some of the possible origins of this have been addressed by previous research, comprehensive models are missing, and the social and economic consequences of this phenomenon have only seldom been studied. The present paper contributes to the debate, using long-run data on the circulating small change currencies in the German lands, c.1400–1900. After an introduction (I.) the second section puts the present case study into an international, historical and conceptual context (II.). A third section provides a brief sketch of German monetary history since the Middle Ages with special regard to penny currency debasement (III.). A fourth section analyses some of the reasons for this, highlighting further areas and directions of research which previous models have missed (IV.). A fifth section studies the social and economic costs of monetary fragmentation and coin debasement (V.). A sixth section concludes (VI.).

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Kleingeldentwertung, monetäre Disintegration und der Fluch des Warengeldes – Das Beispiel Deutschlands, c. 1400–1900 n.C.

Zusammenfassung

Geldentwertung, gemessen an einer langfristigen Reduktion im Edelmetallgehalt der zirkulierenden Münzwährungen, war ein prägendes Phänomen in der vormodernen Geld- und Währungslandschaft Europas (c.1400–1900 n.C.). In den fünf Jahrhunderten vom Hochmittelalter bis zur Industrialisierung verloren die zirkulierenden Kleingeldwährungen auf dem Gebiet des Heiligen Römischen Reiches Deutscher Nation bzw. seiner Nachfolgestaaten und Staatenbünde 90 % ihres ursprünglichen Edelmetallgehalts um 1400 n.C. Da bis um 1900 sich die Kaufkraft der umlaufenden Münzen noch maßgeblich von der in ihnen enthaltenen Menge an Edelmetall (bei den Kleinmünzen nur Silber) ableitete (Metallismus, Warengeld), resultierten diese Edelmetall- oder Feingewichtsschwankungen in beträchtlichen Wechselkursschwankungen bzw. langfristigem Kaufkraftverlust der betroffenen Münzen. Während vereinzelte Aspekte dieser Problematik bereits ansatzweise thematisiert und untersucht worden sind, kann man weder von einem umfassenden Verständnis noch geschlossenen Modellen, geschweige denn einer robusten ‚Theorie' dieser Entwicklung sprechen. Insbesondere die sozialen und ökonomischen Folgekosten von Geldentwertung und Geldverschlechterung in der langen historischen Perspektive sind bislang nur punktuell untersucht worden. Der vorliegende Aufsatz gliedert sich in eine Einführung (I.). Dieser folgt eine Kontextualisierung des Themas und einige methodische Eingrenzungen (II.). Ein dritter Abschnitt bietet einen knappen Abriss deutscher Währungsgeschichte mit besonderem Fokus auf der Kleingeldentwertung und Problematiken wiederholter monetärer Integrationsversuche (III.). Im vierten Abschnitt werden bereits bestehende Modelle kritisch überprüft und weitere Bausteine einer Neu-Interpretation der vor- und frühindustriellen Währungsgeschichte vorgestellt. Ein spezieller Abschnitt ist den sozialen und ökonomischen Folgekosten einer schwach integrierten und durch Geldentwertung geprägten Währungslandschaft gewidmet (V.), bevor eine Zusammenfassung und Ausblick erfolgen (VI.). In dieser Hinsicht leistet der Aufsatz einen Beitrag zu einer Umbewertung und Re-Kontextualisierung deutscher Währungsgeschichte der vor- und frühindustriellen Zeit.

Keywords: Money Demand, Money Velocity, Quantity Theory of Money, Velocity of Money, Bimetallism, Bullion, Coinage, Commodity Standard, Currencies, Currency, Gold, Gold Standard, Monetary Regime, Monetary System, Seigniorage, Silver Standard, Specie, Deflation, GNP, Growth, Inflation, Monetary Policy, Monetary Regime, Monetary Standard, Monetary System

JEL Classification: B110, E41, E42, E49 E52, N13

I. Introduction

It can be held as a commonplace that a stable currency, measured against the price level (domestically), or in terms of its exchange value against foreign currencies (exchange rate stability) is a key factor for economic growth and development. To what extent these things mattered in historical perspective, however, is much less well understood. Small change debasement, measured in terms of a sustained loss of the circulating penny currencies' precious metal content, was a common feature in the monetary history of Europe, c. 1400–1900. Between 1400 and 1900 the German penny currencies lost about 90 per cent of their silver content. Until recently (i.e. mid-twentieth century) most systems of monetary circulation in Europe were based on what *Schumpeter* (1955) called a 'metallist' standard, i.e. the conviction that the purchasing power of money ought to be ultimately derived from the amount of precious metal or real wealth it embodied. It goes with the territory that such a loss in intrinsic value of the currency was connected with a host of economic and social problems. Whilst the social and economic consequences of this peculiar monetary landscape, however, have only seldom been studied, the imputed economic origins have been analysed by some scholars, but mainly in terms of modern models that are quite detached from historical reality.[1] A lot of open questions therefore remain. The present paper will re-evaluate some of the causes as well as social and economic consequences of small change debasement in the German lands, c.1400–1900 (The Holy Roman Empire[2], hereafter 'Germany'), pointing out new directions for future research, as well as modifications to existing models of the pre-industrial monetary landscape. Special focus will be on the fifteenth to seventeenth century, as well as the small change segment of the currency, or 'everyday money'. It should be noted in passing that whilst

[1] *Sargent,* Thomas J./*Velde*, François R., The Big Problem of Small Change (Princeton, 2003). A much better model is *Schremmer*, Eckart/*Streb*, Jochen, 'Revolution oder Evolution? Der Übergang von den feudalen Münzgeldsystemen zu den Papiergeldsystemen des 20. Jahrhunderts', in: Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte 86 (1999), pp. 457–476. For the late fifteenth and early sixteenth century a recent model studying the monetary economics in combination with the politics, sociology and culture of monetary policy has been suggested in Philipp Robinson Rössner, Deflation – Devaluation – Rebellion. Geld im Zeitalter der Reformation (Stuttgart, 2012). Many questions, however, still remain unsolved, as subsequent sections in the present paper will highlight.

[2] Heiliges Römisches Reich Deutscher Nation, formed during the tenth century A.D. and dissolved in 1806.

the paper primarily engages with a historical problem, it will also have some actual relevance for today. There have been voices in recent debates advocating a return to the 'gold standard', remnants of which existed in the United States' monetary system until the abolition of the Bretton Woods System of fixed exchange rate bands in 1971/73. The following remarks may help to promote the basic insight that, from a historical viewpoint, such returns to a non-fiduciary metallist or commodity money standard would be a great fallacy, as the social as well as economic costs are likely to outweigh by far its imputed benefits.

After this introduction (I.) the second section puts the present case study into an international, historical and conceptual context (II.). A third section provides a sketch of German monetary history since the Middle Ages. Between 1400 and 1900 the petty currencies (regionally differing penny and heller coins) lost c. 90 per cent of their intrinsic value, expressed grams of silver per coin. As prior to the twentieth century all legal tender moneys derived their purchasing power from the value of the precious metal contained in them, usually silver, such debasements reflect considerable fluctuations in these coins' exchange value. A lack of economic and monetary coordination prevented a long-term stabilization of coin exchange rates and perpetuated the problem of debasement (III.). A fourth section analyses some of the reasons of these fluctuations (IV.); a fifth one the social and economic costs (V.). A sixth section concludes (VI.). Rather than providing definite solutions the present article is intended to raise a series of new questions and directions for further research into the monetary history of the German lands in the pre-industrial period.

II. Monetary Stability, Monetary Integration and Economic Development in Historical Perspective

Scholars have examined the monetary history for most nations, regions and states in Europe since the Middle Ages, sometimes from a numismatist's perspective, sometimes from the perspective of monetary theory: for England[3], the Netherlands and Flanders[4], several Italian cities[5], Spain[6],

[3] *Challis*, Christopher E. 'Appendix 2', in: Id. (ed.), A New History of the Royal Mint (Cambridge, 1992).

[4] *Munro*, John H., 'Deflation and the Petty Coinage Problem in the Late-Medieval Economy: The Case of Flanders, 1334–l484', Explorations in Economic History XXV,4 (1988), pp. 387–423; *Van Gelder*, Hendrik Enno/*Hoc,*Marcel, Les monnaies des Pays-Bas bourguignons et espagnols, 1434–1713: Répertoire general (Amsterdam, 1960).

Austria and 'Germany'[7], as well as the much-acclaimed general synthesis by *Sargent* and *Velde*.[8] But our understanding of the consequences and bilateral feedback processes between a lack of monetary coordination, monetary instability and economic development is still rudimentary; the present paper can only make a partial contribution to a better understanding of what is still an ill-understood field. Before the analysis can proceed we need to make a few important specifications.

(1) We should note that for the present purpose – a historical study – the question of 'monetary stability' must address two issues, i.e. integration on the one, and price level stability on the other hand. Monetary integration may, in modern words, be effected using currency boards, exchange rate pegs and other types of monetary contracts or agreements directed at exchange rate stabilization, up to its most fully-developed version, i.e. a full monetary union with a common currency. Nothing of that sort existed in pre-industrial Germany. There were more than three hundred different states on the territory we call 'Germany' (The Holy Roman Empire) in the pre-1800 period, and about twenty separate territorial units after 1806/15, which were sometimes loosely united in varying politico-economical confederations of states, such as the *Zollverein* after 1833 etc. Until 1871 these states retained their own currencies and independent monetary policies. Some integration was achieved temporarily on the regional level through cooperative agreements between adjacent states and cities that were economically integrated. Such agreements sometimes took the shape of currency or coinage unions (German: *Münzverein*). Such agreements were formed in the 'Middle Ages'[9], stipulating a

[5] *Bernocchi*, Mario, Le monete della Repubblica fiorentina III: Documentazione (Florence, 1976); *Galeotti,* Arrigo, Le monete del granducato di Toscana (Bologna, [1930] 1971); *Papadopoli*, Nicolò, Le monete di Venezia, Venedig 1893–1909.

[6] *Garcia de Paso*, José I., La Política monetaria castellana de Trastámaras y Austrias, 1400–1700 (Madrid, 2000).

[7] *Metz,* Rainer, Geld, Währung und Preisentwicklung. Der Niederrheinraum im europäischen Vergleich: 1350–1800 (Frankfurt-on-the-Main, 1990).

[8] *Sargent/Velde*, Big Problem of Small Change.

[9] Following a common yet simplistic periodization schedule, 'Middle Ages' denotes the centuries between c. 600 and 1500 A.D., 'Early Modern Period' will refer to the period between circa 1500 and 1800 A.D., and the 'Modern Period' usually refers to the 1800–1914/1918 period, after which the 'contemporaneous age' begins (*Zeitgeschichte*). An alternative classification sees a break around 1800, denoting the pre-1800 period as 'pre-industrial' and post-1800 as 'industrial'. It is clear that any such periodization schedule carries an inherent risk of over-simplification. So it must be treated – as any other model or classification schedule – with due caution.

common standard of weight and type and coin exchange rates for coins that were still produced at the discretion of each separate state or city. From 1500 onwards there existed a different model of coordination; the so-called Imperial Circles (*Reichskreise*), supra-territorial political units which included pro-forma but rather imperative, i.e. postulated, agreements to coordinate monetary policy by creating uniform exchange rates and currency standards for all moneys and coins that circulated within each *Reichskreis*. Scholars have classified both the monetary policy agreements under the *Reichskreise* settlement (the imperial circles had other purposes, too; such as coordinating military action against the Ottoman Empire), as well as the medieval *Münzvereine* as currency or monetary unions.[10] Full monetary integration in the modern sense, however, was neither achieved nor intended at any point in time before 1871. Numerous competing currencies circulated within most territories. Very often two or more different monetary standards existed even within one particular territory. This was neither uncommon, nor limited to pre-modern Germany (it seems to have been the European norm). This situation resulted in ratios (spot or coin exchange rates) of small change coins, such as pennies, hellers and groschen, compared to the larger denomination coins, such as the gold florin or thaler, that were essentially flexible and re-negotiable by the financial market (but could never be enforced by state legislation, in the same way as today).

(2) Two concepts of monetary or price level stability exist in the economic literature, one of which has vanished since the twentieth century with the abolition of metallistic or non-fiduciary currencies and the adoption of what *Schumpeter* has called theoretical and practical chartalism.[11] Today the most common way of measuring monetary stability is in terms of price level changes as measured against a basket of consumables (CPI). There existed, in the economic history of Europe until recently, an alternative yet important concept, in which the purchasing power of a currency was determined also by the intrinsic value of the circulating coins, measured in terms of the number of grams of precious metal (gold, silver) they contained.[12] Whenever the intrinsic value of a currency declined, for instance by a reduction of a coin's fine weight (g Ag/Au),

[10] See papers in *Cunz,* Rainer (ed.), Währungsunionen. Beiträge zur Geschichte überregionaler Münz- und Geldpolitik (Hamburg, 2002).

[11] Denoting the idea that money is a sign of value but does not contain any (material) value in itself. *Schumpeter,* Joseph A., History of Economic Analysis (New York, 1954), pp. 288–300.

[12] See *Sargent/Velde*, Big Problem of Small Change, passim.

vis-à-vis a stable price or lesser decline in the silver (or gold) price, the currency depreciated. Inflation would be the result, as more coins than before of the same denomination would have to be handed over for the same basket of goods. This monetary landscape in pre-1900 Europe was fundamentally different from our modern one which is based on a fiduciary (i.e. nominalist or chartalist) monetary standard, which believes that money is a sign or signifier of value, without carrying intrinsic value on top of its purely material value (which is insignificant in relation to its purchasing power[13]); money should not have value of itself.

(3) The pre-modern monetary landscape was marked by the existence of at least three (if not four, if bills of exchange and other means of cashless payments are considered) monetary layers or spheres of exchange. On top were the high-value or full-bodied coins, usually called gulden or florin which were made of gold (e.g. Rhenish florin/*Rheingulden*) or silver (*Silbergulden*, *Groschen so ein Gulden gilt*, *Thaler*). Usually full-bodied gulden coins contained roughly as much precious metal as they were worth nominally, minus seigniorage, the state's monopoly revenue arising from the royal prerogative of minting (*Münzrecht, Münzregal*) as well as brassage (the costs of minting). This 'upper' layer or monetary sphere may be denoted as M0. Below M0 came what may be called[14] the middle monetary sphere, coins that went in the Saxon and central German lands by the name of *Groschen* (groat), or *Batzen* in the south. These coins usually contained enough silver, but never gold, to be accepted by the public as legal tender. They usually circulated at face value. But their exchange value often fluctuated against the high-value full-bodied coins of the same currency type (say, Saxon money). This is a characteristic which modern moneys do not usually exhibit: one EURO is always worth 100 Cents, regardless whether these Cents are Greek, Italian or French EURO-Cent coins. We may denote this 'middle monetary layer' of the Groschen-Batzen type as *M*0'. At the bottom end came the small change currencies, pennies, heller etc., which circulated in the German lands in hundreds, if not thousands of different types and varieties, varying from state to state. There were about 500 'states' that actively exercised their right to mint coin. Moreover, there was variation over time and within each economic or currency area, as old coins coexisted with and were given and taken in

[13] Today the British £1 Sterling coin, made of a brass-nickel alloy, has a material value that fluctuates with the prices on the London metal exchange (excl. production costs such as wages and fixed capital input). The material value usually is around six to eight pence, i.e. far below 10 per cent of its purchasing power.

[14] *Rössner*, Deflation – Devaluation – Rebellion, ch. IV.

transactions alongside new coins. The financial market would frequently rate these coins 'on the spot' at rates that differed from the official or face value set by the state. As pennies contained a high fiduciary value, because they contained much less silver than they were worth, people were tempted to re-adjust their purchasing power to the amount of precious metal these coins contained, as they adhered to a commodity money or metallist standard. These penny currencies may be denoted as M0''. The remainder of this paper will focus on the small change segment (M0''), because it is especially in this segment that the monetary history of Germany offers a wealth of surprising insights that are fundamentally different from what general monetary theory, as well as most textbooks on the history of money suggest regarding how monetary transactions should have worked, and what the monetary landscape should have looked like.

If we compare available data on petty currency debasement with imputed yet entirely conjectural figures for per capita GDP growth, denoting relative productivity levels rather than GDP, in the early modern period (1500–1800 A.D.), the following picture emerges (Table 1).

Table 1

Average Rates of Coin Debasements and (Imputed) Rates of Economic Growth

	Average yearly debasement rates, small change currencies 1500/1800	*Average rates of growth per capita GDP*
Poland (Danzig, Cracow)	–0.63	0.11
France	–0.54	0.15
Germany (Holy Roman Empire)	–0.44	0.15
Austria	–0.32	0.18
Flanders	–0.35	0.14
Netherlands	–0.29	0.29
Switzerland	–0.28	0.18
England	–0.16	0.29
AVE	–0.42	0.15

Coin debasement rates: Metz, Geld, Währung und Preisentwicklung, Tables and passim; national income growth rates based on figures in Maddison, World Economy, figures taken from the original database on http://www.ggdc.net/maddison/maddison-project/home.htm

Whilst the data are too ambiguous to allow quantitative testing (the 'GDP' figures are ahistorical, mainly based on somewhat shaky urbanization data, giving away, if anything, conjectural estimates of the long-term trend in relative total factor productivity levels but no actual evidence on the development in 'gross domestic product'[15]), they are nevertheless suggestive enough to raise a lot of interesting questions. One obvious question is: can we establish any historical relationship between monetary stability and economic development? The Netherlands for instance had currency depreciation rates that were close to the European average, but turned into the richest and 'first modern economy' between c.1500 and 1820 with an imputed per capita wealth that was double the European average c. 1700 A.D.[16] This may suggest prima facie that currency debasement (or monetary stability) was not so important for economic equilibrium and development. England on the other hand had the lowest long-term rates of small change debasement, and after 1550 virtually 100 per cent monetary stability. Eventually England turned into the first industrial nation becoming the richest nation of the world after the 1820s. Overall, with a value of $R^2 = 0.6323$ for a linear regression of the data assembled in Table 1, the evidence is ambiguous; the data too shaky and approximate (sources are frequently unreliable) too allow quantitative testing. But there are some important and apparent connections between economic performance and monetary stability in historical perspective which can be further explored using a non-quantitative approach.

III. The Monetary History of the German Lands, 1400–1900

A comprehensive monetary history of Germany needs yet to be written, notwithstanding a handful of existing useful surveys.[17] Most of these ac-

[15] There existed in Europe before the nineteenth century neither modern economies nor modern national income and growth accounting methods.

[16] *Vries*, Jan de/*van der Woude*, Ad, The First Modern Economy. Success, Failure, and Perseverance of the Dutch Economy, 1500–1815 (Cambridge, 1997).

[17] Good surveys include *North,* Michael, Das Geld und seine Geschichte. Vom Mittelalter bis zur Gegenwart (Munich, 1994); Id., Kleine Geschichte des Geldes. Vom Mittelalter bis heute (Munich, 2009); *Sprenger,* Bernd, Das Geld der Deutschen. Geldgeschichte Deutschlands von den Anfängen bis zur Gegenwart 3rd ed. (Paderborn/Munich/Vienna/Zurich, 1991), *Rittmann,* Herbert: Deutsche Geldgeschichte 1484–1914 (Munich, 1975), *Suhle,* Arthur, Deutsche Münz- und Geldgeschichte von den Anfängen bis zum 15. Jahrhundert 8th ed. (Berlin, 1975); *Gerhard,* Hans-Jürgen, 'Miszelle: Neuere deutsche Forschungen zur Geld- und Währungsgeschichte der Frühen Neuzeit. Fragen – Ansätze – Erkenntnisse', Vierteljahrschrift für Sozial-

counts, however, will create the impression that one was dealing with homogenous entities, such as 'Germany', or 'German currency', whose history could be told in a quasi-linear manner. Both assumptions need critical re-evaluation.

1. German Monetary History in the Long Run – A Sketch

Since the mid-thirteenth century at latest, by means of the Statutum in Favorem Principum (1231/32), the right to mint coins (i.e. to issue money) had passed from the Emperor to the territories and princes within the Holy Roman Empire. In the later fifteenth and sixteenth century they numbered about three hundred states plus a hard-to-determine number of smaller territories that were vested with some key governmental prerogatives. According to the most reliable estimates there were, around 1500, about 500 open mints within the Empire, i.e. state-backed enterprises where coins were minted.[18]

Coins were struck in mints, small factory-like enterprises using primitive techniques. After the seventeenth century some mechanized procedures became available; until c.1800 methods of producing money remained comparatively simple.[19] Silver and gold represented the basis for

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und Wirtschaftsgeschichte, LXXXIII (1996), 216–230; Id., 'Ein schöner Garten ohne Zaun. Die währungspolitische Situation des Deutschen Reiches um 1600', Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte, LXXXI (1994), 156–177; Id., 'Ursachen und Folgen der Wandlungen im Währungssystem des Deutschen Reiches 1500–1625. Eine Studie zu den Hintergründen der sogenannten Preisrevolution', in: *Schremmer,* Eckart (ed.), Geld und Währung vom 16. Jahrhundert bis zur Gegenwart (Stuttgart, 1993), 69–84. Older numismatic works include *Friedensburg,* Ferdinand, Münzkunde und Geldgeschichte der Einzelstaaten des Mittelalters und der Neueren Zeit (Munich/Berlin, 1926); *Luschin v. Ebengreuth,* A., Allgemeine Münzkunde und Geldgeschichte des Mittelalters und der Neueren Zeit, 2nd ed. (Munich/Berlin, 1926), as well as *Freiherr von Schrötter,* Friedrich, 'Das Münzwesen des Deutschen Reichs von 1500 bis 1566', Jahrbuch für Gesetzgebung, Verwaltung und Volkswirtschaft, XXXV (1911) and XXXVI (1912), reprinted in: *von Schrötter,* Friedrich, Aufsätze zur deutschen Münz- und Geldgeschichte des 16. bis 19. Jahrhunderts (1902–1938), ed. *Kluge,* Bernd (Leipzig, 1991), 3–76. None of these works however addresses the problem of money and silver as an economic, social and cultural resource and the social problems resulting from a commodity money standard.

[18] Bigger states, such as Saxony, had several mints, sometimes up to ten; smaller states such as the Duchy of Henneberg-Schleusingen only one or two. *Schremmer,* Eckart,'Über "stabiles Geld". Eine wirtschaftshistorische Sicht', in: Id. (ed.), Geld und Währung, 9–44.

[19] This paragraph draws on Rössner, 'Money, Banking, Economy' in *Classen,* Albrecht (ed.), Medieval Culture: A Compendium of Critical Topics (Frankfurt/New York, 2014, forthcoming).

monetary stock in circulation, in the shape of old native and foreign coins, raw gold and silver, bullion (ingots), jewellery and ornaments. Anyone could (but chiefly merchants did) deliver silver and gold to the mint, where it was smelted and transformed into sausage-like pieces. These were cut into thin round slices which were then embossed with the coin's image, back and front, using a hammer and a die. Making money, i.e. striking coins and running a mint required hard physical work as well as prodigious outlets of fixed and working capital for factory buildings, smelting ovens, and workers' salaries. Mint masters, usually entrepreneurs recruited from the merchant-bankers' classes, needed intimate knowledge in metallurgy, finance and economics. Most importantly, the state had no control over money supply. It could only set the parameters regarding fineness and weight (intrinsic value) of coins that were given out in return for precious metal brought to the mint. States would formulate 'laws' (edicts, statutes, monetary ordinances) regarding exchange rates of native to foreign coins. More often than not such statutes would be broken. Exchange rates were set on the financial market, frequently on-the-spot.[20] It is almost immediately obvious that this would carry significant economic and social problems (and it should be kept in mind when judging modern proposals directed towards the re-introduction of a metallist monetary standard).

During the early Middle Ages the only coin that existed physically was the penny or denarius (d) (small change or bottom monetary layer: M0''). In the wake of the monetary reform of Charlemagne 794 A.D. it represented the twelfth part of a shilling and the 240th of a Pound and initially also the Florin, or (after the florin-shilling ratio was increased from 20 to 21:1) the 252th part of a Florin in the Germanic and Bohemian lands. Before the later thirteenth century neither the Pound nor the Shilling existed physically, however. They merely represented a reckoning standard or money of account ('ghost money').[21] In 1542 the Gulden-Groschen ratio was, in the central German lands, officially raised from 21:1 to 24:1. This relation for the money of account was retained for the *Reichsthaler* or Rix Dollar; the official or 'imperial' currency standard until 1806. But in day-to-day transactions spot or coin exchange rates remained potentially renegotiable and frequently varied around this 24:1 ratio.

[20] *Rössner*, Deflation – Devaluation – Rebellion, ch. III, esp. section 3.1.

[21] *Lane,* Frederic C./*Mueller,* Reinhold C., Money and Banking in Medieval and Renaissance Venice, Vol. I, Coins and Moneys of Account (Baltimore and London, 1985), ch. 1.

(c) Deutsche Bundesbank.

Front: Elector Johann (John) of Saxony carrying a short sword; back: his brother, Duke Georg (George) of Saxony.

Figure 1: Good Money! Saxon Silver Florin ('Thaler'), ca. 1525/1526

(c) Deutsche Bundesbank.

Figure 2: Evil Money! Austrian Penny, ('Schinderling') c. 1459

From the thirteenth-century onwards, with the quickening of economic life during the Commercial Revolution[22] larger coins representing multiples of the penny began to be minted (middle monetary layer or M0'). These went by the name of groat (German *Groschen*) or shilling (Latin *solidus*, abbreviated in the sources as s. or sol.). In France the first *gros tournois* at 12 deniers containing 4.22 grams of silver were produced from 1266 A.D. onwards. In England, groats were minted since 1279/1351. In the German/Central European lands the *Meißner Groschen* became, along with the Prague groats (*Prager Groschen*) proverbial since the high Middle Ages, after discoveries of rich silver deposits in the central European mining region around the Erzgebirge Mountains in Saxony and Bohemia had been made.[23] Shortly before that date, since 1252, gold coins to the value of one pound or Libra (at 20 solidi or shillings) had been minted in Florence and Genoa. They contained 3.53 (Genovino) and 3.54

[22] *Lopez,* Robert S., The Commercial Revolution of the Middle Ages, 950–1350 (Cambridge, 1976).

[23] *Spufford,* Peter, Money and its Use in Medieval Europe (Cambridge, 1988); *Schwinkowski,* W., Das Geld- und Münzwesen Sachsens. Beiträge zu seiner Geschichte (Dresden, 1918); *Castelin,* Karel, Grossus Pragensis. Der Prager Groschen und seine Teilstücke 1300–1547 2nd ed. (Braunschweig, 1973).

grams of gold (Fiorentino) respectively and attained the name of 'florin' after the latter place (Florence) (upper monetary layer: M0).

Since the later fifteenth century the increasing amount of silver mined in the central European mountainous regions of *Schwaz/Tyrol*, the Saxon and Bohemian Erzgebirge Mountains and the Harz Mountains occasioned the rise of a new currency, the silver florin, called in contemporary usage *Guldengroschen* or *Groschen so ein Gulden gilt*. This coin was minted as the exact equivalent of the Rhenish gold florin. Based on a gold-silver-ratio (the financial market price for gold in terms of the number of units of silver to be handed over in exchange for gold) that usually fluctuated around 1:12, the silver *Thalers*, as these coins became known quickly after the 1520s[24] (Fig. 1 above) were about twelve times as large and heavy as the now increasingly moribund Rhenish gold florins. Initially they exchanged at 20 groats. Then, from the 1490s onwards they exchanged at 21 and from the 1530s until the end of the early modern period at a notional coin exchange rate of 24 groats to the florin or Thaler.[25]

Germany's monetary history between 1400 and 1900, then, may for reasons of simplicity be subdivided into three sub-periods.

(a) The time until 1495 is sometimes labelled an 'era of the regional currency unions' (*Münzvereine*). These agreements were aimed at increasing the degree of monetary integration amongst the member states which were usually also economically integrated in some form. The *Münzvereine* were, of course, no perfect currency unions, but they usually included agreements relating to a common or standardized coin production, such as the minimum intrinsic weight of each type of coin (g Ag/Au), as well as mint output ($dM0/M0$: new coins added to the existing yet uncontrollable stock of currency in circulation) and the exchange rate of different coins within each *Münzverein*. In the southern German/Lake Constance area there existed the *Rappenmünzverein* between the large cities of Basle, Freiburg i. B., Colmar, Breisach and the Elsace[26]; the Archbishops of Mainz, Cologne and Trier and the Palatinate were united in the *Rheinische Münzverein*. Swabia had the Swabian Currency Union

[24] From the Bohemian mining town of Joachimsthal (today: Jàchymov) (Joachimsthaler → Thaler → Dollar).

[25] See *Rössner*, Deflation – Devaluation – Rebellion, ch. III, esp. 311–321, and Id., 'Die (proto)globalen Spannungsfelder und Verflechtungen mitteldeutscher Münz- und Währungspolitik um 1500. Das Beispiel der sächsischen Talerprägung', in: S*chattkowsky*, Martina (ed.), Das Erzgebirge im 16. Jahrhundert. Gestaltwandel einer Kulturlandschaft im Reformationszeitalter (Leipzig, 2013), 103–158.

[26] *Sprenger*, Geldgeschichte, 2nd ed., 85–91.

(*Schwäbische Münzverein*), comprising the Duchy of Württemberg and the cities of Ulm, Constance, Überlingen, Lindau, Ravensburg, Memmingen, St Gallen, Kempten and others. The Harz cities of Goslar, Brunswick, Hildesheim, Einbeck, Hanover and Halberstadt formed a series of agreements on currency standards since the late fourteenth century. The Hanseatic cities had the *Wendische Münzverein*.[27]

(b) With the Imperial Reform movement (*Reichsreform*), a political initiative arose after 1495 that was directed at creating more formal and designated supra-territorial administrative units between the several territories and states within the German Empire. In 1500/1512 the ten 'Imperial Circles' or *Reichskreise* were formed, the Swabian, Franconian, Bavarian, Upper Rhenish, Electoral Rhenish, Lower Rhenish-Westphalian (including the Netherlands and Flanders), the Upper Saxonian, Lower Saxonian, the Burgundian and Austrian Imperial Circle. The purpose of the *Reichskreise* was to coordinate some key elements of economic but mainly fiscal policy at the supra-state level, including the levying of imperial taxes (*Türkensteuer*, *Reichspfennig*), some tolls and customs as well as an *attempted* harmonization of monetary policy. The imperial circles may be compared to regional currency boards or exchange rate pegs[28], where exchange rates, as the legislation said, should be fixed (as the official documents said) and, theoretically, also the number of mints and the amount of money ($dM0/M0$[29]) produced by each member state of each imperial circle.[30] In 1524, 1559 and 1566 three Imperial Currency

[27] Ibid.

[28] *Cohen*, Geography of Money, ch. 3.

[29] As bills of exchange, bank notes and other forms of coin substitutes were not available to the general public (exchange bills were tied to a narrow and prescribed range of economic actors), the monetary stock or base money ($M0$) consisted exclusively of coins. Government could not control the total amount of legal tender (i.e. coins: $M0$) in circulation, but only the increment, i.e. the newly-minted amount of coins on government account, thus $dM0/M0$. See *Rössner*, Deflation – Devaluation – Rebellion, esp. ch. III for full discussion.

[30] On the imperial circles and their political history, see *Moser,* Johann Jakob, Von der teutschen Crays-Verfassung (Frankfurt-on-the-Main/Leipzig, 1773); *Hartmann,* Peter Claus, Der Bayerische Reichskreis (1500 bis 1803). Strukturen, Geschichte und Bedeutung im Rahmen der Kreisverfassung und der allgemeinen institutionellen Entwicklung des Heiligen Römischen Reiches (Berlin, 1997); *Hoffmann,* Hanns Hubert,'Reichskreis und Kreisassoziation. Prolegomena zu einer Geschichte des fränkischen Kreises, zugleich ein Beitrag zur Phänomenologie des deutschen Föderalismus', in: Zeitschrift für Bayerische Landesgeschichte 25 (1962), pp. 377–413; *Conrad,* Hermann, (ed.), Recht und Verfassung des Reiches in der Zeit Maria Theresias (Cologne, 1964).

Ordinances (*Reichsmünzordnungen*) were issued, the first of which (Esslingen 1524) remained purely utopian. It formulated a currency standard that was impossible to implement, given the price for the mark silver on the financial market, which at that time was higher than the amount of coins to be struck from each mark (mint price given in the ordinance). The Imperial Currency Ordinance of Augsburg 1559 introduced an 'imperial' silver florin (*Reichsguldiner*) that should circulate within the Empire at 60 kreuzers. It should contain 22.91 grams of silver. An 'imperial' gold florin (*Ducat*) was also 'created' which should circulate at 104 kreuzers. For each imperial circle (*Reichskreis*) the weight of the circulating nominals, from pennies to groats, kreutzers and batzen, as well as the higher Thaler and other florin nominals was specified. In 1559 the Augsburg Imperial Diet issued a resolution that the Saxon silver florin or Thaler containing 25.98 grams of silver should become the new imperial currency standard (*Reichsthaler*). Nine thalers should be minted out of the Cologne mark of fine silver, and these thalers should circulate at 24 groats or 68 kreuzers.

(c) With the dissolution of the Holy Roman Empire of German Nations in 1806 (*Reichsdeputationshauptschluss*), monetary policy reverted back to the state of the medieval regional currency unions. The difference now was that the number of separate territories in 'Germany' was reduced to 35 plus four former imperial cities. There remained in the German lands more than eight separate currency systems and monetary zones. Coin use retained a distinctly regionalized character, albeit certainly less 'chaotic' than in the pre-1806 era.[31] Only from the time of political unification (1871) and the subsequent standardization of the currency in 1873 there emerged a truly integrated monetary landscape in Germany. The German *Mark Reichswährung* of 1871/3 was based on gold, and issued in nominals at 20, 10, 5, 2, and 1 *Mark*, and 50, 20, 10, 5, 2 und 1 *Pfennig*. The 10 and 20 *Reichsmark* pieces contained gold to their full-bodied value. The remaining coins circulated with precious metal content significantly below face value, thus containing a partly chartalist or fiduciary element. At around the same time the German economy began to catch up with the English and American economy, becoming one of the larger industrial nations of the world.

[31] *Sprenger*, Geldgeschichte, ch. 9.

2. *Problems of Coordination After 1500*

Territories organized in each imperial circle (*Reichskreis*) after 1500 were expected to follow a harmonized monetary policy, i.e. use a common monetary standard including common coin denomination and types with common weights and fineness of coins, as well as agreements limiting mint output to a certain range of specified mints (*Kreismünzstätte*) for each Imperial Circle.[32] There is some indication that the degree of cooperation indeed increased somewhat over the sixteenth century, as is suggested by the documentary evidence of a growing number of meetings of administrative actors on the imperial circle level which numbered, for the Franconian, Bavarian and Swabian circles, 44 meetings during the sixteenth, and 78 meetings during the seventeenth century. Some historians have interpreted this as evidence of an increasing degree of monetary integration.[33] The question, of course is, to what extent these meetings and conventions were *successful* in terms of achieving what they meant to achieve, i.e. a higher degree of monetary coordination between the economies included in such agreements, marked by a reduced variance of coin exchange rates of the currencies that circulated between and within the imperial circles. There is convincing evidence to the contrary; apparently the *Reichskreise* neither increased the degree of monetary integration nor monetary stability. Throughout the sixteenth and seventeenth centuries, coin exchange rates remained, at least within the small change sector (to which we may count the groschen segment, thus M0' plus M0''), principally negotiable and subject to wide inter- and intra-annual variation around the target rates set by the governments.

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[32] *Hartmann,* Peter Claus, 'Regionen in der Frühen Neuzeit – Modell für ein Europa der Regionen. Einführung in die Thematik und Problematik des Kolloquiums', in: Id. (ed.), Regionen in der frühen Neuzeit. Reichskreise im deutschen Raum, Provinzen in Frankreich, Regionen unter polnischer Oberhoheit: ein Vergleich ihrer Strukturen, Funktionen und ihrer Bedeutung (Berlin, 1994), 9–20, *Dotzauer,* Winfried, Die deutschen Reichskreise (1383–1806). Geschichte und Aktenedition (Stuttgart, 1998), or *Nicklas,* Thomas, Macht oder Recht. Frühneuzeitliche Politik im obersächsischen Reichskreis (Stuttgart, 2002).

[33] A useful recent survey is in *North,* Michael, 'Das Reich als Wirtschaftsraum in Europa', in: Schilling, H./Heun, W./Götzmann, J., (eds.), Heiliges Römisches Reich Deutscher Nation 962 bis 1806. Altes Reich und Neue Staaten 1495 bis 1806. Essayband zur 29. Ausstellung des Europarats im Deutschen Historischen Museum Berlin (Dresden, 2006), 158–170, and *North,* Michael, 'Geld- und Ordnungspolitik im Alten Reich', in: Amend-Traut, A.,/Cordes A.,/Sellert, W., (eds.), Geld, Handel, Wirtschaft. Höchste Gerichte im Alten Reich als Spruchkörper und Institution (Berlin, 2013), 99–101.

From the 1570s onwards, when meetings on the level of the imperial circles (*Kreistage*, *Kreismünztage*) became increasingly regular, reports on the lack of coordination and a failure to achieve a common standard in the small change segment increased. Such reports had been ubiquitous more than 100 years before, when the imperial circles had not yet existed.[34] A few examples may suffice. A recess of the Franconian Imperial Circle dated February 1564 complains, in §3, about the 'ubiquitary monetary chaos' (*dieweil sich der Muentz halben allerley Unordnung und Unrichtigkeit befindet*[35]); the June recess of the same year (same circle) identified the problem of 'evil coins' (*böse muntz*), including forged and debased or bad small change coins.[36] A recess from the following year reminded the actors to issue printed lists and surveys of such 'bad' coins circulating within the Franconian imperial circle, so as to make the public aware of the problem and reduce the damage done to the economy by bad money.[37] A *Probierordnung*[38] of the Lower Saxonian imperial circle (1566) spoke of the *agio* or premium (*Aufwechsel*) charged on payments made in bad coin. If too many bad coins were in circulation the merchants and financiers would increase the exchange rate of small coins against full-bodied large coins beyond the legal targets set by government edicts. It was suggested that the princes and states should stop minting small change coins so as to prevent the good or high-value coins from appreciating against the small change coins.[39] This was part of the general phenomenon christened by *Cipolla* the 'big problem of small change', not only in the Holy Roman Empire (Germany): it was European-wide.[40] The same complaints were heard in Franconia in February

[34] *Rössner*, Deflation – Devaluation – Rebellion, ch. IV for a detailed discussion of discourses on 'bad' money around 1500.

[35] *Moser,* Friderich Carl, Sammlung des Heil. Römischen Reichs sämtlicher Crays=Abschiede und anderer Schlüsse, nebst vilen darzu gehoerigen Beylagen, auch mit Summarien, Marginalien und Anmerckungen versehen und grossen Theils erstmals an das Licht gestellt von *Moser,* Friderich Carl, Hochgräfl. Reuß=Plauischen Secretario, Ersther Theil (Leipzig/Ebersdorff im Vogtland, 1747), 381s.

[36] *Moser* I, 332s.

[37] *Moser* I, 344s, 380s.

[38] Official schedule to be followed in the assaying and rating of coins, in which coin exchange rates were fixed by a convention of experts after an extensive sample testing of available coins that circulated within the respective imperial circle.

[39] *Moser* I, 517s.

[40] *Cipolla,* Carlo M., Money, Prices and Civilization in the Mediterranean World. Fifth to Seventeenth Century (New York, 1967); *Sargent/Velde*, Big Problem of Small Change.

1571[41], in January 1572[42], May 1572[43], July 1572[44]; in the Upper Saxon Imperial Circle in September 1588[45], September 1592, and again September 1593 in a common resolution of the Franconian, Swabian and Bavarian Imperial Circles[46]; in August 1593 in a recess of the Franconian Circle (September/October 1593)[47]; in the Lower Saxonian Circle in 1595[48], and in the Westphalian Imperial Circle in 1599.[49]

Two recesses of the Upper Saxonian Circle in 1595 (October) and 1596 (March) highlighted the negative effects underweight small change coins had on general welfare, the level of economic activity (as well as, curiously enough, the Emperor's prestige).[50] This sample of complaints could be multiplied at will by a more complete evaluation of the available documentary evidence. Such complaints had been on the public agenda since the 1470s. They continued into the nineteenth century.[51] Whilst the 'high' or full-bodied coins such as gulden and silver florins (*M*0) witnessed some degree of monetary integration since the fourteenth century, the small and medium change segment (*M*0', *M*0'') of the monetary landscape remained far from integrated prior to 1871/3.

IV. Debasement and a Fragmented Monetary Landscape

1. Long-run Debasement – The Standard Model

Arguably one of the best models explaining coin debasement and the long-run transformation of the German monetary landscape from a metallist to a chartalist or fiduciary monetary system between c.1400 and 1900 A.D. can be found in *Schremmer* and *Streb* (1999).[52] According to this model, which is differentiated into a macroeconomic (state, governance) and a microeconomic component (actors on the financial market),

[41] *Moser* II, 109.
[42] *Moser* II, 161s.
[43] *Moser* II, 213.
[44] *Moser* II, 235.
[45] *Moser* II, 410s.
[46] *Moser* II, 497s (1592), 509s (1593).
[47] *Moser* II, 513s.
[48] *Moser* III, 121.
[49] *Moser* III, 292s.
[50] *Moser* III, 159s (1595), 221 (1596).
[51] *Rössner*, Deflation – Devaluation – Rebellion, 58.
[52] *Schremmer/Streb*, 'Revolution oder Evolution?'

per capita silver supplies faced a protracted decline in the long run (c.1350–1900 A.D.), as, apparently, population and total economic activity in the German lands outstripped monetary growth. Within an economy and society that grew in terms of numbers (population), market participation (share of subsistence sector declining over time), as well as frequency of goods changing hands within the economy increasing, silver supplies that grew at lower rates than total economic activity must have led to 'persistent deflationary pressure'[53]. As price stability would have been the rulers' aim, a claim that is not backed up by direct evidence in the model[54], but which can be easily corroborated by studying economic discourse and political economy pamphlets since the 1300s[55], it follows that, given an ever-increasing silver price over time, which had a persistent deflationary impact on the general price level, price stability could only be achieved by a persistent downwards adjustment of coins' precious metal content over time, so as to avoid deflation in real terms, measured in terms of grams of silver used in the circulating coins. Nominal price level stability was thus achieved at the price of monetary instability or deflation in real terms, as the circulating currencies became progressively debased.[56]

The microeconomic component of the model stresses that minting, i.e. the production of money, was a business. Mint masters were profit-orientated private entrepreneurs. The public brought silver to the mint, where the mint masters would transform it into current money according to a mint price (Ger. *Münzfuß*) set by the ruler or 'state'. This mint price stipulated how many coins of a given denomination should be struck from a given unit of weight of precious metal. Naturally, coins would contain

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[53] *Schremmer/Streb*, 'Revolution oder Evolution?', 458.

[54] *Schremmer/Streb*, 'Revolution oder Evolution?', 459 state (without providing references) that 'In der Zeit der Münzgeldsysteme wurde Preisniveaustabilität von den Marktteilnehmern erwartet und erwünscht. Insbesondere in der feudal-merkantilistischen Wirtschafts- und Gesellschaftsordnung, in der monetäre ebenso wie nichtmonetäre Zahlungsverpflichtungen langfristig oder "auf ewig" fixiert waren, wären Gläubiger dieser Zahlungen durch inflationäre Entwicklungen, Schuldner durch deflationäre Entwicklungen geschädigt worden.'

[55] Monetary theorists since the time of Oresmius, or *Biel,* Gabriel (d.1495) up to German Cameralists such as *von Seckendorff,* Veit Ludwig or *Gottlob Justi,* Johann had developed detailed arguments why coins should always contain a stable intrinsic value and why price level changes would hamper economic life. See detailed discussion in *Rössner*, Deflation – Devaluation – Rebellion, 530–547.

[56] *Schremmer/Streb*, 'Revolution oder Evolution?', 460: 'Die Feingewichtsverringerungen wirkten der Deflation bezogen auf die Preise in Nennwerten entgegen, doch die Deflation bezogen auf die Preise gemessen in Gewichtseinheiten Edelmetall musste hingenommen werden'.

less silver and gold than they would be worth nominally. Brassage (minting costs) and seigniorage (princely prerogative of minting) would have to be deduced, so as to allow a profit for the mint master and a 'tax' for the ruler. It is obvious that whenever silver's price increased, coins would have to be reduced in weight, so as to keep minting profitable.[57] As the silver price was more or less continuously increasing in Europe c. 1400–1700 A.D. it follows almost automatically that, whenever a new round of monetary production (mint output) was called, the mint price (*Münzfuß*) had to be increased. The currency thus became debased. Thus both the macroeconomic, as well as the microeconomic components of the model worked in the same direction. They are centred on the silver price as the independent variable predicting both the micro- as well as the macroeconomic outcomes of the model.

However, several modifications need to be made in the light of recent research. They underline that the monetary history of Germany or Europe cannot be captured accurately by general or catch-all models, or models that focus exclusively on the monetary economics of minting.

2. Towards a New Model: Possible Strategies

Only a select range of the more significant problem fields can be discussed at present, if very briefly, without presenting an alternative model that could claim to be in any way complete. The following points will rather highlight open questions and directions for future research. Numismatists as well as most monetary historians and theorists have in the past either asked the wrong questions; or used modern models that are unfitting for the pre-modern monetary landscape, or – including the present author – formulated 'stepping stones' rather than unified models.

(1) The analytical 'trick' of reducing historical price series given in nominal currency units to their silver weight by dividing them by the imputed 'silver content' of the circulating coins is untenable from the methodological viewpoint. It is still a rather popular method amongst historians studying economic fluctuations or price and wage data, particular in global Asia-Europe comparisons.[58] It rests on two false assumptions. The

[57] E.g. *Sussman,* Nathan, 'Debasements, Royal Revenues, and Inflation in France During the Hundred Years' War, 1415–1422,' The Journal of Economic History, 53.1 (1993), 44–70.

[58] E.g. *Allen,* Robert C., 'The Great Divergence in European Wages and Prices from the Middle Ages to the First World War', Explorations in Economic History,

first is that there was a uniform and identical estimation of silver across space and time. As studies by *Volckart* and others have shown, however, even within Europe financial markets were not fully integrated, with gold-silver-ratios fluctuating widely across time and over space.[59] In the global context the exercise becomes even more meaningless. In China for instance one ounce of silver was worth twice as much as in Europe.[60] Thus silver was a completely different commodity in the monetary, economic and cultural landscape of Asia. Comparing global series of 'deflated' silver price and wage series does not yield particularly meaningful results. The second false assumption is that the monetary stock used for payment would always have been homogenous, and that we could therefore know with certainty which type of coin was used at which place and for which transaction. But as a number of new studies have highlighted[61], even if we do have the normative documents, produced by the state, which prescribe what one local penny should contain (in terms of grams of silver) in any given year, the factual composition of the total monetary stock used for payments at any one point in time and space cannot be reconstructed with any level of certainty. Native coins circulated alongside foreign ones; usually local money represented the minority in total monetary stock, as numismatic studies have shown.[62] There were no delineated currency areas in the modern way with one specified currency as

XXXVIII (2001), 411–447; Id., 'Progress and Poverty in Early Modern Europe', Economic History Review, Second Series, LVI (2003), 403–443, and many more.

[59] E.g. *Chilosi,* David/*Volckart,* Oliver, 'Money, States, and Empire: Financial Integration and Institutional Change in Central Europe, 1400–1520', The Journal of Economic History, LXXI/3 (2011), pp. 762–791.

[60] Most recently *Flynn*, Dennis O./*Giráldez,* Arturo, 'Conceptualizing Global Economic History: The Role of Silver', in: Gömmel, Rainer/Denzel, Markus A., (eds.), Weltwirtschaft und Wirtschaftsordnung. Festschrift für Jürgen Schneider zum 65. Geburtstag (Stuttgart, 2002), 101–114.

[61] *Boldizzoni,* Francesco, The Poverty of Clio: Resurrecting Economic History (Princeton, NJ, 2011); *Rössner*: Deflation – Devaluation – Rebellion, ch. III with case studies for early sixteenth-century Saxony.

[62] E.g. *North* Michael: Geldumlauf und Wirtschaftskonjunktur im südlichen Ostseeraum an der Wende zur Neuzeit (1440–1570). Untersuchungen zur Wirtschaftsgeschichte am Beispiel des Großen Lübecker Münzschatzes, der norddeutschen Münzfunde und der schriftlichen Überlieferung (Sigmaringen, 1990); *Schüttenhelm,* Joachim, Der Geldumlauf im südwestdeutschen Raum vom Riedlinger Münzvertrag 1423 bis zur ersten Kipperzeit 1618. Eine statistische Münzfundanalyse unter Anwendung der elektronischen Datenverarbeitung (Stuttgart, 1987); *Eichhorn,* Hansheiner, Der Strukturwandel im Geldumlauf Frankens zwischen 1437 und 1610. Ein Beitrag zur Methodologie der Geldgeschichte (Wiesbaden, 1973).

legal tender. Furthermore old coins circulated alongside new ones. As we therefore do not know which type of coins were used in which transactions and whether or not these confirmed to official legislation regarding fineness and weight (i.e. the documentary evidence used to 'deflate' the nominal currency series to their imputed grams of silver content), we strictly cannot be sure about the real amounts of silver that changed hands in each transaction; wage or price series that are 'reduced' to grams of silver remain profoundly fictitious. The only viable excuse remains that there is no better method of abstraction at hand. For these reasons the present author may be excused for using this fallacious method indirectly (see 2 below) – but only for reasons of illustrating the general context between possible fluctuations in precious metal content of the currency and adjustment to such changes in terms of the overall price level – and with all due caveats and caution in mind.

(2) If we do, then, study available grain price data for south German markets, usually grain and bread prices quoted in local small change currencies, comparing nominal prices (no corrections made for changing silver weight of the coins) with the officially documented silver content of the circulating local currency (currency edicts), assuming economically rational behaviour, i.e. that financial markets adjusted 'coin exchange rates' to changes in the locally-stipulated minting standards (with all due caution, see point 1), it seems as though virtually all debasements, especially the more notable ones of the 1520s, 1619–23, the years around 1660 or 1680, or the Seven Years War (1756–1763), were either accompanied or followed with only a slight time lag (of a few years) by some nominal inflation (Fig. 3). This finding is in line with evidence from other European countries.[63] Obviously economic actors adjusted their individual estimation of the debased coins to changes in their silver weight, as soon as the debasement became known to the wider public (Figure 3).

If it really had been the rulers' goal to achieve nominal price level stability by a downwards adjustment of the silver content of circulating coins to an increase in silver's price, it is striking how unsuccessful they seem to have been in achieving this goal. Only in the very long run some stability seems to have been achieved. The price data suggest that the loss in terms of precious metal content in the south German penny currencies in the order of 62 per cent between 1500 and 1800 (as displayed

[63] *Sargent/Velde*, Big Problem of Small Change, passim.

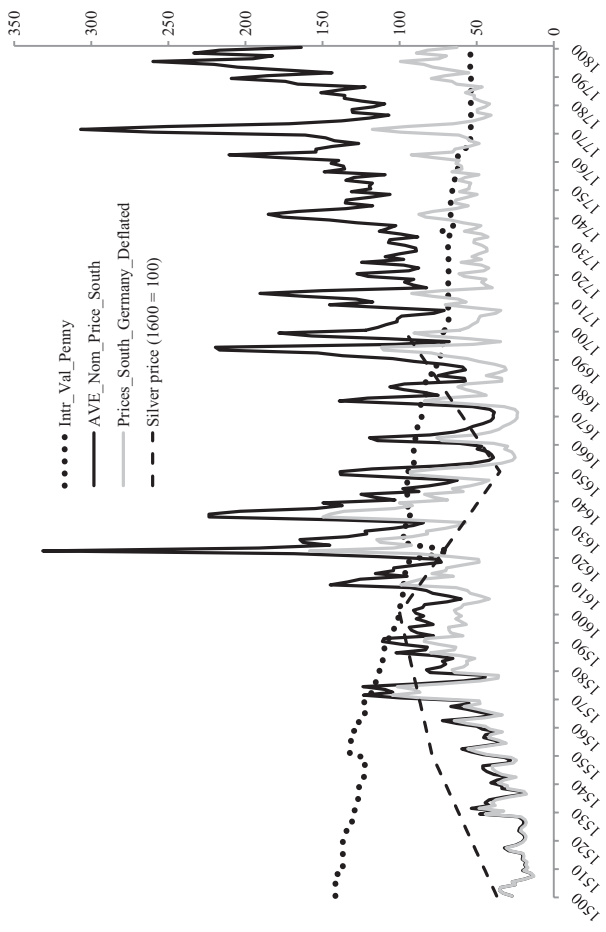

Figure 3: Development of the Intrinsic Value (Fineness of Coins) of (South) German Currencies, 1400–1800 A.D. (1600 = 100)

Places covered: Augsburg, Frankfurt-on-the-Main, Leipzig, Speyer, Munich, Würzburg. Sources: Currency: Allen-Unger-database http://www.history.ubc.ca/faculty/unger/ECPdb/data.html, corrected by data in Metz, Geld, Währung und Preisentwicklung. Tables and passim. Grain prices taken from series presented on http://www.gesis.org/histat/de/data/themes/5. Original source: Thomas Rahlf, Thomas, Getreide in der Sozial und Wirtschaftsgeschichte vom 16. bis 18. Jahrhundert. Das Beispiel Köln im regionalen Vergleich (Trier 1996); Moritz John Elsas, Umriss einer Geschichte der Preise und Löhne in Deutschland. Vom ausgehenden Mittelalter bis zum Beginn des 19. Jahrhunderts. Vol. 1 (Leiden, 1936); Vol. 2A (Leiden, 1940); Vol. 2B (Leiden, 1949); Hans-Jürgen Gerhard/Karl Heinrich Kaufhold (eds.), Preise im vor- und frühindustriellen Deutschland. Grundnahrungsmittel (Göttingen, 1990); Auguste Charles Hanauer, Études économiques sur l'Alsace ancienne et moderne, Vol. 2 (Paris/Strasbourg, 1876/78).

in Fig. 3) smoothed out the general price level trend which in nominal terms rose eightfold between 1507 and 1779 (two troughs in the deflated price series), but only tripled if 'deflated' by imputed silver contents (Figure 3).

(3) Germany's monetary history exhibits some marked fluctuations over time, with significant changes in pattern and rhythm, which make each period idiosyncratic. This should warn us not to devise either long-run or general-purpose models but ones that should be time-space specific. First, there was marked short term variation in the rates of debasement. Whilst in the long run the German penny currencies lost about 90 per cent of their silver content (1400–1900 A.D.), there were marked bouts of coin debasement, when devaluation rates were significantly above average (there were revaluations or 'enhancements' of the currency also, but much less frequently). Such periods were the first three decades of the sixteenth century, a period that has recently been studied in detail as a deflationary depression[64]; or between 1590–1620, culminating in the big 'Kipper-and-Wipper-Inflation 1619–23[65]; or between 1660 and 1690 (Wars against the Turks; 'Second Kipper Inflation'). These were times when the short-run price level for silver was significantly above the (likewise increasing) long-term trend increase in silver's price. At these times there usually also was a net outflow of silver due to a negative balance of payments of central Europe with the Baltic, south-east Europe as well as Asia.[66]

(4) Long-term variation in the rate of small change debasement was also considerable. Debasement was particularly high during the fifteenth century, when the circulating south German currencies lost 50 per cent of their silver content.[67] The cumulative rate of debasement for the sixteenth, seventeenth and eighteenth centuries on the other hand was

[64] *Rössner,* Deflation – Devaluation – Rebellion, 126–251.

[65] Most recently, *Paas,* Martha White/*Paas*, John Roger/*Schofield*, George C.: Kipper Und Wipper Inflation, 1619–23 – An Economic History with Contemporary German Broadsheets (Yale, 2012), 1–17. For the 'second Kipperzeit', see e.g. Gerhard, 'Neue Erkenntnisse'.

[66] For the first three decades of the sixteenth century, see *Rössner*, Deflation – Devaluation – Rebellion, 251–310; for a most recent calculation of silver flows and outflows of silver, see *Pfister*, Ulrich, 'Silber', in: Jaeger, Friedrich (ed.), Enzyklopädie der Neuzeit, Vol. 12 (Stuttgart, 2010).

[67] Calculated from data presented in Fig. 1, based on information by Metz, Geld, Währung und Preisentwicklung, and Elsas, Umriss, as reproduced in the Allen-Unger database and corrected by the findings in Metz, Geld, Währung und Preisentwicklung, passim.

around 25 per cent per century, i.e. about half the rate of the fifteenth century. It is striking that during the fifteenth century, debasement rates were by far the highest, as this century was neither marked by significant population expansion nor by much price inflation prior to the 1470s. So between c. 1350 and 1500, actually 1530 (as the Price Revolution did not really commence prior to the 1530s) those factors predicting debasement in the 'standard model' are lacking. Population and total economic activity only began to increase after c.1470/1530, when long-term coin debasement rates became, paradoxically, much lower on average. It remains a possibility therefore, that the phenomenon of coin debasement was not primarily or exclusively linked to the fighting of inflation, but to other factors, which will be discussed now.

(5) Variation of politics and governance across space: Recent studies have highlighted that whilst over time there was an increasing trend towards financial market integration in those parts of the empire for which robust data on coin exchange rates are available[68], differing states and polities within the empire followed idiosyncratic monetary policies. *Volckart* et al. have shown convincingly that towns and 'free' imperial or largely autonomous cities governed by oligarchic institutions (city councils were often run by merchants) followed distinctly different monetary policies than territorial states that were (more) biased towards exploiting the mint for profit (seigniorage). Autonomous or quasi-independent cities were more inclined to provide a stable currency as one means of supplying inclusive economic institutions and safeguarding property rights – to which a stable and good ('hard') currency without doubt belonged.[69]

(6) Political change. Moreover, it seems as though (see point 4 above) over time German rulers seem to have become less inclined towards exploiting seigniorage (*Münzregal*) as a source of state revenue (inflation tax). Coin debasement rates declined between the late Middle Ages (50 per cent per century, 1400–1500 A.D.) and the Early Modern Period, stabilizing at a still high centennial average of 25 per cent between c. 1500 and 1900 A.D. Other means of financing government expenditure became

[68] Most recently *Chilosi,* David/*Volckart,* Oliver, 'Money, States, and Empire: Financial Integration and Institutional Change in Central Europe, 1400–1520', The Journal of Economic History, LXXI/3 (2011), 762–791.

[69] *Chilosi/Volckart*: 'Money, States and Empire'; *Volckart,* Oliver, 'Regeln, Willkür und der gute Ruf: Geldpolitik und Finanzmarkteffizienz in Deutschland, 14. bis 16. Jahrhundert', Jahrbuch für Wirtschaftsgeschichte 2009/2, 101–129.

available through direct and indirect taxation such as customs and excise duties. This process is known as the 'rise of the modern state' or 'fiscal-military state(s)', culminating in the development of inclusive (in the extreme: democratic, parliamentary) rather than exclusive economic and political institutions towards the later early modern period (but mainly in England and the Netherlands).[70] This process may explain part of the long-term variation in the rates of coin debasement. Rulers may have become aware that cooperative arrangements with their subjects marked by an improved landscape of property rights, monetary stability and more inclusive economic institutions paid off more than the exploitation of seigniorage by currency debasement (inflation tax).

(7) Financial and economic geography. It has been shown that a further distinction should be made between countries that had native silver supplies and those that did not. Larger territorial states such as Saxony had a preference for supplying a stable currency, as there were native silver supplies and silver's price was lower than elsewhere (they also depressed exports due to an over-valued currency).[71] Thus financial geography and resource endowment can be expected to co-determine part of the variation in monetary policy over time and across space.

(8) Business economics. As aptly described in *Schremmer* and *Streb* (1999) minting was a business with the price of silver (circulating capital) being the independent variable, alongside fixed capital input (mint buildings, technical equipment) and workers' wages and salaries. Under a free minting system anyone could bring as much silver as they wanted to the mint at any time and receive coins in return at a prescribed rate (*Münzfuß*, mint price). But the relative costs of minting (average piece costs) differed according to the monetary segments (M, M' and M''). Therefore the intrinsic value of coins received back from the mint differed according to the structure of demand for specific types of coin. Based on empirical case studies from Saxony, one hundred kilograms of

[70] E.g. *Reinhard,* Wolfgang, Geschichte des modernen Staates, Von den Anfängen bis zur Gegenwart (Munich, 2007); *Acemoglu,* Daron/*Robinson,* James, Why Nations Fail. The Origins of Power, Prosperity, and Poverty (London/New York, 2012); *Tilly,* Charles R., Coercion, Capital, and European States AD 990–1990 (Cambridge, [1990] 1993). *Comín Comín,* Francisco/*O'Brien,* P.-K. with Bartolomé Yun-Casalilla (eds.), The Rise of Fiscal States, A Global History, 1500–1914 (Cambridge, 2012); *Pincus* ,Steve (1688), The First Modern Revolution (New Haven, 2010), to name but some of the more recent works in the field.

[71] *Rössner,* Deflation – Devaluation – Rebellion, ch. III for a comprehensive comparison.

silver provided the opportunity to make (at the monetary relations prevailing in 1500–1542) about 1.7 million hellers, or 637,000 pennies containing between one and two grams of pure silver; but only 3,571 silver Thalers containing about 27 grams of silver. It was more cost-efficient for the mint master to strike larger and heavier full-bodied coins. Usually the minting of pennies and groats occurred at a loss (negative yield per unit).[72] We may expect rulers and mint masters to have been reluctant to strike small change coins, or else be tempted to cover losses in the small-change segment by debasing them over-proportionally.[73]

(9) Competing claims on silver, monetary, as well as non-monetary. It is also important to bear in mind that silver was a resource which was never limited to monetary purposes alone (this is something any modern advocates of metallist monetary systems should bear in mind). Seventeenth-century London goldsmiths offered a price for silver that was higher than what the public would get by bringing it to the mint (mint price).[74] The assumption that the ratio of coined money to total silver stock over time can be interpreted as a constant[75] is not backed up by the historical evidence. The share of coined to un-coined silver could – and would – vary considerably over time and space. Luther's anecdotal remarks in the 1540s describe how his wife Katharina von Bora repeatedly turned household silver into money whenever the Luther household was short of liquid funds.[76] The Luthers were wealthy and well-propertied, but obviously faced situations when liquid funds ran out, as especially in the 1530s and 1540s Martin Luther constantly hosted a whole army of enthusiastic guests at his semi-private household at Wittenberg. This re-

[72] *Munro,* John H., 'Art."Münzkosten"', in: Michael North (ed.), Von Aktie bis Zoll. Ein historisches Lexikon des Geldes (Munich, 1995), 263. *Pückert,* Wilhelm, Das Münzwesen Sachsens 1518–1545 nach handschriftlichen Quellen. Erste Abtheilung: die Zeit von 1518–1525 umfassend (Leipzig, 1862), 15–16. *Sprenger,* Bernd, 'Münzverschlechterung, Geldmengenwachstum und Bevölkerungsvermehrung als Einflußgrößen der sogenannten Preisrevolution im 16. und beginnenden 17. Jahrhundert in Deutschland', in: Kaufhold, Karl Heinrich/Riemann, Friedrich (eds.), Theorie und Empirie in Wirtschaftspolitik und Wirtschaftsgeschichte. Wilhelm Abel zum 80. Geburtstag (Göttingen, 1984), 127–144, at 132.

[73] *Rössner,* Deflation – Devaluation – Rebellion, passim, esp. ch. IV; *Sargent/Velde*, Big Problem of Small Change.

[74] *Mayhew,* N. J.: 'Silver in England, 1600–1800: Coinage Outputs and Bullion Exports from the Records of the London Tower Mint and the London Company of Goldsmiths', in: Munro (ed.), Money in the Pre-industrial World.

[75] *Schremmer/Streb*, 'Revolution oder Evolution?', rests on this assumption.

[76] *Treu,* Martin (ed.): Martin Luther und das Geld. Aus Luthers Schriften, Briefen und Tischreden (Lutherstadt Wittenberg, 2000).

minds us that during the early modern period the boundaries between silver as a non-monetary commodity and silver as 'money' were liquid. The ratio between monetized, de-monetized and re-monetized silver stocks was constantly changing and certainly a dependent variable rather than a constant.

(10) Financial Sociology. 'Free minting' (see above) means that both the composition as well as total amount of the monetary stock (*M* plus *M*' plus *M*'') was determined by the actors who brought silver into the mint. It was in turn dependent upon the size, scale and nature of transactions to be carried out with the 'new' coins. Future case studies on the social class of actors who supplied the mint, their specific economic interests and business networks would be desirable so as to shed closer light on the composition of mint output as a key variable of monetary policy issues. In the light of the preceding remarks one may expect for instance that mint output showed a general preference towards full-bodied coins. Existing runs of production statistics from Saxony (large state; main silver supplier in Europe) between 1560 and 1600 A.D. seem to confirm this hypothesis. Between 1572 and 1583 about 4.8 million Thaler coins and 589,000 pennies (equalling 2,046 Thalers at nominal coin exchange rates) were struck (but no hellers whatsoever). Between 1588 and 1598 4 million Thalers were struck and 1.5 million pennies (and 231,552 heller coins).[77] Less than one thousandth of total mint output in value terms went into the production of heller coins. There was a clear bias towards large denomination coin output both in volume as well as in value terms. However at the same time certain smaller territories without native silver supplies, such as the County of Nassau-Wiesbaden-Idstein seem to have had a preference towards striking (undervalue) *pennies* – for reasons that are as yet elusive.[78] These random examples demonstrate that the private sector interests played a role, when it came to the determination of the size as well as composition of mint output, together with aspects such as general politics, financial geography as well as financial sociology and business administration, which all need due attention in future studies and models.

(11) Variations of aggregate velocity over time. In the model suggested by *Schremmer* and *Streb* money's velocity of circulation is, for reasons of convenience, assumed to have been a constant in the long run, chiefly be-

[77] *Rössner*, paper in preparation (2014).

[78] *Schneider*, Konrad, Geld im Taunus: Münzprägung und Geldumlauf (Höhr-Grenzhausen, 2002).

cause studies on velocity of early modern money are both rare and contradictory.[79] New studies, however[80], suggest that this assumption deserves a re-evaluation. If we rearrange the simple Fisher equation

(1) $$MV = PT$$

solving for V, we get

(2) $$V = PT/M$$

Since neither M nor T carry any meaning in terms of measurable quantities for pre-industrial Germany, it has been notoriously difficult to calculate velocity (V). But there is an alternative at hand. The micro-economic model developed by the so-called Cambridge School of Economics in the 1920s and 1930s (*Pigou*, also *Keynes*), replaces velocity with its inverse, which is demand for money to hold (k):

(3) $$V = 1/k$$

Accordingly

(4) $$k = 1/V.$$

The following table gives the number of coin hoards ($\sim k = 1/V$) buried in Germany between 1400 and 1600 A.D.

Obviously the data on coin hoards represent only a sample of the total number of hoards buried in the German lands over time. It is only one possible way of estimating the trend in V over time, provided the data are reliable enough and statistically significant. Some hoards have remained either undetected by hobby archaeologists, or unreported to the authorities. Moreover, many hoards will have been unearthed and re-monetized by those who dug them into the soil originally. They will thus never ap-

[79] *Pieper/North*, as quoted in *Schremmer/Streb*, 'Revolution oder Evolution?'; on V as a historical variable, see also *Mayhew,* N. J.: 'Money Supply, and the Velocity of Circulation in England, 1300–1700', Economic History Review, Second Series, XLVIII (1995), 238–257; *Miskimin*, Harry A., 'Not Sterling: A Comment on Mayhew's Velocity', Economic History Review, Second Series, XLIX (1996), 358–60; *Mayhew,* N. J.: 'Not Sterling: A Reply to Prof. Miskimin', in: Economic History Review, Second Series, XLIX (1996), 361; *Goldstone,* Jack A.: 'Lessons from the English Price Revolution of the Sixteenth and Seventeenth Centuries', The American Journal of Sociology, LXXXIX (1984), 1122–1160.

[80] *Rössner*, Deflation – Devaluation – Rebellion, 190–204.

Table 2

Number of Coin Hoards Deposited in Germany Each Decade (Dating According to Most Recent Datable Coin Within Each Hoard)

1400–1409	644
1410–1419	446
1420–1429	462
1430–1439	420
1440–1449	428
1450–1459	484
1460–1469	416
1470–1479	404
1480–1489	401
1490–1499	423
1500–1509	584
1510–1519	380
1520–1529	425
1530–1539	383
1540–1549	402
1550–1559	385
1560–1569	345
1570–1579	351
1580–1589	341
1590–1599	379

Source: Rössner, Deflation – Devaluation – Rebellion, 99, Fig. II.1. See also discussion of the materials there.

pear as a hoard in the historical and archaeological record. The data in Table 2, however, suggest we should re-think the assumption that V can be safely assumed to have been a constant. And this is bound to have an effect on any model studying the interaction between the variables 'silver price', '(nominal) monetary output', as well as 'price level trend'. Whilst over time (here: 1400–1600 A.D.) the number of coin hoards de-

clined ($k\downarrow$ and therefore $1/k = V\uparrow$), which is in line with the monetarist model of the early modern 'Price Revolution' (1470–1620) suggesting that M and V increased simultaneously, it is striking that the short term variation was also considerable. The first decade of the sixteenth century for instance (the time immediately preceding Martin Luther's 95 theses) was a time when the level of hoarding (and thus k) was significantly above the long-term average, i.e. increased (velocity reduced) vis-à-vis a trend line that was downward sloping ($y = -8.0444x + 509.62$ for the data on k in Table 2). In other words velocity exhibited considerable variation over time, but most likely increased in the very long run.

(12) Segment-specific velocities. Most standard models do not usually differentiate velocity according to different coin types or monetary segments. It can be empirically shown, however, that small change coins devalued much faster than full-bodied coins. This process is known as spontaneous debasement or, colloquially 'Gresham's Law' (Sir Thomas *Gresham*, 1519–1571, was neither its inventor, nor was this 'law' discovered in the sixteenth century; it had been known since the fourteenth century at latest). Gresham's Law is a process where the good money drives out the bad, as a result of different monetary segment-specific velocities.[81] Let $M0$ be the available amount of 'good' or full-bodied gold and silver coins in circulation (e.g. Rhenish Florin, Hungarian Ducat and foreign gold coins), $M0'$ the amount of medium-sized coins such as groats and batzen (coins that were nearly full-bodied but contained some copper or other base metal, i.e. a fiduciary component), and $M0''$ the amount of debased or underweight small change that consisted mainly of copper and other base metals and whose exchange value significantly exceeded these coins' intrinsic value. Let V be the velocity, or frequency with which the full-bodied coins changed hands, V' the equivalent for medium-sized denominations, and V'' the velocity for small change. Then the simple Fisher equation (1) can be re-written as

$$MV + M'V' + M''V'' = PT. \tag{5}$$

[81] E.g. *Munro,* John H., 'Precious Metals and the Price Revolution Reconsidered, The Conjuncture of Monetary and Real Forces in the European Inflation of the Early to Mid-16th Century', in: Flynn, Dennis O./Morineau, Michel/von Glahn, Richard (eds.), Monetary History in Global Perspective, 1500–1808/ L'histoire monétaire: une perspective globale, 1500–1808/Historia monetaria: una perspectiva global, 1500–1808 (Seville, 1998), 35–51, at 47. Cf. *Latimer,* Paul: 'The English Inflation of 1180–1220 Reconsidered', Past & Present, CLXXI (2001), 3–29, at 25.

The empirical historical evidence[82] suggests that

(6) $$V < V' < V''$$

'Gresham's Law' (equation 6) explains quite well why even at times of monetary contraction, measured in terms of available silver resources (g/kg Ag) per capita of the population, debasement may be followed by nominal price inflation within the small-change sector of the economy (see Fig. 3). As people were sceptical towards the debased coins' ability to safeguard basic monetary functions, such as storing and expressing value reliably over time, they would try to get rid of them more quickly than of the better or older coins (which contained more silver). Debased coins circulated more quickly. This result is in line with empirical findings by Sprenger, who found that during the 'Price Revolution' (1470–1620) the price level for a given basket of consumables increased about three times as fast when expressed in pennies compared to prices quoted in florins.[83] Therefore, a focus on full-bodied coins, or else a model that does not differentiate according to different types of coins (M, M', M'') and different segment-specific velocities (V, V', V'') may not accurately capture the monetary and social dynamics of pre-industrial currency systems.

The preceding list of points could certainly be extended by further differentiation. Whilst the Schremmer-Streb-model still provides the best analytical starting point, it must be considerably modified and extended by factors discussed above, as well as possible modifications in future studies.

Other European countries witnessed debasement rates that were similar to the German currencies in the Early Modern period, suggesting that the monetary problems were similar elsewhere. The Castilian small change currency (Maravedí) lost 89 per cent of its fine weight between 1390 and 1700. The Florentine currency was debased by 46 per cent 1400–1800. The Venetian small change lost 59 per cent 1400–1800. The French denier was debased by 85 per cent (1400–1800). In Flanders the

[82] See works referred to in previous note.

[83] *Sprenger,* Bernd, 'Preisindizes unter Berücksichtigung verschiedener Münzsorten als Bezugsgrößen für das 16. und 17. Jahrhundert – dargestellt anhand von Getreidepreisen in Frankfurt/Main', Scripta Mercaturae, 1 (1977), 57–69; Id. 'Münzverschlechterung, Geldmengenwachstum und Bevölkerungsvermehrung als Einflußgrößen der sogenannten Preisrevolution im 16. und beginnenden 17. Jahrhundert in Deutschland', in: Kaufhold, Karl Heinrich/Riemann, Friedrich (eds.), Theorie und Empirie in Wirtschaftspolitik und Wirtschaftsgeschichte. Wilhelm Abel zum 80. Geburtstag (Göttingen, 1984), 127–144.

debasement between 1400 and 1713 amounted to a 77 per cent loss in the intrinsic weight of the local penny and mite (heller) currencies.[84] One last modification of a general model of the history of money in the German lands c.1400–1900 must be made before a brief conclusion will summarize.

V. Economic and Social Costs of Coin Debasement

Assume that there is a plethora of coins that all bear similar names and carry similar denominations, i.e. a penny or groat, and that they are all meant to exchange at face value. A penny's a penny, a groat is a groat. Now assume that these coins are minted by different monetary authorities. Remember that there are about 500 open mints, and that money travels across borders (there are no specifically delineated areas of circulation for one particular currency). The public (financial market), acting rationally within the general framework given by a metallist monetary standard, will try to rate these coins at their market, not their face value (i.e. the official coin exchange rate set by the government). What will happen? In order to get a tentative answer we may take a look at a select range of historical examples. To what extent these are representative is another matter; but the source coverage for the pre-industrial time is thin compared to the nineteenth and twentieth centuries. Still, the examples used in the following, which have been examined in greater detail in a larger study[85], give away some of the central problems in early modern economic exchange.

In 1514 the peasants of Elchesheim and Steinmauern in the Margraviate of Baden complained that they had to pay the yearly tax (Bede) in full-bodied gulden coins. Whenever the sums due were below the value of one gulden, or else the peasants did not have gulden coins at hand, the authorities would charge them an agio or premium on the official coin exchange rate between the florin and the groschen/batzen.[86] Exchange

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[84] *Sargent/Velde*, Big Problem of Small Change, 16, Fig. 2.1. I am indebted to François Velde for providing the data in an excel table via email attachment.

[85] *Rössner*: Deflation – Devaluation – Rebellion, ch. V.

[86] The original reads: So wyr armen zu gwonlichen zytten vwern gnadenn dye Järlich Bethen vßrechtten vnnd darvmb bezalung thon sollenn, wollen dye Amptlute von vnns Armen, ab Sychwol zu zytten dye Sum, so eyn Armer gebenn muß, nitt vff eyn guldynn lauft, Goltt habenn vnnd vermeynen dye gwonlich, landtleuffig Muntz, von vwern gnaden geschlagenn, von vnns nytt anzunemen, dardurch wyr oft vnnd vil vmb dye wege gezogenn vnnd gemuwet werdenn, vnns vmb Goltt

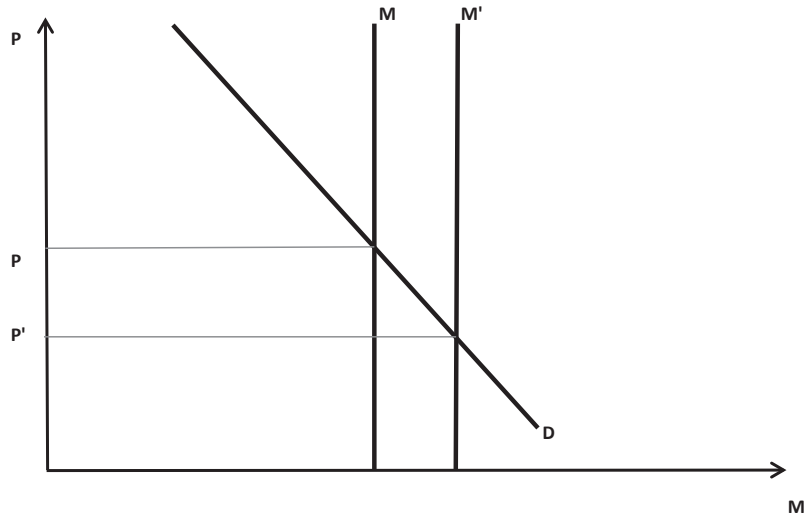


Figure 4: Schematic Representation of Coin Exchange Rate Formation

rates were formed according to the laws of supply and demand. Neither the Margraves of Baden nor anyone else could control the amount of money and different types of coins in circulation. This can be illustrated using historical evidence from sixteenth-century Saxony:

Let *P* represent the target exchange rate of the Saxon groat against the Rhenish florin, i.e. the rate fixed in the official ordinances and edicts, which was 21 groats to the florin until the 1540s; later on 24:1, the official 'Reichsthaler' relation (see above). Now assume that a larger-than-desired quantity of non-Saxon underweight groats is coming into circulation within the Saxon economy, due for instance to an import of debased groats from Brandenburg to be used for payment on the Leipzig fairs or other markets (this arbitrage operation by foreign merchants was fre-

zu bewerbenn, Hiemytt das vnßer versumen vnnd verzeren musßen. Dye will nu gnediger Herr, wyr Armen zu vnnßerm wyllen nytt allwegenn goltt vberkommen mogen, vnnd dan auch nach vermoge vwer gnadenn landßordnung den Wechßel berurende vnns by schwerer straff verboten wyrdt, vff dheynen Guldyn ychtts vffzugebenn etc., So ist vnnßer flyssig bytte, v.f. g. wolle ynbezalungen vwergnaden Bethen vnnd zynßen von vnns Armen derselbenn vwergnadenn vnnd derglichen Muntzen gnediglich thonn empfahenn vnnd annemen, as quoted in: *Kattermann,* W.: 'Bäuerliche Beschwerden in der Markgrafschaft Baden und dem Bühler Armen Konrad von 1514', Zeitschrift für Geschichte des Oberrheins 95 (1943), 110–205, at 147.

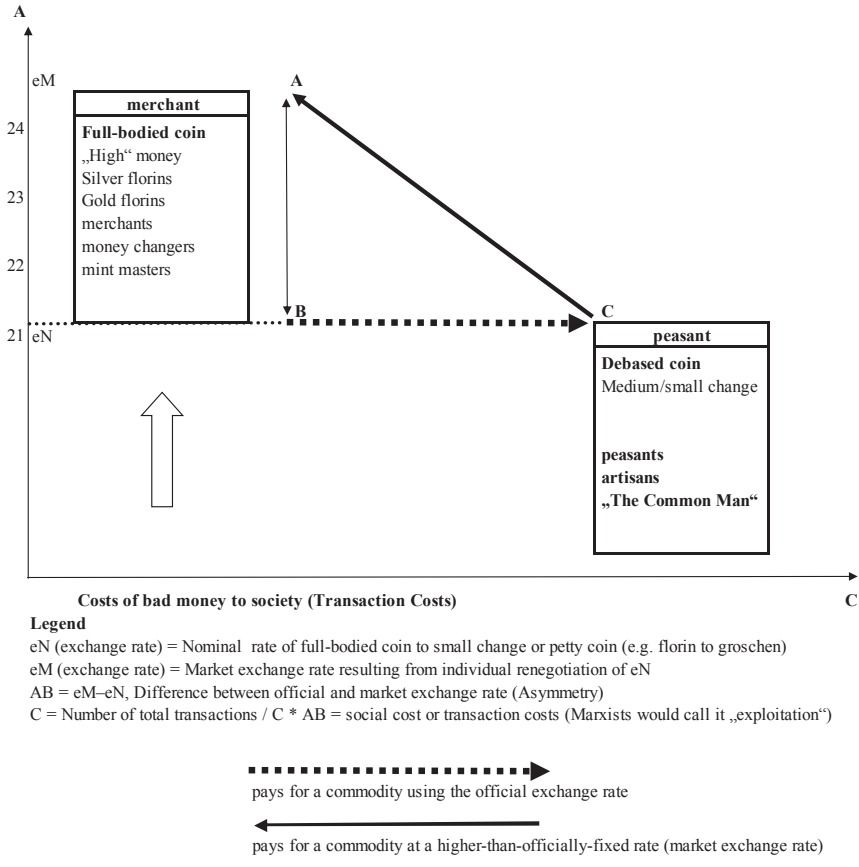
quently complained about in the early sixteenth century[87]). This will increase the total supply of groats, both native and foreign, over demand ($M \rightarrow M'$), driving down the spot exchange rate of the groat from P to P', leading to a depreciation of groats in terms of Rhenish florins (say 22, 23 or 24 groats to the florin or thaler). Spontaneous debasement ('Gresham's Law') will decrease the purchasing power of all types of groats, as payments will usually be made from a mix of native and foreign, old and new coins, the precise intrinsic value of which we cannot determine. The taker of the sample of coins handed over will either have to accept them at face value, or – if she acts economically rationally – accept them at a discount due to the inherent risk these coins bear in terms of reduced utility as a means of storing of wealth (and dubious means of payment also). Actors may be expected to charge an agio or premium, which is the difference in the factual vs. nominal coin exchange rate in this transaction.

In the same parts of southern Germany complaints had been heard since the 1470s by the raftsmen (Flößer) on the upper Rhine who were paid for their rafting services at the official coin exchange rate of 24 white pennies (Albus groats) to the florin. This was the rate stipulated in the official ordinances. But whenever the peasants paid taxes their reeves and other officials would frequently refuse to accept white pennies (albi) at the official rate, driving the exchange rate of the full-bodied florin or gulden up to 27 albi or white pennies (three albi more than stipulated in the currency ordinances as the 'legal' or target exchange rate).[88] Even Goethe, in his several positions as high-ranking official in the service of the Duke of Saxony-Weimar-Eisenach in the later eighteenth century, made similar remarks that the state was in no obligation to accept small change currency (which the state itself had produced in the first instance!) at face value when it came to tax payments.[89] The peasants on

[87] *Rössner*, Deflation – Devaluation – Rebellion, ch. III.

[88] "So wurd ich ouch bericht, wiewol etlich arm lut im Murgental und andern enden ir holtz und anders in die herschafften Baden und Eberstein umb gold verkoffen, wann sy dann bezalung haben wellen, muessen sy nyemen fur ain guldin vierundzwaintzig wisspfenning oder mangeln, und verkoffen doch dieselben schiffherren das holtz an den Rin ouch umb gold und nyemen dann fur ainen guldin sechs- oder subenundzwaintzig wisspfenning, damit sy das gold verlaussen und wisspfenning nyemen und des also gewin haben den andern zuo beschwaerd, den sy die billich gaeben als synaemen; dadurch dann das gold ouch nit zuoland komm," quoted in *Günter,* Heinrich, Das Münzwesen in der Grafschaft Württemberg (Stuttgart, 1897), 40, n. 1.

[89] I am indebted to Bertram Schefold (Frankfurt-on-the-Main) for this reference to Goethe.



Source: Rössner: Deflation – Devaluation – Rebellion, 48 (Fig. 2).

Figure 5: Asymmetrical Exchange Scenarios Due to Differential Cash Structure Held by Different Social Classes

the other hand, as well as anyone else holding 'bad' coins, viewed this premium or agio (or auffgeld, as it was usually called in contemporary documents) as a form of undue extraction or economic rent (Fig. 2).

It is likewise obvious that whenever such transactions took place avoiding the legal or target exchange rate, e.g. of 21 groats to the florin in central Germany, or 24 albi to the florin in the southwest, transaction costs increased due to the enhanced (coin) exchange rate and increasing degree of haggling, bargaining and re-negotiating of individual exchange relations between the different coins. People incurred extra information and transaction costs when checking coins or else trying to obtain good

money. As there always was a certain level of indeterminacy about exchange rates for small-change coins (M' + M''), and economic exchange frequently involved conflicts over coin exchange values, it is also clear that many of the circulating coins neither fulfilled their full function as a means of exchange (as there could be debates about the exchange rate); nor did these unstable or underweight coins fulfil, to full extent, the criteria as a means of storing value. Whoever managed to get a favourable coin exchange rate out of the deal where legally-fixed target rates existed, would gain an economic rent. Whenever such practices were carried out habitually with the intent to make a profit (arbitrage, speculation) we may call this practice 'usurious'[90], using Luther's words, as it – potentially – involved practices of enrichment that were in conflict with the law (which said that all coins must circulate at face value) and frequently, if the above complaints are to be believed, were based upon another person's lack of reliable market information and bargaining power. The issue became prominent in the numerous social revolts and peasant uprisings of the middle ages, culminating in the great Peasants' War of 1524–26.[91]

Thus the product $C^*(A - B)$ in the above graph (denoting market size, C times the difference between factual (A, E^m) and legal or target exchange rate (B, E^n) can be interpreted as the difference or additional costs of the system, covering increased transaction costs as well as economic rents to be gained from a non-integrated monetary landscape, as compared to a hypothetical counterfactual or fiduciary monetary standard, where the intrinsic or material value of coins and banknotes is insignificant vis-à-vis their official value or purchasing power, and where the face value of a particular means of payment within the respective currency system is open to neither doubt nor re-negotiations.

[90] "Nu ist an allen zweyffel niemant, der do wolt, das yhm rocken auff korn, boeße muntze auff gutte, poße wahr auff gute wahr gelyhen wurd. It is klar, das solche leyher widder die naturhandelnn, todlich sunden, wucherer seyn und ungleych handelln mit yhrem nehstenn. For Luther, usury was defined as scenarios of exchange where people mehr odder eyn anders widder geben mussen, das besser ist, dan sie geporgett haben." Martin Luther, Gesammelte Werke Vol. VI (Weimar, 1888), 48–9.

[91] *Rössner*: Deflation – Devaluation – Rebellion, ch. IV.

VI. Conclusion

As the present paper has suggested, if tentatively, monetary stability and monetary integration are likely to promote social stability and economic growth. Whilst some of the numerical long-run data presented in Table 1 are ambiguous, case studies demonstrate that the lack of coordination was seen as critical by contemporaries, creating social (economic rents) as well as economic costs (increased transaction costs). Some members of the population, especially merchant-bankers, frequently seem to have made arbitrage and speculation profits out of this uncoordinated monetary landscape. But it is doubtful whether these profits outweighed the economic losses made by the majority of the population (section V).

Secondly, a commodity money standard is suboptimal compared to fiduciary or chartalist theories of money. In the pre-industrial period the technique of free minting precluded a proactive monetary policy, as the state monopoly on money only extended to the quality, i.e. weight, fineness and shape of coins, but neither the amount (arguably an important tool for modern monetary and economic policy) nor composition of money in circulation, i.e. the changing relations between small change and 'full-bodied' change coins. This was left to the public i.e. the free market. As the present paper has shown, this version of a commodity money standard was arguably suboptimal, compared to a chartalist (i.e. modern) standard, since it increased social as well as economic costs, causing multiple disequilibria.

Thirdly, is monetary competition good for development? Within the Holy Roman Empire there was a certain degree of institutional competition or 'institutional arbitrage' opportunities. Scholars have highlighted that economic actors would be able to 'choose' the economic or political environment that fit their purposes best.[92] The territorial fragmentation of medieval and early modern Germany may be expected to have increased the system's institutional efficiency by institutional arbitrage. This logic is ambiguous to say the least: with respect to the largely uncoordinated monetary landscape the costs of competition could be considerable. As

[92] See e.g. *Volckart,* Oliver: 'Politische Zersplitterung und Wirtschaftswachstum im Alten Reich, ca. 1650–1800', Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte (1999), 1–38; Id., 'Einleitung: Obrigkeitlicher Wettbewerb als Faktor der Wirtschaftsentwicklung', in: Id. (ed.), Frühneuzeitliche Obrigkeiten im Wettbewerb: Institutioneller und wirtschaftlicher Wandel zwischen dem 16. und 18. Jahrhundert (Baden-Baden, 1997), 11–30.

the present paper suggests monetary competition increased, rather than decreased the social and economic costs of the system, even though it would be difficult to quantify the negative as well as the positive effects of this.

Fourthly, we are still far from a comprehensive model of the pre-industrial monetary landscape. The time is not yet ripe for formulating a 'new' or general model (such as the one in *Sargent/Velde* 2003, or *Schremmer/Streb* 1999); to the contrary: we are only at the beginning of a fundamental re-interpretation of pre-modern monetary history, which will obviously require many future years and research efforts into what was a very intricate and infinitely complex monetary landscape: the Holy Roman Empire in the pre-industrial period.

Fifth, any monetary or historical theory of pre-modern money that leaves out idiosyncrasy, politics, sociology, culture and geography, is bound to remain incomplete. Such factors belong into monetary theory lest the models become unrealistic. This is to be redressed by future studies.

References

Acemoglu, D./*Robinson,* J.A. (2012): Why Nations Fail. The Origins of Power, Prosperity, and Poverty, London/New York.

Allen, R. C. (2001): 'The Great Divergence in European Wages and Prices from the Middle Ages to the First World War', Explorations in Economic History, XXXVIII (2001), pp. 411–447.

– (2003): 'Progress and Poverty in Early Modern Europe', Economic History Review, Second Series, LVI (2003), pp. 403–443.

Bernocchi, M. (1976): Le monete della Repubblica fiorentina III: Documentazione, Florence.

Boldizzoni, F. (2011): The Poverty of Clio: Resurrecting Economic History, Princeton, NJ.

Castelin, K. (1973): Grossus Pragensis. Der Prager Groschen und seine Teilstücke 1300–1547 2nd ed., Braunschweig.

Challis, C. E. (1992): 'Appendix 2', in: Id., ed., A New History of the Royal Mint, Cambridge.

Chilosi, D./*Volckart,* O. (2011): 'Money, States, and Empire: Financial Integration and Institutional Change in Central Europe, 1400–1520', The Journal of Economic History, LXXI/3 (2011), pp. 762–791.

Cipolla, C. M. (1967): Money, Prices and Civilization in the Mediterranean World. Fifth to Seventeenth Century. New York.

Comín Comín, F./*O'Brien,* P.-K./*Yun-Casalilla,* B., eds. (2012): The Rise of Fiscal States: A Global History, 1500–1914, Cambridge.

Conrad, H., ed. (1964): Recht und Verfassung des Reiches in der Zeit Maria Theresias, Cologne.

Cunz, R., ed. (2002): Währungsunionen. Beiträge zur Geschichte überregionaler Münz- und Geldpolitik, Hamburg.

Dotzauer, W. (1998): Die deutschen Reichskreise (1383–1806). Geschichte und Aktenedition, Stuttgart.

Eichhorn, H. (1973): Der Strukturwandel im Geldumlauf Frankens zwischen 1437 und 1610. Ein Beitrag zur Methodologie der Geldgeschichte, Wiesbaden.

Elsas, M. J. (1936–1949): Umriss einer Geschichte der Preise und Löhne in Deutschland. Vom ausgehenden Mittelalter bis zum Beginn des 19. Jahrhunderts. 3 vols, Leiden.

Flynn, D. O./*Giráldez,* A. (2002): 'Conceptualizing Global Economic History: The Role of Silver', in: Gömmel, R./Denzel, M.A., eds., Weltwirtschaft und Wirtschaftsordnung. Festschrift für Jürgen Schneider zum 65. Geburtstag, Stuttgart, pp. 101–114.

Friedensburg, F. (1926): Münzkunde und Geldgeschichte der Einzelstaaten des Mittelalters und der Neueren Zeit, Munich/Berlin.

Galeotti, A., ([1930] 1971): Le monete del granducato di Toscana, Bologna.

Garcia de Paso, J. I. (2000): La Política monetaria castellana de Trastámaras y Austrias, 1400–1700, Madrid.

Gelder, H. E. van/*Hoc,* M. (1960): Les monnaies des Pays-Bas bourguignons et espagnols, 1434–1713: Répertoire general. Amsterdam.

Gerhard, H.-J. (1993): 'Ursachen und Folgen der Wandlungen im Währungssystem des Deutschen Reiches 1500–1625. Eine Studie zu den Hintergründen der sogenannten Preisrevolution', in: Schremmer, E., ed., Geld und Währung vom 16. Jahrhundert bis zur Gegenwart, Stuttgart, pp. 69–84.

– (1994): 'Ein schöner Garten ohne Zaun. Die währungspolitische Situation des Deutschen Reiches um 1600', Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte, LXXXI (1994), pp. 156–177.

– (1996): 'Miszelle: Neuere deutsche Forschungen zur Geld- und Währungsgeschichte der Frühen Neuzeit. Fragen – Ansätze – Erkenntnisse', Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte, LXXXIII (1996), pp. 216–230.

Gerhard, H.-J./*Kaufhold,* K. H. (1990): Preise im vor- und frühindustriellen Deutschland. Grundnahrungsmittel, Göttingen.

Goldstone, J. A. (1984): 'Lessons from the English Price Revolution of the Sixteenth and Seventeenth Centuries', The American Journal of Sociology, LXXXIX (1984), pp. 1122–1160.

Günter, H. (1987): Das Münzwesen in der Grafschaft Württemberg, Stuttgart.

Hanauer, A. C. (1876/78): Études économiques sur l'Alsace ancienne et moderne, Vol. 2, Paris/Strasbourg.

Hartmann, P. C. (1994): 'Regionen in der Frühen Neuzeit – Modell für ein Europa der Regionen. Einführung in die Thematik und Problematik des Kolloquiums', in: Id., ed., Regionen in der frühen Neuzeit. Reichskreise im deutschen Raum, Provinzen in Frankreich, Regionen unter polnischer Oberhoheit: ein Vergleich ihrer Strukturen, Funktionen und ihrer Bedeutung, Berlin.

– (1997): Der Bayerische Reichskreis (1500 bis 1803). Strukturen, Geschichte und Bedeutung im Rahmen der Kreisverfassung und der allgemeinen institutionellen Entwicklung des Heiligen Römischen Reiches, Berlin.

Hoffmann, H. H. (1962): 'Reichskreis und Kreisassoziation. Prolegomena zu einer Geschichte des fränkischen Kreises, zugleich ein Beitrag zur Phänomenologie des deutschen Föderalismus', in: Zeitschrift für Bayerische Landesgeschichte 25 (1962), pp. 377–413.

Kattermann, W. (1943): 'Bäuerliche Beschwerden in der Markgrafschaft Baden und dem Bühler Armen Konrad von 1514', Zeitschrift für Geschichte des Oberrheins 95 (1943), pp. 110–205.

Lane, F. C./*Mueller,* R. C. (1985): Money and Banking in Medieval and Renaissance Venice, Vol. I: Coins and Moneys of Account, Baltimore and London.

Latimer, P. (2001): 'The English Inflation of 1180–1220 Reconsidered', Past & Present, CLXXI (2001), pp. 3–29.

Lopez, R. S. (1976): The Commercial Revolution of the Middle Ages, 950–1350, Cambridge.

Luschin v. Ebengreuth, A. (1926): Allgemeine Münzkunde und Geldgeschichte des Mittelalters und der Neueren Zeit, 2nd ed. Munich/Berlin.

Luther, M. (1888): Gesammelte Werke Vol. VI, Weimar.

Maddison, A. ([2001] 2006): The World Economy: A Millennial Perspective, Paris.

Mayhew, N. J. (1995): 'Money Supply, and the Velocity of Circulation in England, 1300–1700', Economic History Review, Second Series, XLVIII (1995), pp. 238–257.

– (1996): 'Not Sterling: A Reply to Prof. Miskimin', Economic History Review, Second Series, XLIX (1996), p. 361.

– (2012): 'Silver in England, 1600–1800: Coinage Outputs and Bullion Exports from the Records of the London Tower Mint and the London Company of Goldsmiths', in: Munro, J. H., ed., Money in the Pre-industrial World: Bullion, Debasements and Coin Substitutes, London.

Metz, R. (1990): Geld, Währung und Preisentwicklung. Der Niederrheinraum im europäischen Vergleich: 1350–1800, Frankfurt-on-the-Main.

Miskimin, H. A. (1996): 'Not Sterling: A Comment on Mayhew's Velocity', Economic History Review, Second Series, XLIX (1996), pp. 358–60.

Moser, F. C. (1747): Sammlung des Heil. Römischen Reichs sämtlicher Crays=Abschiede und anderer Schlüsse, nebst vilen darzu gehoerigen Beylagen, auch mit Summarien, Marginalien und Anmerckungen versehen und grossen Theils erstmals an das Licht gestellt von Friderich Carl Moser, Hochgräfl. Reuß=Plauischen Secretario, Ersther Theil. Leipzig/Ebersdorff im Vogtland.

Moser, J. J. (1773): Von der teutschen Crays-Verfassung, Frankfurt-on-the-Main/Leipzig.

Munro, J. H. (1988): 'Deflation and the Petty Coinage Problem in the Late-Medieval Economy: The Case of Flanders, 1334–1484', Explorations in Economic History XXV,4 (1988), pp. 387–423.

– (1995): 'Art. "Münzkosten"', in: North, M., ed., Von Aktie bis Zoll. Ein historisches Lexikon des Geldes. Munich, pp. 263.

– (1998): 'Precious Metals and the Price Revolution Reconsidered: The Conjuncture of Monetary and Real Forces in the European Inflation of the Early to Mid-16th Century', in: Flynn, D.O./Morineau, M./Glahn, R. von, eds., Monetary History in Global Perspective, 1500–1808/L'histoire monétaire: une perspective globale, 1500–1808/Historia monetaria: una perspectiva global, 1500–1808. Seville, pp. 35–51.

Nicklas, T. (2002): Macht oder Recht. Frühneuzeitliche Politik im obersächsischen Reichskreis, Stuttgart.

North, M. (1990): Geldumlauf und Wirtschaftskonjunktur im südlichen Ostseeraum an der Wende zur Neuzeit (1440–1570). Untersuchungen zur Wirtschaftsgeschichte am Beispiel des Großen Lübecker Münzschatzes, der norddeutschen Münzfunde und der schriftlichen Überlieferung, Sigmaringen.

– (1994): Das Geld und seine Geschichte. Vom Mittelalter bis zur Gegenwart, Munich.

– (2006): 'Das Reich als Wirtschaftsraum in Europa', in: Schilling, H./Heun, W./Götzmann, J. eds., Heiliges Römisches Reich Deutscher Nation 962 bis 1806. Altes Reich und Neue Staaten 1495 bis 1806. Essayband zur 29. Ausstellung des Europarats im Deutschen Historischen Museum Berlin, Dresden.

– (2009): Kleine Geschichte des Geldes. Vom Mittelalter bis heute, Munich.

– (2013): 'Geld- und Ordnungspolitik im Alten Reich', in: Amend-Traut, A./Cordes, A./Sellert, W., eds., Geld, Handel, Wirtschaft. Höchste Gerichte im Alten Reich als Spruchkörper und Institution. Berlin, pp. 99–101.

Paas, M. W./*Paas,* J. R./*Schofield,* G. C. (2012): Kipper Und Wipper Inflation, 1619–23 – An Economic History with Contemporary German Broadsheets, Yale.

Papadopoli, N. (1893–1909): Le monete di Venezia, Venice.

Pfister, U. (2010): 'Silber', in: Jaeger, F., ed., Enzyklopädie der Neuzeit, Vol. 12, Stuttgart.

Pincus, S. (2010): 1688: The First Modern Revolution, New Haven.

Pückert, W. (1862): Das Münzwesen Sachsens 1518–1545 nach handschriftlichen Quellen. Erste Abtheilung: die Zeit von 1518–1525 umfassend, Leipzig.

Reinhard, W. (2007): Geschichte des modernen Staates: Von den Anfängen bis zur Gegenwart, Munich.

Rittmann, H. (1975): Deutsche Geldgeschichte 1484–1914, Munich.

Rössner, P. R. (2012): Deflation – Devaluation – Rebellion. Geld im Zeitalter der Reformation, Stuttgart.

– (2013): 'Die (proto)globalen Spannungsfelder und Verflechtungen mitteldeutscher Münz- und Währungspolitik um 1500. Das Beispiel der sächsischen Talerprägung', in: Schattkowsky, M., ed., Das Erzgebirge im 16. Jahrhundert. Gestaltwandel einer Kulturlandschaft im Reformationszeitalter, Leipzig, pp. 103–158.

– (2014): 'Money, Banking, Economy' in: Classen, A., ed., Medieval Culture: A Compendium of Critical Topics, Frankfurt/New York (forthcoming).

Sargent, T. M./*Velde,* F.R. (2003): The Big Problem of Small Change, Princeton.

Schneider, K. (2002): Geld im Taunus: Münzprägung und Geldumlauf, Höhr-Grenzhausen.

Schremmer, E. 'Über "stabiles Geld". Eine wirtschaftshistorische Sicht', in: Id., ed. (1993): Geld und Währung vom 16. Jahrhundert bis zur Gegenwart, Stuttgart, pp. 9–44.

Schremmer, E./*Streb,* J. (1999): 'Revolution oder Evolution? Der Übergang von den feudalen Münzgeldsystemen zu den Papiergeldsystemen des 20. Jahrhunderts', Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte 86 (1999), pp. 457–476.

Schrötter, F. Freiherr von (1911/12): 'Das Münzwesen des Deutschen Reichs von 1500 bis 1566', Jahrbuch für Gesetzgebung, Verwaltung und Volkswirtschaft, XXXV (1911) and XXXVI (1912), reprinted in: Friedrich von Schrötter, Aufsätze zur deutschen Münz- und Geldgeschichte des 16. bis 19. Jahrhunderts (1902–1938), ed. Bernd Kluge (Leipzig, 1991), pp. 3–76.

Schumpeter, J. A. (1954): History of Economic Analysis, New York.

Schüttenhelm, J. (1987): Der Geldumlauf im südwestdeutschen Raum vom Riedlinger Münzvertrag 1423 bis zur ersten Kipperzeit 1618. Eine statistische Münzfundanalyse unter Anwendung der elektronischen Datenverarbeitung, Stuttgart.

Schwinkowski, W. (1918): Das Geld- und Münzwesen Sachsens. Beiträge zu seiner Geschichte, Dresden.

Sprenger, B. (1977): 'Preisindizes unter Berücksichtigung verschiedener Münzsorten als Bezugsgrößen für das 16. und 17. Jahrhundert – dargestellt anhand von Getreidepreisen in Frankfurt/Main', Scripta Mercaturae, 1 (1977), pp. 57–69.

– (1984): 'Münzverschlechterung, Geldmengenwachstum und Bevölkerungsvermehrung als Einflußgrößen der sogenannten Preisrevolution im 16. und beginnenden 17. Jahrhundert in Deutschland', in: Kaufhold, K. H./Riemann, F., eds., Theorie und Empirie in Wirtschaftspolitik und Wirtschaftsgeschichte. Wilhelm Abel zum 80. Geburtstag, Göttingen, pp. 127–144.

– (1991): Das Geld der Deutschen. Geldgeschichte Deutschlands von den Anfängen bis zur Gegenwart 3rd ed. Paderborn/Munich/Vienna/Zurich.

Spufford, P. (1988): Money and its Use in Medieval Europe, Cambridge.

Suhle, A. (1975): Deutsche Münz- und Geldgeschichte von den Anfängen bis zum 15. Jahrhundert 8th ed., Berlin.

Sussman, N. (1993): 'Debasements, Royal Revenues, and Inflation in France During the Hundred Years' War, 1415–1422,' The Journal of Economic History, 53.1 (1993), pp. 44–70.

Tilly, C. R. ([1990] 1993): Coercion, Capital, and European States AD 990–1990, Cambridge.

Treu, M., ed., Martin Luther und das Geld. Aus Luthers Schriften, Briefen und Tischreden. Lutherstadt Wittenberg.

Volckart, O. (1997): 'Einleitung: Obrigkeitlicher Wettbewerb als Faktor der Wirtschaftsentwicklung', in: Id., ed., Frühneuzeitliche Obrigkeiten im Wettbewerb: Institutioneller und wirtschaftlicher Wandel zwischen dem 16. und 18. Jahrhundert. Baden-Baden, pp.11–30.

– (1999): 'Politische Zersplitterung und Wirtschaftswachstum im Alten Reich, ca. 1650–1800', Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte (1999), pp. 1–38.

– (2009): 'Regeln, Willkür und der gute Ruf: Geldpolitik und Finanzmarkteffizienz in Deutschland, 14. bis 16. Jahrhundert', Jahrbuch für Wirtschaftsgeschichte 2009/2, pp. 101–129.

Vries, J. de/*Woude,* A. van der (1997): The First Modern Economy. Success, Failure, and Perseverance of the Dutch Economy, 1500–1815, Cambridge.