Population Growth and the Price Revolution in England

Harry A. Miskimin
Yale University

Ever since 1568 when Jean Bodin,[1] addressing the problems of his age, articulated a primitive version of the quantity theory of money, historians and economists have been fascinated by this tautologically true and deceptively simple equation that relates the money supply, its velocity of circulation, prices, and output. Not only did it provide a *rationale* for the great economic events of the sixteenth century, but it proved its utility in aiding comprehension of the economic consequence of the Californian and Brazilian gold rushes and of the mining boom in the Klondike. Extensions and development of the equation have served to explain the waning of the middle ages, the economic development of early modern Europe, and the birth of capitalism. Even today, apparent simplicity has commended the monetary equation to one of the major political parties of the United States where it has been applied as policy with unfortunately mixed results.

The enthusiasm of the proponents of the quantity theory has never successfully silenced critical voices. Malestroit [2] remained opposed to Bodin; Nef,[3] Felix,[4] and others have sought to modify Hamilton's [5] elaboration

[1] H. Hauser, editor, *La Response de Jean Bodin à M. de Malestroit: 1568*, Paris, A. Colin, 1932.

[2] Malestroit, « The Paradoxes of Malestroit », (trans. G. A. Moore), in G. A. Moore, *Jean Bodin's Response (1568-78) to Malestroit's Paradoxes (1556)*, Chevy Chase, Country Dollar Press, 1946.

[3] J. U. Nef, « Prices and Industrial Capitalism in France and England, 1540-1640 », *Economic History Review*, VII (1937), pp. 155-85.

[4] D. Felix, « Profit Inflation and Industrial Growth: The Historic Record and Contemporary Analogies », *Quarterly Journal of Economics*, (1956), pp. 441-63.

[5] E. J. Hamilton, « American Treasure and the Rise of Capitalism (1500-1700 »,

of the consequences of the price revolution; and Eliott,[6] Nadal,[7] and others more recently have raised questions regarding the historical validity of the quantity theory. Despite such criticism, however, the basic truth of the quantity theory remains an accepted part of the historiography of the sixteenth century and it is only the more extreme extensions of that theory that have fallen before the critics. Most historians still accept as fact the notion that it was the great influx of bullion from the new world that caused the dramatic rise in prices during the sixteenth century, although some would now ascribe a portion of the increase to heightened population pressure.

Empirical testing of the quantity theory of money is virtually impossible in any historical period — first because of the very nature of the equation and secondly because historical periods never preserve the economist's precondition of "ceteribus paribus". On the first count, since the equation $MV=PT$ is tautologically true, the equality is preserved no matter what consequence results from a given change in any one of the terms. If, for example, the money supply doubled and prices fell, we would not be justified in asserting that the theory was disproved, but only that there had either been a downward adjustment in velocity, or an upward adjustment in output, of both, and that this had more than offset the increase in the money supply. Unless all of the terms are known with a precision that history forbids, the quantity theory is immune to empirical refutation. Further, since the equation is simply a tautology, if they were so known, it is inevitable that the equation would balance.

What is at issue then is not the validity of the quantity equation, but rather the precise definition of the individual terms and the evaluation of the relative importance and of the direction of movement of each individually. The price term raises perhaps the fewest difficulties. There is no doubt that the prices of many goods rose substantially during the sixteenth century, but there remains an index problem since not all prices rose, nor did those that rose do so in the same proportion. Felix and others have noted sharp increases in food prices and lesser or non-existant increments in industrial and manufactured goods prices. These observations, in turn, have led to more sophisticated applications of the quantity theory. Brenner,[8] for example,

---

Economica (1929); *American Treasure and the Price Revolution in Spain, 1501-1650*, Cambridge, Mass., 1934; and « Prices as a Factor in Business Growth; Prices and Progress », *Journal of Economic History* (1952).

6 J. H. Elliot, *Imperial Spain, 1469-1716*, New York, New American Library, 1966, pp. 161-208.

7 J. Nadal Oller, « La Revolución de los Precios Españoles en el siglo XVI », *Hispania*, XIX (1959), pp. 503-29.

8 Y. S. Brenner, « The Inflation of Prices in Early Sixteenth Century England », *Economic History Review*, 2nd ser., XIV (1961), pp. 225-39 and « The Inflation of Prices in England, 1551-1650 », *Economic History Review*, 2nd ser., XV (1962), pp. 266-84.

includes population growth, migration to urban centres, political events, and relative demand and supply elasticities in his exposition of the early sixteenth century price rise. He is, of course, correct in ascribing more significance to the velocity and output terms than has often been the case in the past, yet even with these modifications, some puzzles remain.

The literature of economic history abounds in references to the "massive" influx of bullion which resulted from the opening of the new world's mines, but only recently has serious attention been given to the need to put the newly mined and imported bullion into the context of the pre-existant European monetary stock.[9] "Massive" is a relative word and it is well therefore to measure sixteenth century bullion imports on a relative scale. Elsewere I have suggested that bullion imports had their heaviest impact on prices in the early sixteenth century because the low levels of the monetary stock in the preceding century allowed great leverage to relatively small increments of new metal,[10] but the evidence remains obscure and difficult to interpret. As an alternative to depending on extremely crude estimates of the fifteenth century monetary stock for our measure of the importance of the new imports, it is instructive to return to an even earlier period of high mint activity and to compare thirteenth and fourteenth century levels of coinage of precious metal with those of sixteenth-century mints. Feaveryear [11] and Craig [12] have provided a fairly complete series of the annual output of the London mint so such a comparison by period is feasible, although some modification for production at the less studied subsidiary mints is required. In the subsequent discussion, coinage figures from the thirteenth and fourteenth centuries will be understated as a result of the absence of records from the Durham and Canterbury mints,[13] while sixteenth-century levels of output are understated because of the confused documentation in the period 1547-51 when several mints were at work during the great debasement.[14] The foreign output of the mint at Calais during the early period is excluded although it probably added something to the English domestic coinage.

---

9 F. P. Braudel and F. C. Spooner, « Prices in Europe, 1450-1750 », *Cambridge Economic History of Europe*, IV, pp. 442-46.

10 H. A. Miskimin, « Agenda for Early Modern Economic History », *The Journal of Economic History*, XXXI (1971), pp. 172-83.

11 A. E. Feaveryear, *The Pound Sterling: A History of English Money*, Oxford, Clarendon Press, 1931.

12 Sir John Craig, *The Mint: A History of the London Mint from A.D. 287-1948*, Cambridge, Cambridge University Press, 1953.

13 N. J. Mayhew, « Numismatic Evidence and Falling Prices in the Fourteenth Century », *Economic History Review*, 2nd Ser., XXVII (1974), p. 7.

14 J. D. Gould, *The Great Debasement: Currency and the Economy in Mid-Tudor England*, Oxford, Clarendon Press, 1970, pp. 34-41.

Conversion of all output figures into tower pounds of fine metal permits rough comparison of the bullion supplies in two eras, should consequently shed light on the relative importance of the individual components of the quantity equation.[15] Total recorded gold coinage at the London mint in the one hundred year period, 1501-1600, amounted to 105,433 tower pounds of fine gold. By comparison, the period from 1344 to 1374, the first thirty-one years of England's gold coinage, witnessed the striking of 106,699 tower pounds of fine gold. More gold was struck during a thirty-one year period in the fourteenth century than was struck during the entire sixteenth century.

Now it is well known that the literature of the price revolution directs our attention primarily to silver rather than gold; let us, therefore, compare silver production in the two periods. During the one hundred years between 1273 and 1372, the London mint struck 1,960,058 tower pounds of fine silver. By contrast, in the period 1501-1600, but excluding the years 1550 and 1551, the mint struck 2,276,356 tower pounds of fine silver. The difference between the earlier period's 1.9 million pounds and the sixteenth century's 2.2 million would not appear to be the stuff from which price revolutions are made. The statistics are admittedly imperfect. According to Gould,[16] the Feaveryear-Craig series understates output from 1545 to 1547, but overstates production in 1550-51. Since the documentation in these years is flawed, precise quantitites elude us, yet even if we assume that all the bias weighed in one direction, that the subsidiary mints added nothing in the early period, and that they added much in the latter, we would not be tempted, no matter how generous we became, to add more than four or five hundred thousand pounds of pure silver to compensate for understatement during the six disputed years of the sixteenth century. Exen after such a hypothetical addition, the level of silver coinage in sixteenth century England would be only 35% greater than it was in 1273-1372. For those who distrust the hypothetical, we may note as an alternative measure of magnitude that during the period, 1552-94, when the records are firm and when only the London mint was operating, silver output was 1,432,436 tower pounds; this is almost identical to the 1,404,891 tower pounds of silver struck during a comparable forty-two year period between 1279 and 1321.

Mint output is not a direct measure of the available bullion supply, but it surely, particularly when we are primarily concerned with one hundred year periods, reflects the level of the bullion supply. In both periods, substantial recoinages occur, so it is perhaps fair to assume that the influence

---

[15] These and subsequent mint figures are calculated from the material presented in Sir JOHN CRAIG, *The Mint*.

[16] GOULD, *The Great Debasement*, pp. 41-42.

of recoinage on the output figures is roughly equivalent. Indeed, if we simply compare recoinage figures, the 367,000 pounds of silver recoined in 1279-81 is significantly greater than the 276,000 pounds struck during the recoinage of 1560-62. These figures would suggest, if anything, a larger bullion supply during the thirteenth century than that available to the sixteenth. Subtractions from the bullion supply as a result of foreign trade and the expenses of war and diplomacy, although unknowable, were probably not less during the turbulent sixteenth century than in the period from 1273 to 1372. Since mint output levels in the two periods do not appear to differ significantly, it would seem that the explanation of the very considerable price increases which occurred during the sixteenth century must be sought elsewhere than in bullion flows alone.

Before attempting this however, we must first be more precise as to the size of the price increases to be explained. Price series are difficult to interpret; the quality of the statistics vary, changes in taste and demand affect different commodities in different ways, and changes in the overall economic structure may have discrete effects on individual goods. Bearing all these difficulties in mind, let us consider the price index of a composite unit of consumables as developed by Phelps and Hopkins and use it as a rough measure of price chances over the three hundred year time span that we are investigating.[17] In the period, 1551-1600, mint output is reasonably certain and the level of bullion imports from the New World were approaching their maximum. We may compare this period to that between 1323 and 1372 — selected in order to include the impact of the gold coinage which was initiated in 1344. The average price index over the five fourteenth-century decades was 121.3; this may be compared to the late sixteenth century average of 349.8. The Phelps Brown index suggests that late sixteenth-century prices were roughly three times as high as those of the mid-fourteenth century.

Recall, however, Malestroit's argument against Bodin.[18] Malestroit maintained that the inflation of the sixteenth century was illusory, and that, if one simply adjusted for currency debasement, it could be shown that the price level had not changed between the time of St. Louis and his own era. Following his lead, we may easily undertake the suggested adjustment and convert the Phelps Brown index to units of account of constant silver value. When such conversion is performed, the fifty-year average in the fourteenth century falls to 106.5 and that in the sixteenth century reduces

---

[17] E. H. PHELPS BROWN and SHEILA V. HOPKINS, « Seven Centuries of the Prices of Consumables, Compared with Builders' Wage Rates », *Economica* (1956).

[18] MALESTROIT, *The Paradoxes* in G. A. MOORE, *The Response of Jean Bodin to the Paradoxes of Malestroit and the Paradoxes*, Washington, The Country Dollar Press, 1946.

to 124.5.[19] Only minimal inflation is apparent in the bullion price of commodities over our span of three centuries. Mint output figures do not support the conclusion that significantly more bullion was available in the sixteenth century than in the fourteenth and our price index does not indicate a significant change in the bullion price of goods in the latter period. By far the greatest portion of the nominal sixteenth century inflation would appear to have been the result of currency debasement.

Before proclaiming Malestroit the victor in his debate with Bodin, however, it is necessary to note that victory is his only if the velocity and transaction terms of the quantity equation remained the same. The latter condition seems patently false. There is little doubt that both output and transactions — the T term — were significantly greater in England in the second half of the sixteenth century than in the middle of the fourteenth century. Further, a relatively stable bullion supply, a slightly enhanced bullion price of commodities, and an increasing level of transactions and output collectively imply a substantial rise in the velocity of circulation of bullion. Conversely, in the absence of an increase in the velocity of circulation of bullion, sixteenth century prices, expressed in bullion, would probably have been lower than their fourteenth century counterparts. The inflation of the sixteenth century would thus appear to have two components. On the one hand, when prices are adjusted to intrinsic silver content, concealed inflation seems to have resulted from increased bullion velocity. On the other, when prices are expressed in money of account, inflation in response to debasement is manifest. The latter form of inflation may however be considered either as the result of an expanded nominal money supply or as the result of a sharp increase in the velocity of circulation of bullion made possible by debasement. In the case of each of the two components of the sixteenth century inflation, the velocity terms is of crucial significance.

What factors affect the velocity of circulation of bullion and what social mechanisms permit increased velocity? The velocity of circulation of bullion may increase directly as for example when the same coin simply passes from hand to hand more rapidly. It may increase as more sophisticated forms of credit develop in such a way as to enhance the leverage of a given quantity of bullion and to make that limited quantity perform greater service. And it may also increase as debasement, by reducing the metal content of each coin, allows more rapid turnover of bullion; with less metal per coin, less metal lies idle in consumer pockets.

---

[19] The silver content of the pound of account was as follows:

1323-34	.987
1335-44	.945
1345-51	.888
1352-72	.800
1551-1600	.356

It is probable that all of these factors were at work during the sixteenth century and that many factors accelerated the circulation of bullion, but I shall consider only two, taxation and population growth. Elsewhere, I have suggested that debasement can affect bullion velocity primarily to the degree that the sovereign is capable of enforcing the circulation of his coin at par.[20] To this extent, he acquires the ability to create fiat money, a form of credit, and thus to increase greatly the service performed by a given quantity of bullion. In order to force circulation at par, however, a sovereign must be able to offer some guarantee of the redeemability of the coin and perhaps the most certain guarantee is taxation. By assuring the subjects that coin will be taken at par by the fisc, the sovereign in effect guarantees that it will not be traded at less than par anywhere else. Rising taxation and enhanced political power surely contributed to royal authority over coinage and thus indirectly to the inflation of the sixteenth century. Bullion could circulate more rapidly when there was less of it in each unit of account and when the overall money supply was increased by the implementation of a fiat coinage.

Since the quantity equation makes no provision for its inclusion, the role of population growth as a causative factor in stimulating inflation has only recently come to be discussed and even so, without much theoretical elegance. Demographic factors, however, do seem to have influenced both price levels and price structures. The impact of demographic change on price structure is, of course, familiar to historians of both the later middle ages and of the sixteenth century. The relative inelasticity of per capita demand for food tended to exaggerate price behaviour in basic commodities as population varied, but let us limit our concern to the impact of demographic factors on the overall price level.

The population of England appears to have grown from about 2.2 million in 1500 to 3.75 million in 1604.[21] Such an increase would presumably have put greater numbers of persons in closer contact with each other, enhanced trading opportunities, and ultimately have led to a rise in the velocity of bullion circulation. This trend was almost certainly reinforced by burgeoning urbanization and the expansion of London from a town of 45,000 to a city of 224,000 over the same time span [22] a rate more than two and one half times the general population increase. Urbanization entails the development of more specialized economic functions, the presence of more traders, carters,

---

20 H. A. MISKIMIN, « The Enforcement of Gresham's Law », Paper delivered at the Quarta Settimana di Studio, Istituto Internazionale di Storia Economica "Francesco Datini", Prato, April, 1972.

21 J. CORNWALL, « English Population in the Early Sixteenth Century », *Economic History Review*, 2nd ser., XXIII (1970), pp. 32-44.

22 F. MAURO, *Le XVI^e siècle Européen: aspects économiques*, Paris, Presses Universitaires de France, 1970, p. 161.

officials, and shopkeepers, and a concomitant reduction in the number of people who are insulated from the cash economy. Of necessity, the number of cash payments will rise and with it the velocity of circulation of bullion. Since velocity and the level of transactions increase simultaneously, however, the effect is not necessarily inflationary, but the transaction demand for specie certainly expands.

Population growth, of course, affects not only the level of economic specialization but real output as well. More workers are available, and although diminishing returns limit the gain, real output increases with the number of workers. As the total quantity of goods and services grows, there is a concomitant increase in the transactions demand for cash. More money is required to turn over the larger total of goods and services and the disadvantages and costs of a limited and inflexible money supply increase. In the historical context of early modern Europe, this would mean that population growth heightened the pressure to find an alternative to a money based solely on bullion and thus limited by the scarcity of metal and tied to international bullions flows. As population rose, so too did the cost of refusing to take royal money at face value and of attempting to maintain the intrinsic value of prices. Under these circumstances, debasement could truly result in the creation of a fiat money and in the consequent acceleration in the velocity of circulation of bullion. Even in the absence of significant new bullion supplies and after adjustment for debasement, such an increase in the velocity of circulation of bullion would have had an inflationary effect. Further research on the price revolution might fruitfully be conducted along these lines.