

II. MACRO- AND STRUCTURAL CHANGES IN THE EUROPEAN ECONOMY, 1290 - 1520

B. MONEY AND MONETARY CHANGES IN WESTERN EUROPE, 1290 – 1520 (Part 2)

<p>4. 2 October 2013</p> <p>Epstein, ch. 8-9 Brady, ch. 5 (Munro); Cipolla, ch. 7, 8; Davis chs. 6, 14; 2</p> <p>ET 3</p>	<p>3</p>	<p>MONETARY CHANGES:</p> <p>The Monetary Chaos of the 14th Century; the Late-Medieval ‘Bullion Famines’ and the 15th Century Central-European Silver Mining Boom (1320-1520).</p>
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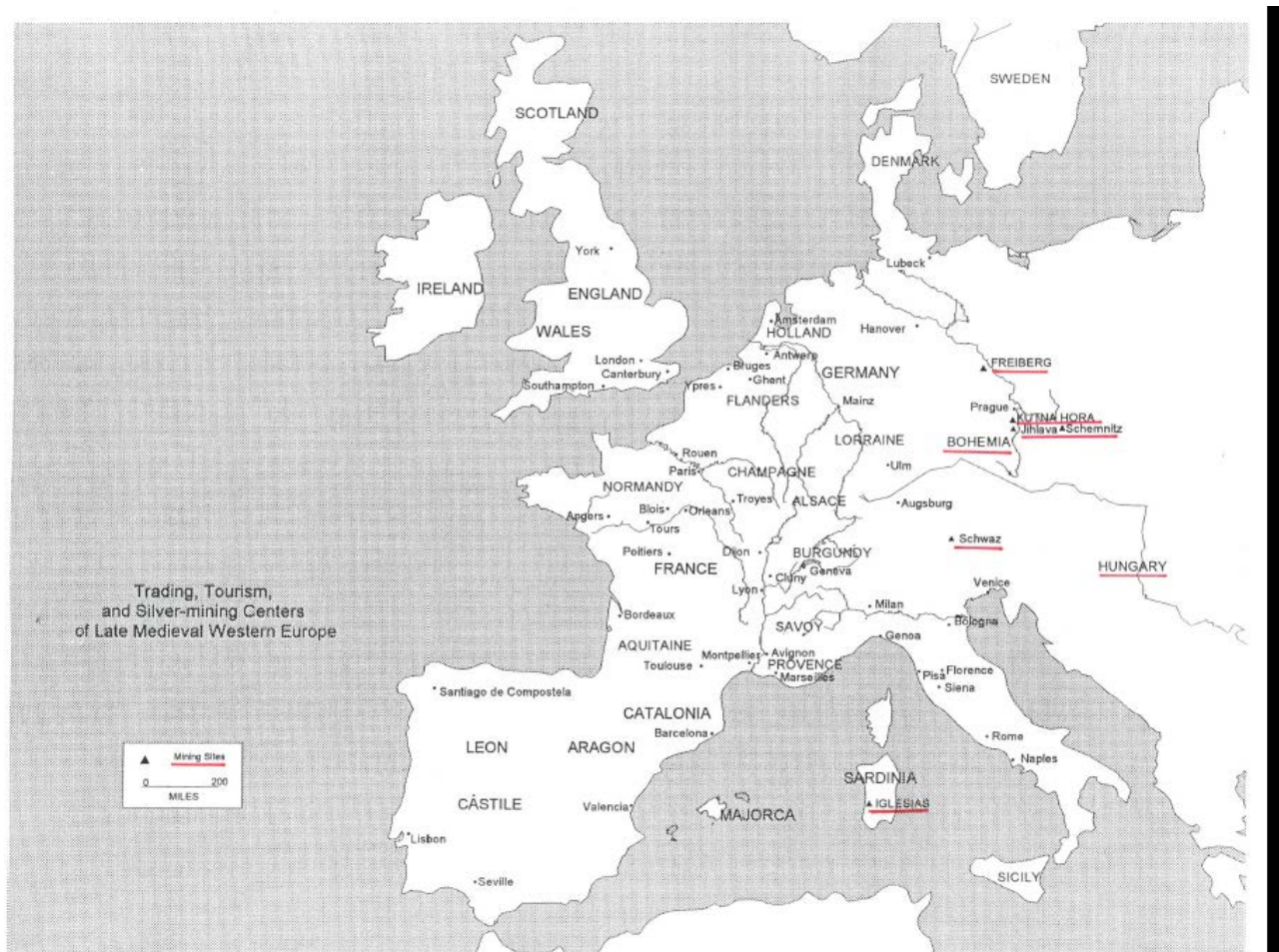
‘Bullion Famines’ in late-medieval Europe?

- **Problem: did late-medieval western Europe experience shortages – periodic shortages of precious metals, in relation to?:**
- **(1) aggregate demand for precious metals**
- **(2) thus, in relation to population changes**
- **(3) were late-medieval monetary contractions related to demographic decline?**
- **(4) in relation also to changes in the use and supplies of credit: a subsequent topic**

European Precious Metal Supplies

- **SILVER: came from:**
 - - **mines in Germany & Central Europe:** Saxony, Bavaria, Austria, Italian Tyrol, Bohemia, Serbia
 - - Almost none from foreign trade
- **GOLD: came from:**
 - **Mines: in Bohemia and Hungary**
 - **foreign trade the chief source:** especially imports from West Africa, via North African Mediterranean ports

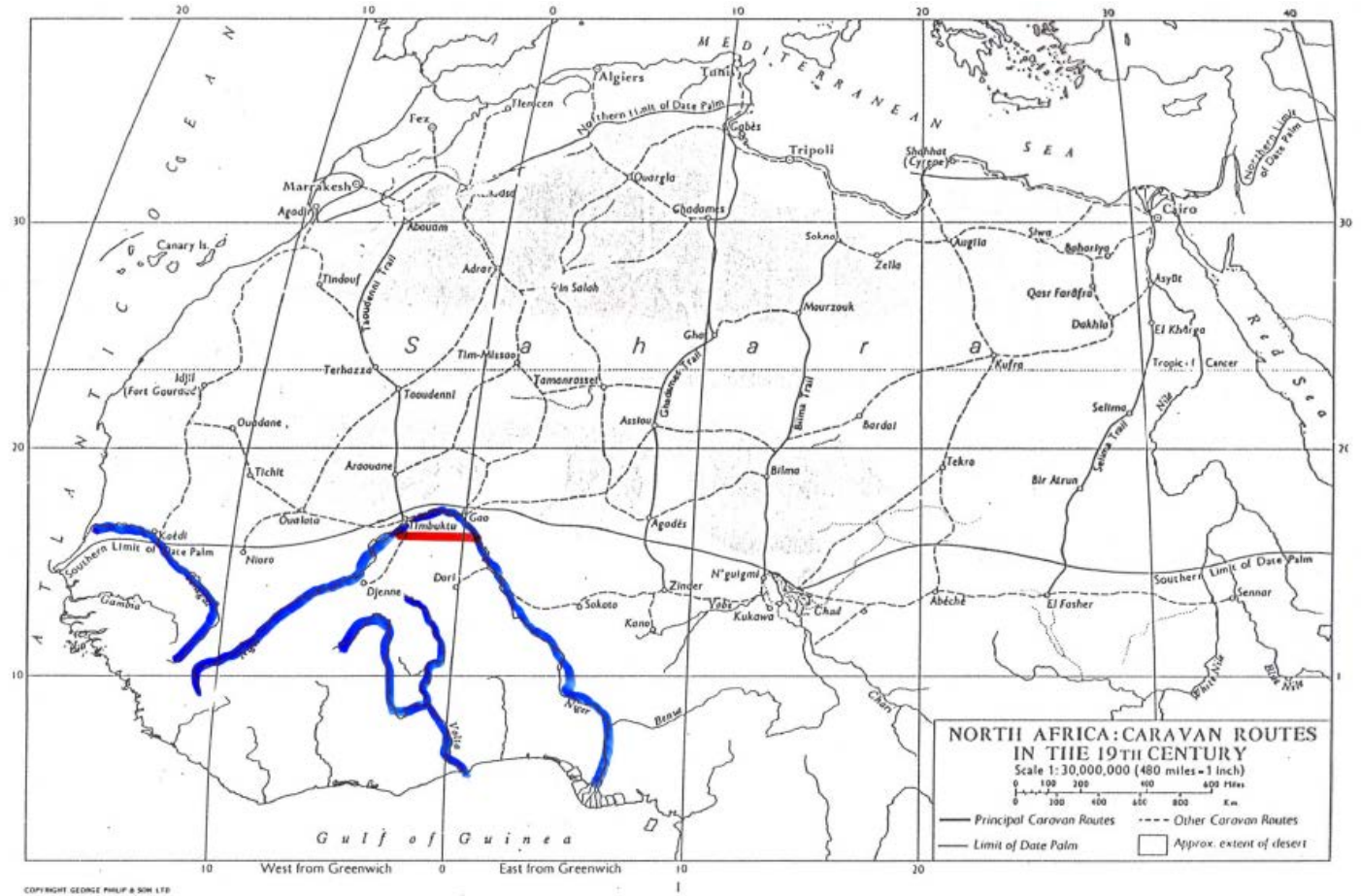
Silver Mines in Medieval Europe



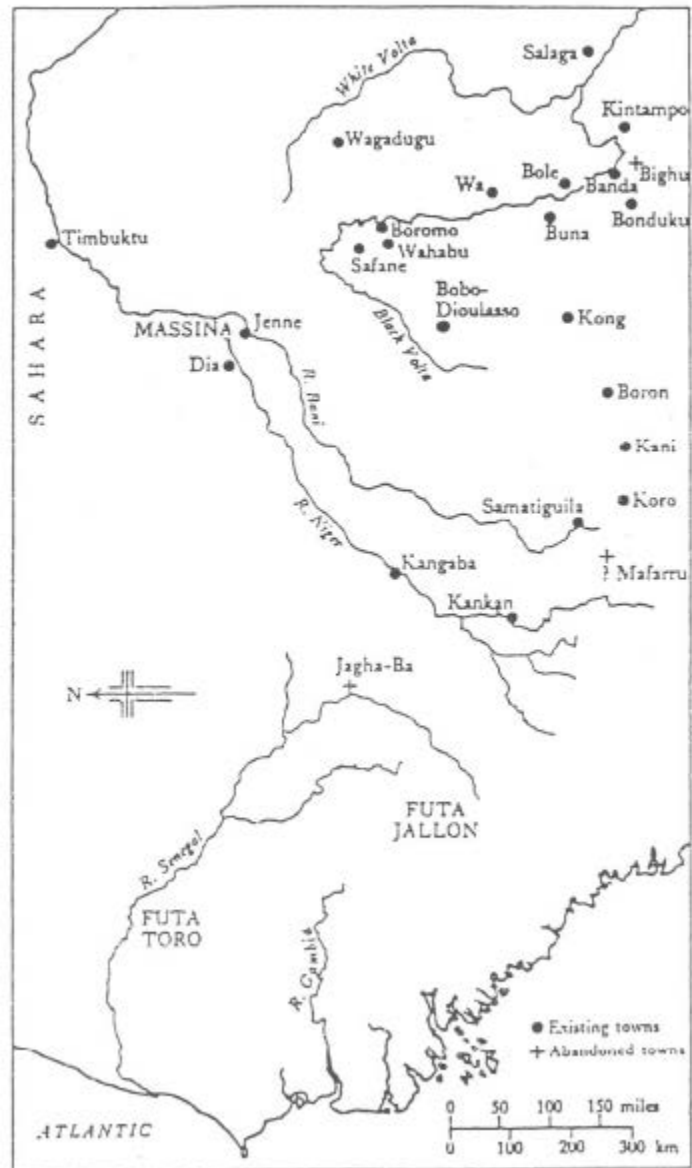
Role of Africa in supplying GOLD

- **ITALY** had long enjoyed a 'favourable balance of trade' with **North Africa** (Tunisia – Algeria - Morocco)
- i.e., **Europe exported greater value** of goods: textiles, arms, horses, & commercial services (shipping)
- - **AFRICA:** exported to Europe fewer commodities and thus more **GOLD**, coming from W. Africa:
- **Upper Senegal river: Bambuk**
- **Upper Niger river: Mali**
- **Upper Volta river: Lobi**
- **For West Africans:** gold was just an export commodity

Gold Mines in West Africa: Senegal, Niger, Volta Rivers



The Portuguese Gold Trade in West Africa (the Gold Coast)
in the 15th and 16th Centuries



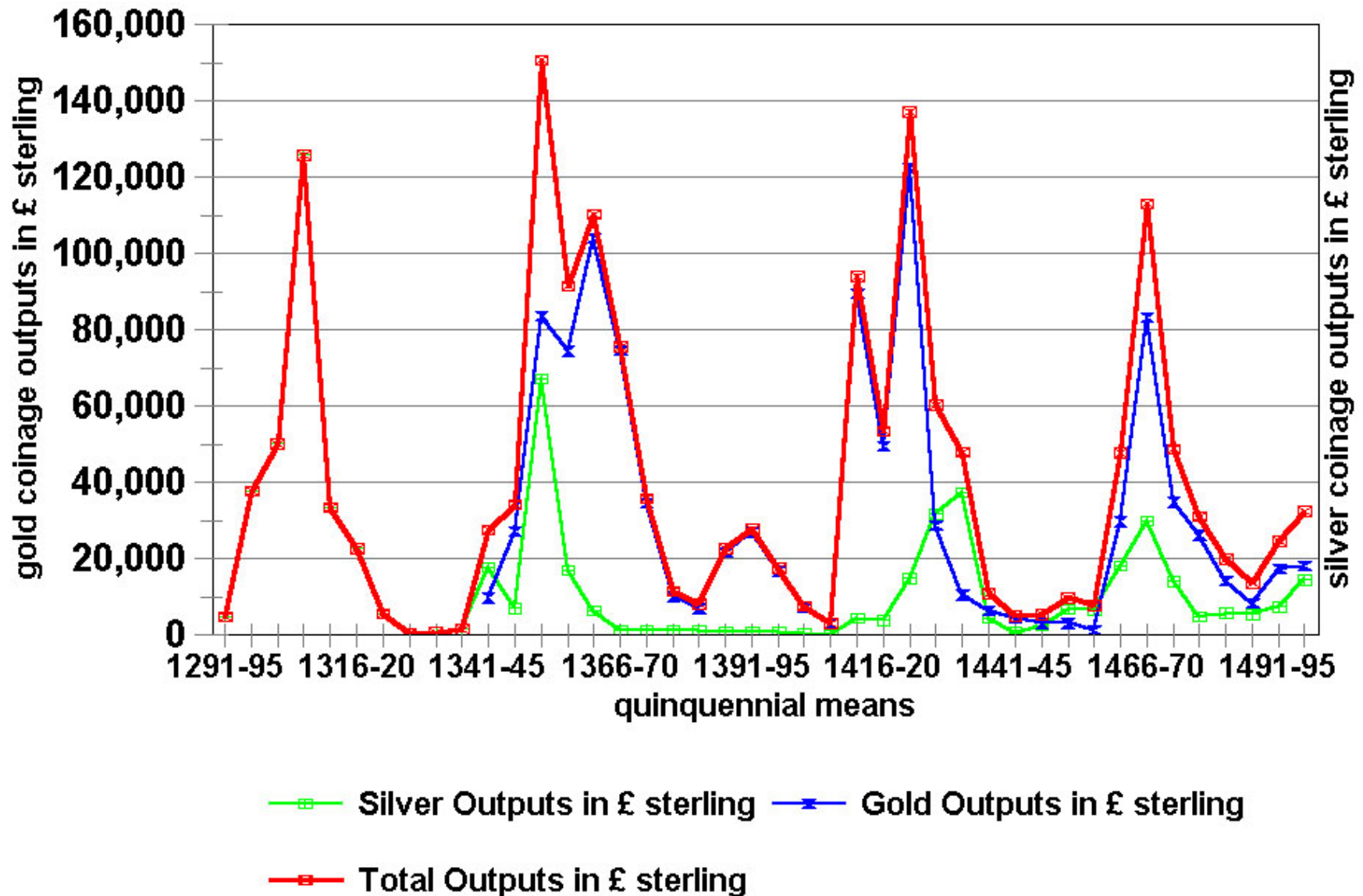
Monetary Expansion during the Commercial Revolution era: to 1320s

- (1) **England**: silver mining boom in the north (Cumberland-Northumberland) from the 1130s to ca. 1180
- (2) **Germany**: Harz Mountains region of Saxony: even more momentous silver mining boom from the 1160s to the 1320s
- (3) **Expansion in Italian trade** with Muslim North Africa: producing larger gold influxes from West Africa: to the 1370s
- **NB: this monetary expansion *preceded* the European demographic expansion – from the 1180s.**

An early 14th century bullion famine?

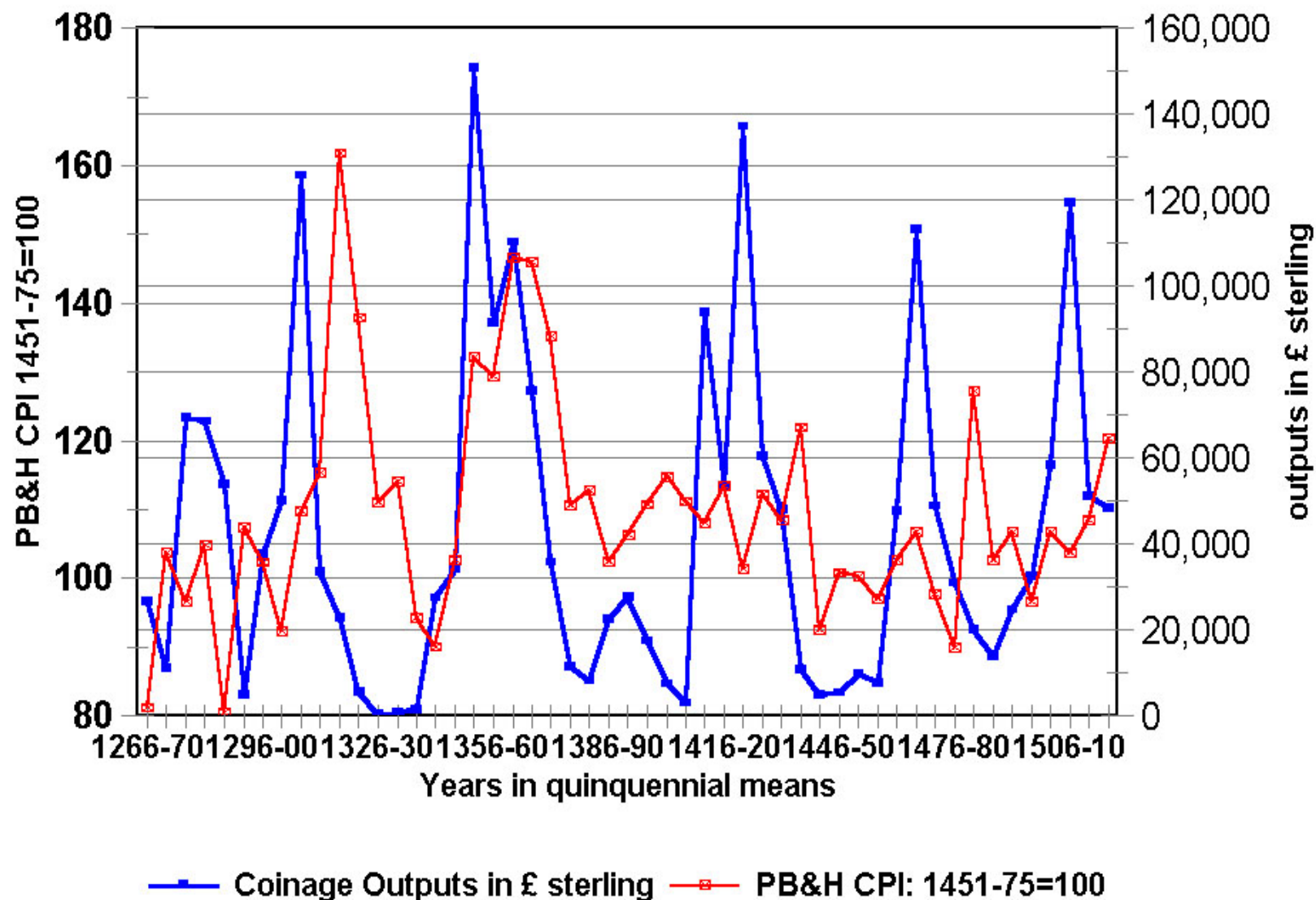
- (1) **By the 1320s, evidence of severe monetary scarcities: at least in England**
- - **drastic declines in English silver mint outputs**
- - **very severe deflation, 1320s to 1340s**
- - domestic complaints about coin scarcities
- (2) **Possible Causes:**
- - **silver mining:** European decline from 1320s
- - **European warfare: -**
- - **warfare impeded international bullion flows;**
- - **but also English bullion exports to finance military expeditions on continent (though major ones, only from the 1330s)**

English Gold & Silver Mint Outputs 1291-95 to 1496-00 in £ sterling



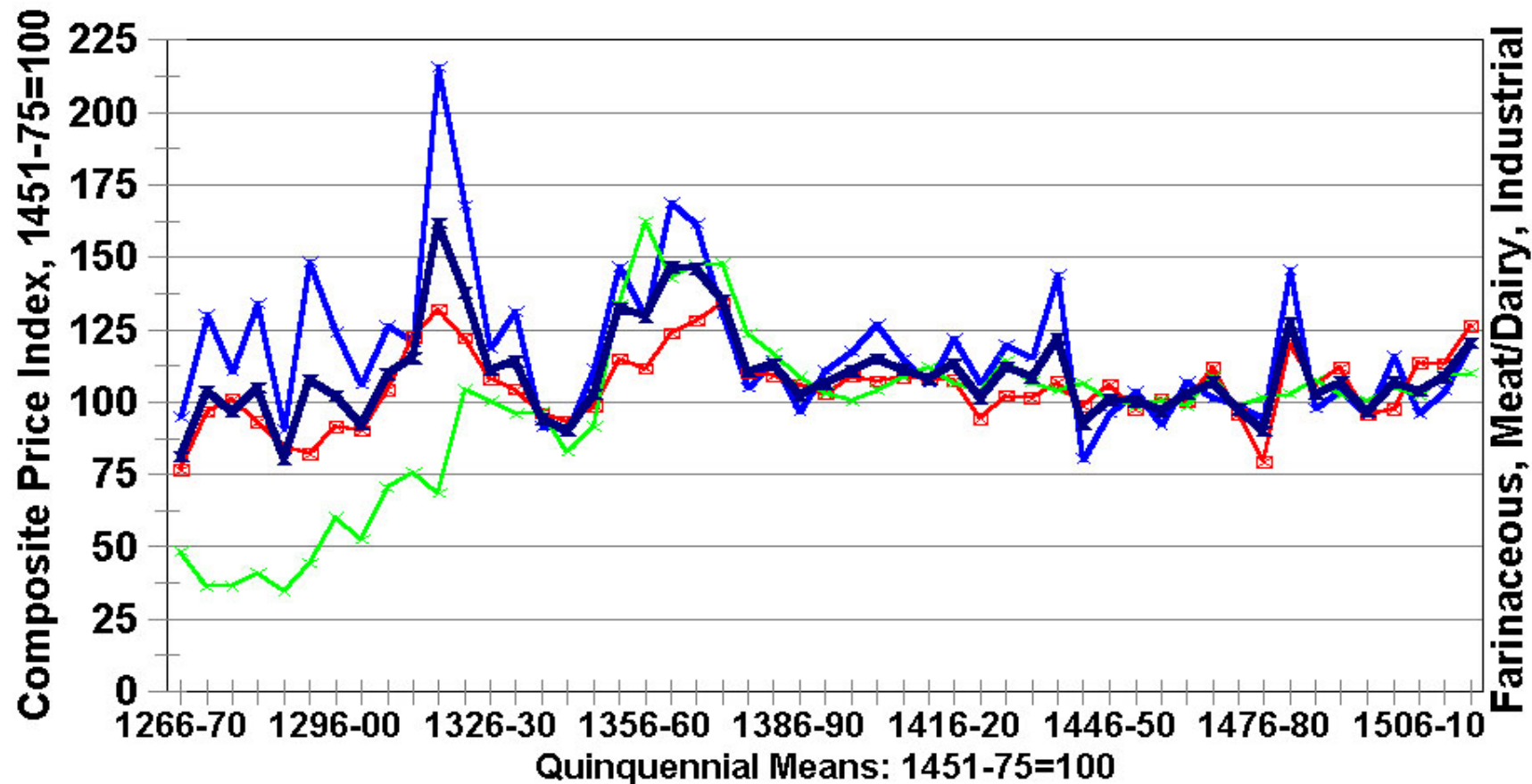
Coinage and Prices in England

Mint Outputs and CPI, 1264-1520



English Price Indices, 1266-1520

Farinaceous, Meat/Dairy, Industrial



Farinaceous Index

Meat/Dairy Index

Industrial Goods Index

Composite Price Index 1451-75=100

The Black Death and the Money Supply: demographic factors

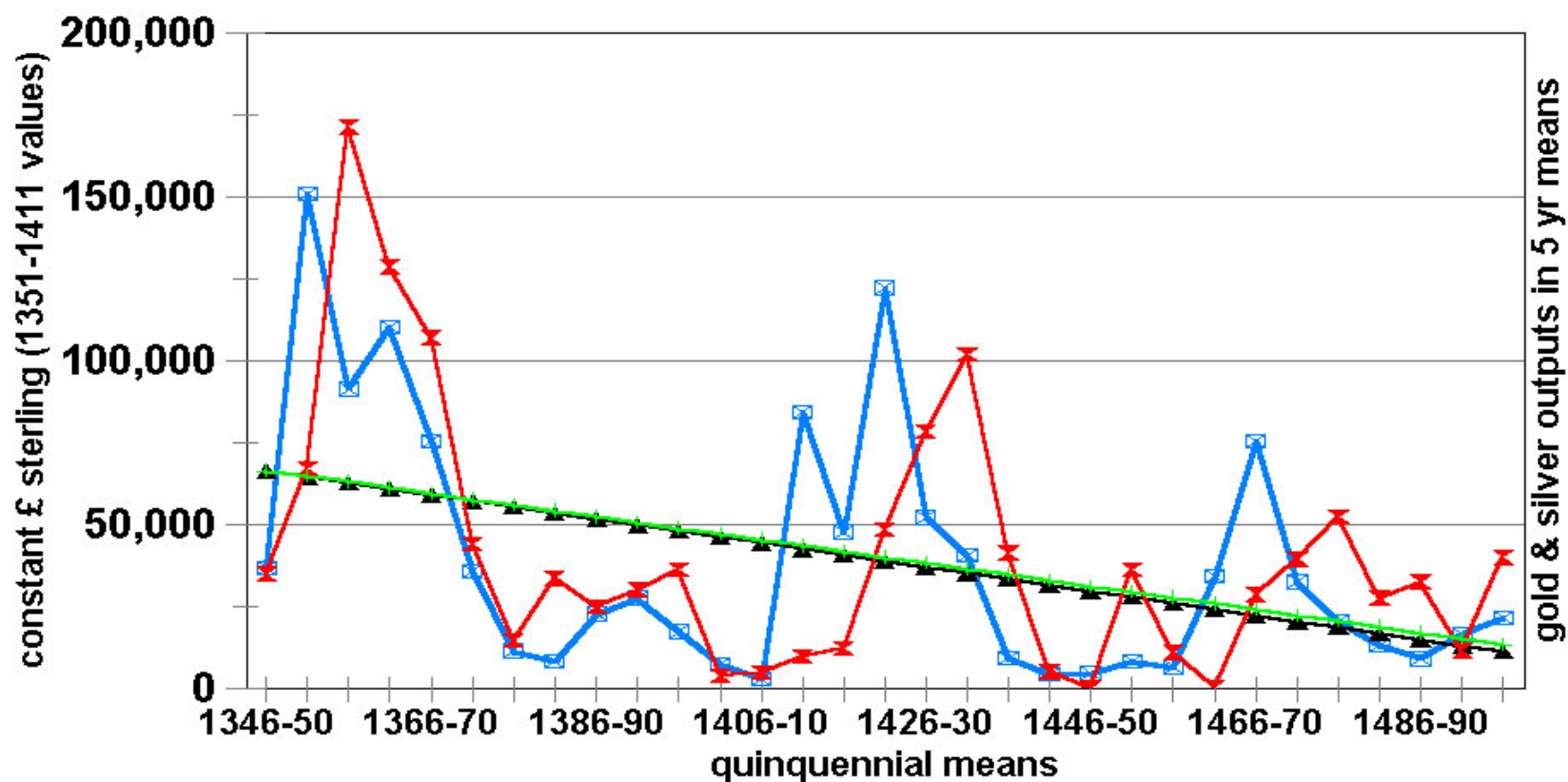
- (1) **The Black Death (from 1348)**: brought to sudden end any possible 'bullion famine'
- (2) **population then fell far more dramatically -- by over 40%** -- than did any continuing decline in Europe's mined silver outputs
- (3) **David Herlihy**: 'Men were dying, but coins were not'

Post Plague Inflations

- (1) **That evident surplus in per capita money supplies** led to rampant inflation throughout western Europe
- (2) **Post-Plague spending spree** contributed to inflation: income-velocity factors
- (3) **Thus: no evidence for, no reason for, any *relative scarcity*** in precious metals and the aggregate money supply until the later 14th century.

Mint Outputs of England & Flanders/LC

1346 - 1500 in constant £ sterling:



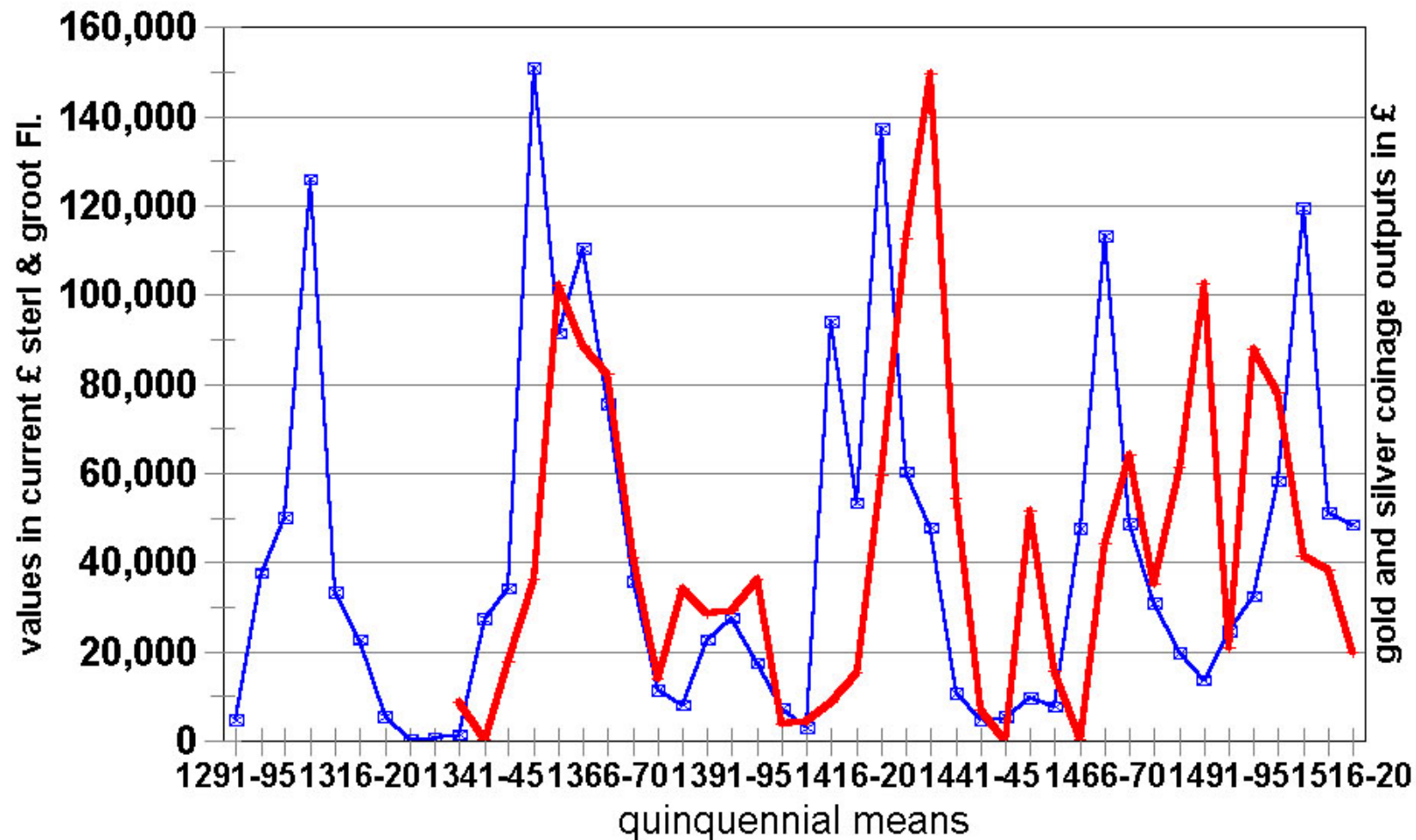
English Mint Outputs: constant £

English Trend Line

Flanders/LC mint outputs: constant £

Flanders/LC Trend Line

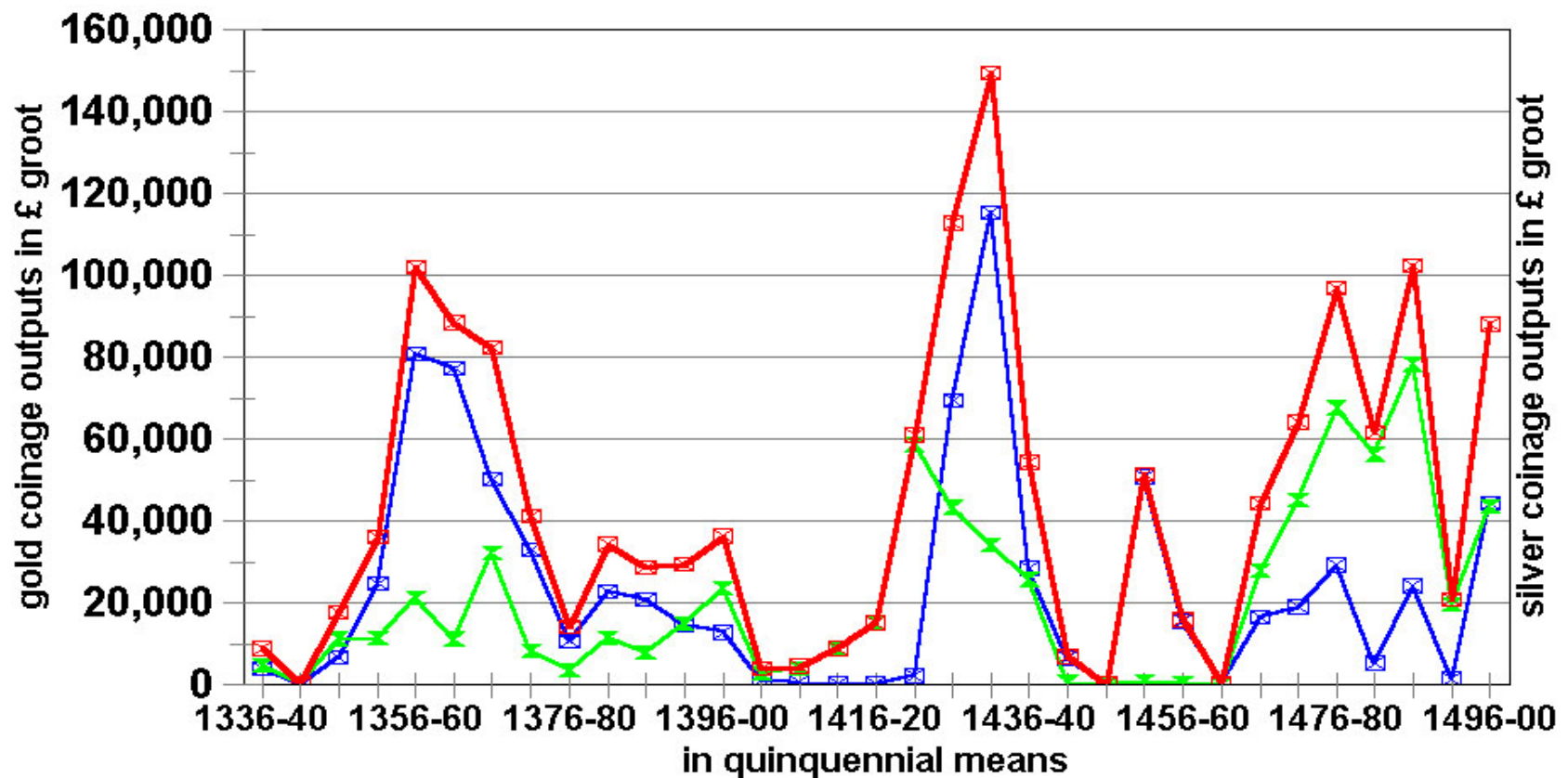
Total Current Values of Mint Outputs England & Low Countries, 1290-1520



—□— English Mint Outputs in £ sterling

— Low Countries' Mint Outputs in £ gr.

Flanders/Brabant: Gold & Silver Outputs in £ groot Flemish: 1336-40 to 1496-00



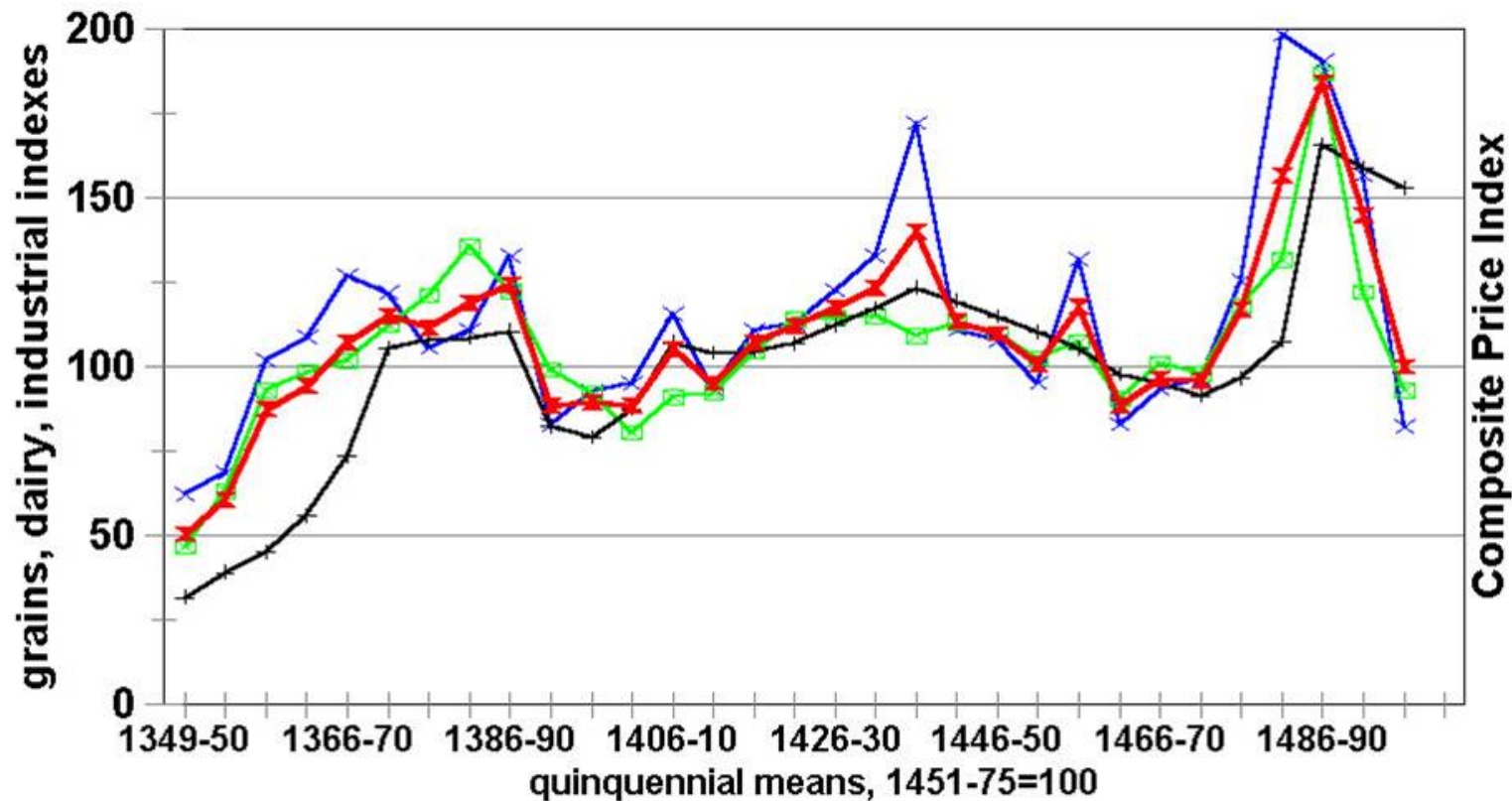
—■— Gold Coinage in £ groot Flem

—×— Silver Coinage in £ groot Flem

—■— Total Value: £ gr (Brabant < 1420)

Flemish Commodity Prices, 1346 - 1500

in 5 yr means: 1451-75=100



—x— farinaceous index

—□— dairy products index

—+— Industrial (textile) index

—x— Composite Price Index 1451-75=100

Late-medieval Bullion Famines I?

- **A. First Major Bullion Famine: from 1370s to ca. 1415**
- **(1) Rapid and drastic declines in mint-outputs**, both gold and silver: from 1370s: in England, Low Countries, France, Italy (Florence)
- **(2) Severe deflations, from 1370s or 1380s:** best measured in England and Flanders

Late-medieval Bullion Famines II?

- **B. Temporary end to the bullion famine:
from ca. 1415 – ca. 1450:**
- **warfare (Hundred Years' War)** alleviated first bullion famine: with
- **severe coinage debasements, taxation →** dishoarding, military expenditures.

Late-medieval Bullion Famines III?

- **C. Second Major Bullion Famine:**
- **from the 1430s to the 1470s, throughout western Europe'**
- - **drastic falls in mint-outputs:** see graphs
- - **severe deflations** – also indicated on graphs
- **Population:** beginning to recover in SOUTH, but not yet the NORTH (not till 1520s)

Causes of Bullion Famines 1

- (1) **Losses from coinage wear & tear** (1% per decade), shipwrecks, unrecovered hoards?
- **Thus, mints had to replenish silver** coin supplies.
- (2) **increased balance of payments deficits with the East**: bullion outflows to Asia, Russia?
- - **favoured hypothesis**: of Miskimin, Day, Spufford
- **1420s, 1490s**: Italian sales to Levant (Syria-Egypt) were only about one third in merchandise and thus about 2/3rds in precious metals

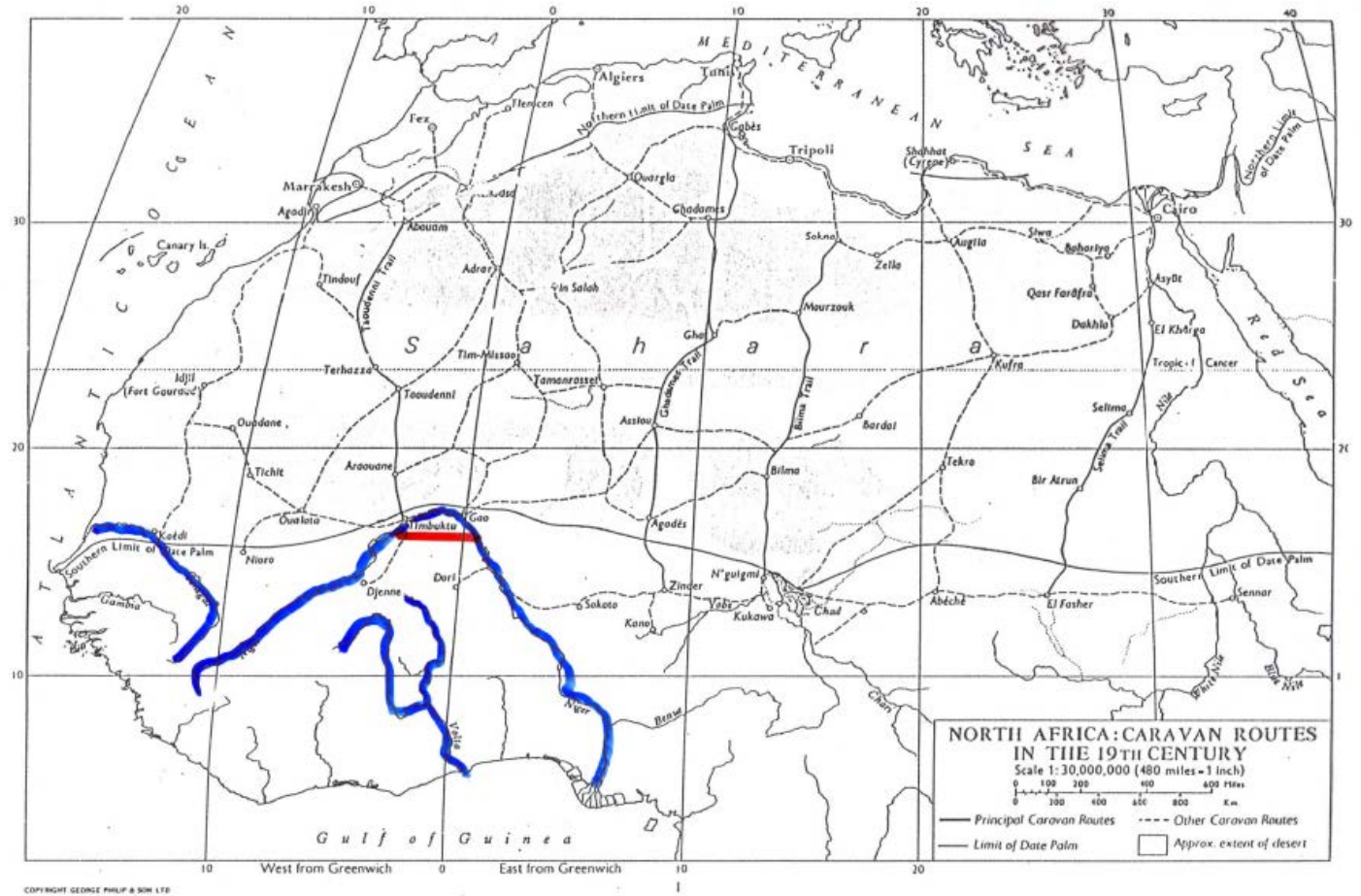
**Estimates of Venice's 'Balance of Payments Deficit' with the Levant in the 1490s
(according to Eliyahu Ashtor)**

Aspects of the Levant Trade	Total Value of Imports from the Levant as valued in Venetian ducats	Total Value of Merchandise Exports to the Levant as Valued in Venetian ducats	Total Value of Precious Metal Exports to the Levant (coin & bullion) in Venetian ducats	Percentage of the trade conducted in precious metals
Galley Trade with Alexandria and Beirut: minimum	450,000	150,000	300,000	66.67%
Galley Trade with Alexandria and Beirut: maximum	550,000	190,000	360,000	65.45%
Cog Trade in Syrian Cotton: minimum	130,000	67,500	62,500	48.08%
Cog Trade in Syrian Cotton: maximum	180,000	83,750	96,250	53.47%
Total Trade with Levant: minimum	580,000	217,500	362,500	62.50%
Total Trade with Levant: maximum	730,000	273,750	456,250	62.50%
Estimated Mean Values of Levant Trade	655,000	245,625	409,375	62.50%

Causes of Bullion Famines 2

- (3) **African gold flows diminished:**
- - **Mali Empire:** collapsed in civil war in 1360s
- - **Songhai Empire:** its successor empire failed to maintain stability:
- **diminished security** on trans-Saharan trade routes from Timbuktu to Sijilmassa (Algeria) and Kairouan (Tunisia)

Gold Mines in West Africa: Senegal, Niger, Volta Rivers



Causes of Bullion Famines 3

- (4) **Hoarding – Reduction in Income Velocity of money:**
 - **socio-psychological consequences of repeated waves of plague and incessant warfare**, civil wars, general anarchy, and related, consequent economic depressions
 - **Pessimism → increased hoarding:**
 - in conversions of coined money into plate and jewelry, in buried coin hoards,
 - **Rational hedge against insecurity** and anticipated future need for money: → increased **LIQUIDITY PREFERENCE**

Causes of Bullion Famines 4

- (5) **Other Factors to explain hoarding:**
 - a) **Reaction to coinage debasements** (last day's lecture)
 - b) **Medieval bullionist policies – bans on bullion exports & coin imports** : restricted international flows of bullion & specie
 - c) **Deflation, as a consequence, led to more hoarding:** anticipation that future value of money would rise

Spufford on late-medieval hoarding

- **Fear of disorder made men conceal their coin.** Fear of not being able to replace coin made men the keener to keep their assets liquid. With scarcity of coin went a reluctance to spend or invest what one had in hand, so that there was a sluggish circulation, which in itself was equivalent to a further reduction in the available quantity of coin.
- **Fear of debasements, and the instability of money,** made men happier to keep their silver in the form of plate, in addition to the desire for ostentation.
- **All of these methods of hoarding,** from the few petty coins put aside by poorer men in earthen vessels to the vast sums locked up in chests by the greatest of the land, removed a great deal of coin from circulation....

Credit, Hoarding, & Deflation

- **Fear that debtors would not replay loans:** → reduced supplies of credit for trade
- **Spufford:** 'This too was partially a consequence of the shortage of money and was also a cause of yet further shortage.'
- **Thus increased LIQUIDITY PREFERENCE** meant increased savings in hoards → reduced monetary flows (velocity): next topic

Causes of Bullion Famines 5: Silver Mining I

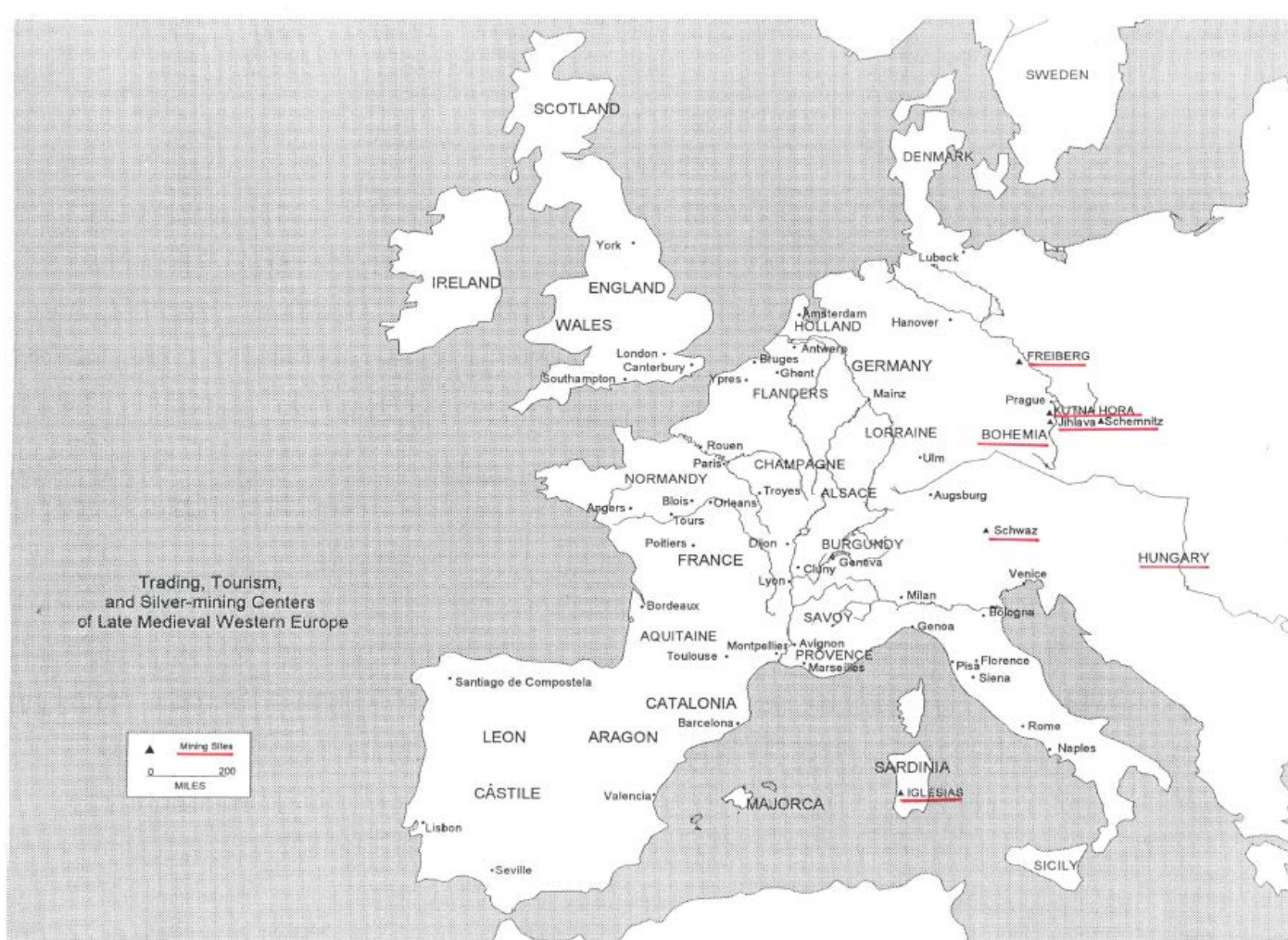
Declining output from older silver mines:

- **Continuing problem in absence of any technological** advances from Roman times
- **Drainage problems:** especially acute:
- mines in mountainous regions subject to flooding, restricting mining to surface ores
- **Diminishing returns:** inevitable problem with all natural resource industries.

Silver Mining Problems: II

- **New mines in 14th and early 15th centuries:** in **Sardinia, Bohemia, Serbia & Bosnia**
- **But failed to compensate for falling outputs** of older mines
- **also subject to diminishing returns**
- **Serbian & Bosnian mines:** lost to western Europe with the conquests of the Ottoman Turks in the 1440s.

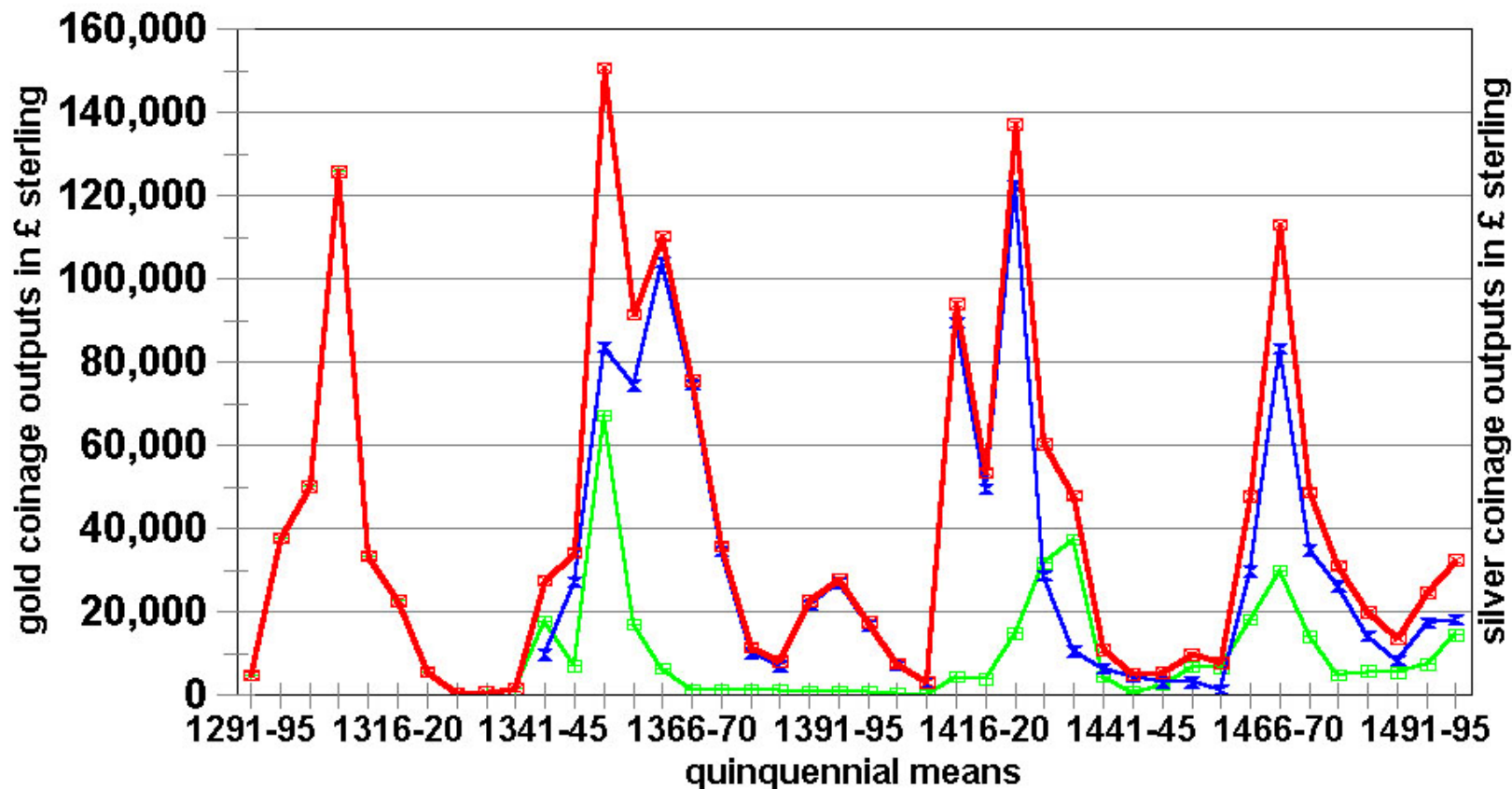
Silver Mines in Medieval Europe



Second Bullion Famine, Deflation, and Technological Changes: 1440s – 1460s

- - **Proof for the second bullion famine**
- - **mint outputs** drastically declined 1440s – 1470s
- - **very severe deflations**: on order of 35%
- **Consequence of deflation** : to increase the relative purchasing power of silver
- **Significance**: increased profits from silver mining → technological changes in the mining industries

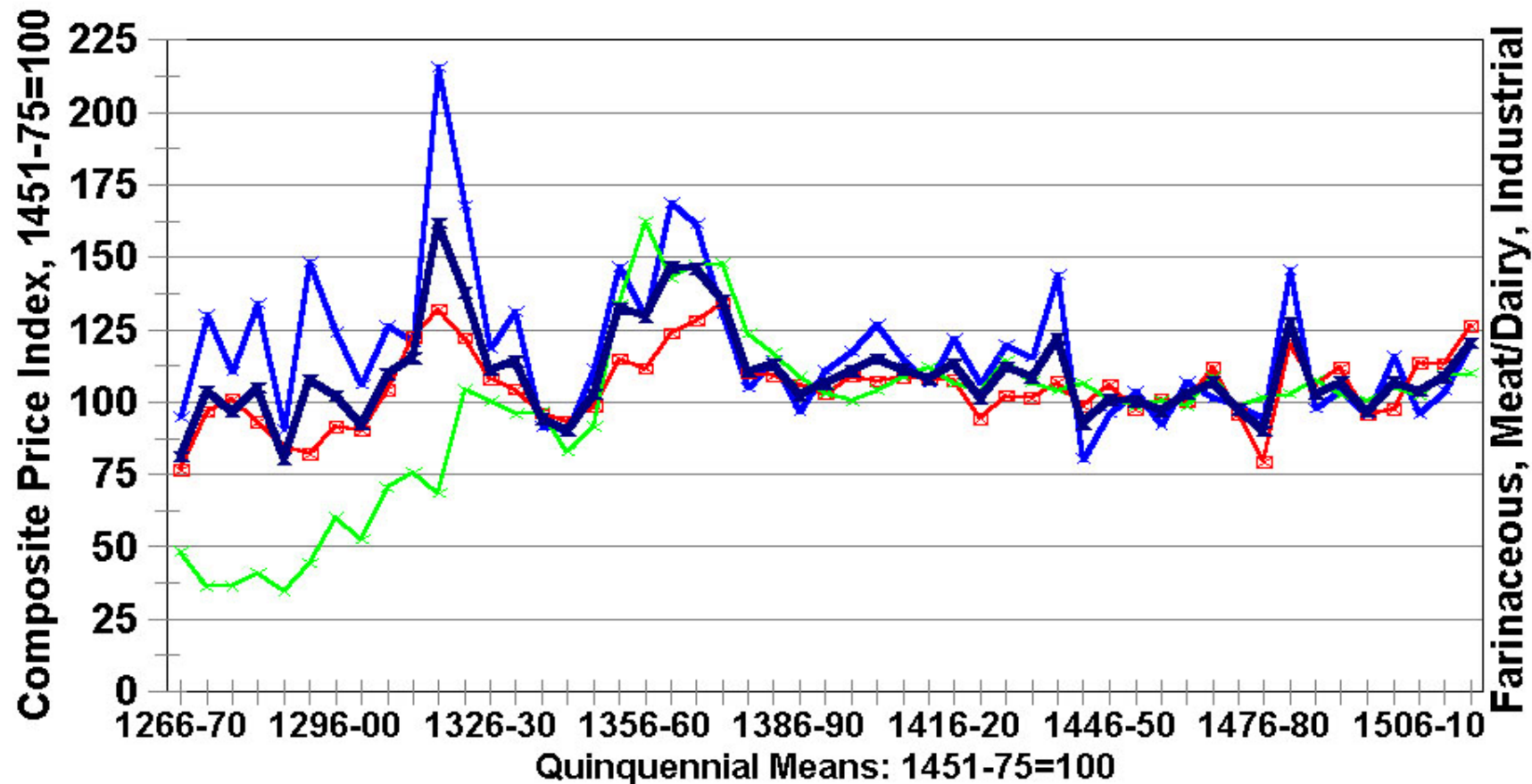
English Gold & Silver Mint Outputs 1291-95 to 1496-00 in £ sterling



—■— Silver Outputs in £ sterling
 —▲— Gold Outputs in £ sterling
—■— Total Outputs in £ sterling

English Price Indices, 1266-1520

Farinaceous, Meat/Dairy, Industrial



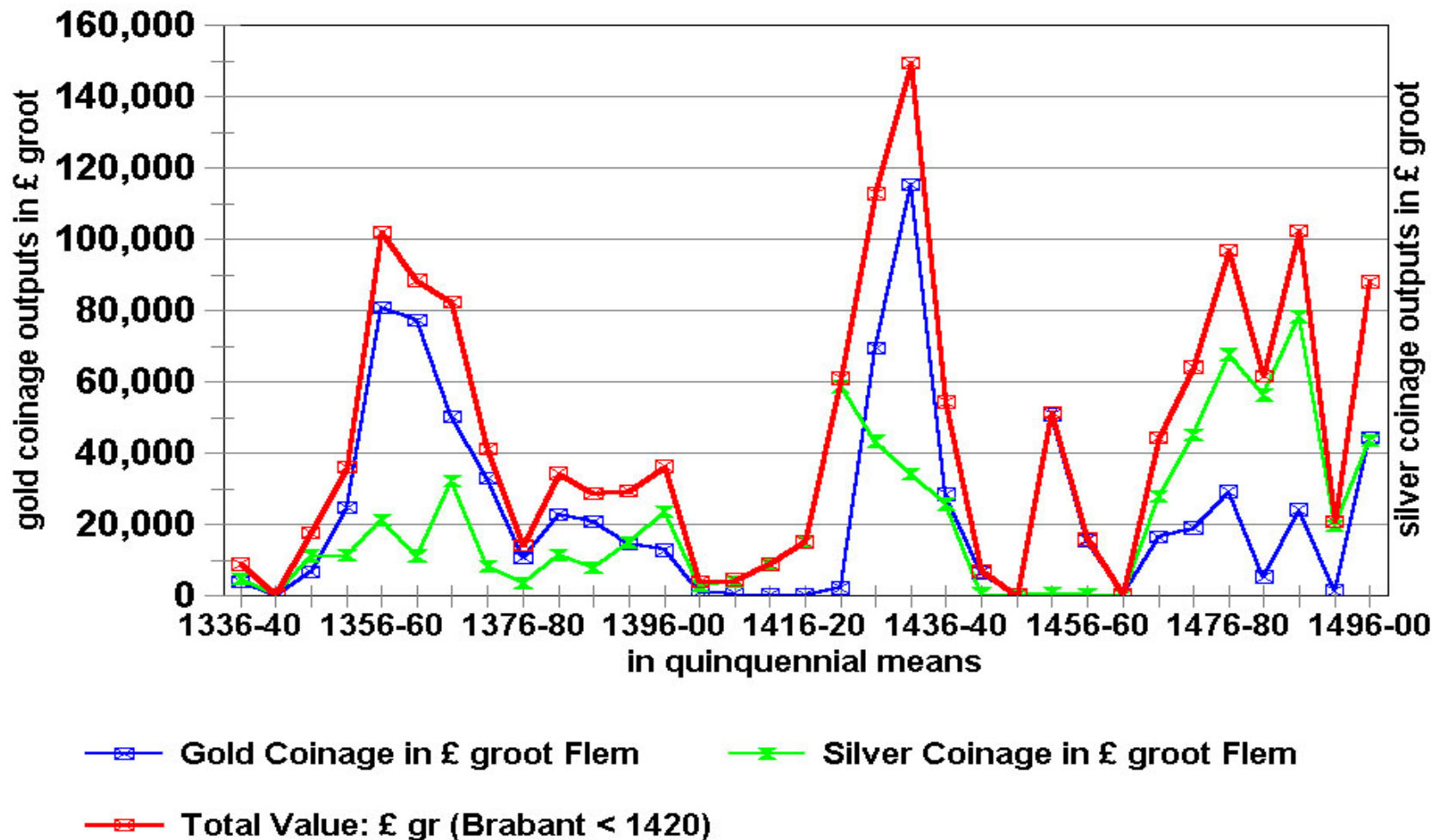
Farinaceous Index

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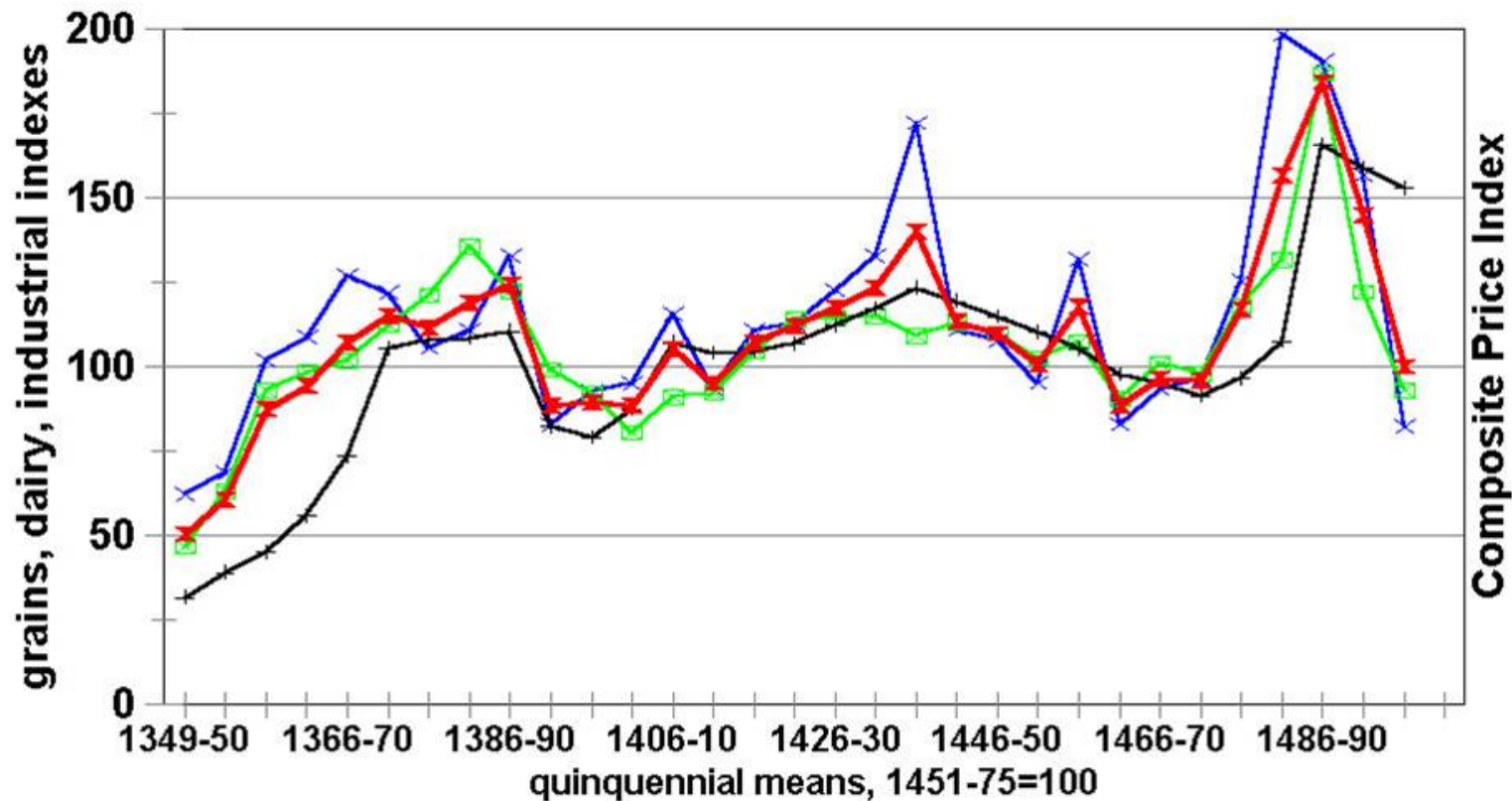
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Flemish Commodity Prices, 1346 - 1500

in 5 yr means: 1451-75=100



—x— farinaceous index

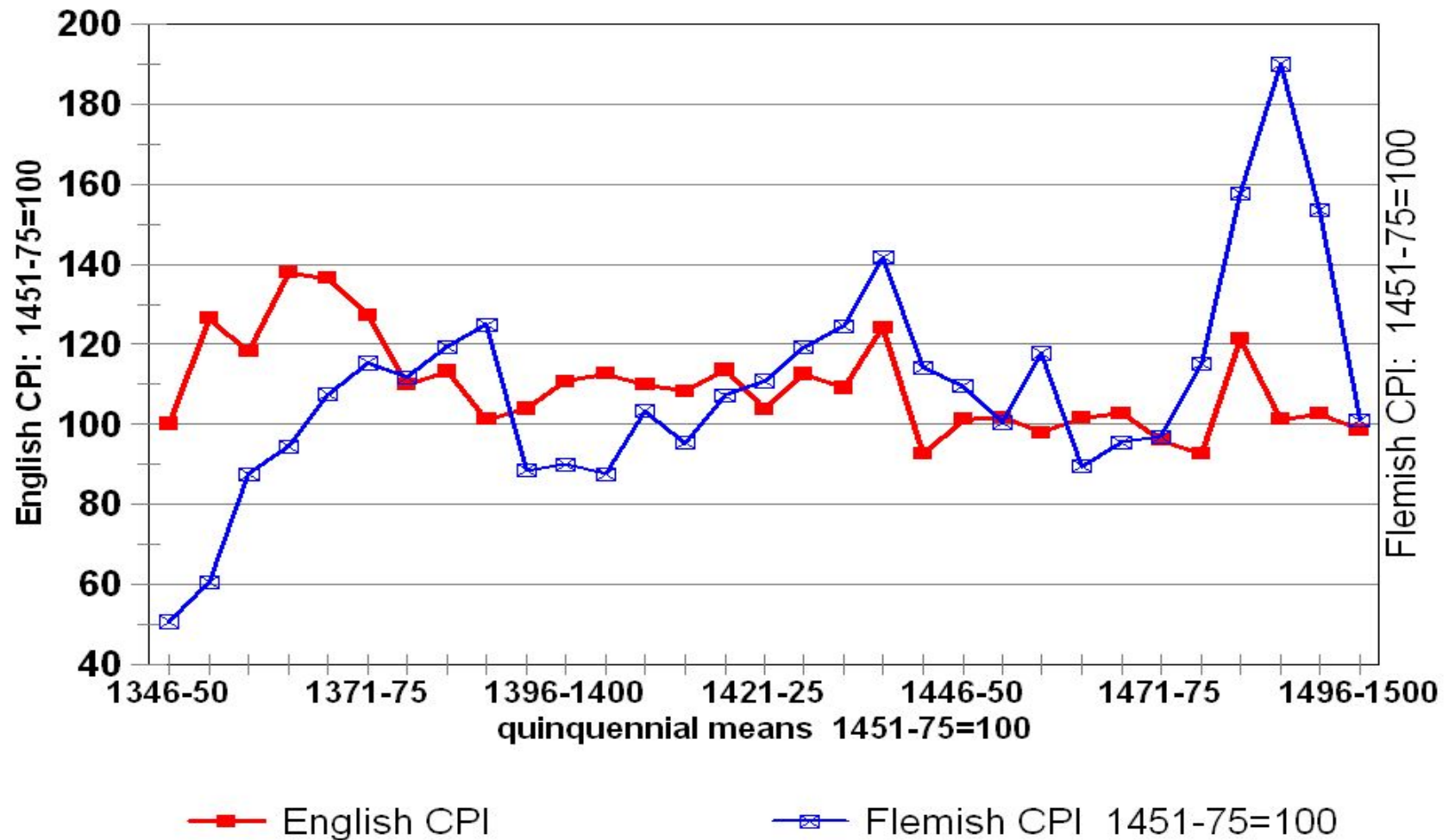
—□— dairy products index

—+— Industrial (textile) index

—x— Composite Price Index 1451-75=100

England & Flanders: Price Indexes

CPI in quinquennial means, 1346-1500



European Silver Mining Boom:

ca. 1460 – ca. 1540: 1

- **TECHNOLOGICAL CHANGES IN EUROPEAN SILVER-COPPER MINING**
- (1) **In mechanical engineering: drainage pumps** (water- and horse-powered) to permit much deeper mining shafts
- - use of **drainage adits** in mountain sides
- (2) **In chemical engineering: the *Saigerhütten* process:** to separate silver from copper in argentiferous-cupric ores: using **lead in smelting** the ores (lead combines with silver)

European Silver Mining Boom: ca. 1460 – ca. 1540: 2

- 3) **These ores were the main source of silver in South Germany, and Central Europe:**
- **but there had been previously no known means of separating the two metals,**
- - nor of reaching deeper ores

European Silver Mining Boom: ca. 1460 – ca. 1540: 3

- **4) New water-powered Blast Furnaces:**
- **to smelt these ores** on a vastly larger scale: with falling marginal costs
- **output of European silver mines increased five-fold** from the 1460s to the 1540s: to a peak output of almost 56,000 kg in late 1530s.
- **From the Spanish Americas, by the 1550s,** came a much cheaper source of silver

German mining pumps

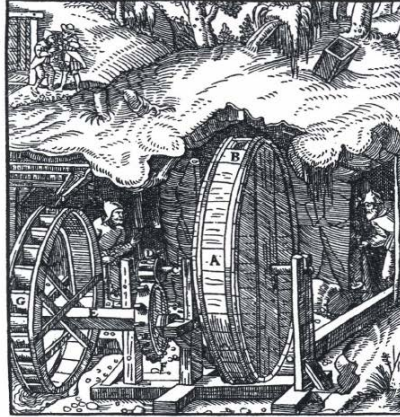


FIGURE 2-18. Water-powered ventilating fan for mines, Agricola, 1556. Paddles were rotated in the cylinder *A* by the overshot wheel, *C*, taking in air at *B* and forcing it into the mine through the wooden conduit situated near the lower right portion of the picture.

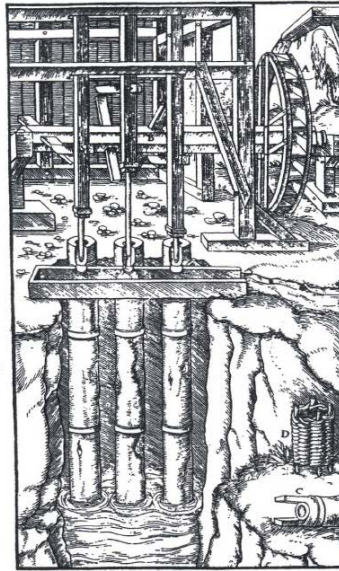


FIGURE 2-19. Triple suction pump operated by overshot water wheel, Agricola, 1556. The piston rods of these pumps were lifted by the cams situated along the axle, *B*, of the water wheel.

Water-Powered Blast Furnace

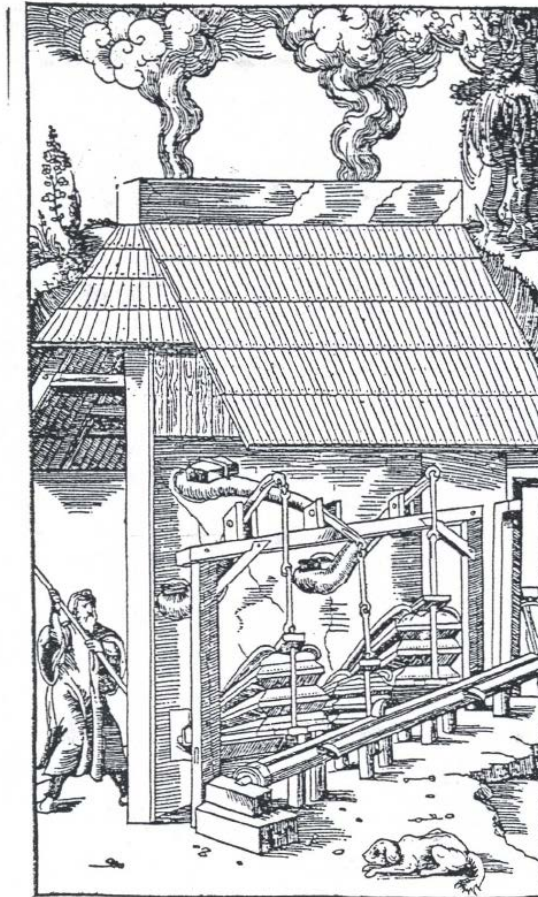


FIGURE 2-26. Water-powered blast furnace from Agricola, 1556. A portion of the water wheel can be seen at the extreme right. The bellows were cam-activated. As the cam rotated, it closed the bellows, forcing air through the furnace. They were reopened by means of a counter-weighted lever arm after the cam had rotated out of contact.

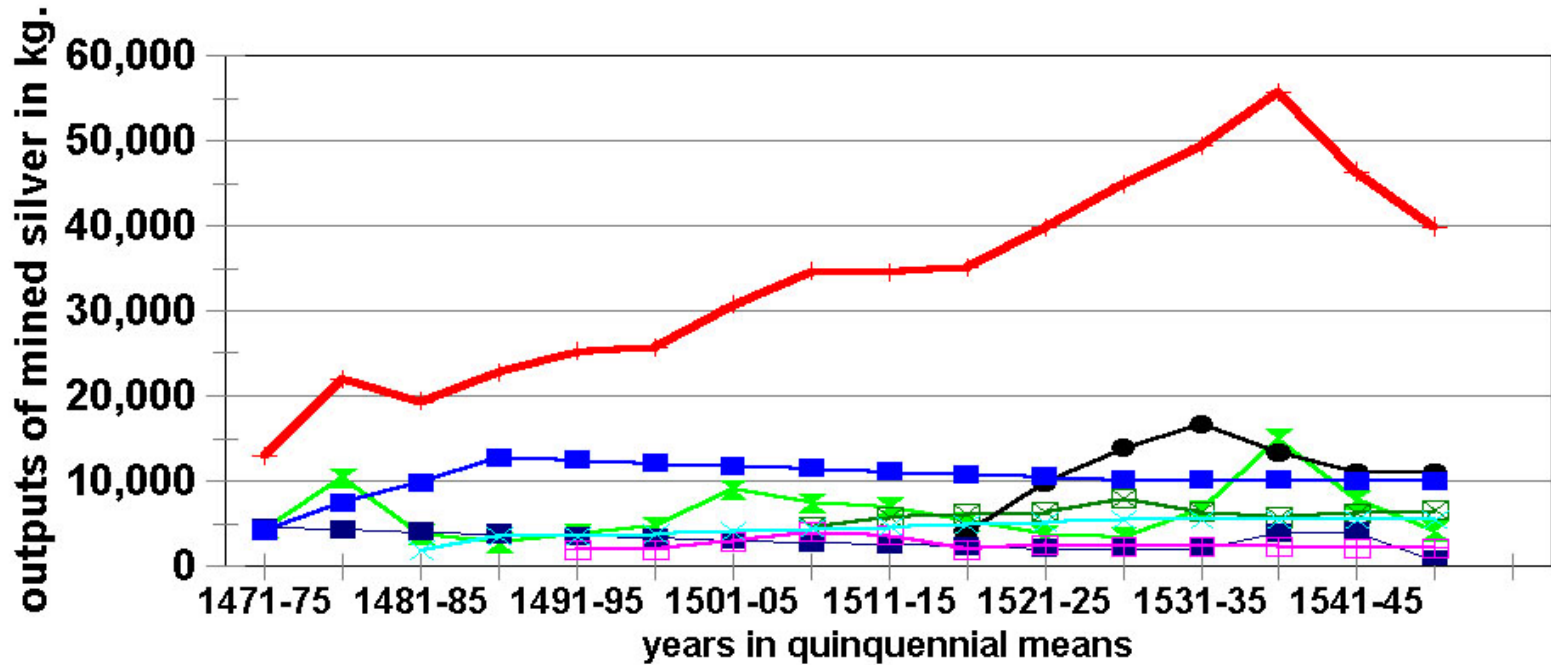
Silver Outputs from the Major South German-Central European Mines

in kilograms of fine metal, in quinquennial means: 1471-75 to 1546-50

Years	SAXONY	THURINGIA	BOHEMIA	BOHEMIA	SLOVAKIA	HUNGARY	TYROL:	TOTAL
5 -yr pr.	Est. Total	Est. Total	Joachimsthal	Kutna Hora	Fugger- Thurzo kg	Nagybanya	Schwaz	Estimated
	in kg.	in kg.	in kg.	in kg.	in kg.	in kg.	in kg.	in kg.
1471-75	4,360.94			4,500.0			4,112.50	12,973.44
1476-80	10,317.46			4,250.0			7,354.00	21,921.46
1481-85	3,743.30			4,000.0		1,800.0	9,745.80	19,289.10
1486-90	2,770.04			3,750.0		3,523.0	12,751.00	22,794.04
1491-95	3,757.33			3,500.0	1,957.12	3,523.0	12,422.75	25,160.21
1496-00	4,641.69			3,250.0	1,957.12	3,795.9	12,094.50	25,739.17
1501-05	8,979.23			3,000.0	2,870.47	4,068.7	11,766.25	30,684.65
1506-10	7,416.41	4,626.19		2,750.0	3,990.76	4,341.6	11,438.00	34,562.92
1511-15	6,925.10	5,713.42		2,500.0	3,632.11	4,614.4	11,109.75	34,494.81
1516-20	5,189.14	6,079.43	3,970.00	2,250.0	1,983.07	4,887.3	10,781.50	35,140.43
1521-25	3,701.18	6,301.73	9,703.24	2,000.0	2,486.46	5,160.1	10,453.25	39,806.00
1526-30	3,425.12	7,889.16	13,795.32	2,000.0	2,269.15	5,433.0	10,125.00	44,936.74
1531-35	6,663.07	6,300.90	16,554.81	2,000.0	2,269.15	5,433.0	10,125.00	49,345.92
1536-40	14,973.18	5,734.07	13,248.01	3,947.0	2,243.58	5,433.0	10,125.00	55,703.84
1541-45	7,739.26	6,144.00	10,936.85	3,997.0	2,141.55	5,433.0	9,963.49	46,355.16
1546-50	4,131.66	6,576.20	10,936.85	700.0	2,141.55	5,433.0	9,963.49	39,882.76

German-Central European Silver Mining

silver outputs in kg: 1471/5 - 1546/50



—x— Saxony

—x— Thuringia

—●— Bohemia: Joachimsthal

—□— Slovakia: Fuggers

—x— Hungary

—■— Tyrol: Schwaz

—+— Total Silver Outputs in kg (est)

Importance of Copper

- (1) **Copper as a monetary metal**
- - **all coins**, even the best silver and gold coins, always contained some copper as hardening agents
- - **Coinage debasements**: more copper → less silver
- **All-copper coins**: Habsburg Netherlands in 1543;
- Spain in 1599 ; France in 1607
- (2) **Equally important industrial metal**
- (3) **Copper alloys**:
- a) **Brass**: copper plus zinc
- b) **Bronze**: copper plus tin
- **became major European exports** to Africa and Asia in late 15th & 16th centuries

Bronze Artillery

- **Cast bronze cannons**
- **evolved from church bells:** developed in 14th century:
- **much safer** and thus much preferred to iron, even if bronze cannons cost more
- **shift to cast iron cannons:** only with the Industrial Revolution, from 1760s

Central European Copper Production and Exports: in Kilograms of Fine Copper
with exports to Venice and Antwerp, in quinquennial means: 1491-95 to 1536-40

	Total Outputs	Exports: Total	To Venice	To Venice	To Antwerp	To Antwerp
	Estimated in kg	kg	kg	Percent	kg	Percent
1481-85	1,400,504					
1486-90	1,400,504					
1491-95	1,980,746					
1496-00	2,704,948	1,390,392.3	446,742.2	32.13%	72,545.1	5.22%
1501-05	3,041,820	1,403,347.5	409,357.8	29.17%	453,686.4	32.33%
1506-10	4,770,333	1,627,847.0	184,642.0	11.34%	819,753.4	50.36%
1511-15	5,654,047	1,659,584.9	60,358.6	3.64%	968,521.4	58.36%
1516-20	5,203,097	1,388,953.7	29,544.6	2.13%	606,520.0	43.67%
1521-25	5,341,702	1,434,963.1	66,809.2	4.66%	488,633.1	34.05%
1526-30	5,275,248	1,062,740.6	54,876.6	5.16%	625,457.9	58.85%
1531-35	4,628,886	1,008,644.5	111,652.6	11.07%	543,443.9	53.88%
1536-40	4,336,708	1,207,783.7	150,544.0	12.46%	593,242.8	49.12%

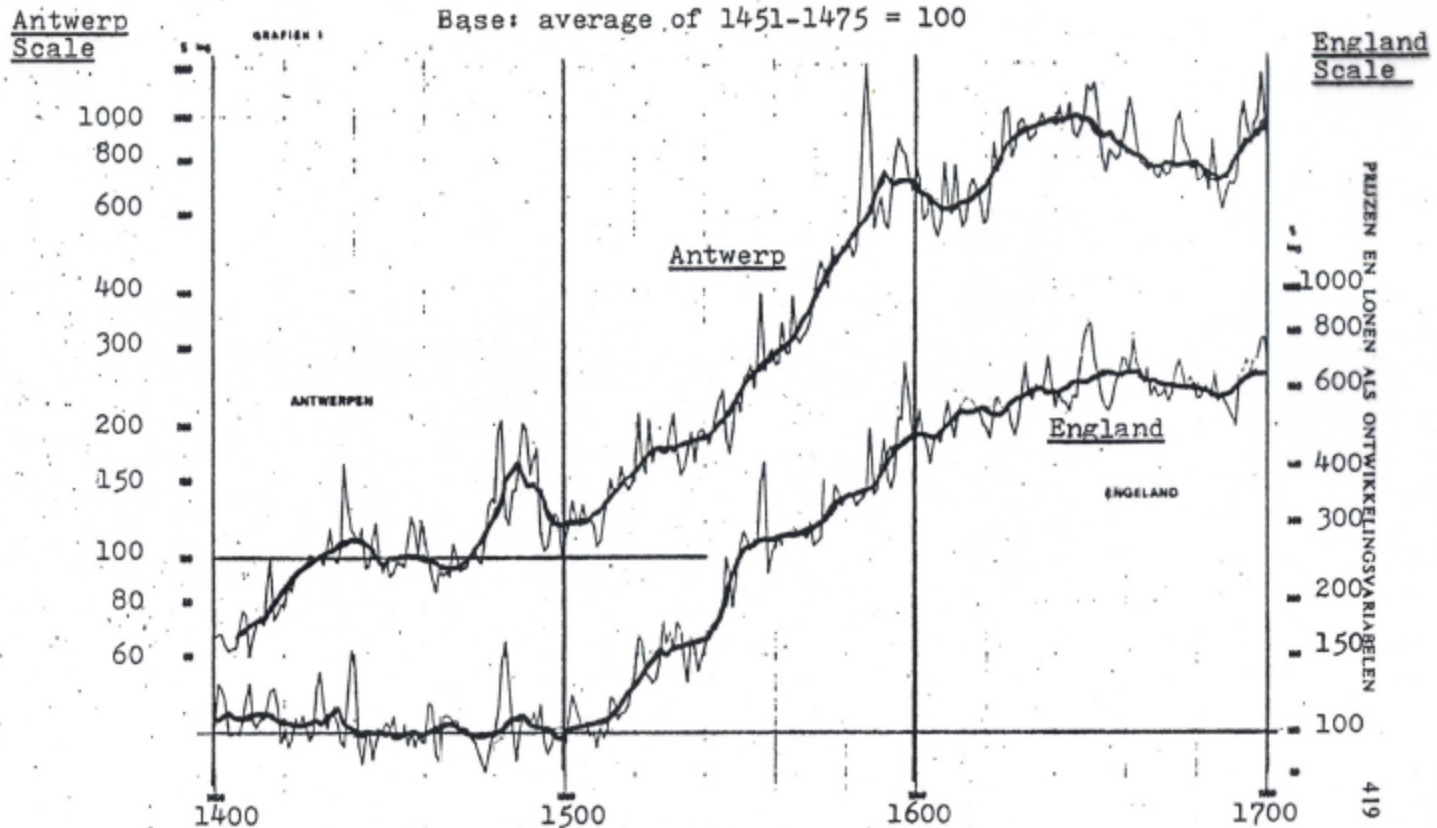
Economic Importance of the South German Silver-Copper Mining Boom

- (1) **South-Germany became the leading economic region** of later-medieval economy, from the 1460s: mining, textiles, banking, trade
- (2) **Major force in promoting revival of overland transcontinental routes:** by new **eastern routes from Venice** – South Germany (across Alps) – to Frankfurt – along Rhine → to the Low Countries
- (3) **Major factor in the Rise of the Antwerp Market** -- governing European economy, 1460s to 1560s (in second semester)

Central European Mining Boom

- (4) **Revival and expansion of the European economy from 'Great Depression': BEFORE** any major demographic recovery
- (5) **Provided Europeans with chief commodities** for trade with Africa & Asia (silver & copper):
- **for foundations of European overseas Colonialism and Imperialism, from the 1490s: GLOBALIZATION**
- (6) **Ended bullion famines** → providing monetary foundations for the **PRICE REVOLUTION, 1520 - 1650:**
 - unique period of inflation

The Movement of Prices in England and the Low Countries, 1400 - 1700
 annual indexes and moving averages (13 years): mean of 1471-75 = 100



Grafiek I : Gewogen nominaal prijsindex van een pakket essentiële verbruiksgoederen in West-Brabant en Zuid-Engeland, 1400-1700 : jaarlijkse indices en voortschrijdende interkwartiele medianen over 13 jaar (semi-logaritmische schaal).

