VIII. Macro-economic changes in the early-modern European economy

C. Price Movements during the Price Revolution and 'General Crisis' eras

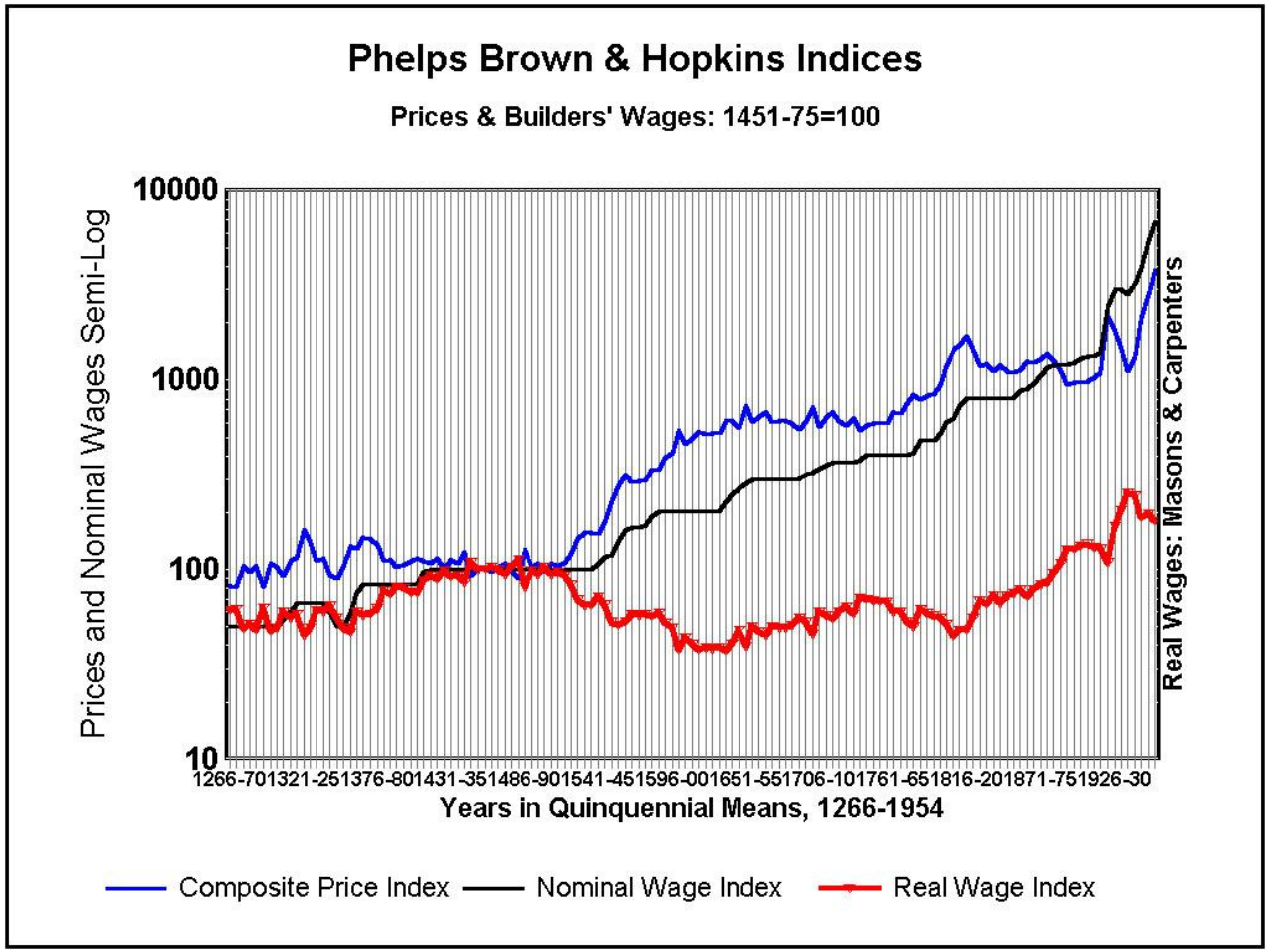
revised 26 January 2012

Week no., Wednesday Dates, and Suggested Readings	**Lect-ure No.**	**LECTURE TOPICS** to be covered
15. **25 January 2012** **Brady**, ch. 5 (Munro); ch. 4 (Yun); **Davis,** chs. 6, 9, 12; **Cipolla**, ch. 10 (pp. 234-59); **de Vries**, ch. 1; **Musgrave**, chs. 1-3; **ET 6, 7**	**16**	**THE COURSE OF PRICES AND ECONOMIC TRENDS:** **The Debates About the 16th Century 'Price Revolution' era (1520 - 1640) and the 17th-Century 'General Crisis' era (1640 - 1740).** **Hamilton's 'Profit Inflation' Thesis**; and changes in factor costs with inflation and deflation.

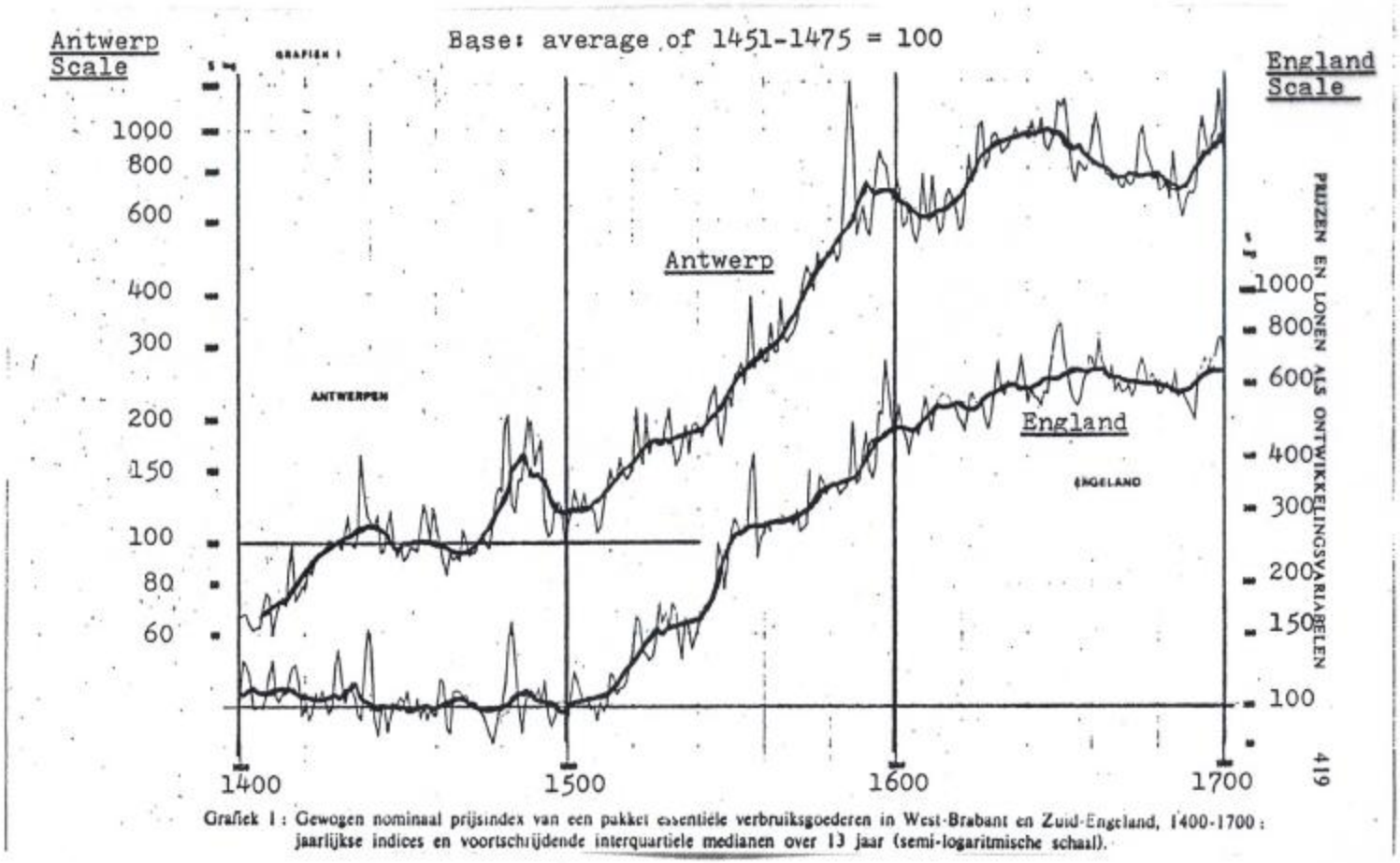
Price Revolution: Introduction

- **(1) Historical significance:**
- - **while inflationary & deflationary cycles are a constant theme of European economic history,** from the 12th century to present day, **the Price Revolution era is unique:**
- - **longest sustained period of inflation ever recorded,**
- - **importance: changes in both the price level (CPI) and changes in relative prices often had very major impacts on** economic changes and economic growth:
- **especially in the agricultural and industrial sectors**: in early modern Europe (from ca. 1500 to 1750: eve of Industrial Revolution)
- **I will later contend that most technological innovations** were in response to changes in relative factor costs

Price Revolution in England



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

Weighted price index of a basket of essential household goods in West Brabant (Antwerp-Lier region) and southern England, 1400 - 1700: annual indexes and 13-year moving averages (inter-quartile medians), on a semi-logarithmic scale.

Price Indexes: England, Brabant, Spain

1451 - 1650: 5 yr means (1501-10 =100)

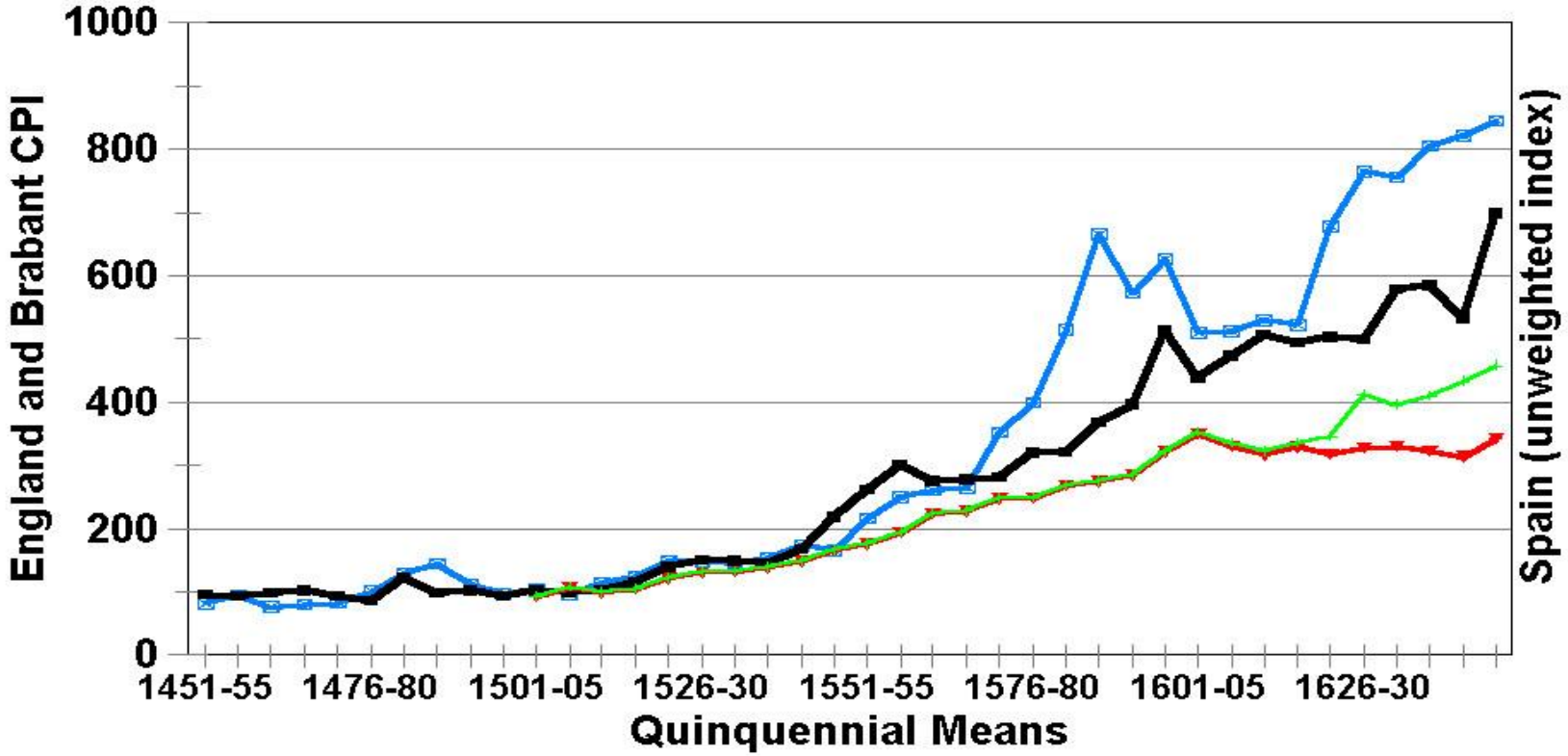
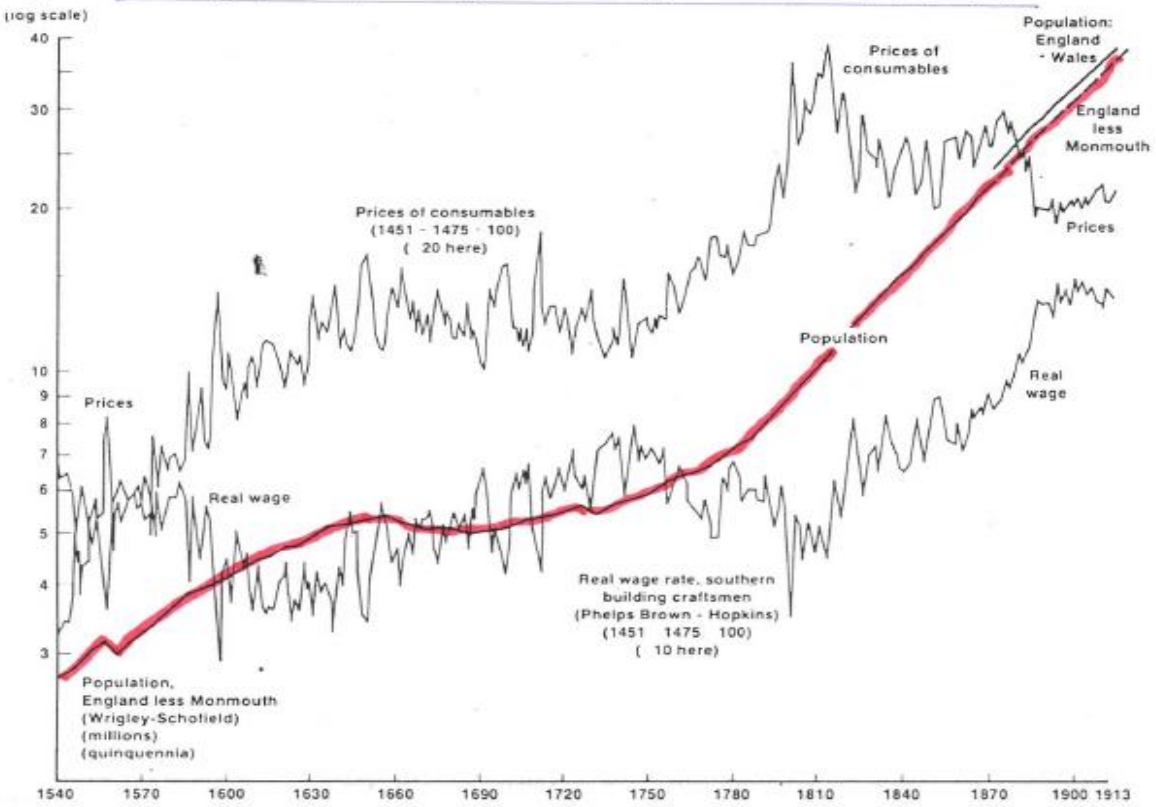


Fig. 1 Real Wages, Prices, and Population in England and Wales, 1541–1913



RWI = NWI/CPI

The Real Wage Index = Nominal Wage Index divided by the Consumer Price Index

Peter Lindert, 'English Population, Wages, and Prices: 1541 - 1913', *Journal of Interdisciplinary History*, 15 (Spring 1985), 614.

Price Revolution: Introduction (2)

- (2) **Debate about causes of the Price Revolution**
- (a) **The Real School**: **that demographic factors (population growth) provided the primary (or even sole) cause** – as suggested in the Lindert graph
- - **in my view, this thesis is badly mistaken:**
- - confuses micro-economics with macro-economics; and
- - **confuses changes in relative prices with changes in the price level (CPI)**

Price Revolution: Introduction (3)

- (2) **Debate about causes of the Price Revolution**
- (b) **The Monetary School**: **that inflation & deflation are essentially monetary phenomena**
- - **What is the more important**: changes in stocks (money supplies) or in flows (income velocity)?
- - **not, however, purely a monetary phenomenom:** -
- - **demographic factors probably played some role** in income-velocity changes: to be demonstrated later
- - **changes in aggregate output (NNI) = 'y':** endogenous or exogenous to population growth?
- (c) **how and why are modern inflations different:** in nature & form, from World War I?

Price Levels and Price Trends in England, 1450-1749 Mean Price Indices* and Mean Annual Rates of Price Changes, for 25-Year Periods.

Mean of Price Indices for 1451-1475 = 100 (Base)*

Quarter Century	Mean Price Index:* 1451-75=100	Mean Annual Percentage Change in Price Index	Standard Deviation (s.d.)	Coefficient of Variation (s.d./Mean)
1450-74	101.4	+0.08%	7.68	7.6
1475-99	104.6	+0.06%	18.52	17.7
1500-24	115.5	+1.47%	19.21	16.6
1525-49	168.8	+1.56%	29.57	17.5
1550-74	287.2	+0.20%	41.45	14.4
1575-99	401.6	+2.26%	94.71	23.6
1600-24	505.3	+0.69%	47.94	9.5
1625-49	595.6	+0.95%	81.48	13.7
1650-74	631.6	-0.42%	72.26	11.4
1675-99	616.7	+0.48%	74.01	12.0
1700-24	617.8	-0.09%	81.03	13.1
1725-49	587.6	-0.17%	51.00	8.7

* The Phelps Brown and Hopkins Price Index.

Quantity Theories of Money 1

- (1) **Fisher Identity: Equation of Exchange: M.V. = P.T**
  - **based on the transactions** velocity of money
  - **fault:** impossibility of measuring transactions
- (2) **Friedman Version:** **M.V = P.y**
  - based on the **income velocity** of money
  - **y** = Net National Income - deflated by CPI
- - **in both:** distinguish between **monetary stocks (M) and monetary flows (V)**

Quantity Theories of Money 2

- (3) **Cambridge Cash Balances (modernized)**
- - **M = k.P.y**
- - in which '**k**' measures that proportion of NNI (P.y) that the public chooses to hold in active cash balances (with no investment yield):
- **so that M = the quantity of money necessary to satisfy that equation**
- - **Cambridge 'k'**: also seen as the **propensity to hoard** (without earning investment income)

Quantity Theories of Money - 3

- (4) **Keynes: Liquidity Preference:**
- the component factors explaining **'k'**: to hold active cash balances (instead of spending or investing)
- - **transactions motive**
- - **precautionary motive** (for a 'rainy day')
- - **investment + speculative motive**
- **opportunity cost of 'k'**: forgoing income earned from investing those same funds
- - **Cambridge 'k' = reciprocal of Friedman 'V':** i.e, the Income Velocity of Money
- ➔ **k = 1/V; V = 1/k**

Quantity Theories of Money - 4

- (5) **Basic Assumptions involved in both Quantity Theories:**
- a) **Classical Quantity Theories → Fisher Identity:**
- i) **That economies always operate at Full Employment ('the norm')** ➔ so that T (i.e, Y) is at its maximum, while V is fixed (short term)
- ii) **Thus, an increase in M must lead to a proportional increase in P** (inflation): if T and V are fixed

Quantity Theories of Money - 5

- b) **Keynes' Liquidity Preference Theory:**
- **an increase in M will lead to a fall in Fisher's V (velocity) = a rise in Cambridge k, for two reasons:**
- i) **Both V and k (V = 1/k) reflect society's ability to economize on its use of money**: if M is more plentiful, more money will be kept as cash balances (Δ k) = decline in V
- ii) **An increase in M, with LP constant, will result in a fall in interest rates** ➔ increase in 'k' (i.e., reduction in opportunity cost) and also in **'y'**
- iii) **The economy was/is rarely, if ever, at Full Employment**

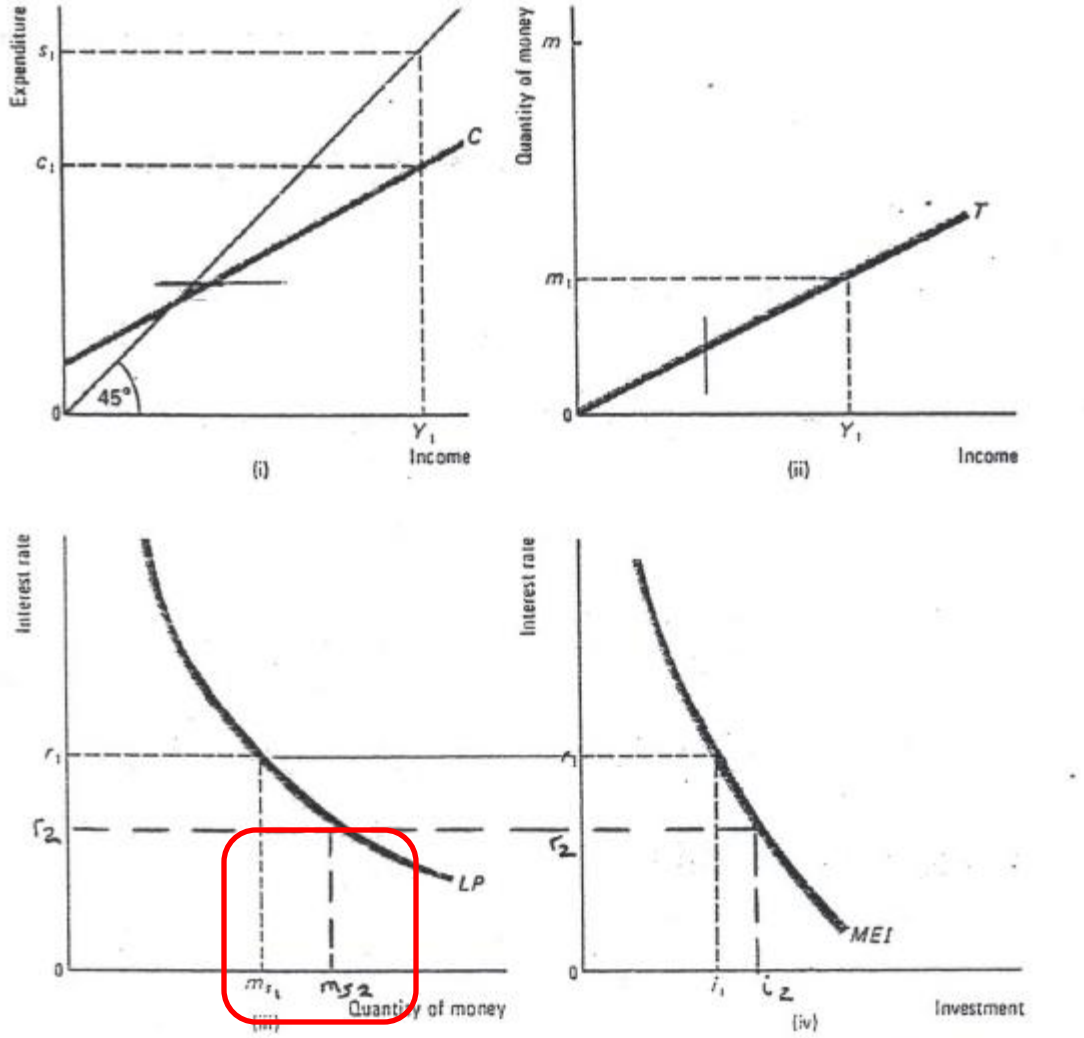
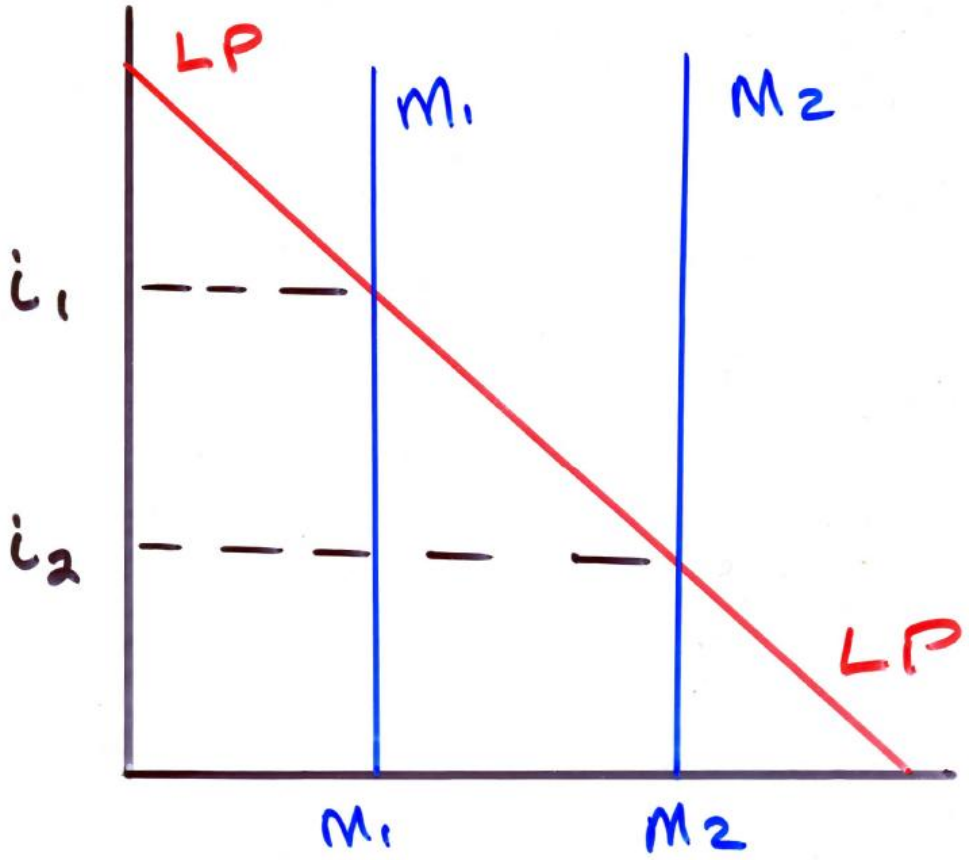


Fig. 43.1 The Keynesian model. (i) The consumption function (ii) The transactions demand for money (T) varies with the level of income (Y) (iii) The speculative and precautionary demand for money (LP) varies with the rate of interest (r) (iv) Investment (MEI) varies with the rate of interest (r)

Keynes: Liquidity Preference & interest rates



Quantity Theories of Money - 6

- (6) **My views on anticipated changes from Δ M**
- - a) **some possible decrease in V** → a rise in **'k'**
- - b) **some increased investment** - from a fall in interest rates → an increase in Friedman '**y**'
- **N.B.: Y = NNI = NNP: is a 'real' variable (not monetary)**
- -c) **some increase in P (CPI: price level)**: but **never** proportionate to the increase in **M**

Quantity Theories of Money - 7

- -d) **possible exception: coinage debasements**, increasing M, **may** also increase V (= fall in k): as a 'flight from money' into real assets
- - **but not during Henry VIII's 'Great Debasement'** (1542-51)
- - **also not so during 15th century** Flemish debasements
- (7) **Changes in Friedman's 'y' (NNI = NNP): 'real' variable**
- - an endogenous or exogenous variable?
- - what was the impact of population growth and technological changes on 'y'?

Debasements and Inflation in Medieval and Early Modern Europe

Relationships between the debasements of the Flemish silver penny groot and changes in the Consumer Price Index in Flanders, 1409 - 1484

Consumer Price Index: base 1451-75 = 100

Years	Silver Content of the Flemish silver penny in grams	percentage change from previous coinage	Value of 1 kg fine silver in £ groot Flemish	percentage change from previous coinage	Year 1	Year 3	Price Index in Year 1	Price Index in Year 3	Percentage Change 2 years
1409	1.182		3.524						
1416	0.958	-18.95%	4.349	23.39%	**1416**	**1418**	118.916	92.239	-22.43%
1418	0.850	-11.30%	4.903	12.75%	**1418**	**1420**	92.239	98.118	6.37%
1428	0.749	-11.91%	5.566	13.53%	**1428**	**1430**	112.317	125.849	12.05%
1433	0.814	8.80%	5.116	-8.09%	**1433**	**1435**	139.210	108.046	-22.39%
1466	0.703	-13.67%	5.926	15.83%	**1466**	**1468**	95.930	96.153	0.23%
1467	0.677	-3.77%	6.158	3.92%	**1467**	**1469**	102.146	96.000	-6.02%
1474	0.597	-11.79%	6.981	13.37%	**1474**	**1476**	108.208	92.370	-14.64%
1477	0.522	-12.50%	7.979	14.29%	**1477**	**1479**	98.775	149.327	51.18%
1482	0.466	-10.71%	8.936	12.00%	**1482**	**1484**	193.932	120.307	-37.96%

Relationships between the debasements of the English sterling silver penny and changes in the Consumer Price Index in England, 1346 - 1544

Consumer Price Index: base 1451-75 = 100

Years	Silver Content of the English silver penny in grams	percentage change from previous coinage	Value of 1 kg fine silver in £ sterling English	percentage change from previous coinage	Year 1	Year 3	Price Index in Year 1	Price Index in Year 3	Percentage Change 2 years
1346	1.199		3.476						
1351	1.079	-10.00%	3.862	11.11%	**1351**	**1353**	128.695	132.567	3.01%
1412	0.899	-16.67%	4.634	20.00%	**1412**	**1414**	103.557	107.673	3.97%
1464	0.719	-19.99%	5.793	25.00%	**1464**	**1466**	88.062	105.511	19.81%
1526	0.639	-11.11%	6.517	12.50%	**1526**	**1528**	137.120	184.364	34.45%
1542	0.491	-23.14%	8.479	30.11%	**1542**	**1544**	174.939	180.847	3.38%

Formula to relate the percentage change in the silver content of the coin (reduction by debasement) and the increase in the money-of-account value of fine silver: i.e., the expected rate of increase in the money supply and of inflation:

$$\Delta T = [1/(1 - x)] - 1$$

ΔT = % change in the money-of-account value of the silver **traite:** per pound or kg of fine silver

x = % change (reduction) in the silver content of the penny (as a decimal)

Quantity Theories of Money - 8

- (8) **Monetarists and Keynesian views on V and k (V = 1/k):**
- - **Monetarists: believe that V (1/k) is fixed** or relatively stable, at least in the short-run
- - **Keynesians: believe the opposite:**
- that V is very flexible in the short run
- - **Keynesians also believe that k = 1/V is very responsive to changes in interest rates:** that it will rise when interest rates fall

Recent Canadian Monetary Experience - 1

- (1) **Behaviour of V = 1/k: 1975 to 2011**
- - **V (based on M as M1+ Gross):**
- **-** has ranged from a low of 2.843 in 2011 (k = 0.342) to the previous high of 7.228 in 1981 (k = 0.138)
- - V had risen from 1975 (and earlier) to this 1981 peak:
- - **Note the considerable expansion in the money supply (M1+) -- and Keynes proposition:** that V will fall ('k'with a rise in M: also seen in Mayhew's table).

Money Supply, GDP, Interest Rates, and Prices in Canada, 1975 - 2011: Annual Means of monthly data

Year	M M1+ Gross $ billions	V = Y/M Income Velocity of M1+ Gross	k =1/V Cambridge cash balances	P CPI 2002=100	y = Y/CPI Real GDP: $ billions in 2002 dollars	GDP = Y Gross Domestic Product in $ billions at current market prices	Population Canadian population in millions	Inflation: Percent Change in CPI	Bank Rate Bank Rate (percent)	Real GDP p.c. Real GDP per capita in 2002 dollars
1975	34.913	4.973	0.20109	28.96	599.591	173.6210	23,102,980	10.68%	8.500	25,952.96
1976	35.719	5.599	0.17860	31.14	642.211	199.9940	23,414,365	7.55%	9.292	27,428.10
1977	39.682	5.569	0.17958	33.63	656.984	220.9730	23,694,035	8.01%	7.708	27,727.83
1978	42.886	5.710	0.17513	36.65	668.229	244.8770	23,935,651	8.95%	8.979	27,917.74
1979	44.782	6.243	0.16018	39.99	699.065	279.5770	24,170,445	9.13%	12.104	28,922.30
1980	51.033	6.161	0.16232	44.05	713.637	314.3900	24,471,129	10.16%	12.891	29,162.40
1981	49.873	7.228	0.13836	49.53	727.771	360.4710	24,785,059	12.43%	17.931	29,363.30
1982	55.175	6.885	0.14525	54.88	692.151	379.8590	25,083,479	10.80%	13.958	27,593.90
1983	62.592	6.573	0.15215	58.10	708.123	411.3860	25,336,505	5.86%	9.553	27,948.74
1984	70.527	6.375	0.15687	60.60	741.943	449.5820	25,577,353	4.30%	11.312	29,007.80
1985	89.427	5.431	0.18411	63.00	771.009	485.7140	25,813,854	3.96%	9.647	29,868.03
1986	102.767	4.987	0.20050	65.63	780.952	512.5410	26,068,353	4.18%	9.214	29,957.87
1987	108.522	5.151	0.19415	68.48	816.218	558.9490	26,399,956	4.34%	8.403	30,917.38
1988	116.428	5.266	0.18990	71.25	860.441	613.0940	26,754,940	4.05%	9.686	32,160.06
1989	125.911	5.224	0.19143	74.81	879.187	657.7280	27,219,748	4.99%	12.293	32,299.60
1990	128.499	5.291	0.18899	78.40	867.246	679.9210	27,638,583	4.76%	13.045	31,378.10
1991	134.510	5.095	0.19626	82.80	827.738	685.3670	27,987,829	5.62%	9.034	29,574.92
1992	139.841	5.009	0.19964	84.00	833.905	700.4800	28,319,473	1.49%	6.783	29,446.34
1993	151.501	4.800	0.20834	85.60	849.514	727.1840	28,648,235	1.86%	5.088	29,653.28
1994	156.280	4.933	0.20273	85.70	899.502	770.8730	28,958,270	0.16%	5.766	31,062.00
1995	160.398	5.053	0.19792	87.60	925.144	810.4260	29,262,649	2.17%	7.308	31,615.18
1996	179.464	4.663	0.21445	88.90	941.354	836.8640	29,570,577	1.58%	4.531	31,834.15
1997	197.601	4.467	0.22385	90.40	976.475	882.7330	29,868,726	1.62%	3.521	32,692.21
1998	205.509	4.452	0.22461	91.30	1,002.161	914.9730	30,125,715	0.99%	5.104	33,265.97
1999	221.764	4.430	0.22573	92.90	1,057.525	982.4410	30,369,575	1.73%	4.917	34,821.87

Year	M M1+ Gross $ billions	V = Y/M Income Velocity of M1+ Gross	k =1/V Cambridge cash balances	P CPI 2002=100	y = Y/CPI Real GDP: $ billions in 2002 dollars	GDP = Y Gross Domestic Product in $ billions at current market prices	Population Canadian population in millions	Inflation: Percent Change in CPI	Bank Rate Bank Rate (percent)	Real GDP p.c. Real GDP per capita in 2002 dollars
2000	231.436	4.652	0.21497	95.38	1,128.783	1,076.577	32,352,977	2.70%	5.771	34,889.62
2001	254.823	4.348	0.22997	97.78	1,133.170	1,108.048	31,129,298	2.52%	4.313	36,402.05
2002	282.192	4.086	0.24477	100.00	1,152.905	1,152.905	31,446,719	2.27%	2.708	36,662.17
2003	296.506	4.092	0.24440	102.75	1,180.706	1,213.175	31,734,093	2.75%	3.188	37,206.22
2004	322.897	3.998	0.25013	104.66	1,233.452	1,290.906	32,038,401	1.86%	2.500	38,499.17
2005	344.243	3.991	0.25057	106.98	1,284.267	1,373.845	32,352,977	2.21%	2.917	39,695.49
2006	371.124	3.908	0.25588	109.12	1,329.220	1,450.405	32,690,242	2.00%	4.313	40,661.06
2007	402.631	3.799	0.26323	111.45	1,372.444	1,529.589	33,048,782	2.14%	4.604	41,527.83
2008	436.712	3.672	0.27236	114.09	1,405.373	1,603.418	33,448,916	2.37%	3.208	42,015.50
2009	491.771	3.109	0.32163	114.43	1,336.140	1,528.985	33,856,945	0.30%	0.650	39,464.28
2010	551.750	2.944	0.33962	116.47	1,394.908	1,624.608	34,254,344	1.78%	0.850	40,722.09
2011	599.765	2.843	0.35173	119.86	1,422.668	1,705.181	34,605,346	2.91%	1.250	41,111.22

Recent Canadian Monetary Experience - 2

- 2) **Cambridge 'k' and the Bank Rate:**
- - **Keynes also predicted that 'k' will vary inversely with the bank rate:**
- **Why? Because holding cash balances has an opportunity cost:** foregoing investment income
- **in 1981, Bank Rate was at its high** – 17.931% and Cambridge 'k' was at that low of 0.138
- - **in 2010:** Bank Rate = 0.850% and k = 0.340 (but 0.352 in 2011, when Bank Rate rose to 1.250%)

Mayhew's Estimates of Money Supplies, Velocity, Prices, and National Income in England, 1300 - 1670

Date	1300	1470	1526	1546	1561	1600	1643	1670
Money Supply in millions of £ sterling	0.900	0.900	1.400	1.450	1.450	3.500	10.000	12.000
Velocity (Income V)	5.178	3.889	3.571	5.517	9.310	6.286	3.500	3.407
Price Level: PBH Index	104.800	104.600	135.100	172.300	289.300	478.300	597.800	635.700
National Income Y in millions £ st.	4.660	3.500	5.000	8.000	13.500	22.000	35.000	40.880
Population in millions	6.000	2.300	2.300	2.900	3.000	4.100	5.100	5.000

Source: Nicholas J. Mayhew, 'Population, Money Supply, and the Velocity of Circulation in England, 1300-1700', *Economic History Review*, 2nd ser. 48:2 (May 1995), p. 244.

Recent Canadian Experience - 3

- (3) **Relationship between M and Price level**
- a) **Money supply (M1+)**: grown from $34.913 billion in 1975 to $599.765 billion in 2011: a 17.178 fold increase (= 1617.88%)
- b) **The CPI (2002=100):** has increased from 28.96 in 1975 to 119.86 in 2011: only a 4.138 fold increase (= 313.88%)
- c) **Real GDP (2002 dollars)**: has grown from $599.591 billion in 1975 to $1,422.668 billion in 2011 (+137.27%)
- d) **Population:** grown from 23.102 million in 1975 to 34.605 million in 2011 (1.498 fold increase = 49.79%)

Recent Canadian Experience - 3

- 4) **Conclusions on the Quantity Theory:**
- a) **the expansion in M was offset by**:
- - **a fall in V** (= rise in 'k')
- - **an expansion in y** = NNP (here: real GDP
- b) **importance of population growth**: contributed to growth in GDP, thus offsetting inflationary force of Δ M
- c) **Growth in Real GDP per capita ($2002)**: from $25,953 in 1975 to $41,111 in 2011 (1.584 fold increase = 58.40% increase)

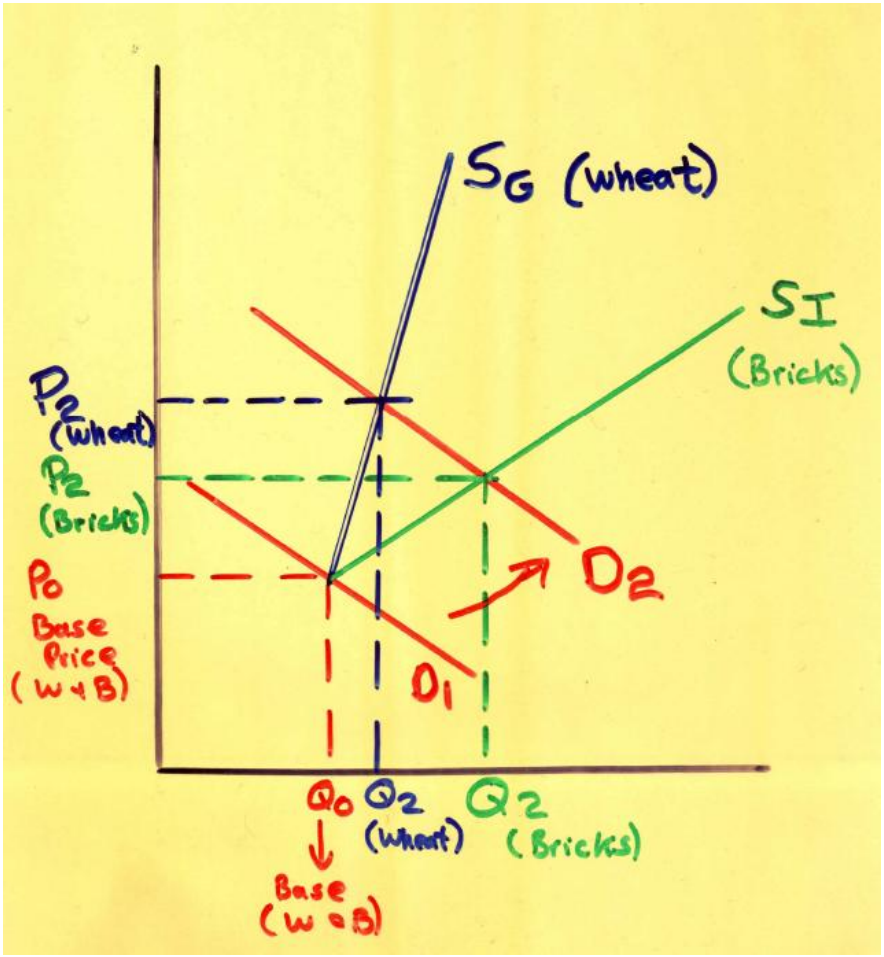
The Role of Population in the Price Revolution era (1520 – 1650) - 1

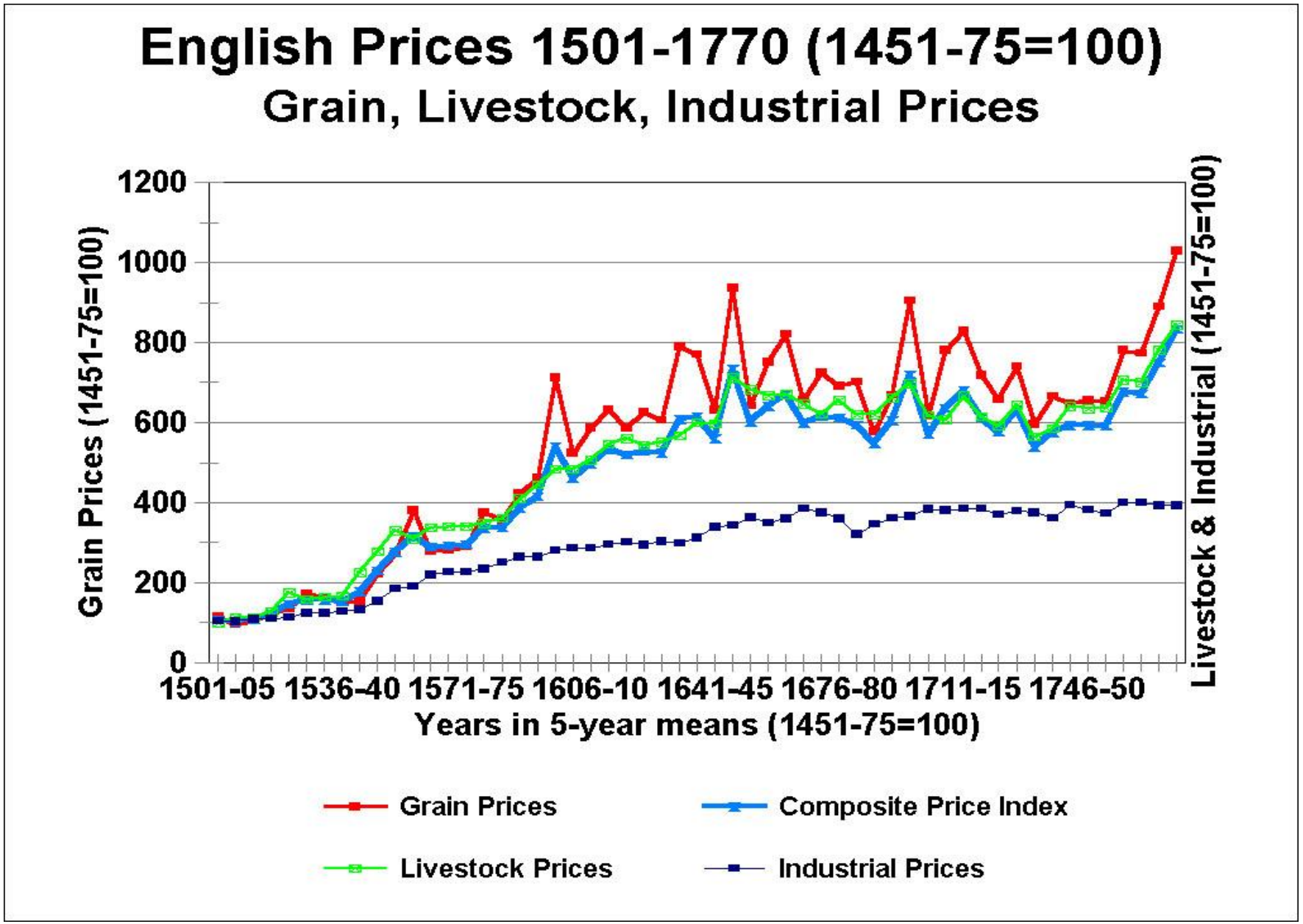
- (1) **Basic premise of the Real School is a fallacy**: that population growth itself 'caused' the Price Revolution:
- a) **Note: inflation began before the demographic recovery:**
- **- inflation: from about 1515** (in England & Low Countries)
- **- demographic growth: from the 1520s** (in same regions)
- b) **this Real model confuses micro- and macro-economics:**
- i) **Yes: population growth** can produce an increase in individual, **relative prices** -- for grains, lumber, fuels, etc.,
- ii) **But: population growth by itself cannot cause a rise in the general price level: in the CPI**

The Role of Population in the Price Revolution era (1520 – 1650) - 2

- c) **micro-economics: rise in prices of necessities (whose production subject to diminishing returns)** would lead, in context of **family budget** constraints, **to reduced demand** and → **relative fall** (real fall) in prices of other commodities
- d) **key factor: differences in supply & demand elasticities,** in the longer run (see graphs)

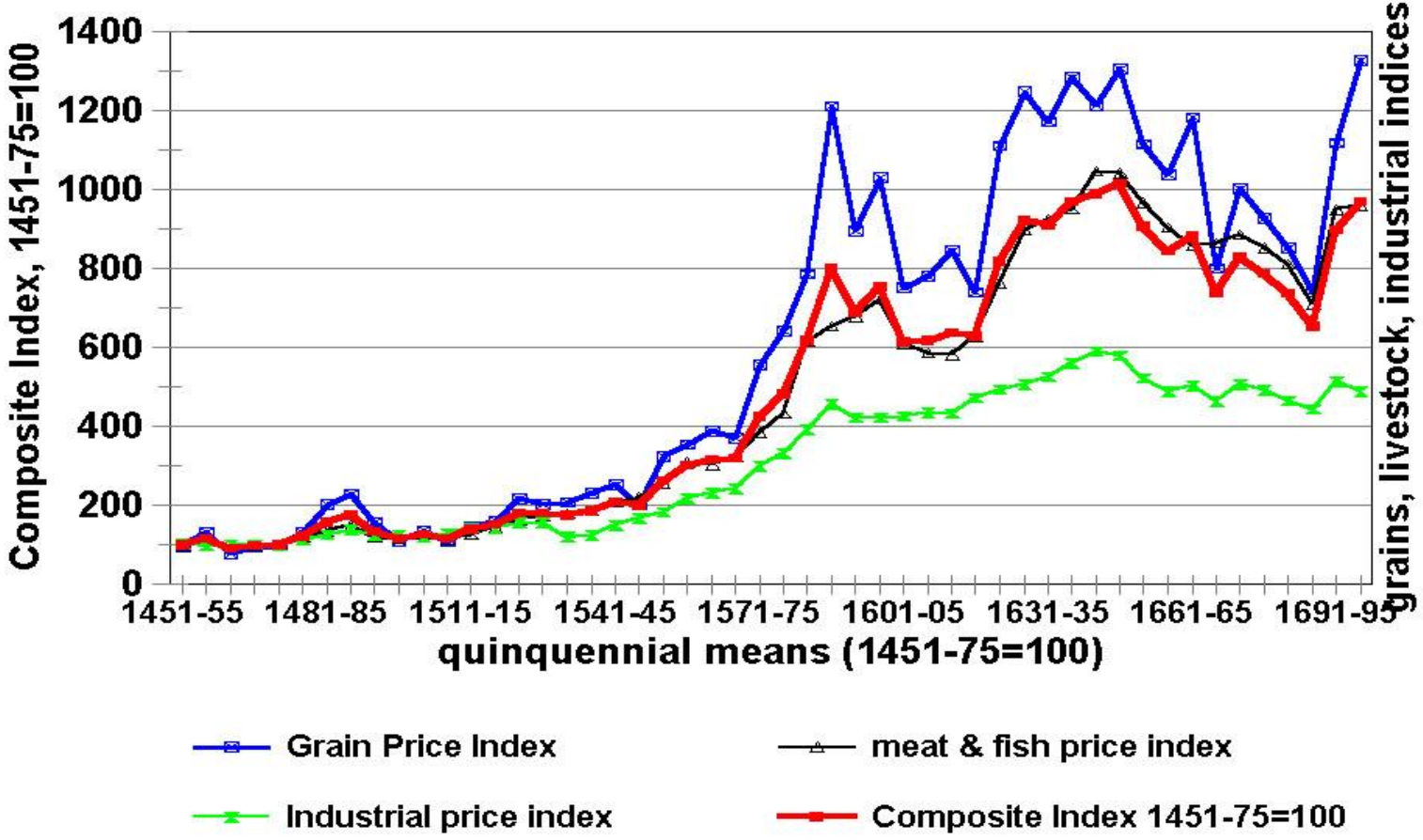
Relative price changes with population growth




English Prices 1501-1770 (1451-75=100)
Grain, Livestock, Industrial Prices
Grain Prices (1451-75=100)
Livestock & Industrial (1451-75=100)
0
200
400
600
800
1000
1200
1501-05
1536-40
1571-75
1606-10
1641-45
1676-80
1711-15
1746-50
Years in 5-year means (1451-75=100)
Grain Prices
Composite Price Index
Livestock Prices
Industrial Prices

Brabant: Price Indexes, 1451-1700

grain, livestock, industrial,composite



The Role of Population in the Price Revolution (3)

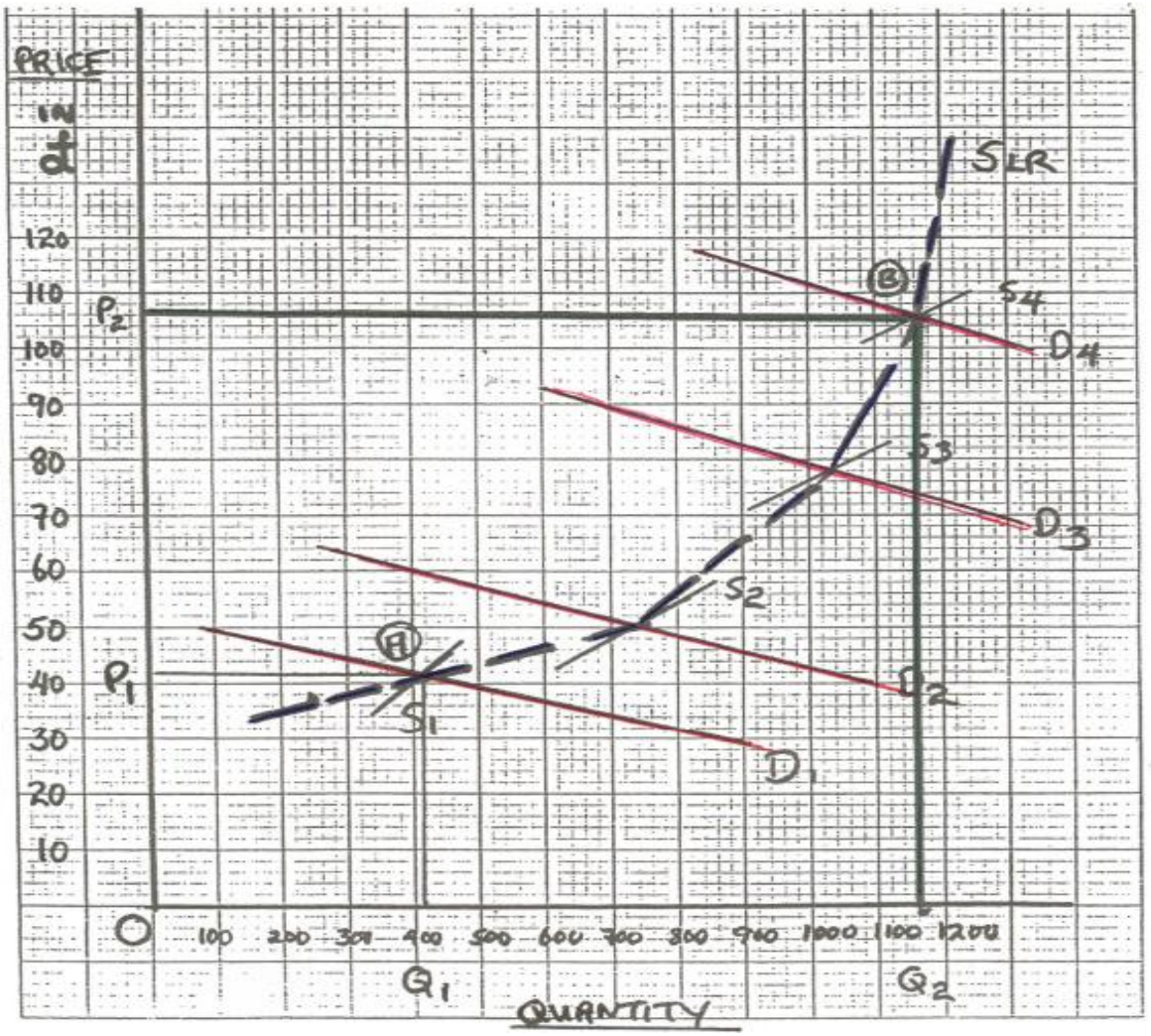
- (2) **Keynesian Aggregate Demand: Population growth and inflation:**
- a) **If we shift the aggregate demand curve upwards, on basis of population growth,** and we see a rise in the price level, what are we missing in this model?
- b) **the fact that prices in the model are measured in terms of a silver-based money-of-account**
- i) **note that with a rise in price level from P(1) to P(2)**, the value of PQ(1) rises from £17,220 to £122,960 for the value of PQ(2):
- ii) **where does all that extra money come from**: an increase in M or an increase in V, or both??

AGGREGATE SUPPLY AND AGGREGATE DEMAND:

POPULATION, MONEY, AND PRICES

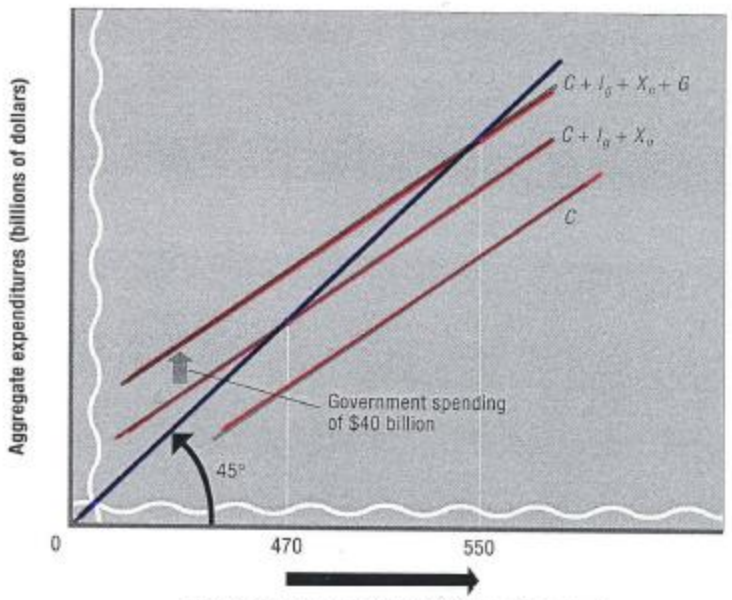
A. Price Level 1: $D_1.S_1 = 42 * 410 = £17,220\ (P_1.Q_1)$

B. Price Level 2: $D_4.S_4 = 106 * 1160 = £122,960\ (P_2.Q_2)$



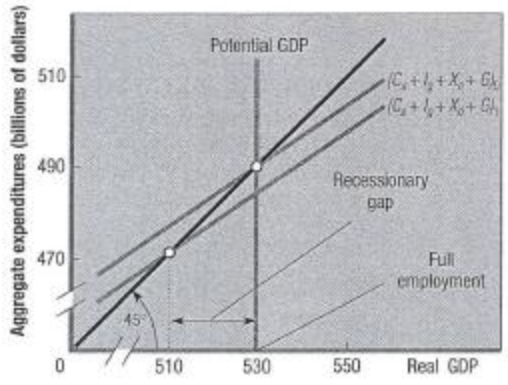
The Role of Population in the Price Revolution (4)

- (3) **The Phillips Curve (1958 article): demonstrating a negative correlation between changes in unemployment rates and the price level, 1861 - 1913**
- **the closer an economy reached full employment, the higher rose the price level**
- - conversely: the higher the unemployment, the more stable was the price level-
- **note difference from the Keynesian L-shaped national income diagram: Y = C+I+G+(X-M)**

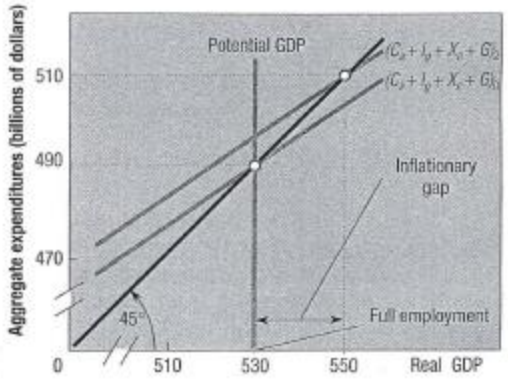


(a) Aggregate expenditures-domestic output approach

FIGURE 10-8 Recessionary and inflationary gaps



(a) Recessionary gap



(b) Inflationary gap

The Phillips Curve: relating unemployment and money wage rates

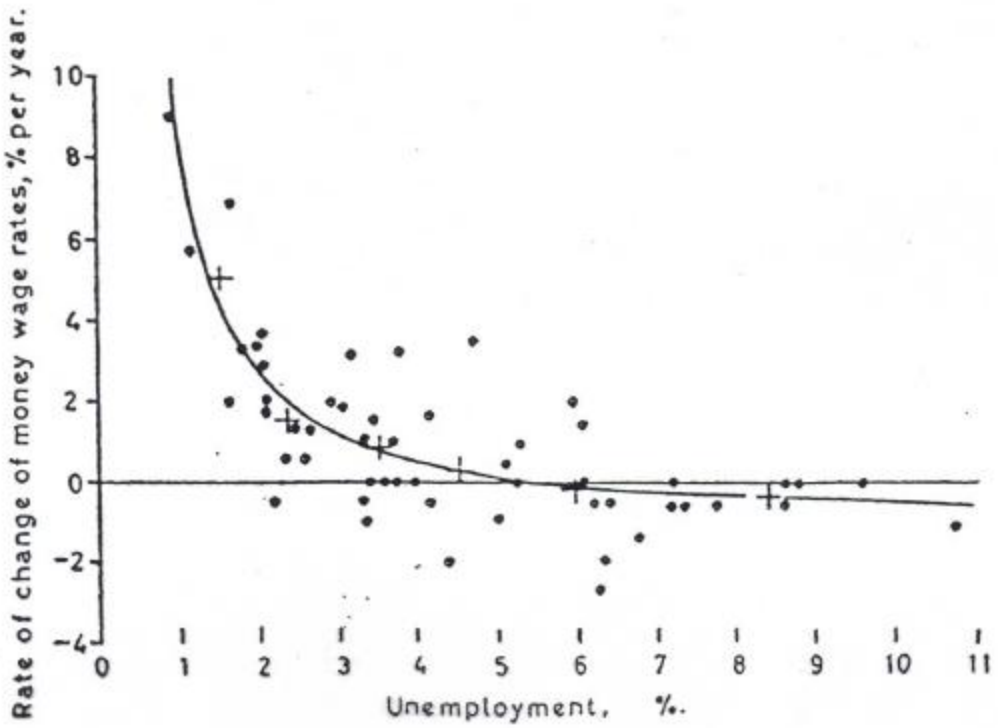
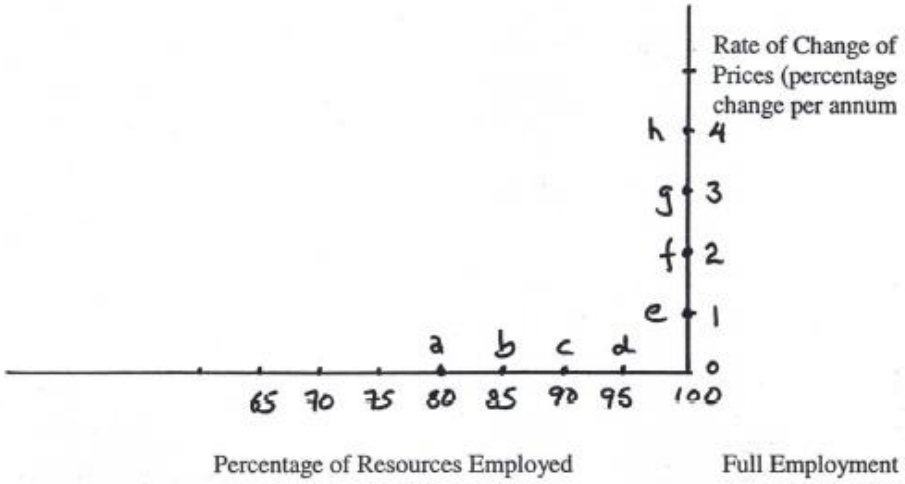


Fig.1. 1861 – 1913

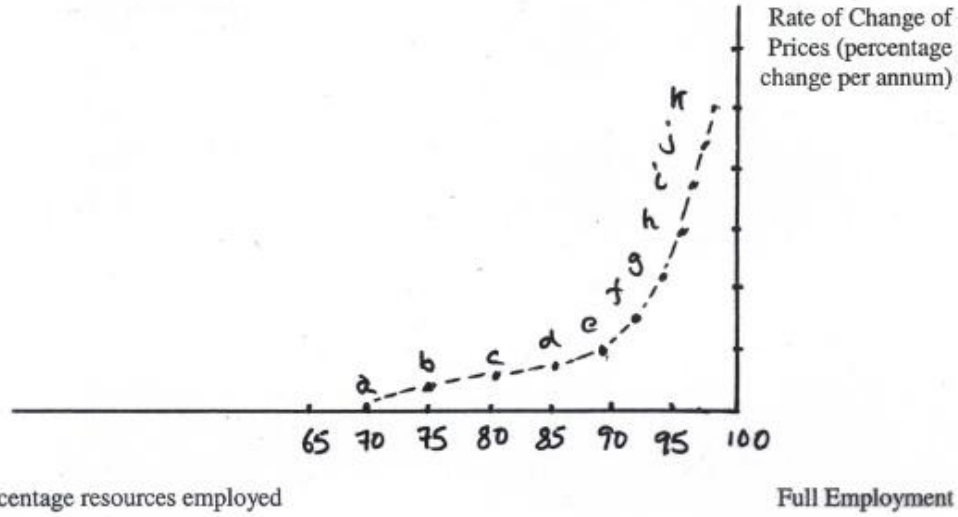
KEYNES AND PHILLIPS

Inflation with Full Employment: the Keynes L-Shaped Relation (Inverted)



The Inverted Phillips Curve:

degrees of inflation with unemployed and then fully employed resources



Keynes: the General Theory (1936)

- **It is probable that the general level of prices will not rise very much as output increases**, so long as there are available efficient unemployed resources of every type.
- **But as soon as output has increased sufficiently to begin to reach the 'bottle necks',** there is likely to be a sharp rise in the prices of **certain** commodities.

The Role of Population in the Price Revolution (5)

(1) **The potential effects on population growth on money, output, and prices:**

- a) **On Supply Side:**
- i) **fuller employment** of existing resources
- ii) → **diminishing returns and rising marginal costs** in agriculture and natural-resource (extraction) industries

The Role of Population in the Price Revolution (6)

(1) The potential effects on population growth on money, output, and prices: cont'd

b) **On the Demand Side**:

- i) **increased demand for money** (increased 'k') ➔ reduce inflationary impact from **Δ M**
- ii) **changes in structure of demand** with more urbanization (Goldstone effect)
- iii) **changes in population's age pyramid** ➔larger families with more children per adult ➔further changes in aggregate demand (Lindert effect)

The Role of Population in the Price Revolution (7)

- (2) **The Goldstone Velocity Theory of Inflation:**
- -a) **the case of England: rapid population growth produced disproportionate urbanization,** with far more complex, more fully monetized market structures (agriculture + industry)-
- **accompanied by growth of commercial + financial institutions:** → much more credit used
- "in occupationally specialized linked networks, the potential velocity of circulation of coins grows as the square of the size of the network"

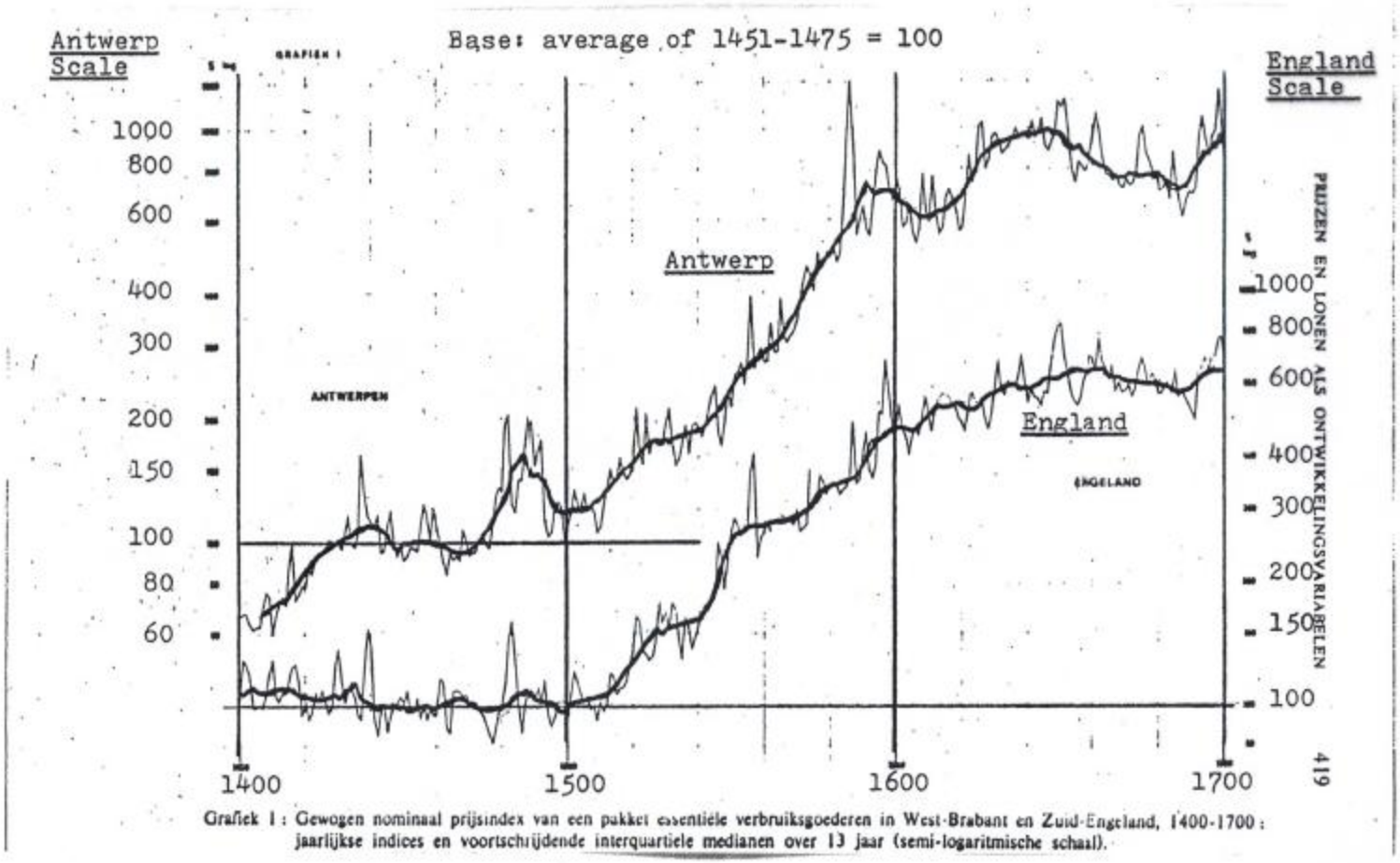
The Role of Population in the Price Revolution (8): Velocity A

- b) **Major Problems with the Goldstone thesis:**
- i) **in both England and Low Countries, Price Revolution began before 1520** (ca. 1515) – before any signs of significant population growth (as stressed earlier)
- ii) **Note the similarity of the degree of inflation in both countries:**
- but Low Countries had become far more urbanized, commercialized, and more advanced in these more complex networks a century before England

The Role of Population in the Price Revolution (9): Velocity A

- b) **Major Problems with the Goldstone thesis:**
- iv) **pretends that velocity is a demographic variable:**
- it is of course a **monetary** variable – V = 1/k.
- iii) **ignores all the evidence on vast increases in the money supply** in both countries: as presented in last lecture, for England & Low Countries

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



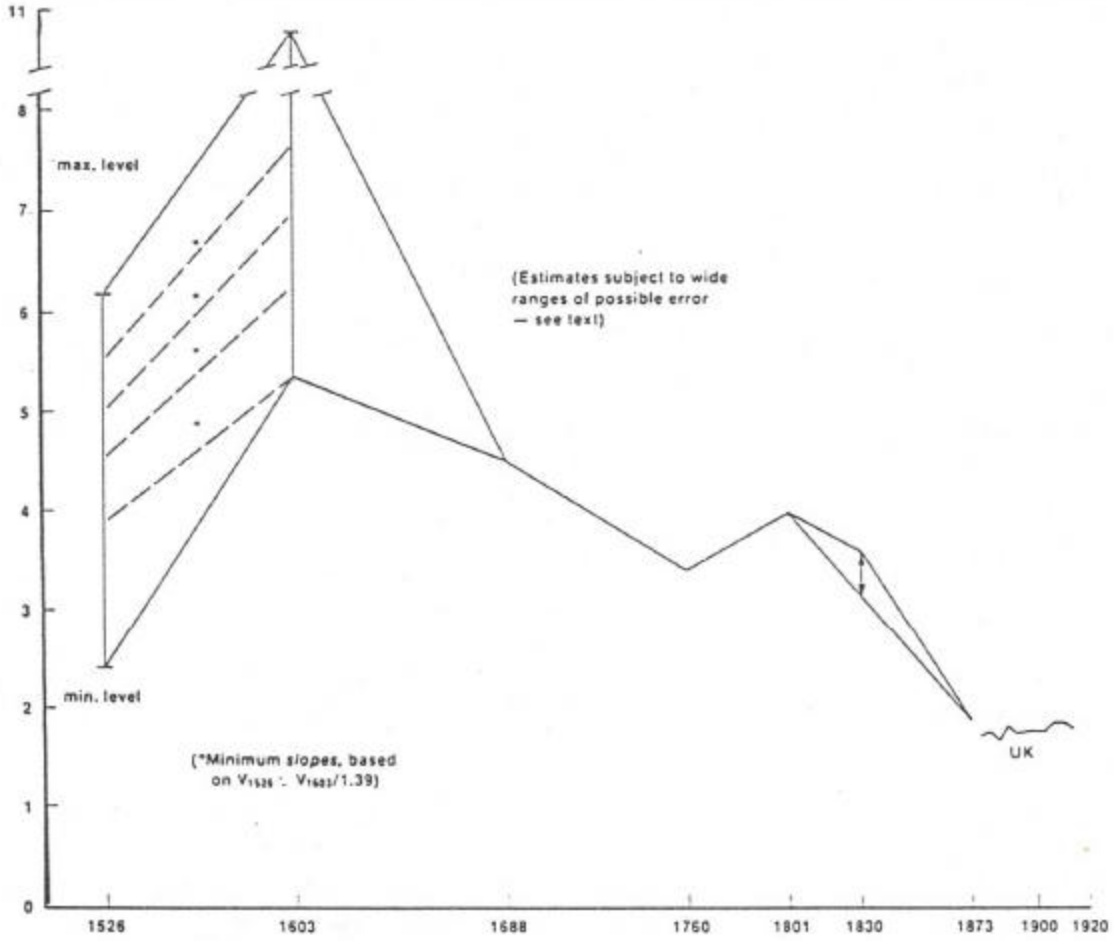
Grafiek 1 : Gewogen nominaal prijsindex van een pakket essentiële verbruiksgoederen in West-Brabant en Zuid-Engeland, 1400-1700 : jaarlijkse indices en voortschrijdende interquartiele medianen over 13 jaar (semi-logaritmische schaal).

Weighted price index of a basket of essential household goods in West Brabant (Antwerp-Lier region) and southern England, 1400 - 1700: annual indexes and 13-year moving averages (inter-quartile medians), on a semi-logarithmic scale.

The Role of Population in the Price Revolution (10): Velocity B

- (3) **The Lindert Velocity Model:**
- **How population growth may have led to an increase in the income velocity of money:**
- a) **by raising the cost of living:** especially in food prices + fuel → reduction in demand for idle balances, inducing dishoarding
- b) **by increasing family size and thus ratio of dependent children (non-earners) to adults** → similarly reducing cash balances, inducing dishoarding
- c) **but how long could this have been sustained**?

Fig. 2 Income Velocity of Money, England and Wales, 1526–1913 (UK after 1873)



The Role of Population in the Price Revolution (11): Velocity C

- (4) **Nicholas Mayhew on Income Velocity of Money in England**:
- a) **agrees with Lindert, Goldstone, Miskimin**: that the income velocity of money (V) rose during the Price Revolution era (1520 – 1650)
- b) **But, before and after, he agrees with Keynes:** that increases in the money supply ➔ fall in income velocity of money = rise in 'k': primarily because of a fall in real interest rates (Keynes LP schedule)
- c) **Changed composition of the coinage supply:**
- **shift from gold to silver,** with a far higher transactions & income velocity for silver coins:

Mayhew's Estimates of Money Supplies, Velocity, Prices, and National Income in England, 1300 - 1670

Date	1300	1470	1526	1546	1561	1600	1643	1670
Money Supply in millions of £ sterling	0.900	0.900	1.400	1.450	1.450	3.500	10.000	12.000
Velocity (Income V)	5.178	3.889	3.571	5.517	9.310	6.286	3.500	3.407
Price Level: PBH Index	104.800	104.600	135.100	172.300	289.300	478.300	597.800	635.700
National Income Y in millions £ st.	4.660	3.500	5.000	8.000	13.500	22.000	35.000	40.880
Population in millions	6.000	2.300	2.300	2.900	3.000	4.100	5.100	5.000

ENGLAND: SILVER AND GOLD COINAGE OUTPUTS:

in kg. fine metal and in £ sterling values
in quinquennial means: 1501-05 to 1596-1600

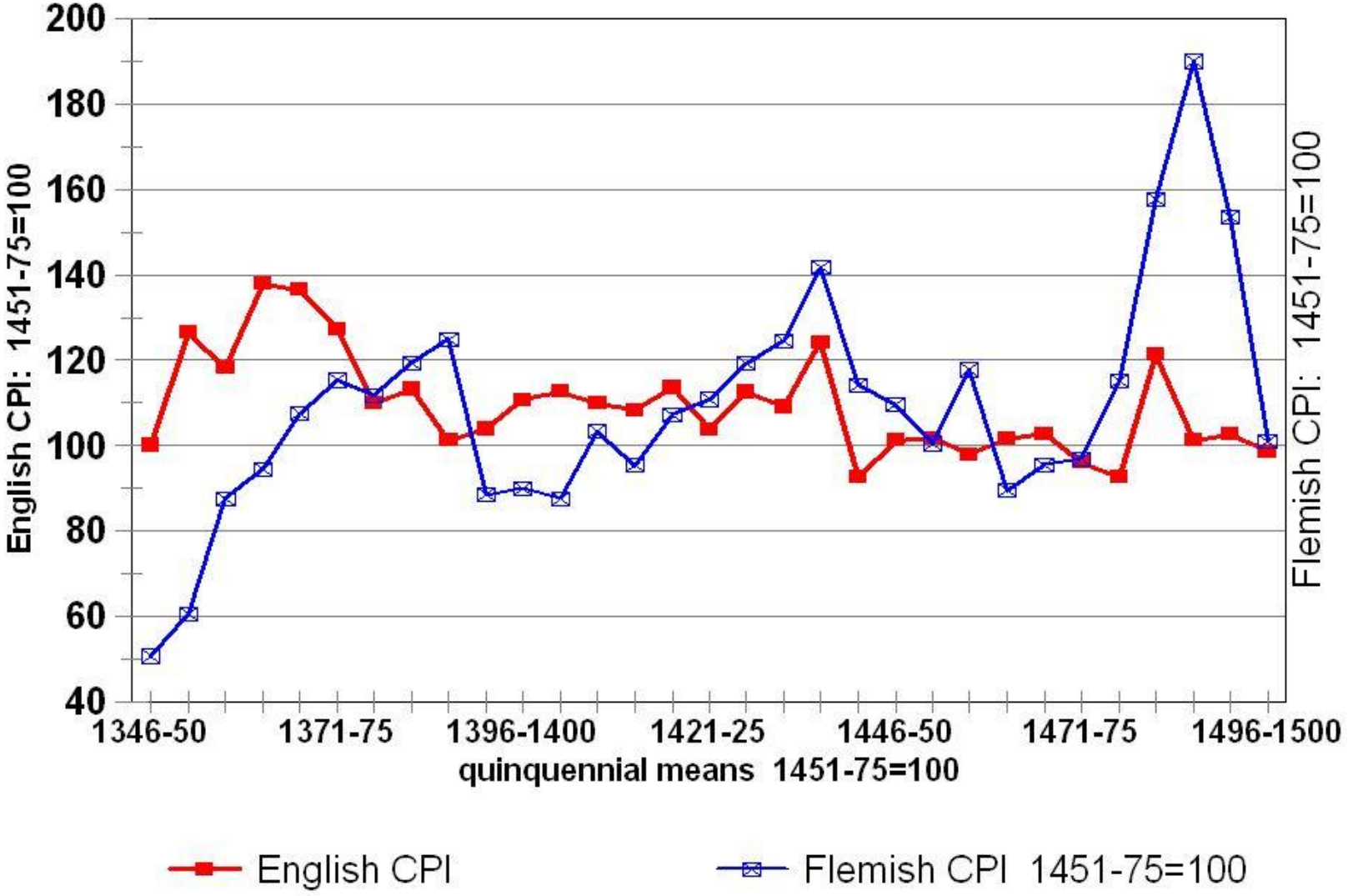
Year	SILVER Total kilograms	SILVER Value £ sterling	GOLD Total kilograms	GOLD Value £ sterling	TOTAL VALUES in £ sterling	Percent Silver	Percent Gold
1501-05	4,313.544	24,988.026	516.604	33,392.271	58,380.297	**42.80%**	**57.20%**
1506-10	3,633.212	21,046.916	1,523.115	98,451.267	119,498.183	**17.61%**	**82.39%**
1511-15	1,089.012	6,308.562	694.599	44,897.564	51,206.126	**12.32%**	**87.68%**
1516-20	79.145	458.481	743.656	48,068.530	48,527.011	**0.94%**	**99.06%**
1521-25	3,148.207	18,237.317	442.136	28,578.780	46,816.096	**38.96%**	**61.04%**
1526-30	9,244.701	60,248.025	736.422	54,079.255	114,327.280	**52.70%**	**47.30%**
1531-35	4,616.832	30,088.071	189.160	13,890.972	43,979.043	**68.41%**	**31.59%**
1536-40	5,684.094	37,043.459	406.719	29,826.052	66,869.511	**55.40%**	**44.60%**
1541-45	5,707.032	100,776.324	963.792	79,997.508	180,773.832	**55.75%**	**44.25%**
1546-50	22,029.731	402,892.436	1,992.083	188,860.922	591,753.358	**68.08%**	**31.92%**
1551-55	9,428.855	121,874.569	136.583	16,023.336	137,897.905	**88.38%**	**11.62%**
1556-60	4,152.477	36,023.662	137.533	23,955.867	59,979.529	**60.06%**	**39.94%**
1561-65	24,263.303	210,873.247	255.828	24,682.712	235,555.960	**89.52%**	**10.48%**
1566-70	11,097.432	96,429.852	236.160	22,790.897	119,220.749	**80.88%**	**19.12%**
1571-75	8,806.166	76,520.164	102.633	9,934.572	86,454.736	**88.51%**	**11.49%**
1576-80	8,071.535	70,489.334	76.197	7,416.226	77,905.560	**90.48%**	**9.52%**
1581-85	16,056.314	139,852.039	337.318	32,770.995	172,623.034	**81.02%**	**18.98%**
1586-90	6,405.349	55,658.544	185.206	17,957.031	73,615.575	**75.61%**	**24.39%**
1591-95	18,653.363	162,086.240	178.498	17,306.684	179,392.924	**90.35%**	**9.65%**
1596-00	7,461.690	64,837.491	131.637	12,736.568	77,574.058	**83.58%**	**16.42%**

Monetary, Demographic, and Price Trends, 1348 - 1750

- (1) **1348 – 1370s: Era of the Black Death**
- - severe demographic crises & rapid population decline (40%)
- - but also severe inflation
- (2) **1370s – 1490s: late-medieval 'Great Depression': second phase**
- - continued demographic decline & stagnation
- - two 'bullion famines' ➔ severe deflation (except during major wars + debasement)
- (3) **1490s – 1520s: monetary expansion,** commercial-economic recovery, but no inflation
- (4) **1520s – 1640s: era of Price Revolution:** monetary, economic, then demographic expansion, with sustained inflation
- (5) **1640s – 1740s: era of the 'General Crisis' with:**
- - **monetary contraction** ➔ deflation (except during wartime)
- - **demographic decline** or stagnation

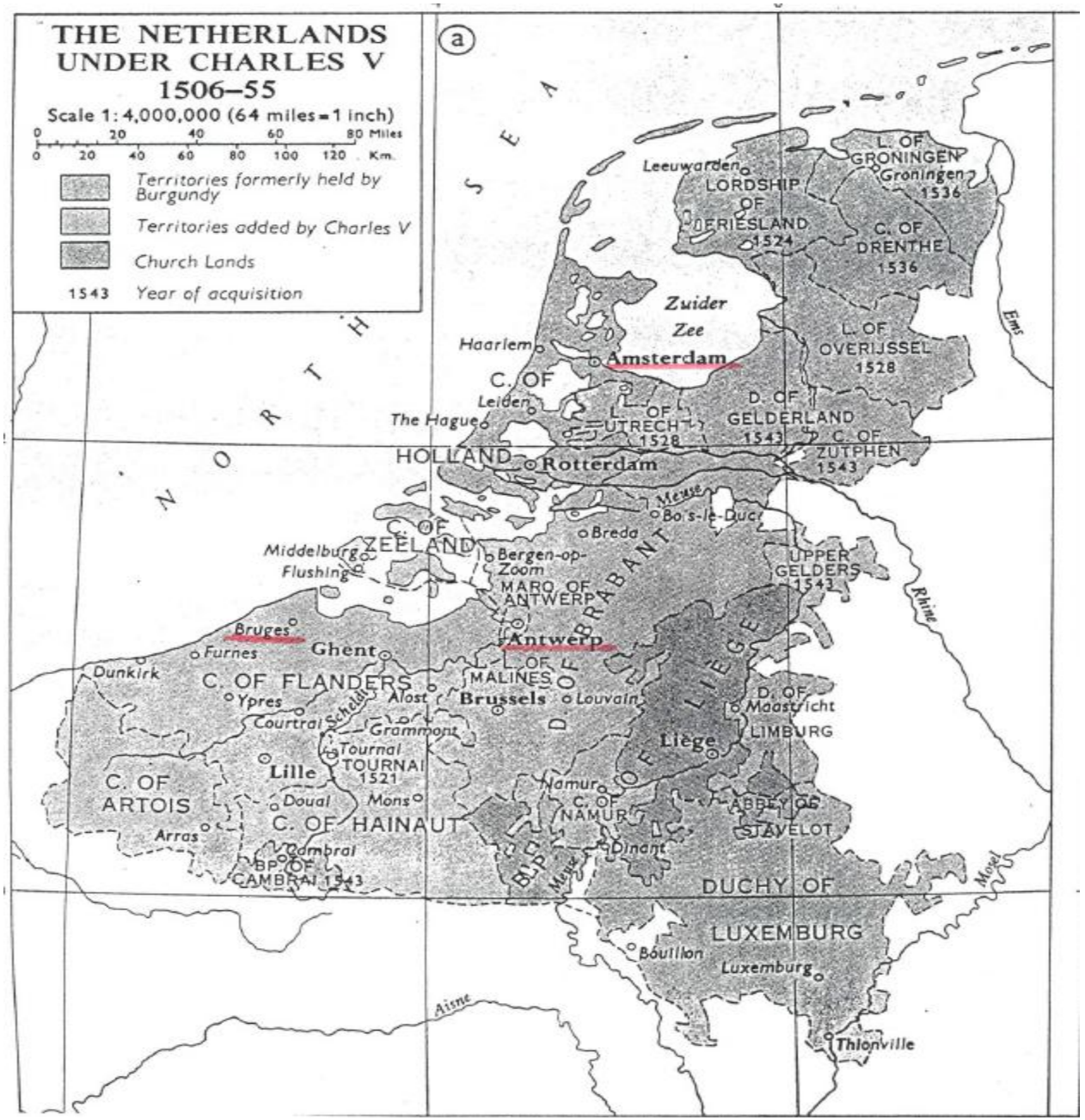
England & Flanders: Price Indexes

CPI in quinquennial means, 1346-1500



Money, Population, Prices: before and during the Price Revolution era

- (1) **the South German-Central European mining boom: c. 1460 – c. 1540:**
- -a) **ended late-medieval 'bullion famines' --** with a five-fold expansion in European silver + copper supplies
- - b) **rise of the Antwerp Market, from 1460s**: based on tripod of **English woollens, German metals (& banking), Portuguese Asian spices**
- c) **note that this monetary and economic expansion** well preceded the demographic recovery & expansion (from 1520s
- in both England and Low Countries (not before 1520)
- if somewhat earlier in Italy and South Germany

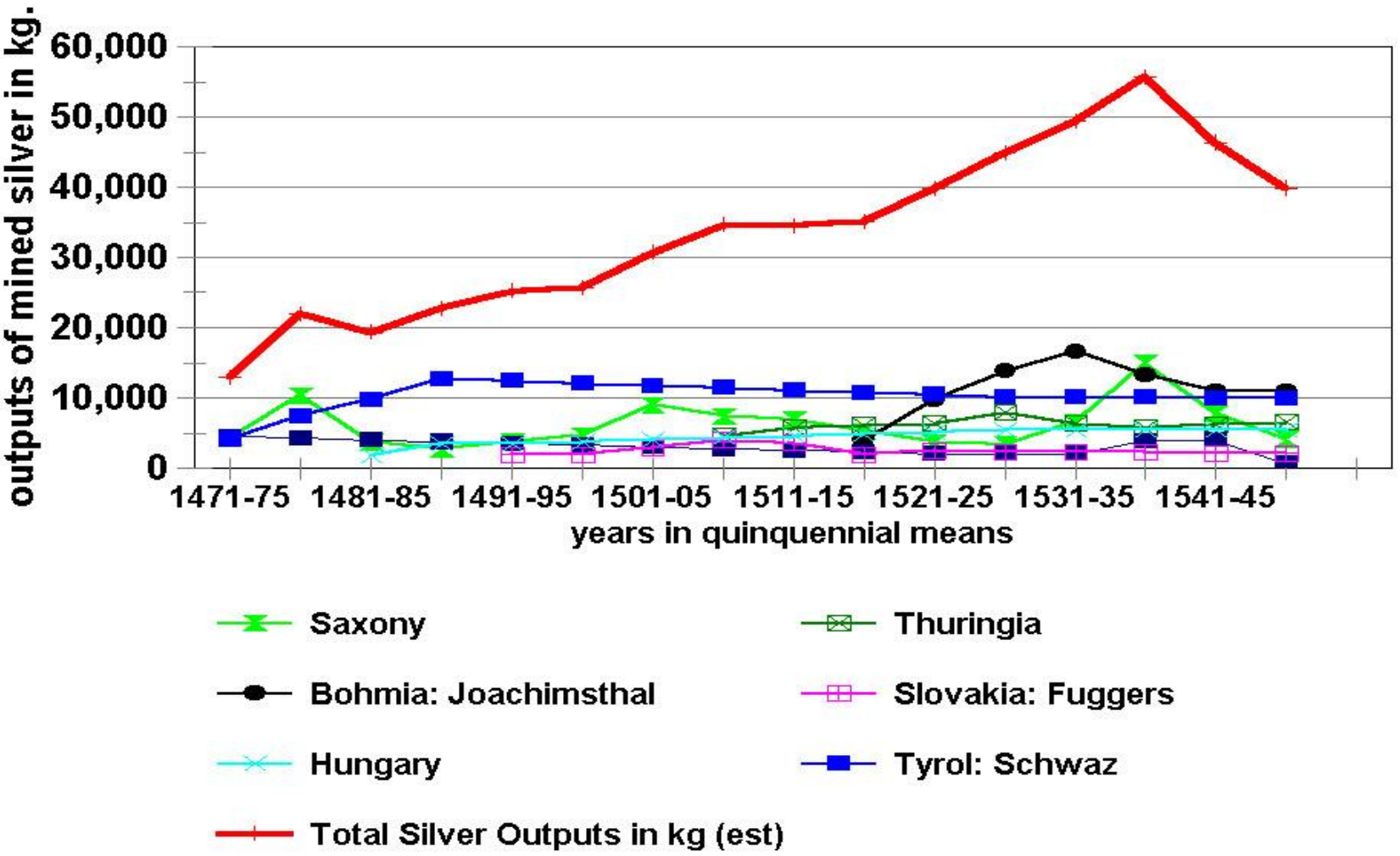

THE NETHERLANDS UNDER CHARLES V 1506–55
Scale 1: 4,000,000 (64 miles = 1 inch)
0 20 40 60 80 Miles
0 20 40 60 80 100 120 Km.
Territories formerly held by Burgundy
Territories added by Charles V
Church Lands
1543 Year of acquisition
a
NORTH SEA
L. OF GRONINGEN
Groningen
1536
Leeuwarden
LORDSHIP OF FRIESLAND
1524
C. OF DRENTHE
1536
Zuider Zee
Ems
Haarlem
Amsterdam
L. OF OVERIJSSEL
1528
C. OF HOLLAND
Leiden
The Hague
L. OF UTRECHT
1528
D. OF GELDERLAND
1543
C. OF ZUTPHEN
1543
Rotterdam
Meuse
Bois-le-Duc
Breda
C. OF ZEELAND
Middelburg
Flushing
Bergen-op-Zoom
MARQ. OF ANTWERP
D. OF BRABANT
UPPER GELDERS
1543
Rhine
Bruges
Furnes
Ghent
Antwerp
Dunkirk
C. OF FLANDERS
L. OF MALINES
D. OF LIÈGE
Ypres
Alost
Brussels
Louvain
D. OF Maastricht
Courtrai
Scheldt
Grammont
LIMBURG
Liège
Tournai
TOURNAI 1521
Lille
C. OF ARTOIS
Namur
C. OF NAMUR
ABBEY OF STAVELOT
Douai
Mons
C. OF HAINAUT
Arras
Dinant
Cambrai
BP. OF CAMBRAI 1543
BP. OF LIÈGE
Meuse
DUCHY OF LUXEMBURG
Moselle
Bouillon
Luxemburg
Aisne
Thionville

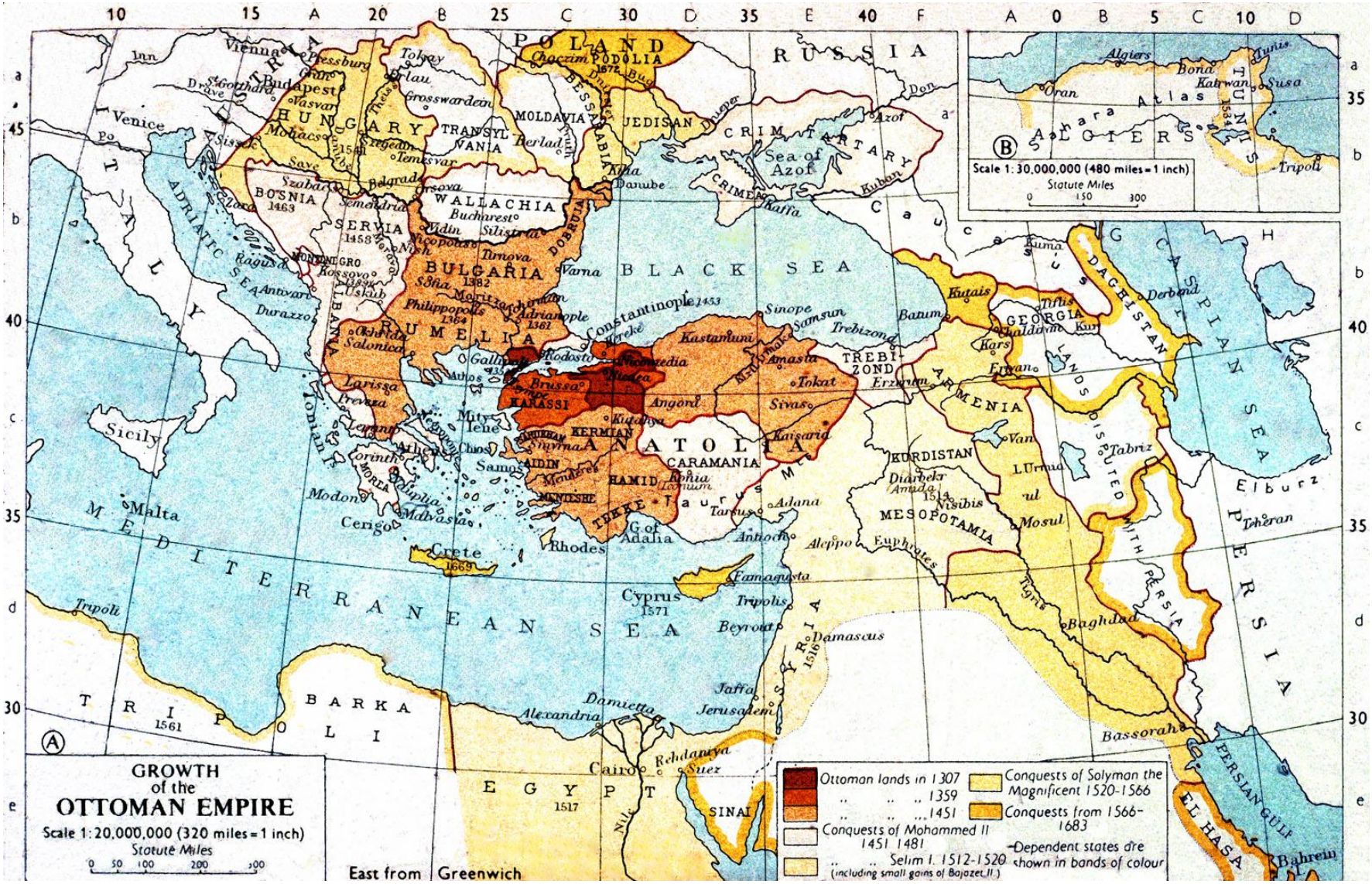
Money, Population, Prices: before and during the Price Revolution era (2)

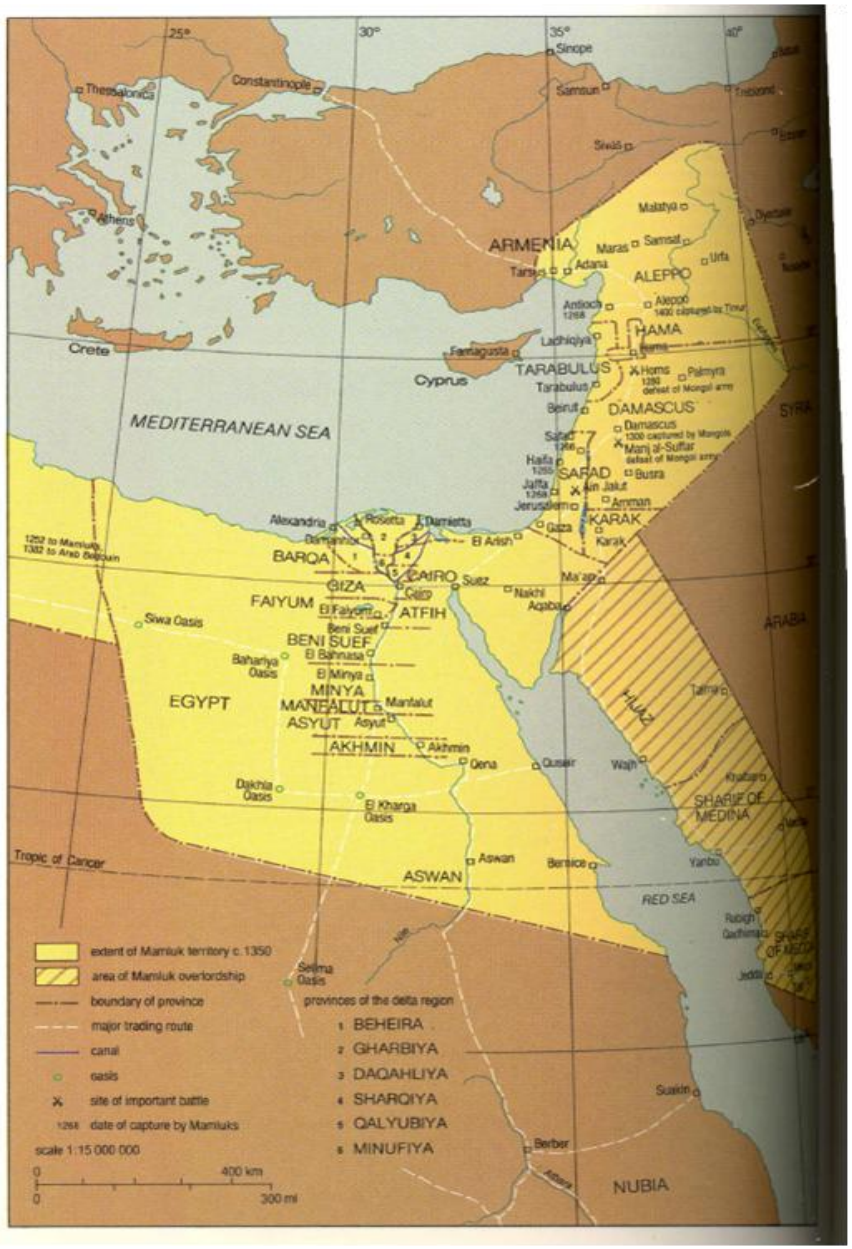
- (2) **Why was there no Price Revolution from 1460s to ca. 1520?**
- a) **Major expansion in Central European mining came after 1516**: opening of Joachimsthal silver mines (Bohemia)
- b) **Venetian wars with Turks from 1490s:** curbed trade with & silver exports to Levant
- - **1517: Ottoman conquest of Mamluk Egypt and Syria + the new Portuguese trade with Asia:** severe drop in Venetian silver + copper exports ➔ more German silver and copper going to Antwerp market
- - **but somewhat offset by Portuguese silver exports to Asia**
- c) **changes in aggregate supplies**: elastic before 1510?

German-Central European Silver Mining

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




GROWTH
of the
OTTOMAN EMPIRE
Scale 1: 20,000,000 (320 miles = 1 inch)
Statute Miles
0 50 100 200 300
East from Greenwich
Ottoman lands in 1307
.. 1359
.. 1451
Conquests of Mohammed II 1451 1481
.. .. Selim I. 1512-1520 (including small gains of Bajazet II.)
Conquests of Solyman the Magnificent 1520-1566
Conquests from 1566-1683
Dependent states are shown in bands of colour
Scale 1: 30,000,000 (480 miles = 1 inch)
Statute Miles
0 150 300
POLAND
RUSSIA
HUNGARY
TRANSYLVANIA
MOLDAVIA
WALLACHIA
BESSARABIA
BUDJEDISAN
CRIMEA TARTARY
Sea of Azof
BOSNIA 1463
SERVIA 1458
BULGARIA 1382
RUMELIA
BLACK SEA
Constantinople 1453
ANATOLIA
KARAMANIA
KURDISTAN
ARMENIA
GEORGIA
DAGHESTAN
CASPIAN SEA
MESOPOTAMIA
PERSIA
ITALY
ADRIATIC SEA
MEDITERRANEAN SEA
Crete 1669
Cyprus 1571
Rhodes
Malta
Sicily
TRIPOLI 1561
BARKA
EGYPT 1517
SINAI
EL HASA
PERSIAN GULF
Bahrein
ALGIERS
TUNIS 1534
Sahara
Atlas


25°
30°
35°
40°
Sinope
Constantinople
Thessalonica
Samsun
Trebizond
Siwās
Erzerum
Malatya
Athens
ARMENIA
Maras
Samsat
Urfa
Tarsus
Adana
ALEPPO
Antioch
1268
Aleppo
1400 captured by Timur
HAMA
Crete
Famagusta
Lachiqiya
Hama
Cyprus
TARABULUS
Homs
1281
defeat of Mongol army
Palmyra
Tarabulus
Beirut
DAMASCUS
SYRIA
MEDITERRANEAN SEA
Damascus
1300 captured by Mongols
Marj al-Suffar
defeat of Mongol army
Safad
1266
Haifa
1265
SAFAD
Busra
Jaffa
1268
Ain Jalut
Amman
Jerusalem
KARAK
Alexandria
Rosetta
Damietta
Gaza
Karak
1252 to Mamluks
1382 to Arab Bedouin
Damanhur
El Arish
BARQA
CAIRO
Suez
Ma'an
GIZA
Giza
FAIYUM
El Fayoum
ATFIH
Nakhl
Aqaba
Siwa Oasis
Beni Suef
ARABA
BENI SUEF
El Bahnasa
Bahariya Oasis
El Minya
MINYA
EGYPT
MANFALUT
Manfalut
Tamia
HIJAZ
ASYUT
Asyut
AKHMIN
Akhmin
Qena
Qusair
Wajh
Khaibar
Dakhla Oasis
SHARIF OF MEDINA
El Kharga Oasis
Tropic of Cancer
Aswan
Berenice
Yanbu
ASWAN
RED SEA
Rabigh
Qadhimah
Selima Oasis
Jedda
extent of Mamluk territory c. 1350
area of Mamluk overlordship
boundary of province
major trading route
canal
oasis
site of important battle
1268 date of capture by Mamluks
provinces of the delta region
1 BEHEIRA
2 GHARBIYA
3 DAQAHLIYA
4 SHARQIYA
5 QALYUBIYA
6 MINUFIYA
scale 1:15 000 000
0
400 km
0
300 mi
Suakin
Berber
NUBIA

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 Ouputs Estimated in kg	Exports: Total kg	To Venice kg	To Venice Percent	To Antwerp kg	To Antwerp Percent
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%

Money, Population, Prices: before and during the Price Revolution era (3)

- c) **Lessons from the Philips curve:**
- - **there were so many unemployed resources** (land, labour, capital) from the late-phase of the 'Great Depression' era, that economic recovery & growth took place with elastic supplies of inputs, without rising MC → so no price increases
- **that 'bottlenecks' and rising marginal costs not encountered** before ca. 1515-1520: still much 'slack' in the economy
- - **problem**: no significant population growth in NW Europe before the 1520s

Money & Population during the Price Revolution era, c. 1520 – 1640 (4)

- (3) **Money supplies: more rapid expansion**
- a) **height of the Central European mining boom**: ca. 1520 – ca. 1540
- b) **influx of gold, then silver from Spanish America,** especially from 1550s
- c) **coinage debasements:** England + Low Countries: but not in Spain
- (2) **Credit:** **financial revolution in negotiable credit** instruments + negotiable public debts: from 1520s
- (3) **Population growth**: from the 1520s: effects of Δ urbanization on income velocity of money?

Monetary Approach to Balance of Payments (1)

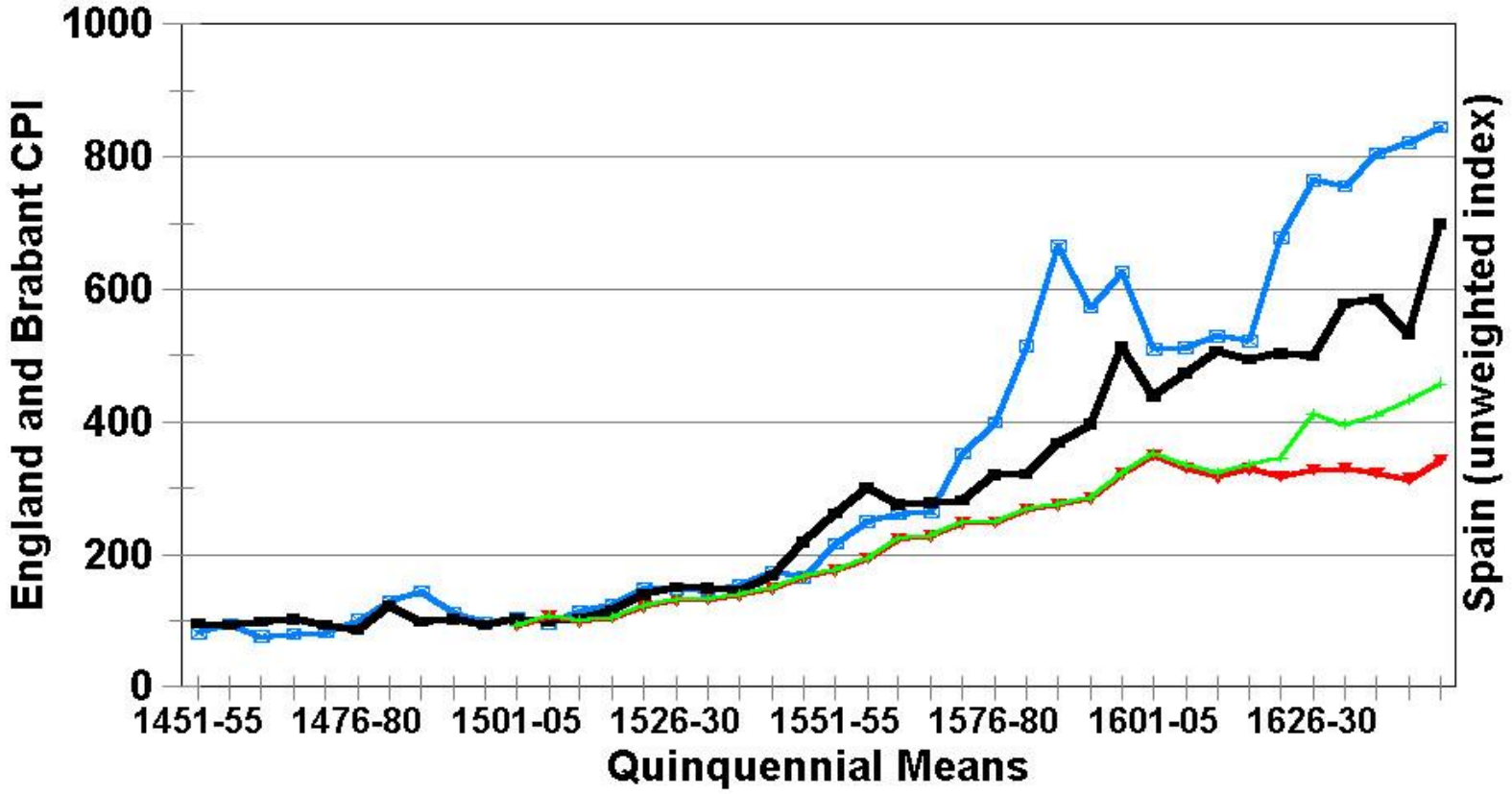
- 1) **Read lectures:** for today and last week
- 2) **Problem 1: suppositions of Classical School on international trade and inflation**
- a) **favourable balance of trade** (export revenues > imports) ➔ bullion influx ➔ ΔM ➔ inflation
- b) **unfavourable trade balance** ➔ bullion outflow ➔ fall in M ➔ deflation
- 3) **Problem 2: Inflation was European-wide, but**
- a) **Not all countries could have had a continuous favourable** trade balances
- b) **especially with Δ bullion outflows in trade** with Levant, southern Asia, Baltic zone

Monetary Approach to Balance of Payments (2)

- (4) **Solution: Monetary Approach to Balance of Payments**: Prof. Harry Johnson
- a) **world bullion stocks determine overall world price level** (in terms of silver)
- b) **'law of one price' in international trade (arbitrage)**: will establish same commensurate price level in each country
- c) **each country's money supply adjusts** to accommodate that increased price level

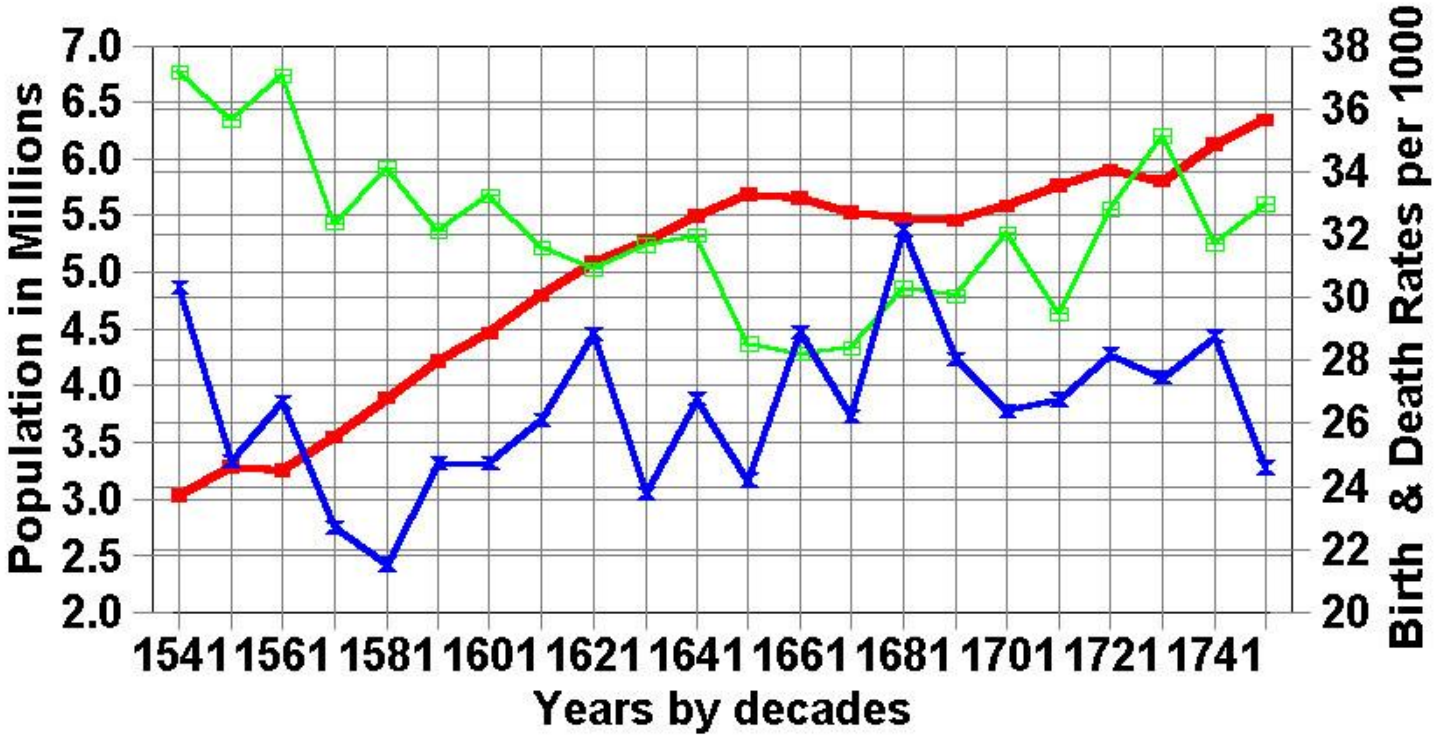
Price Indexes: England, Brabant, Spain

1451 - 1650: 5 yr means (1501-10 =100)



POPULATION: ENGLAND & WALES 1541-1741

in millions, by decades



Consequences of Inflation: Impact on Factor Costs of Production - 1

- (1) **Hamilton's Thesis of 'Profit Inflation': on lagging real wages and 16th century industrialization**
- a) **his most famous role: Quantity Theory of money** in explaining Price Revolution
- b) **also important for his thesis on the origins of modern industrial capitalism**
- - **contended that during the Price Revolution, wages lagged behind consumer prices, providing entrepreneurs with growing profits**
- - **argued that industrial entrepreneurs invested those extra profits** in more capital-intensive, larger scale forms of industry

Consequences of Inflation: Impact on Factor Costs of Production - 2

- -c) **that this was much more true of England than of Spain or France:** ➔ hence a major reason why England became homeland of the Industrial Revolution
- -d) **his 'profit inflation' thesis was warmly endorsed by J. M. Keynes** (who actually coined the phrase).
- **-** e) **Note: historically, during periods of inflation, wages do indeed lag behind consumer prices (irrespective of demographic changes): so that real wages necessarily fall [RWI = NWI/CPI]**

Consequences of Inflation: Impact on Factor Costs of Production - 3

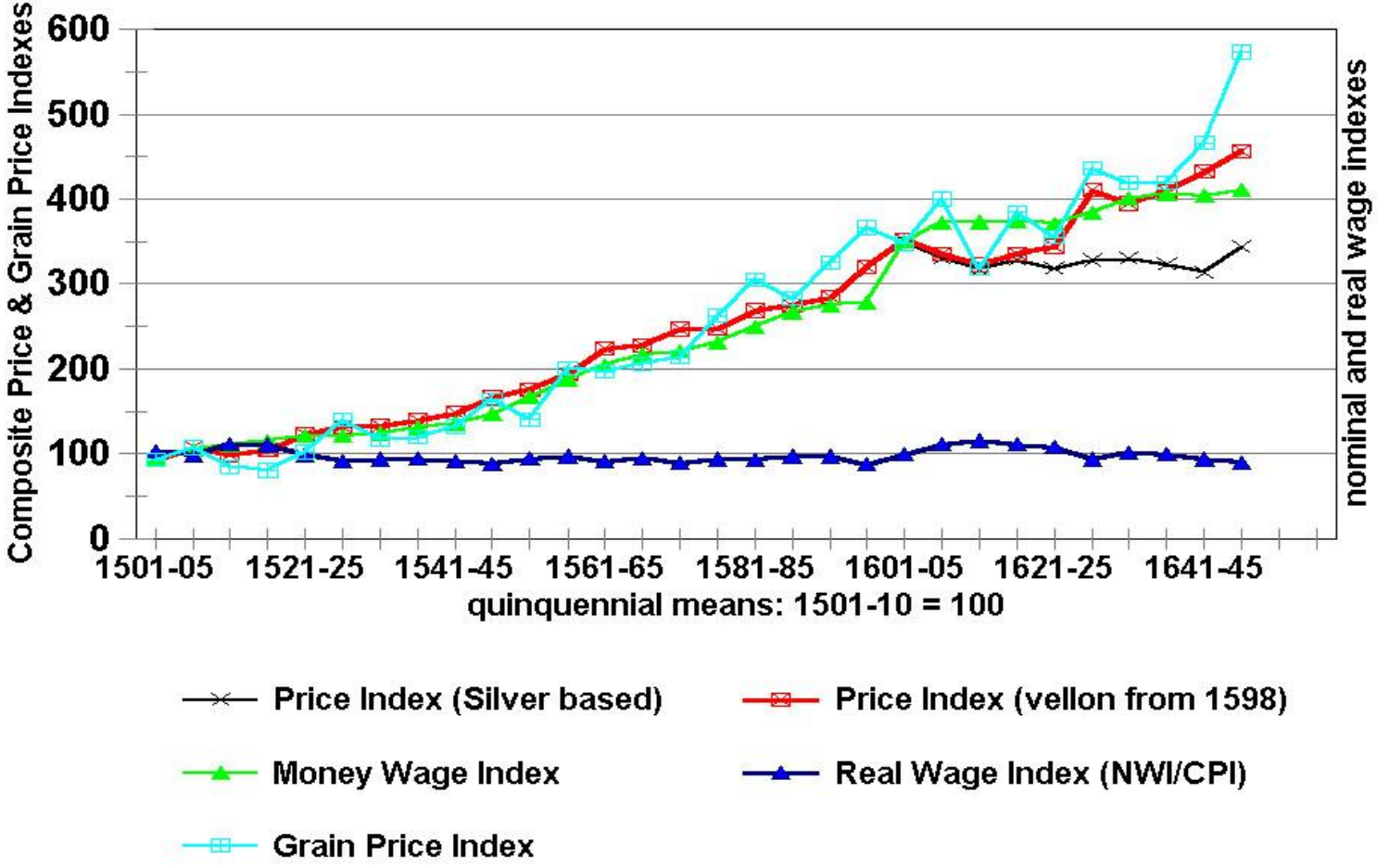
- f) **problems with Hamilton's 'profit inflation' thesis:**
- i) **what prices? Hamilton never clear on this crucial issue:** the CPI, agricultural or industrial prices?
- if the CPI, heavily weighted with food prices, rose, how would falling real wages benefit entrepreneurs? **[RWI = NWI/CPI]**
- - **rising food + fuel prices would, with budget constraints, curb much of the market demand for industrial goods from wage earners**
- - **though impact would have been somewhat offset** by rising real incomes for agricultural producers

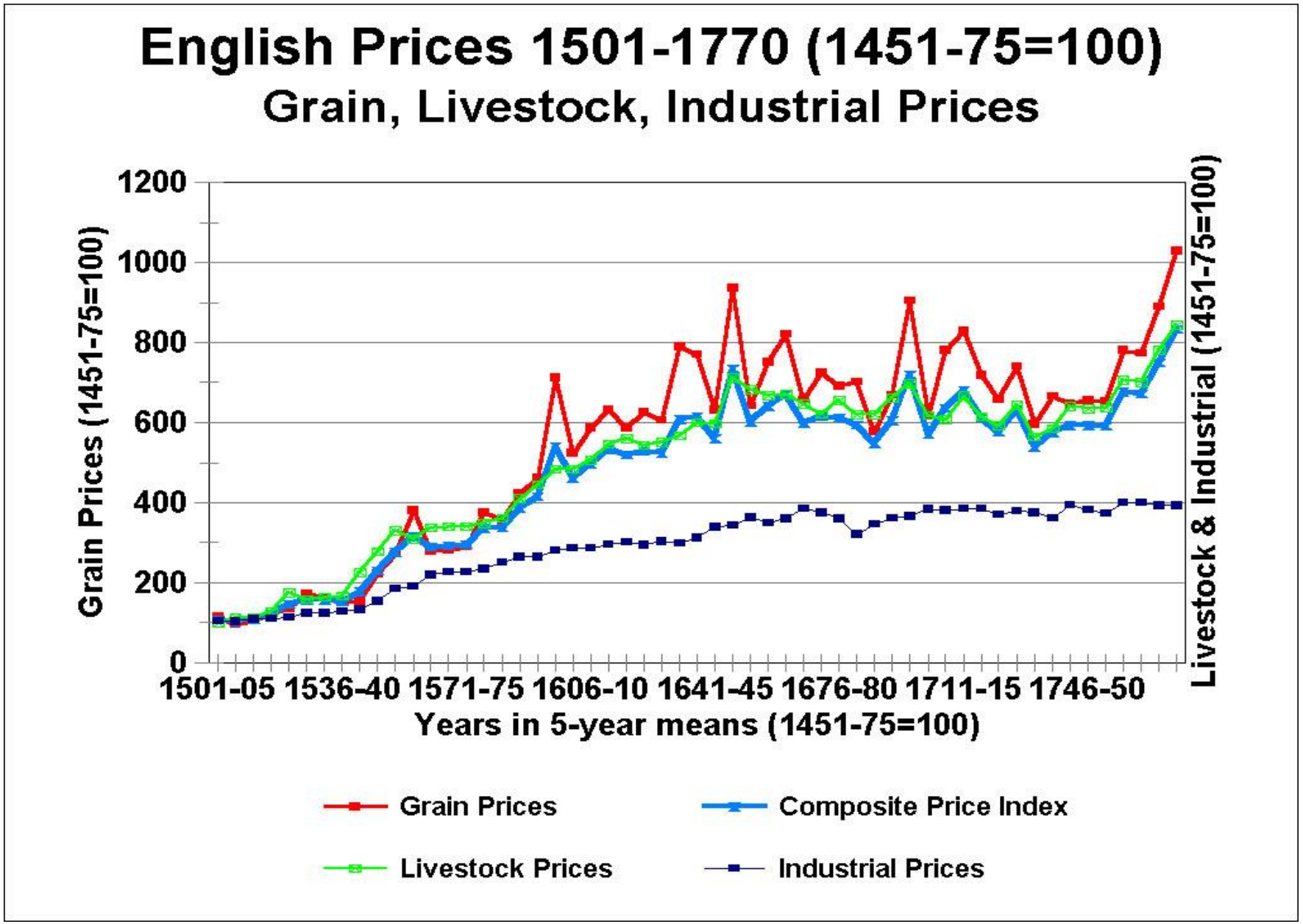
Consequences of Inflation: Impact on Factor Costs of Production - 4

- f) **problems with Hamilton's 'profit inflation' thesis:**
- ii) **the true issue must be: did industrial wages lag behind the wholesale prices for the same industrial products?**
- iii) **even if wages did lag, did entrepreneurs encounter other rising input or factor costs** during Price Revolution era?
- iv) **Even if industrial entrepreneurs did earn increased profits, why would they choose to invest them in more capital intensive forms of larger scale industry,** if labour was becoming relatively cheaper?

Spain: Price & Wage Indexes 1501-1650

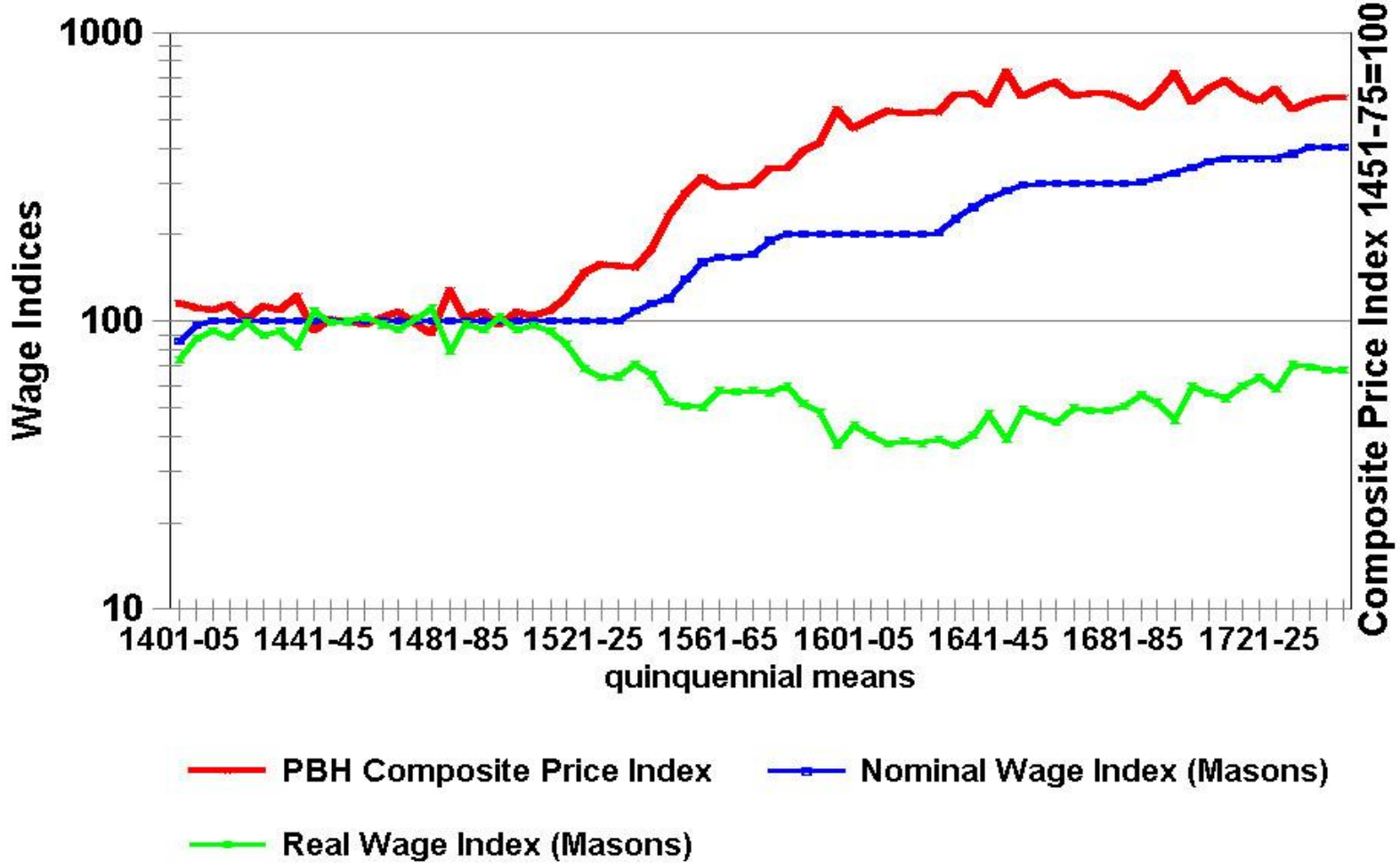
Price, Nominal, Real Wage Indexes




English Prices 1501-1770 (1451-75=100)
Grain, Livestock, Industrial Prices
Grain Prices (1451-75=100)
Livestock & Industrial (1451-75=100)
0
200
400
600
800
1000
1200
1501-05
1536-40
1571-75
1606-10
1641-45
1676-80
1711-15
1746-50
Years in 5-year means (1451-75=100)
Grain Prices
Composite Price Index
Livestock Prices
Industrial Prices

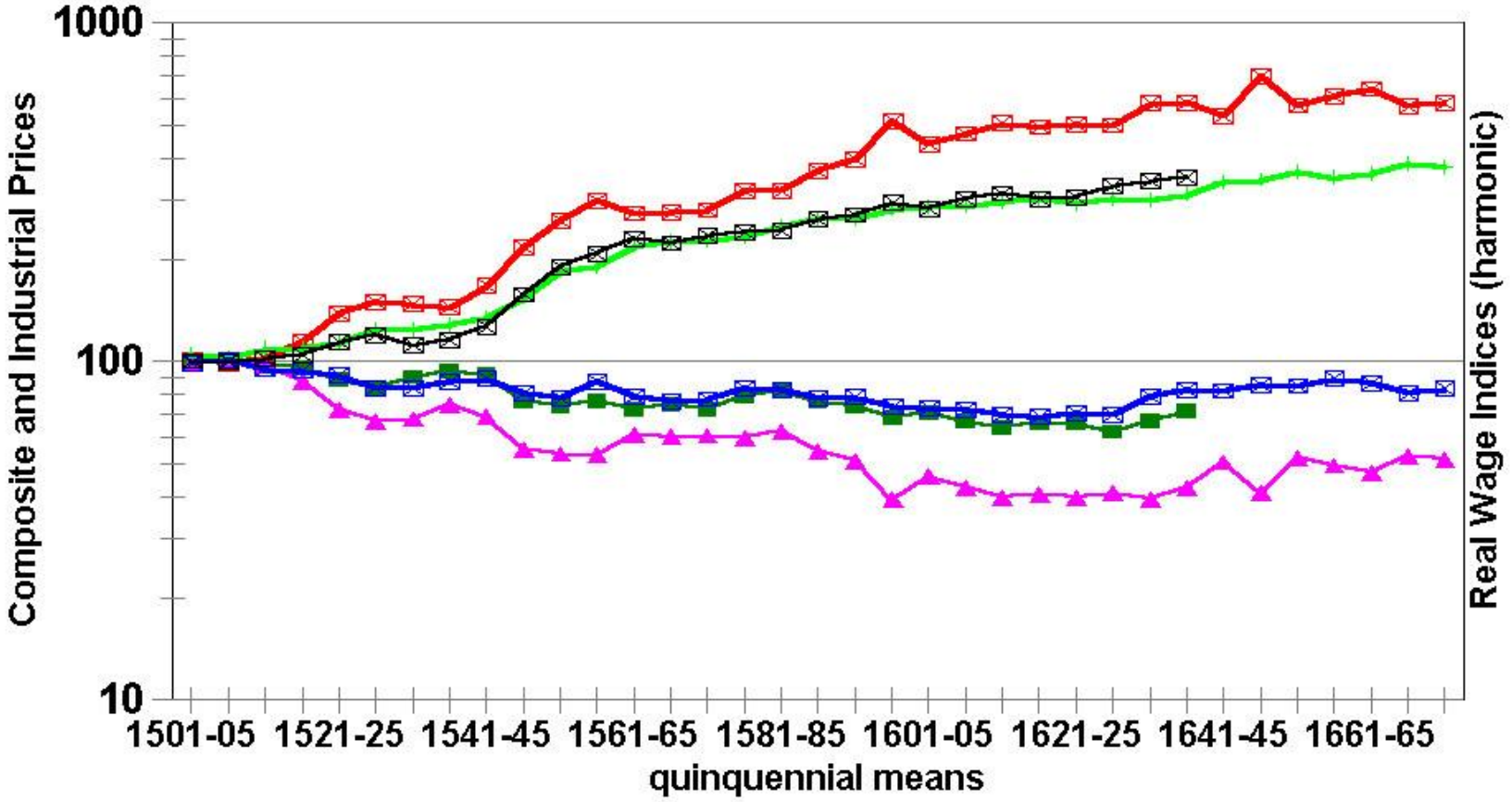
English Prices and Wages, 1401-1750

Price & Wage Indices: 1451=75=100



England: Prices & Wages, 1501-1675

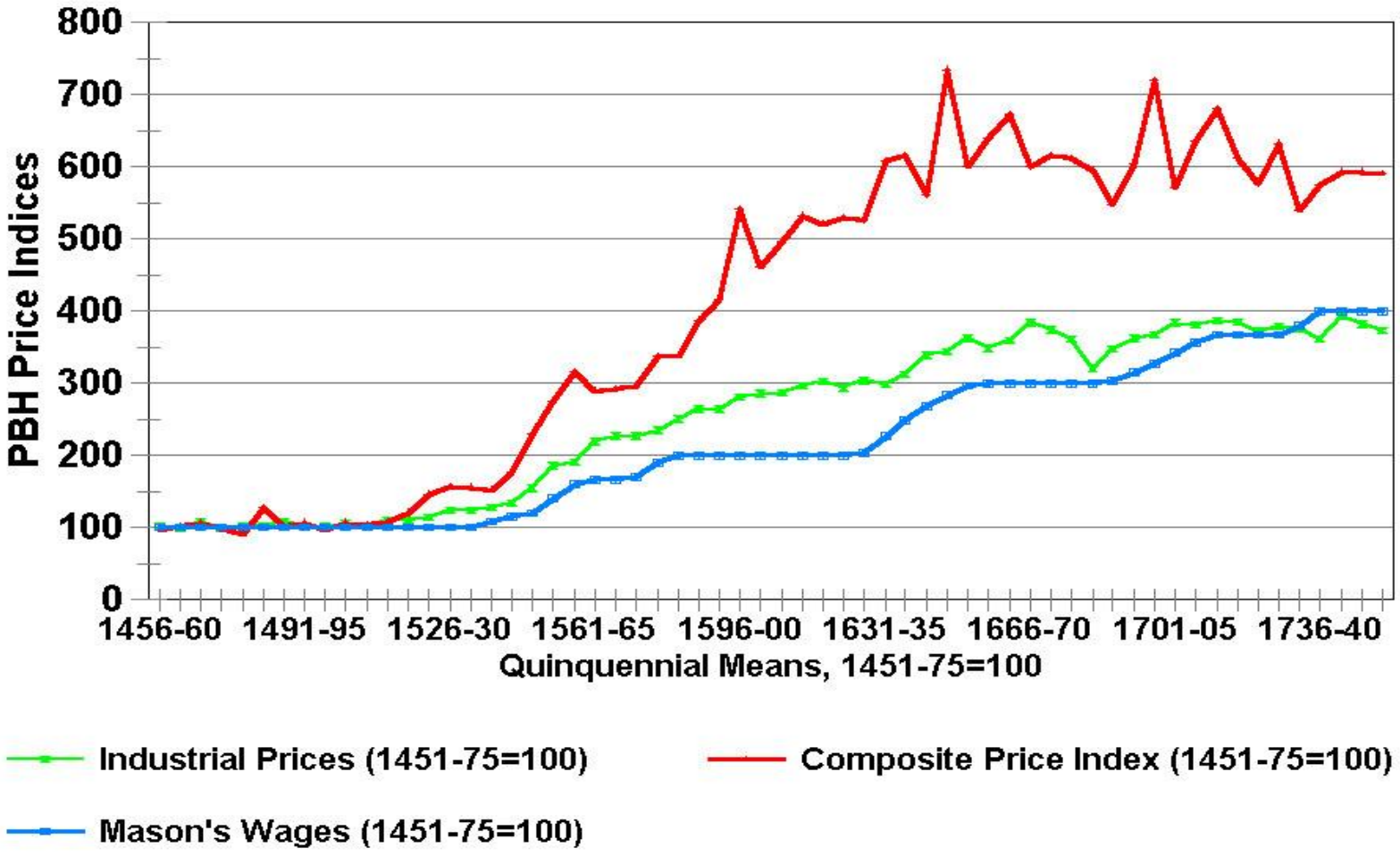
5 yr means: 1501-10=100



Doughty Wage:IndPrice Ratio
England Composite Price Index
Real Wage Index (harmonic)
PBH Ind Price Index
PBH Money Wage:Ind Price Ratio
Doughty Ind Price Index

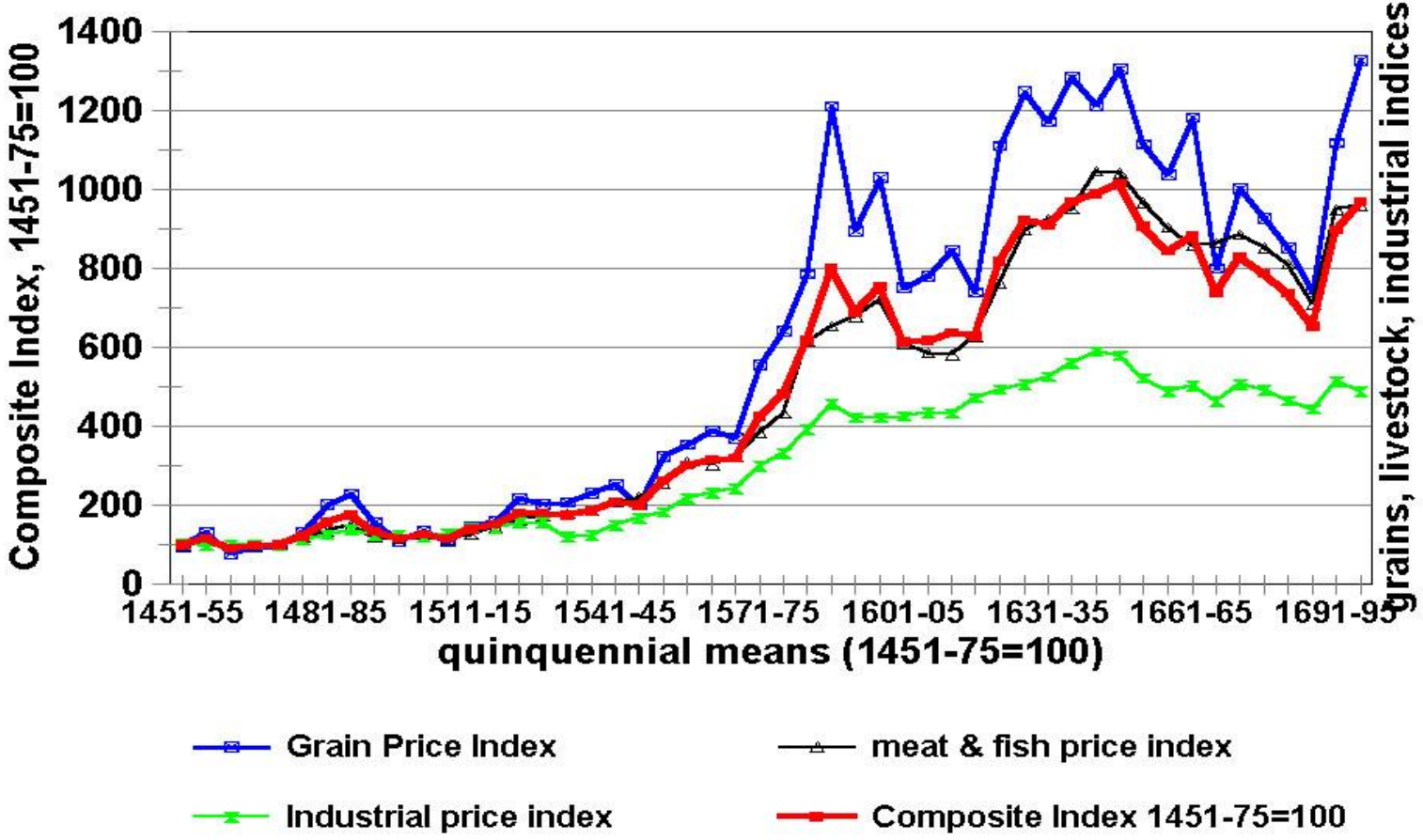
Money Wages and Industrial Prices

England, 1451 - 1750



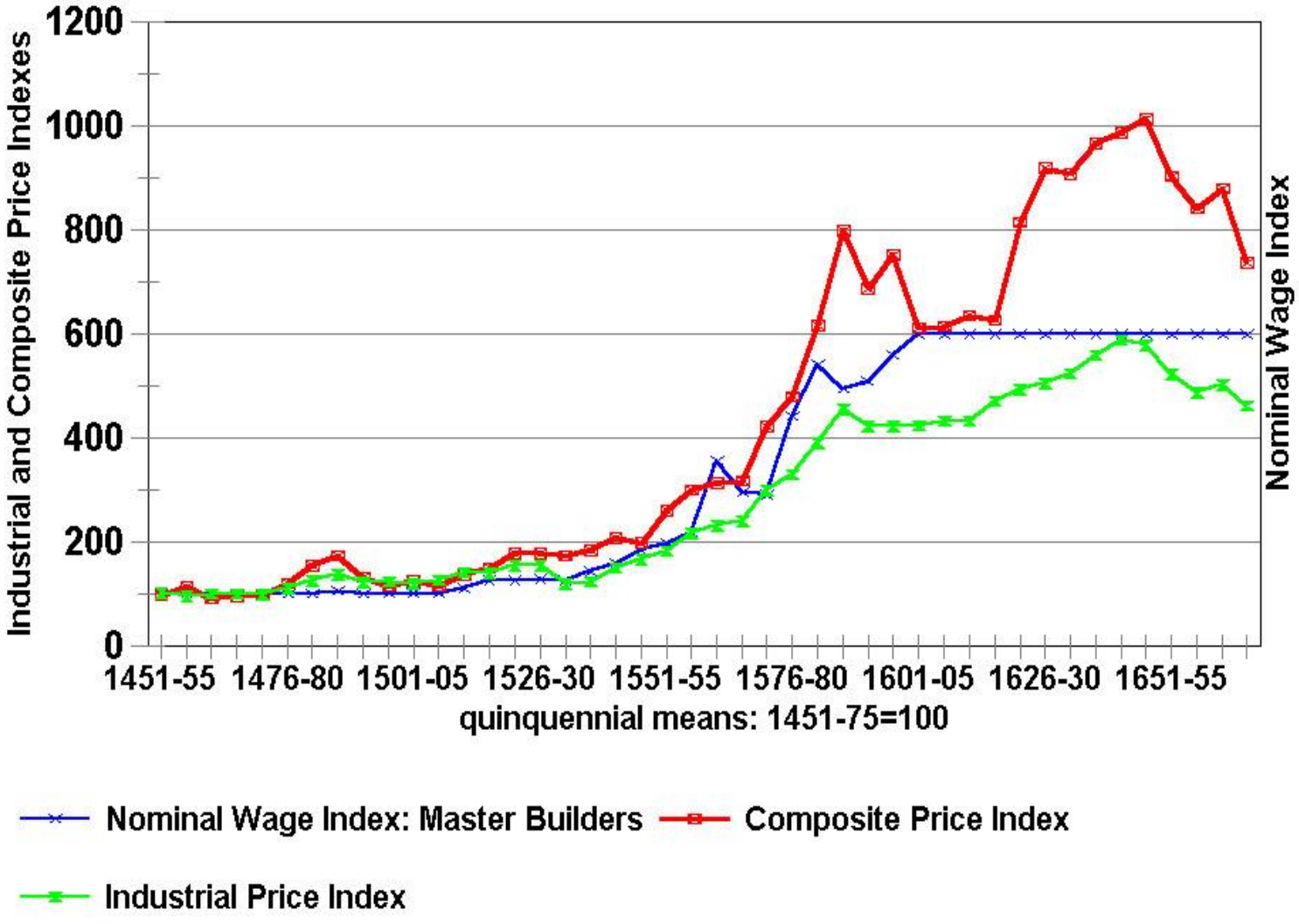
Brabant: Price Indexes, 1451-1700

grain, livestock, industrial,composite



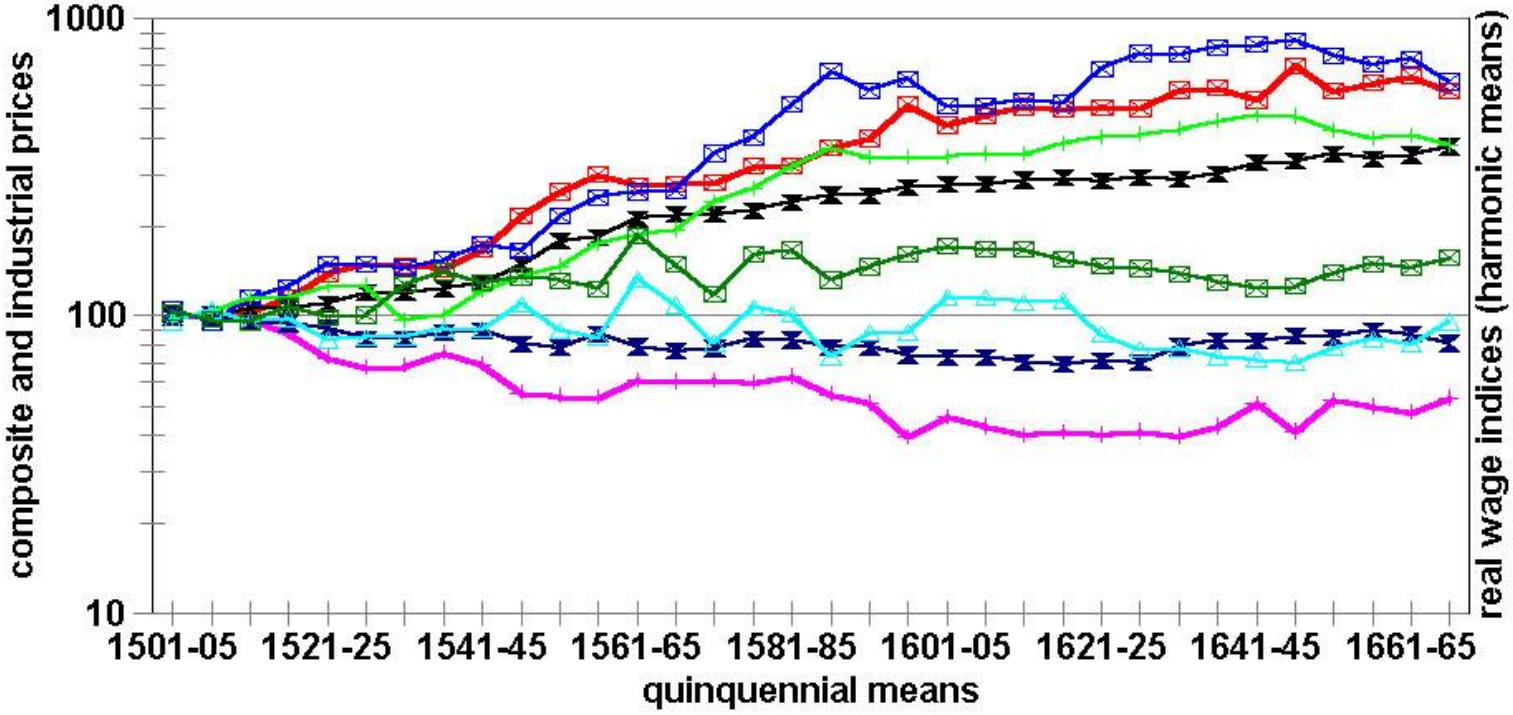
Brabant Price & Wage Indexes 1451-1670

Industrial Prices, CPI, Nominal Wages



Prices & Wages in England & Brabant

1501 - 1670: 5 yr means (1501-10=100)



Consequences of Inflation: Impact on Factor Costs of Production (5)

- (2) **Land Rents: did they rise with agricultural prices?**
- - **English agriculture: customary (servile) rents did not rise:** fixed by custom, in money-of-account terms
- - **Agriculture & Enclosures**:
- - incentives for landlords to evict customary tenants, to re-capture 'economic rent' on land, with rising grain prices
- - **leasehold lands:**
- - **rents were fixed** for the period of contractual leases,
- so that those renting such lands (farmers, industrial entrepreneurs) benefited from rising prices of products produced on those leasehold lands

Consequences of Inflation: Impact on Factor Costs of Production (6)

- (3) **Other land-based factor costs: rising costs of wood-based fuels in particular** → led **John Nef (**Hamilton's Chicago colleague) to offer his alternative thesis on origins of modern industrial capitalism in Price Revolution era, in Tudor-Stuart England
- - **we will deal with the Nef thesis in the final** lecture on Tudor Stuart 'Industrial Revolution'
- (4) **Capital and Interest: did inflation cheapen capital costs? YES: it did cheapen the costs of previously borrowed capital**

Investment in a Blast Furnace During Inflation

Hypothetical Example, with 5% annual inflation (compounded)

Loan Contract: £1,000 principal to be repaid in full in ten years, with annual interest payments of 10% (£100) paid each year for ten years.

YEAR	INTEREST	VALUE OF OUTPUT
1	£100	£500.00
2	£100	£525.00
3	£100	£551.25
4	£100	£578.81
5	£100	£607.75
6	£100	£638.14
7	£100	£670.05
8	£100	£703.55
9	£100	£738.73
10	£100	£775.66

Deflation during the 'General Crisis' era, c. 1650 – c. 1740: 1

- (1) **Deflation from the 1650s to the 1740s:** except for the war-torn 1690s
- (2) **Possible Causes? last day's lecture:**
- a) **monetary contraction:** as **outflows** of silver to Baltic, Levant, East Asia **exceeded** the declining influx from the Americas
- b) **demographic contractions or slumps**
- c) **declines in the income velocity of money?**

Deflation during the 'General Crisis' era, c. 1650 – c. 1740: 2

- 3) **Problems: with and from deflation:**
- a) **raised the real and relative factor costs of production:**
- i) **wage stickiness:** nominal wages remain flat ➔ real wages rise with deflation
- ii) **land rent contracts: fixed by leases for many years** (up to 99 years): fixed nominal rents thus ➔ rising real burden of rent with deflation
- iii) **interest rates by longer-term contracts**: similar situation with nominal rents ➔ rising real rates

Deflation during the 'General Crisis' era, c. 1650 – c. 1740: 3

- b) **deflation hurts credit and curbs investment**
- i) **fear of non-repayment**: paper credit generally contracts more than the coined money supplies
- ii) **reluctance to borrow:** with anticipated rises in real interest rates
- iii) **economic pessimism:** reduces incentives to produce and invest