

Federal Reserve Bank of Minneapolis
Research Department Staff Report 175

Revised October 1995

Inflation, Money, and Output Under Alternative Monetary Standards

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ABSTRACT

Our study examines whether there is a systematic relationship between the monetary standard under which a country operates and the rate of inflation it experiences. It also explores whether there are other properties of inflation, money, and output that differ between economies operating under a commodity standard and economies operating under a fiat standard. The basis for our study is price, money, and output data for 15 countries that have operated under both types of monetary standards. For each of these countries the data cover 80 years, and for most the data cover more than 100 years. With these data we are able to establish several facts about the differences in inflation, money growth, and output growth between economies operating under commodity standards and those operating under fiat standards. Specifically, we find that the following facts emerge when comparing commodity standards to fiat standards: inflation, money growth, and output growth are all lower; growth rates of monetary aggregates are less highly correlated with each other; growth rates of monetary aggregates are less highly correlated with inflation; and growth rates of monetary aggregates are more highly correlated with output growth.

*We are indebted to Lou Cain, V. V. Chari, Milton Friedman, Andrew Seltzer, Neil Wallace, and participants at seminars at Cornell University, Boston University, and the Federal Reserve Bank of Minneapolis for helpful comments. We also thank Nathan Grawe for his invaluable research assistance. The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

1. Introduction

In the early 1930s the United Kingdom and the United States changed monetary standards; both permanently left the gold standard and went to a fiat standard. Before 1930 the governments of these two countries minted gold coins and issued paper currency that represented promises to specified amounts of gold. After 1933 both governments issued fiat money—token coins and paper currency—that carried no promise of either present or future convertibility in gold or anything else of intrinsic value.

Since that time the United Kingdom and the United States have experienced substantially higher rates of inflation than either country did previously. This could be a coincidence. But there could also be a systematic relationship between the monetary standard under which a country operates and the rate of inflation it experiences. This paper examines whether such a relationship exists. It also seeks to identify other properties of inflation, money, and output that differ between economies operating under a commodity standard and economies operating under a fiat standard.

The basis for our study is price, money, and output data for 15 countries that have operated under both types of monetary standards. For each of these countries the data cover 80 years, and for most of them the data cover more than 100 years. With these data we are able to establish several facts about the differences in inflation, money growth, and output growth between economies operating under commodity standards and those operating under fiat standards.

Specifically, we find that the following facts emerge when comparing commodity standards to fiat standards:

- inflation, money growth, and output growth are all lower;
- growth rates of monetary aggregates are less highly correlated with one another;
- growth rates of monetary aggregates are less highly correlated with inflation; and

- growth rates of monetary aggregates are more highly correlated with output growth.

A study of inflation, money, and output is not, in itself, original.¹ What sets this study apart is that we document differences in the behavior of these variables under alternative monetary standards for a large sample of countries (15) over a long historical period (more than 80 years). Previous studies that use a long historical record, such as Friedman and Schwartz 1963, have typically examined only a single country and have failed to distinguish between periods with different monetary standards. Others that use a large number of countries, such as Barro 1987 and Dwyer and Hafer 1988, have typically examined only a short historical record over which a single monetary standard prevailed. The recent study by Backus and Kehoe 1993 utilizes data on 10 countries over a historical period roughly comparable to that used here. However, the focus of their study is on whether the cyclical behavior of inflation, money, and output is the same across countries. They do not consider how the behavior of these variables differs across monetary standards.

We believe that understanding the behavior of inflation, money, and output under different monetary standards will help economists build better models of money and ultimately help central banks design better policies. Because experimenting with real world economies is not possible, economists have to rely on models of economies to assess the impact of policy alternatives. But rarely is there sufficient data to directly test a model's policy implications. Experiences under different monetary standards provide such data because different monetary standards represent different monetary policy rules.

In Section 2 we define what we mean by *commodity* and *fiat* standards and discuss the various measures of money that we use in our study. In Sections 3 through 8 we present the evidence for the facts discussed above, and in Section 9 we discuss the robustness of our results. In the concluding section we discuss why these facts are important to both academics and policymakers and present some suggestions for future research. The data used are described in the Appendix.

2. Definitions of Monetary Standards and Measures of Money

Since our investigation is directed at uncovering differences in the behavior of inflation, money, and output under two types of monetary standards (commodity and fiat), we first carefully define what we mean by a *monetary standard*. Making this definition rigorous proves useful in classifying and interpreting the historical experiences we consider.

By a *monetary standard* we mean the objects that serve as the unit of account and that back the objects which circulate as generally accepted means of payment (that is, the objects that back the objects that are money). Under a commodity standard, the unit of account is a fixed amount of the commodity; government currency consists of coins made of the commodity and notes redeemable in the commodity; private monies, such as bank notes, are also redeemable in the commodity. Under a fiat standard, the unit of account is some abstract value such as a dollar, pound, or peso; government currency consists of irredeemable token coins and notes (fiat money); private monies are redeemable in fiat money.

Identifying the monetary standard under which a country is operating is not always straightforward. The standard is unambiguous when people expect it to be permanent. Identification is a bit less clear with temporary fiat systems, which are often the result of a need to finance a war. Bordo and Kydland (1993) argue that such systems are in fact commodity standards because people put a positive probability on the money being convertible in the future. They argue that the gold standard should be thought of as a rule permitting such temporary suspensions. For this paper we adopt the Bordo-Kydland definition of the gold standard and consider those temporary fiat systems that are followed by a return to a commodity standard as being part of a commodity standard.

Assessing the behavior of inflation and money under different monetary standards requires empirical counterparts to the concept of money. Our approach as to which empirical measures to use will be somewhat eclectic. Following conventional studies of inflation and money, we use a broad

measure of money (M2) that encompasses most objects that circulate as a medium of exchange or that can quickly be converted into such objects.

Since we are guided by theories suggesting that broad measures of money may fail to reveal important relationships between money and inflation, we also employ narrower measures of money. These theories imply that money should be divided into two mutually exclusive categories: objects that represent a convertibility promise by or claim on the issuer, and objects that represent no convertibility promise or claim. For convenience, we will refer to the nonconvertible, unclaimable objects as *primary money* and the convertible, claimable objects as *secondary money*.² Gold and silver coins that used to circulate in the United States, and Federal Reserve notes that circulate today, are examples of primary money; the issuers of this money do not promise to convert it into anything of value. Bank notes that used to circulate in the United States and bank deposits that circulate today are examples of secondary money; the issuers of this money promise to convert it into something else, usually on demand.

The importance of the distinction we are making between primary and secondary money can be found in theories of both fiat money and commodity money. Tobin (1963) argues the importance of fiat standards. He views commercial banks as being in the same type of business as other financial intermediaries and as creating a medium of exchange—a bank deposit—that is fundamentally different from government-created fiat money. According to Tobin (p. 415),

. . . the fountain pens of commercial bankers are essentially different from the printing presses of governments. Confusion results from concluding that because bank deposits are like currency in one respect—both serve as media of exchange—they are like currency in every respect. Unlike governments, bankers cannot create means of payment to finance their own purchases of goods and services. Bank-created “money” is a liability, which must be matched on the other side of the balance sheet. . . . Once created, printing press money cannot be extinguished, except by reversal of the budget policies which led to its birth. . . . For bank-created money, however, there is an economic mechanism of extinction as well as creation, contraction as well as expansion. [italics added]

Wallace 1977 formalized Tobin's view in an overlapping generations model in which fiat money has value. The implications of the model are striking. With all other things being equal, changes in the

growth rate of fiat money cause a direct and corresponding change in inflation. However, that is not true for changes in money created by banks. By the very nature of such changes, other things cannot be equal: banks change their liabilities when technology or preferences for borrowing and lending change. As a result, changes in bank liabilities may not be associated with changes in inflation; when they are, the sign of the change will depend on the nature of the underlying change in economic fundamentals.

Sargent and Wallace (1983) find that the importance of the distinction between primary and secondary money also holds for a model of commodity money. In their model, changes in the growth of commodity money will also cause a direct change in inflation. Like other commodities, an increase in the supply of commodity money lowers its price relative to other commodities. Changes in bank money, however, have no predictable relationship to the price of the commodity money or any other commodity. As in Wallace's fiat money model, banks change their liabilities when technology or preferences for borrowing and lending change. Consequently, changes in the growth of bank liabilities may not be associated with changes in inflation.

The quantity of primary money in an economy is the total amount of nonconvertible objects circulating as media of exchange. We measure it by the total quantity of monetary assets that remain after the balance sheets of all agents in the economy (the nonbank public, banks, the central bank, and the government) are consolidated. In netting out assets and liabilities, we consider objects that conventionally appear on the balance sheet of central banks and the government as liabilities only when they actually represent convertibility promises on the part of the issuer. For example, fiat money issued by a central bank conventionally appears on the liability side of its balance sheet, even though it represents no convertibility promise on the part of the bank. Consequently, this money would not be considered a liability for the purposes of our consolidation. Under a commodity standard, the quantity of primary money is that total amount of specie held by all agents in the economy. Under a fiat standard,

the quantity of primary money is equal to the *monetary base*—the quantity of fiat money plus specie that is held by the public, both bank and nonbank.

To measure the quantity of secondary money, we add all the assets held by the nonbank public that are used as a medium of exchange and subtract the quantity of primary money. We take the assets that circulate as media of exchange to include those types that are included in the conventionally used monetary aggregate M2. Our measure of secondary money is M2 less primary money.

3. Inflation Rate Comparisons

According to our evidence, there is a marked difference in the behavior of inflation under different monetary standards. Inflation rates are clearly lower under commodity standards than they are under fiat standards. Our evidence consists of 33 historical episodes, some going back as far as the 1600s.

We define an *episode* as a time period during which a country operated under either a commodity or a fiat monetary standard. There are 15 commodity standard episodes, one for each country in our sample. Each begins when data for a country first become available and ends when the country permanently goes off a commodity standard. We do not differentiate commodity standards by type of commodity. Nor do we consider the change from a bimetallic standard to a monometallic standard as being a new episode. There are 18 fiat standard episodes in our sample. Of these, 13 begin when a country permanently goes off a commodity standard and end with the most currently available data point. Of the other 5 episodes, 3 are for Germany, and two are for Spain. Each of these episodes either begins or ends with a major change in either the government or the structure of the central bank. The 33 historical episodes are listed in Table 1.

The country-by-country inflation experiences by episode, as measured by the average rate of growth of prices over the period, is presented in Figure 1. This figure shows that for every country in our sample, the rate of inflation is lower during commodity standard episodes than it is during fiat

standard episodes. Further, ranking episodes by rates of inflation, we find that 8 out of the lowest 10 and 13 out of the lowest 15 are commodity standard episodes. Further, the average rate of inflation during commodity standard episodes (weighted by episode length) is 1.0 percent; the average during fiat standard episodes—excluding the episode which includes the German hyperinflation—is 13 percent.³

Our conclusion from this section does not appear to be sensitive to the fact we have considered commodity standards only after 1600. Earlier data on inflation during commodity standards are somewhat sketchy. What are available, however, do not appear to overturn our conclusion.

For example, consider the so-called Price Revolution of the sixteenth and seventeenth centuries in Europe caused by the large “increase in world silver production after the conquests of Mexico and Peru” (Hamilton 1960, p. 155). Hamilton provides some data on which to compute the inflation rates for Spain and England during the Price Revolution period (p.152):

. . . when decennial prices in Spain reached their apogee during the Price Revolution, they were 3.4 times higher than a hundred years before. English prices reached their zenith during the Price Revolution in 1643–1652, when they were 3.5 times the 1501–1510 level.

A 3.4 times increase in the price level over 100 years, as occurred in Spain, amounts to an average annual inflation rate of only 1.2 percent, lower than all but one of the inflation rates for fiat standard episodes shown in Figure 1. A 3.5 times increase in the price level over 133 years (taking the shortest interval for England) amounts to an even lower average annual inflation rate of only 0.94 percent, lower than any of the inflation rates for fiat standard episodes in Figure 1.⁴

4. Money Growth Comparisons

Most theories of money predict that, other things being equal, a change in money growth causes a change in the rate of inflation in the same direction. Consequently, given that inflation is lower during commodity standard episodes than during fiat standard episodes, we would expect to find that rates of

money growth are also lower during commodity standard episodes. And that is what we find, especially when M2 and primary money are the measures of money.

The comparison of rates of money growth for countries operating under commodity and fiat standards uses data for the same countries as in the previous section. However, the periods of some commodity and fiat standard episodes are different from those used to study inflation, due to the more limited availability of money data. The episodes that we consider are listed in Table 2.

The country-by-country money growth experiences by episode, as measured by the average rate of growth of money over the period, are presented in Figures 2, 3, and 4 for M2, primary money, and secondary money, respectively. Figure 2 shows that for every country in our sample, M2 growth is lower during commodity standard episodes than it is during fiat standard episodes. Further, ranking episodes by rates of M2 growth, we find that 9 out the lowest 10 and 13 out of the lowest 15 are commodity standard episodes. Further, the weighted average rate of M2 growth during commodity standard episodes is 5.3 percent. This average is lower than the rate of M2 growth during all but one fiat standard episode. The average during fiat standard episodes (once again excluding the episode that includes the German hyperinflation) is 15 percent.⁵

Figure 3 shows that the growth rates of primary money also are lower during commodity standard episodes than during fiat standard episodes. For each of the 12 countries for which we have data on primary money growth under both commodity and fiat monetary standards, primary money growth is lower during commodity standard episodes than it is during fiat standard episodes. Further, ranking episodes by rates of primary money growth, we find that 9 out the lowest 10 and 11 out of the lowest 13 (the number of commodity standard episodes for which we have data) are commodity standard episodes. Further, the weighted average rate of primary money growth during commodity standard episodes is 3.1 percent. This average is lower than the rate of primary money growth during all but one fiat standard

episode. The average during fiat standard episodes (again excluding the episode that includes the German hyperinflation) is 13 percent.⁶

Figure 4 shows that the growth rates of secondary money exhibit the same general tendency to be lower during commodity standard episodes than during fiat standard episodes, but the tendency is weaker. In this case, we find that secondary money growth is lower during commodity standard episodes than it is during fiat standard episodes for only 11 of the 12 countries for which we have data on secondary money growth under both commodity and fiat monetary standards. The exception is Spain, which had higher secondary money growth during the 1874–1883 episode under commodity money than it had during the subsequent 1883–1935 episode under fiat money. Further, ranking episodes by rates of secondary money growth, we now find that only 7 of the lowest 10 and 8 of the lowest 13 are commodity standard episodes. Nonetheless, the difference in weighted average growth rates is still large. The weighted average rate of secondary money growth during commodity standard episodes is 7.1 percent; the weighted average during fiat standard episodes (again excluding the German hyperinflation) is 14 percent. The difference in unweighted mean secondary money growth rates is significant at better than the 0.025 level.

Since we previously found that inflation is lower during commodity standards than during fiat standards, we anticipated the finding that money growth, also, is lower during commodity standards. Further, even if we had not uncovered the fact about inflation rates, there is a sense in which the results on money growth are not surprising. Under a commodity standard, the rate at which primary money (specie) can grow is limited by technology; in the long run we expect that the rate of growth of primary money would be approximately the same as that of real output. This limitation does not apply to primary money under a fiat standard, for under such a standard, it is virtually costless to produce.

Viewed from a different perspective, however, the money growth results leave an unresolved issue. Governments can choose to have fiat money grow at the average rate that primary money grows under a commodity standard. The issue is, Why do governments choose to have fiat money grow faster?

5. Output Growth Comparisons

We have found that inflation and money growth are lower under commodity standards than under fiat standards. Another fact we have uncovered is that the growth rate of output, also, is lower under commodity standards than under fiat standards—but the difference is less marked and the evidence less strong than that for inflation and money growth.

The comparison of rates of output growth for countries operating under commodity and fiat standards uses data for the same countries as did the comparisons of inflation and money growth. However, once again the timing of some commodity and fiat standard episodes is changed due to the differential availability of output data. The episodes that we consider are listed in Table 3.

The country-by-country output growth experiences by episode, as measured by the average rate of growth of output over the period, are presented in Figure 5. This evidence appears to provide reasonable support for the conclusion that output growth is lower for commodity standard episodes than for fiat standard ones. Specifically, for 12 of the 15 countries in the sample, the rate of output growth is lower during commodity standard episodes than during fiat standard episodes. For Argentina, output growth is higher during the commodity standard episode than under the fiat standard episode. For Germany and Spain, the two countries for which we have multiple fiat standard episodes, the evidence is mixed. Output growth under the commodity standard episode is lower than output growth during one fiat standard episode, but higher than output growth during other fiat standard episodes.

When the sample is considered as a whole, however, support for the conclusion is less strong. Ranking episodes by rates of output growth, we find that only 6 out the lowest 10 and only 10 out of the lowest 15 are commodity standard episodes. Further, the weighted average rate of output growth during

commodity standard episodes is 2.4 percent; the average during fiat standard episodes is only slightly higher, at 3.1 percent. In addition, the difference between the unweighted means of the two types of episodes is not significant, even at the 0.1 level.

6. Relationships Between Growth Rates of Monetary Aggregates

Up to this point we have examined prices, money, and output and established that the growth rates of each are lower during commodity than during fiat money standards. We now examine relationships among these variables during the two types of regimes to determine whether the correlations among them are different under the two standards. We begin with the relationship among the monetary aggregates. To explore this relationship, we use the commodity and fiat money standard episodes described in Table 2. Treating each commodity or fiat standard episode as an observation, we find that the growth rates of primary and secondary money are less highly correlated under commodity standards than under fiat standards.

There is no relationship between the growth rates of primary and secondary money during commodity standard episodes. The correlation is -0.09 . This almost complete absence of a relationship is shown in Figure 6, where we display a plot of the growth rate of primary money against the growth rate of secondary money during commodity standard episodes.

By contrast, there is a strong, positive relationship between the growth rates of primary and secondary money during fiat standard episodes. The correlation is 0.99 . (These computations exclude the episode covering the German hyperinflation. If it is included, the correlation is unity.) The close relationship between primary and secondary money growth during fiat standard episodes is shown in Figure 7, where we display a plot of the growth rate of primary money against the growth rate of secondary money. The difference in the strength of the relationship between the growth rates of the two types of money under the different types of monetary standards comes across clearly when Figures 6 and 7 are compared.

7. Relationships Between Money Growth and Inflation

Another relationship we examine is that between the growth rates of our various measures of money and the rate of inflation. The historical episodes that we use to explore this relationship are the intersection of those in Tables 1 through 3. The fact we have uncovered is that the various measures of money are less correlated with inflation for commodity standard episodes than for fiat standard episodes.

This is shown by the results in Table 4. In column 1 we display the correlations between growth rates of the three measures of money and the rate of inflation during commodity standard episodes. In column 2 we display the correlations between growth rates of the three measures of money and the rate of inflation during fiat standard episodes. Every correlation in column 2 is higher than the corresponding correlation for commodity standard episodes in column 1. (Once again, all the correlations exclude the episode covering the German hyperinflation.)

What is clear from Table 4 is that there is a strong positive relationship between rates of money growth and rates of inflation during fiat standard episodes. Further, the strength of the relationship does not vary with the measure of money used. All the correlations in column 2 are 0.99. The close relation between inflation and money growth under fiat standards is shown clearly in Figure 8, where we display a plot of inflation against primary and secondary money growth for the fiat standard episodes.

For the commodity standard episodes, by contrast, there is at best a moderate positive relationship between rates of money growth and rates of inflation. Further, the strength of the relationship depends on the measure of money used. The highest correlation between money growth and inflation is 0.78, when M2 is the measure of money. A somewhat smaller correlation (0.51) is obtained when primary money is the measure. The correlation is even lower (0.36) when secondary money is the measure. The weaker relationship between money growth and inflation, and the differences in this relationship depending on which measure of money is used, are shown in Figure 9, where we display a

plot of inflation against the growth rates of primary and secondary money for the commodity standard episodes.

We also made the same set of correlations reported in Table 4 while using money growth less output growth instead of money growth. We found that both the qualitative and quantitative results reported above were virtually unchanged.

8. Relationships Between Money Growth and Output Growth

The final relationship we examine is that between the growth rates of our various measures of money and the rate of output growth. The historical episodes that we use are the same as those used in the previous section. The fact we have uncovered is that money is more highly correlated with output for commodity standard episodes than it is for fiat standard episodes.

This fact is shown by the results in Table 5. (Once again, all of the correlations exclude the episode covering the German hyperinflation.) Two of the three correlations between money growth and output growth under commodity standards are higher than the corresponding correlations under fiat standards. Only for secondary money is the correlation under fiat standards higher.

The table also shows that there is only a weak positive relationship between money growth and output growth during fiat standards. None of the correlations is greater than 0.40. By contrast, under commodity standards, there is a strong positive relationship between primary money growth and output growth, but the relationship between secondary money growth and output growth is weakly negative.

9. Robustness of Results

An examination of the timing of our historical episodes shows that, with the exceptions of Germany, Portugal, and Spain, commodity money episodes end and fiat money episodes begin around 1930. This might lead one to conclude that the differences in the behavior of inflation, money growth, and output growth that we have found are not characteristics of alternative monetary standards but rather

result from some (unspecified) other event that occurred around that time. However, in this section we present the results of a robustness test which indicates that our findings are not subject to this latter interpretation.

The test involves reexamining the facts using an alternative plausible timing of commodity and fiat episodes for some of the countries in our sample. For four countries it is reasonable to argue that the timing of commodity and fiat money standards could differ from that given in Tables 1 through 3. Specifically, Argentina could be considered to have gone on a fiat standard in 1914 rather than in 1930 because its return to the gold standard in the late 1920s was short-lived. Brazil could be viewed as having gone on a fiat standard in 1864 because, even though it was nominally on a gold standard until 1929, it experienced numerous suspensions of convertibility up to that time. Chile could be considered to have gone on a fiat standard in 1878, since it only returned to a commodity standard after this date for short periods of time—from 1895 to 1898 and from 1926 to 1931. Finally, Japan could be considered as having gone on a fiat standard in 1917, since its return to the gold standard in the early 1930s was short-lived. Under these assumptions about the timing of commodity and fiat monetary standards, roughly half the countries in our sample have had commodity standard episodes end and fiat episodes begin at times other than the 1930s.

We have redone the computations in Sections 3 through 8 under the above assumptions about when Argentina, Brazil, Chile, and Japan switched from commodity to fiat monetary standards. We find almost no substantial differences in the results. For each of these countries, rates of inflation, money growth, and output growth remain lower during the commodity standard episode. Weighted mean growth rates for these variables, over all countries in the sample, also are still lower for the commodity standard episodes, although the difference between mean weighted rates of output growth is less than under the previous classification scheme. Correlations between rates of growth of various measures of money are virtually unchanged, as are correlations between the rate of growth of output and the growth

rates of the various measures of money. Money and inflation remain highly correlated during fiat standard episodes, and the correlation between money and inflation during commodity standard episodes increases slightly.

10. Summary and Concluding Remarks

In this study we have uncovered several facts about differences in inflation, money, and output under commodity and fiat standards. We find that inflation, money growth, and output growth are all lower under a commodity standard. We also find that growth rates of various measures of money are less correlated with each other and with inflation under a commodity standard. Indeed, under a commodity standard, the correlation of secondary money and inflation is approximately zero. And we find that money and output are more highly correlated under a commodity standard than under a fiat standard.

Our facts are based on extensive historical price, money, and output data for 15 countries. As a consequence, they are open to the objections that the historical data are poor and that our sample is small. We would respond that we think we have used the best data available and that our sample includes not only the experience of several Western European countries, Canada, and the United States, but also the experience of three Latin American countries and Japan. Of course, better data on the countries in our sample or data for other countries would be welcome in order to determine precisely how robust our facts are.

Nevertheless, we think our facts will hold up to more and better data. And if they do, there are important implications for designing monetary policies. In particular, we have shown that the behavior of inflation, money, and output under different monetary standards holds on an international basis and will require an explanation that does not rely on the specifics for any individual country. Moreover, while one needs to be cautious about drawing policy implications without a model, the fact about the

behavior of inflation under different standards suggests that the long-run rate of inflation is strongly influenced by the monetary standard under which an economy is operating.

Notes

¹See for example the studies by Cagan 1956, Friedman and Schwartz 1963, Schwartz 1973, Sargent 1982, Smith 1985, Barro 1987, and Dwyer and Hafer 1988, to name but a few.

²We introduce new definitions of money because existing definitions such as outside money or base money do not distinguish monies by their convertibility property. *Outside money* (Gurley and Shaw, 1960, p.73) is defined as any government-issued money that is used to purchase goods and services for government. Thus, outside money could be government-issued money that is convertible into gold. Similarly, *base money* is any type of money, convertible or inconvertible, that can be used as bank reserves.

³The unweighted difference in means between the two types of episodes is significant at any reasonable level.

⁴Hugh Simpson of the Bank of England kindly provided us with a "Retail prices index, 1985 = 100" for the United Kingdom, dating from 1270. Based on this series, we would date the Price Revolution as beginning in 1530 and ending in 1640. Over this period, prices increased 4.2 times, with an average annual growth rate of 1.3 percent.

⁵The unweighted difference in means between the two types of episodes is significant at any reasonable level.

⁶The unweighted difference in means between the two types of episodes is once again significant at any reasonable level.

Table 1

Historical Episodes for Inflation Comparisons

Country	Dates	Monetary Standard
Argentina	1885–1929	Commodity
	1930–1989	Fiat
Brazil	1860–1929	Commodity
	1930–1993	Fiat
Canada	1870–1931	Commodity
	1932–1994	Fiat
Chile	1860–1931	Commodity
	1932–1991	Fiat
France	1820–1936	Commodity
	1937–1994	Fiat
Germany	1820–1913	Commodity
	1915–1923	Fiat
	1924–1947	Fiat
	1948–1991	Fiat
Italy	1861–1935	Commodity
	1935–1994	Fiat
Japan	1885–1931	Commodity
	1932–1994	Fiat
Netherlands	1817–1936	Commodity
	1936–1992	Fiat
Norway	1850–1931	Commodity
	1931–1992	Fiat
Portugal	1833–1891	Commodity
	1932–1990	Fiat
Spain	1812–1883	Commodity
	1883–1935	Fiat
	1941–1983	Fiat
Sweden	1732–1931	Commodity
	1931–1994	Fiat
United Kingdom	1600–1931	Commodity
	1931–1991	Fiat
United States	1790–1932	Commodity
	1933–1991	Fiat

Table 2

Historical Episodes for Money Growth Comparisons

Country	Dates	Monetary Standard
Argentina	1885–1929	Commodity
	1930–1984	Fiat ^a
Brazil	1839–1929	Commodity
	1930–1987	Fiat
Canada	1871–1929	Commodity
	1935–1993	Fiat
Chile	1860–1925	Commodity
	1937–1980	Fiat
France	1897–1936	Commodity
	1937–1994	Fiat
Germany	1876–1913	Commodity
	1915–1923	Fiat
	1948–1991	Fiat
Italy	1862–1935	Commodity
	1947–1994	Fiat
Japan	1868–1931	Commodity ^b
	1932–1994	Fiat
Netherlands	1864–1936	Commodity
	1936–1992	Fiat ^c
Norway	1850–1931	Commodity
	1931–1978	Fiat
Portugal	1854–1891	Commodity
	1932–1989	Fiat
Spain	1874–1883	Commodity
	1883–1935	Fiat
	1941–1980	Fiat
Sweden	1871–1931	Commodity ^a
	1931–1994	Fiat ^d
United Kingdom	1870–1931	Commodity
	1931–1988	Fiat
United States	1820–1932	Commodity
	1933–1991	Fiat

^aUsed for M2 comparison only, due to limited data.

^bSpecie series only to 1919, due to limited data.

^cM1 used as M2 substitute from 1936–56, due to limited data.

Secondary money for 1957–92 only, due to limited data.

^dMoney base series only 1948 to 1994, due to limited data.

Table 3

Historical Episodes for Output Growth Comparisons

Country	Dates	Monetary Standard
Argentina	1885–1929	Commodity
	1930–1984	Fiat
Brazil	1861–1929	Commodity
	1930–1992	Fiat
Canada	1870–1931	Commodity
	1932–1994	Fiat
Chile	1908–1931	Commodity
	1940–1980	Fiat
France	1815–1936	Commodity
	1937–1994	Fiat
Germany	1830–1913	Commodity
	1915–1923	Fiat
	1924–1947	Fiat
	1950–1992	Fiat
Italy	1862–1935	Commodity
	1935–1994	Fiat
Japan	1885–1931	Commodity
	1932–1994	Fiat
Netherlands	1900–1936	Commodity
	1936–1992	Fiat
Norway	1865–1931	Commodity
	1931–1991	Fiat
Portugal	1849–1891	Commodity
	1932–1991	Fiat
Spain	1849–1883	Commodity
	1883–1935	Fiat
	1941–1991	Fiat
Sweden	1861–1931	Commodity
	1931–1994	Fiat
United Kingdom	1870–1931	Commodity
	1931–1988	Fiat
United States	1820–1932	Commodity
	1933–1991	Fiat

Table 4

Money Aggregate Growth and Inflation Correlations

Measure of Money	Commodity Standards	Fiat Standards
M2	.78	.99
Primary	.51	.99
Secondary	.36	.99

Table 5

Money Aggregate Growth and Output Growth Correlations

Measure of Money	Commodity Standards	Fiat Standards
M2	.41	.09
Primary	.74	.40
Secondary	-.17	.37

Figure 1
Inflation Under Commodity and Fiat Standards

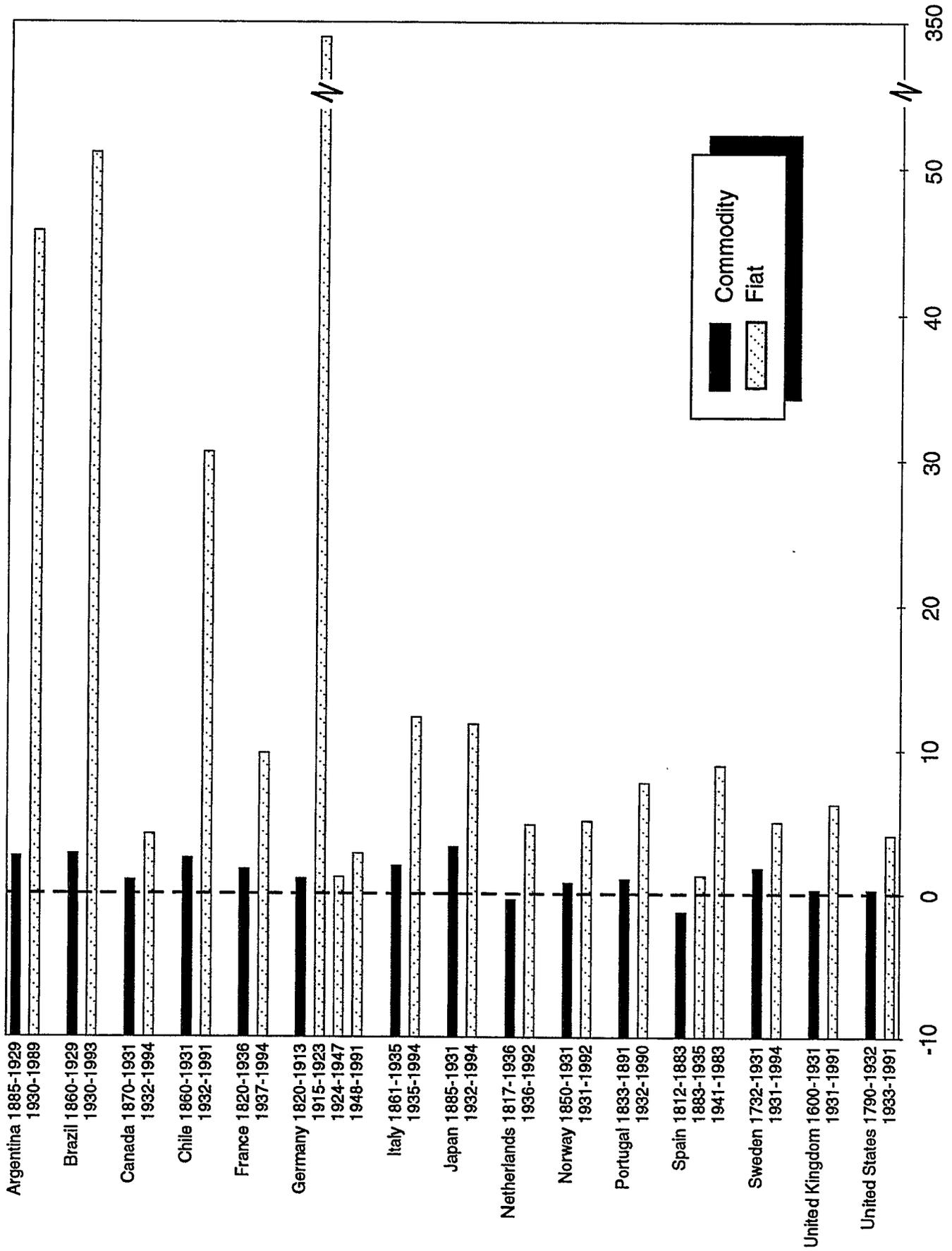


Figure 2
M2 Growth Under Commodity and Fiat Standards

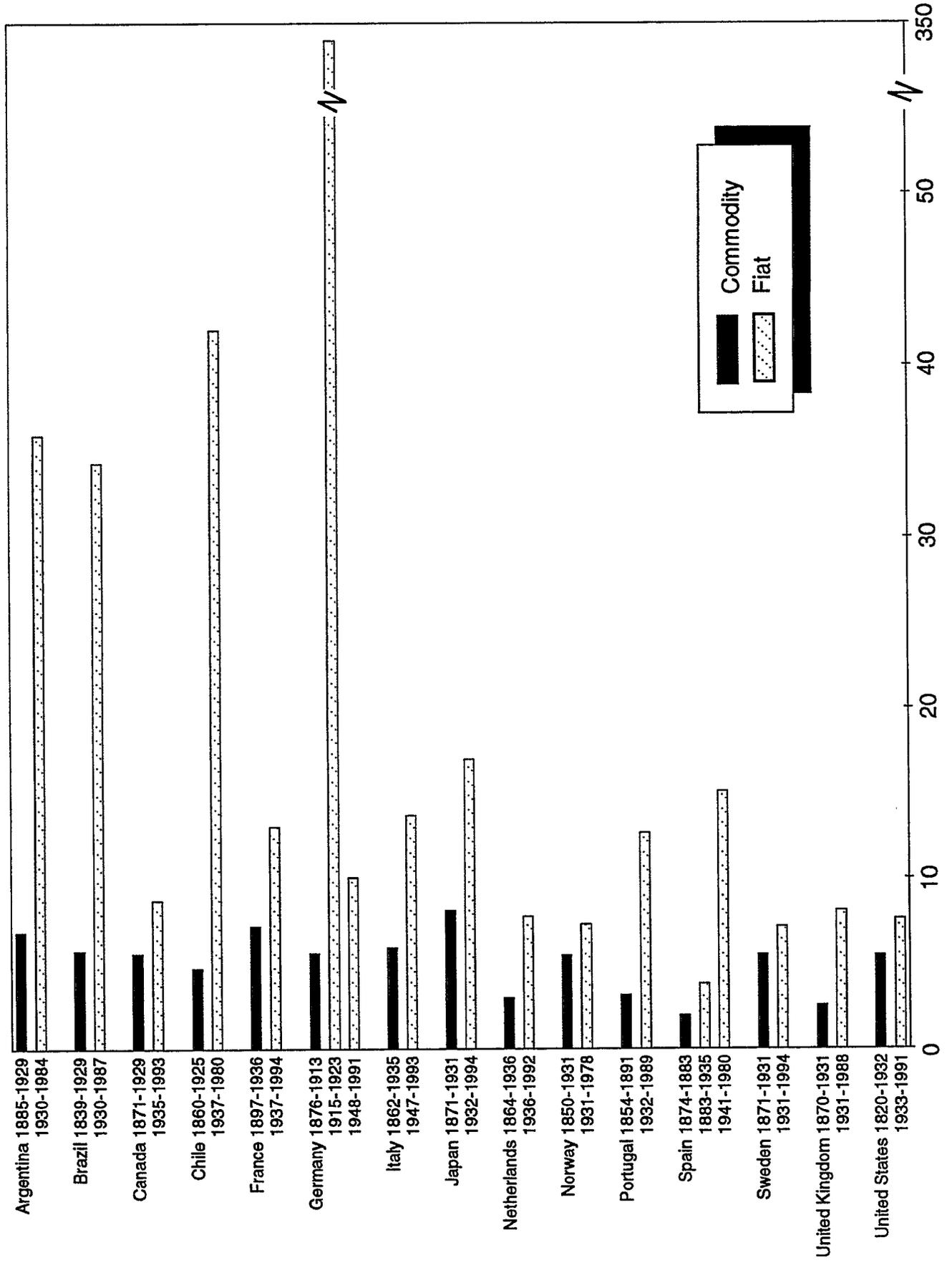


Figure 3
 Primary Money Growth Under Commodity and Fiat Standards

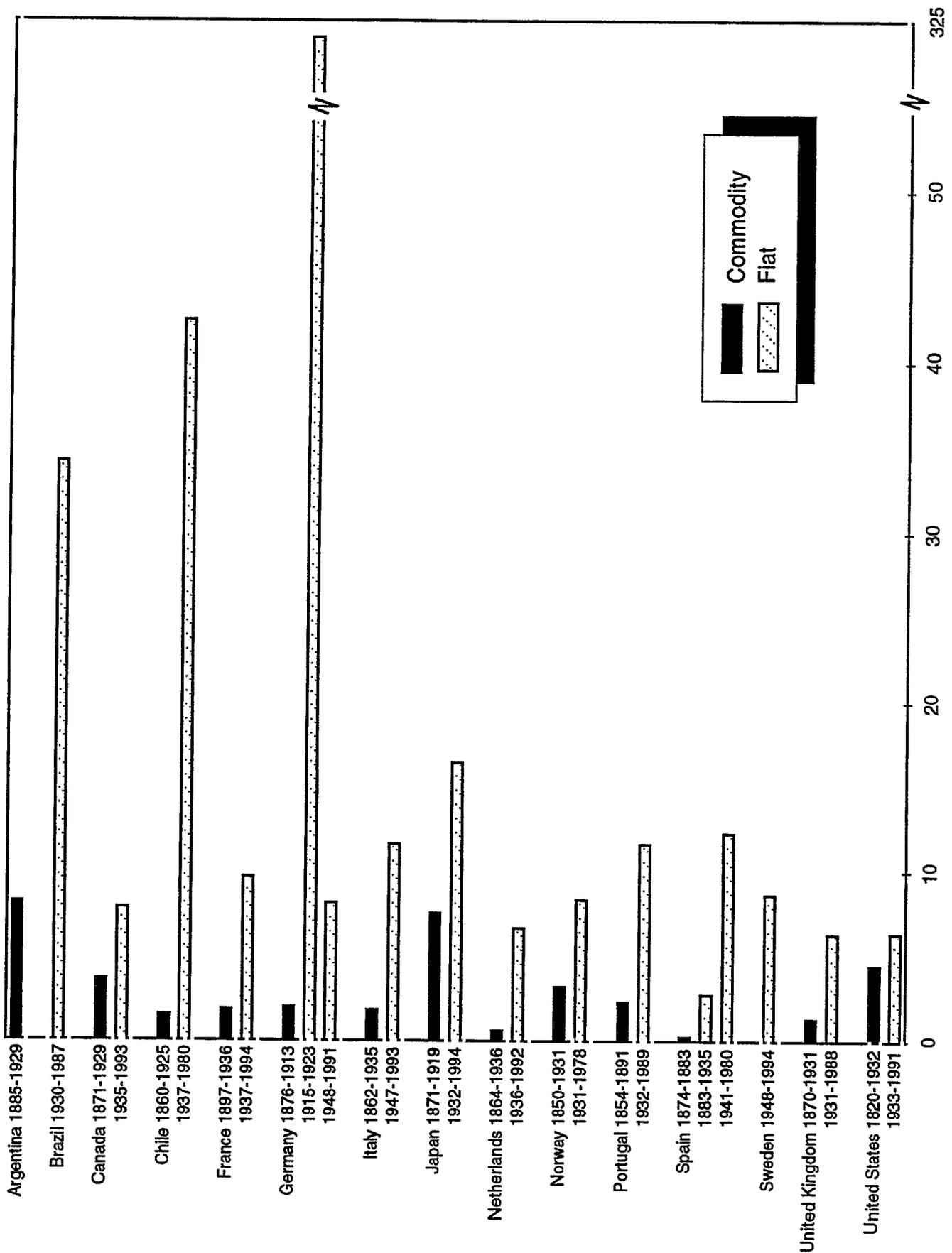


Figure 4
Secondary Money Growth Under Commodity and Fiat Standards

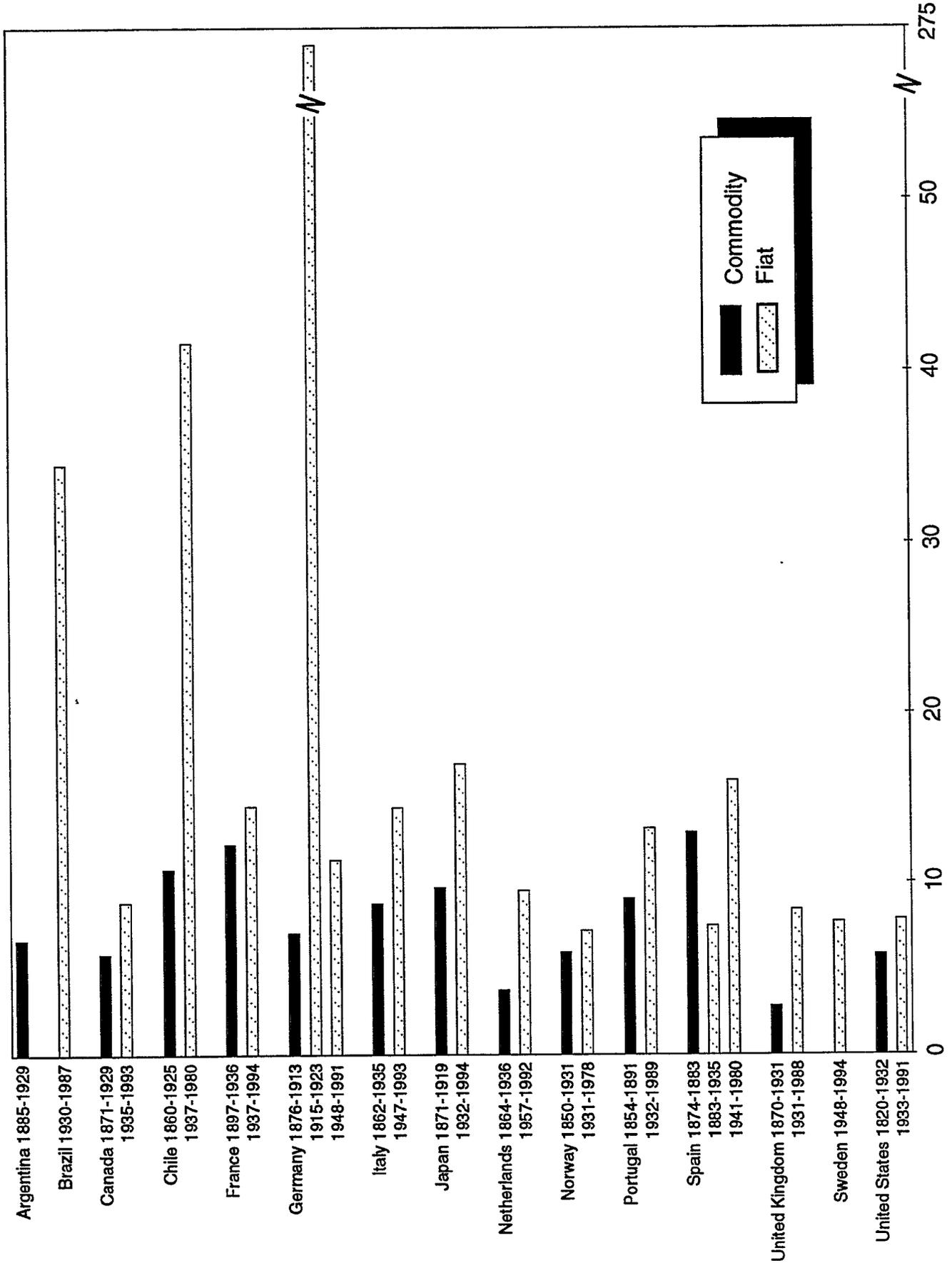


Figure 5
Output Growth Under Commodity and Fiat Standards

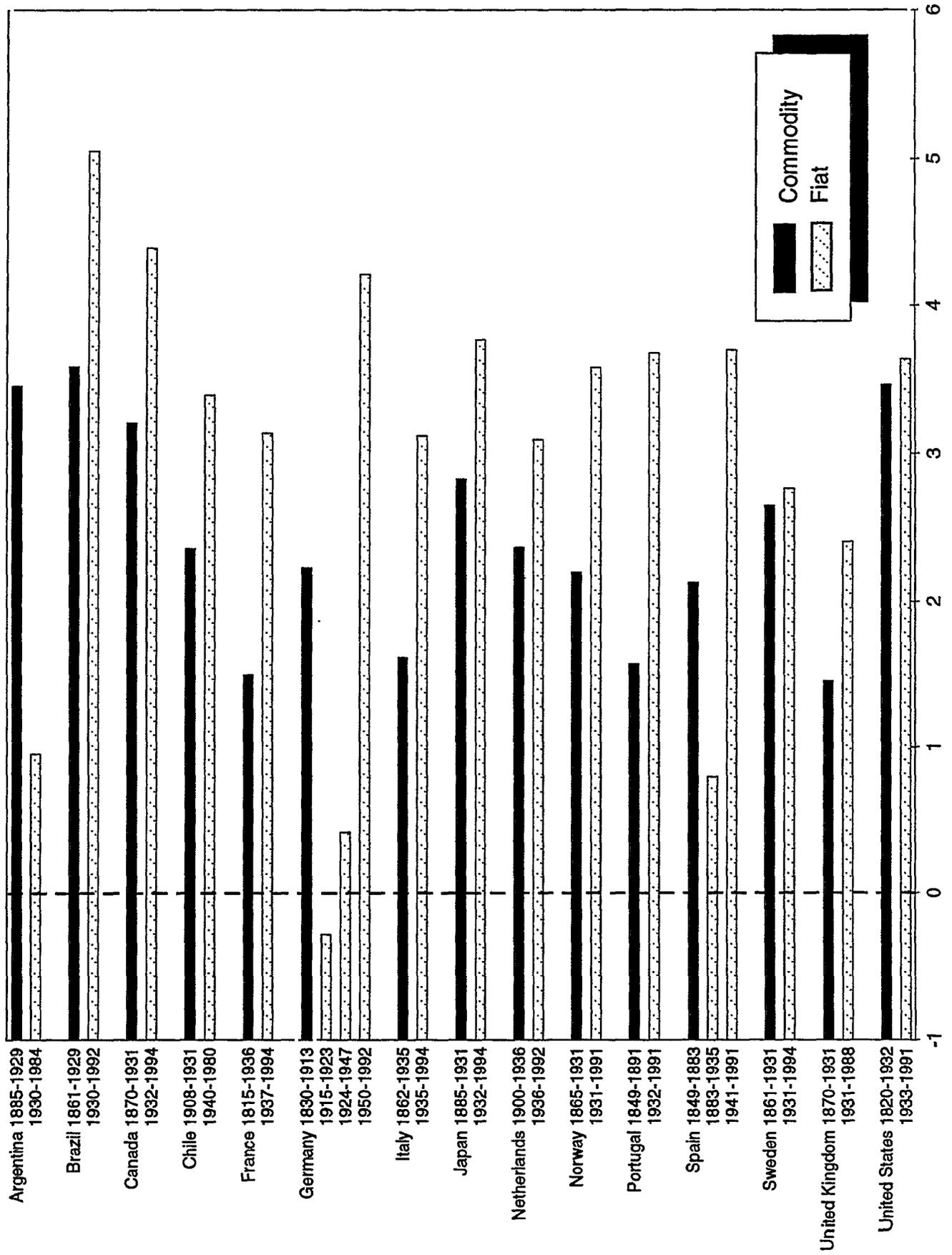


Figure 6: Money Correlations
Commodity Money Standards

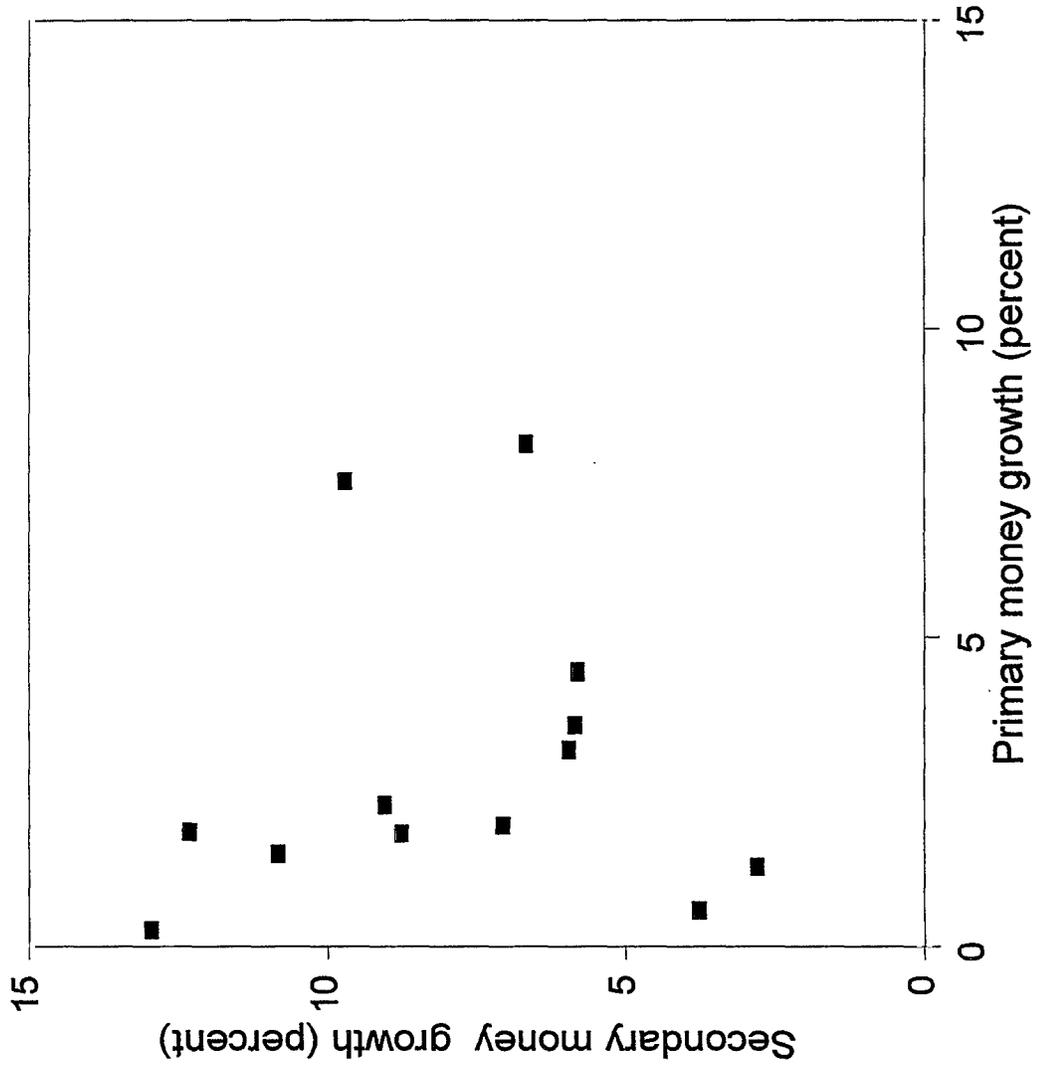


Figure 7: Money Correlations
Fiat Money Standards

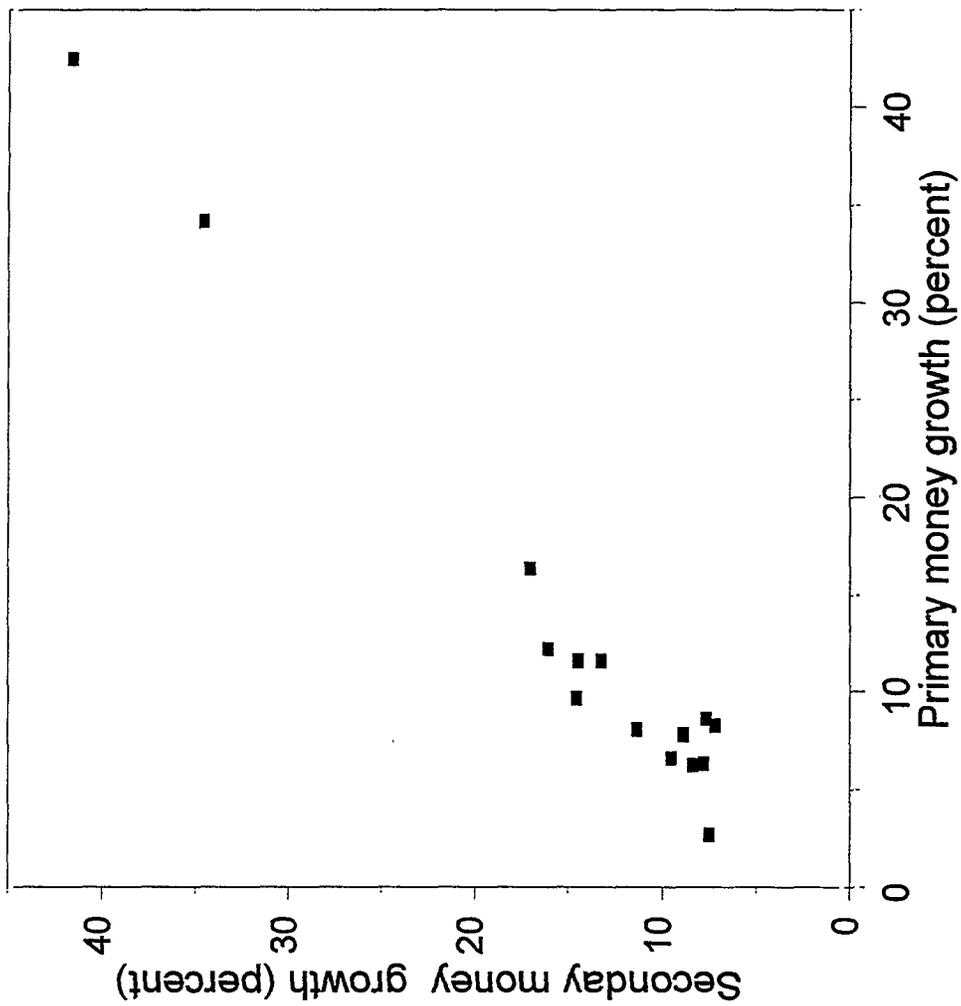


Figure 8: Money Growth and Inflation
Fiat Money Standards

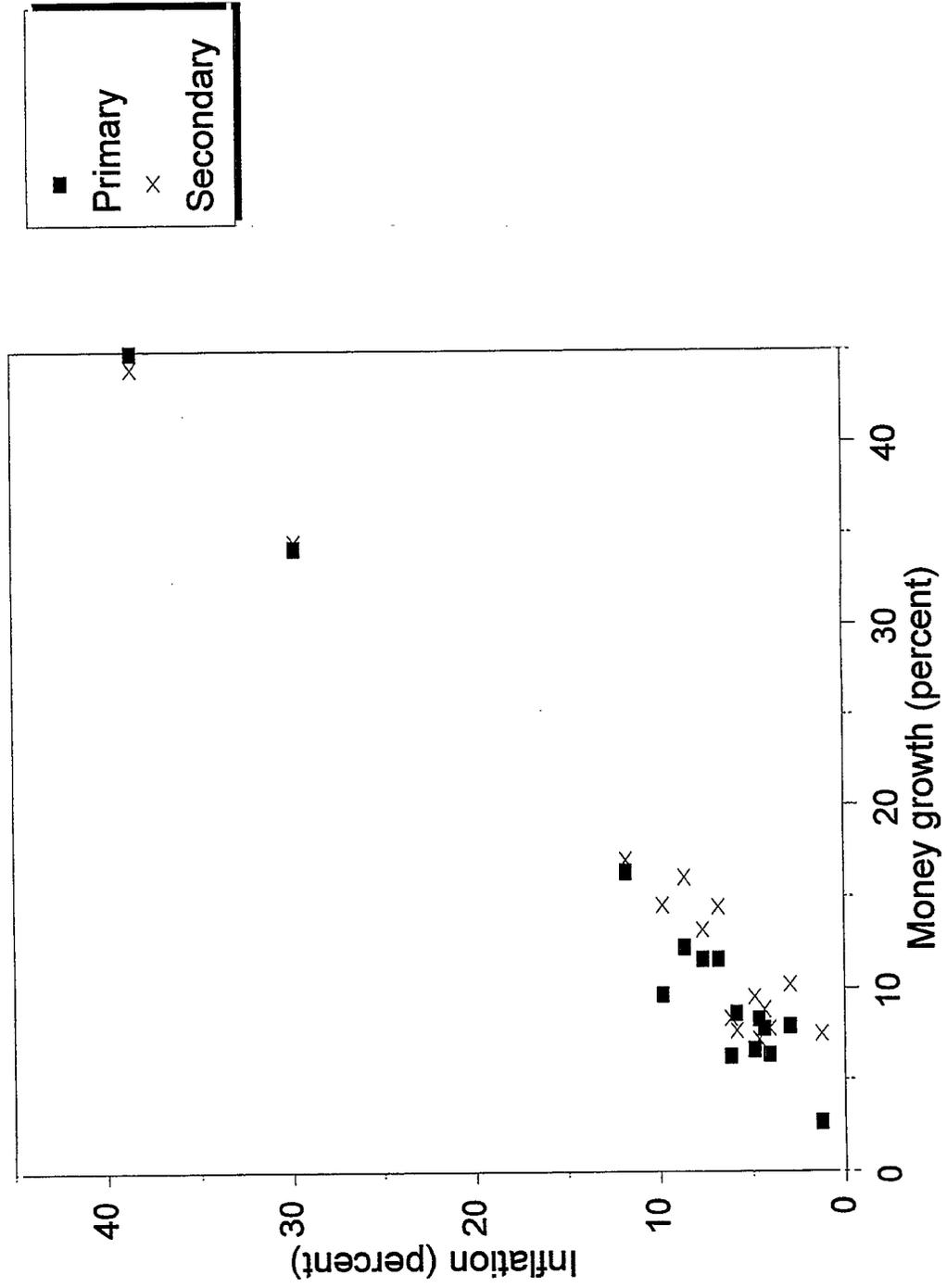
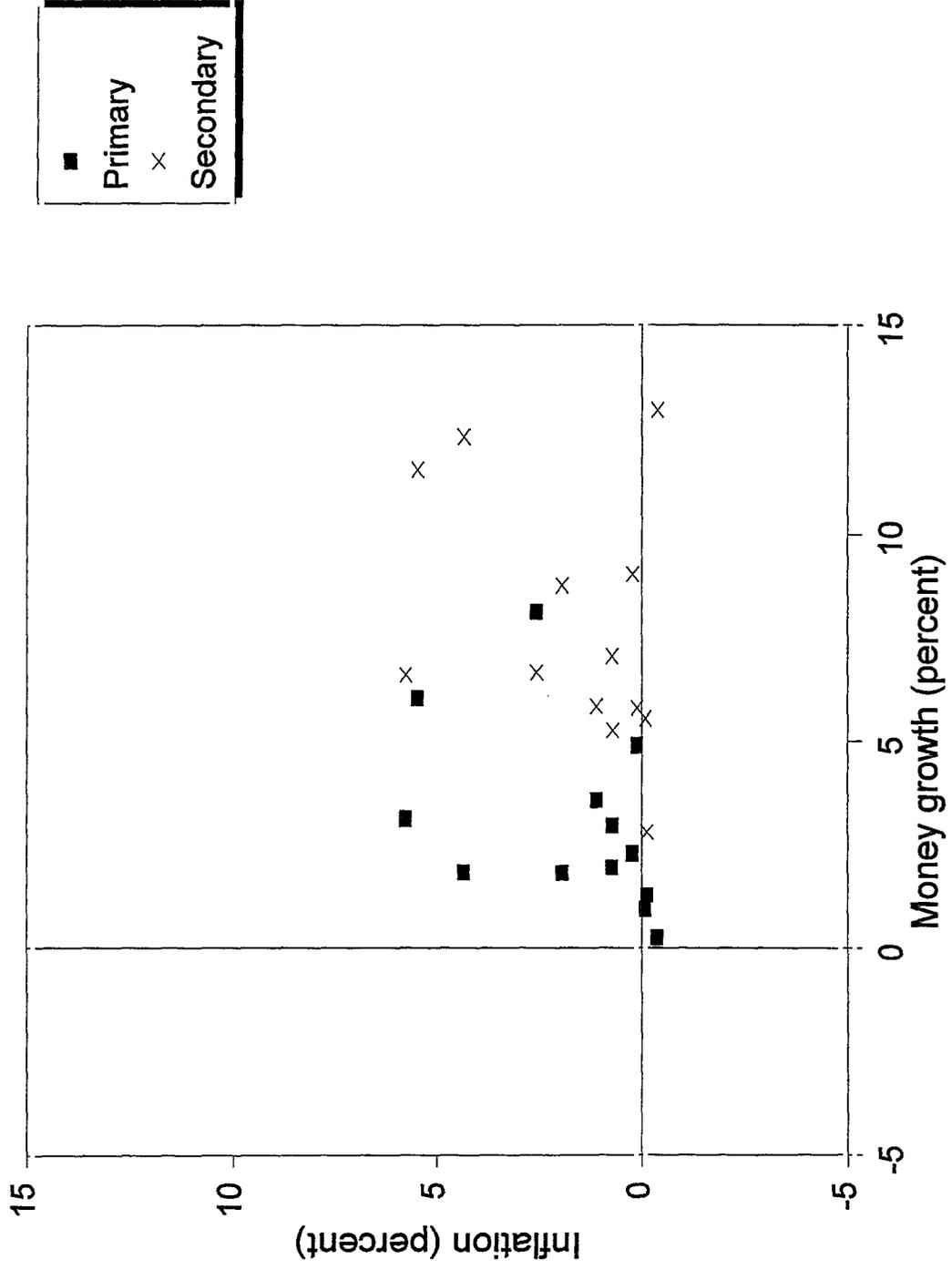


Figure 9: Money Growth and Inflation
Commodity Money Standards



Data Appendix

Argentina*Specie*

1885–1913: “Terminal Specie Stock,” Della Paolera 1988, Table 32, p. 173, col. 3.

1914–1929: “Reservas de Oro y Divisas,” Domenech 1986, cuadro 15, p. 139, col. 1.

Monetary Base

1885–1913: “Monetary Base,” Della Paolera 1988, Table 30, p. 170, col. 1.

1913–1989: No data at present.

M2

1885–1913: “Money Supply,” Della Paolera 1988, Table 30, p. 170, col. 7.

1914–1984: “M3,” Domenech 1986, cuadro 14, p. 138, col. 2.

Prices

1885–1913: “Price Level 86 = 100,” Della Paolera 1988, Table 37, p. 186, col. 4.

1914–1959: “Indice de Precios al Consumidor (base 1960 = 100),” Domenech 1986, cuadro 6, pp. 122–123, col. 1 (converted to base 1985 = 100).

1960–1989: “Consumer price index” (base 1985 = 100), IFS.

Output

1885–1913: “Real Output Index,” Della Paolera 1988, Table 37, p. 186, col. 6.

1914–1984: “Producto Bruto Interno a precios de mercado (precios de 1960),” Domenech 1986, cuadro 18, pp. 144–145, col. 1.

Brazil*Specie*

(No data were found.)

Monetary Base

1839–1960: “Base Monetaria,” Peláez and Suzigan 1981, Table A.4, col. 1, pp. 417–429.

1961–1993: “Reserve Money,” IFS, *International Financial Statistics Yearbook* (various years).

M2

1839–1960: “M2,” Peláez and Suzigan 1981, Table A.3, col. 9, pp. 395–411.

1961–1987: “M2,” World Bank.

Prices

1860–1912: “Índice do Custo de Viza no Brasil,” Onody 1960, col. 1, pp. 117–119.

1913–1946: “Deflator,” Contador and Haddad 1975, Table C–3, col. 2, pp. 434–435.

1946–1959: Quotient of “PIB a Precos Correntes,” APEC 1994, Table A–2, col. 1, and “PIB a Precos de 1980,” *ibid.*, col. 2.

1960–1991: “GDP Deflator,” World Bank.

Output

1861–1962: “Renda Real,” Contador and Haddad 1975, Table C–1, col. 1, pp. 430–431.

1963–1992: “GDP 1990 Prices,” IFS.

Canada

Specie

1871–1929: Sum of “Coin (in circulation),” Metcalf, Redish and Shearer 1995; “Current Gold and Subsidiary Coin Total,” Curtis 1931, p. 36; and “Deposits in the Central Gold Reserves,” *ibid.*, p. 35.

Monetary base

1935–1947: Sum of “Canadian Dollar Deposits, Chartered Banks,” Statistics Canada 1972, Section 13, Table 1, col. 8, p. 137; “Notes in Circulation Total,” *ibid.*, col. 6; and “Coin (held by public),” Metcalf, Redish, and Shearer 1995.

1948–1994: “Reserve Money,” IFS.

M2

1871–1993: “M2,” Metcalf, Redish, and Shearer 1995.

Prices

1870–1926: “Implicit Price Index,” Urquhart 1986, Table 2.9, col. 3, pp. 30–31.

1927–1960: “P,” Bordo and Jonung 1987. These data were kindly supplied by Pierre Siklos.

1961–1994: “GDP Deflator,” Federal Reserve System.

Output

1870–1926: “GNP in Constant (1900) Prices,” Urquhart 1986, Table 2.9, col. 2, pp. 30–31.

1927–1960: “Y,” Backus and Kehoe 1992, Worksheets.

1961–1994: “GDP 1986 prices,” Federal Reserve System.

Chile*Specie*

1810–1925: “National Stock of Coins,” Mamalakis 1985, vol. V, Table 1.2, pp. 5–6, col. 4.

1926–1980: No data at present.

Monetary base

1860–1925: “National Stock of Coins,” Mamalakis 1985, vol. V, Table 1.2, pp. 5–6, col. 4, plus “Notes in Bank Reserves,” *ibid.*, vol. V, Table 1.10, pp. 34–35, col. 6.

1926–1936: No data at present.

1937–1980: “Monetary Base, Total,” Mamalakis 1985, vol. I, Table 1.10, pp. 22–31, col. 4. Data are yearly averages of monthly data.

M2

1810–1859: Assumed to be equal to the stock of specie, since the Banco de Chile, the first bank authorized to issue notes that could circulate as currency, was not formed until 1859 (Mamalakis 1985, vol. V, p. 22).

1860–1925: “Money Supply-M,” Mamalakis 1985, vol. V, Table 1.11, pp. 36–37, col. 3.

1926–1936: No data at present.

1937–1980: “ M_2^d ,” Mamalakis 1985, vol. I, Table 1.13, pp. 41–51, col. 5. Data are yearly averages of monthly data.

Prices

1860–1931: “Price Index” (compiled by Lattore), Mamalakis 1985, vol. I, Table 4.8, pp. 225–226, col. 1.

1932–1959: “Consumer Price Index of Chile” (base 1978 = 100), Mamalakis 1985, vol. I, Table 5.7, pp. 242–243, col. 6 (converted to base 1985 = 100).

1960–1991: “Consumer price index” (base 1985 = 100), IFS.

Output

1908–1931: “Aggregate and Sectoral Production Indices (1929 = 100), Aggregate,” Ballesteros and Davis 1963, Table 1, pp. 160–161, col. 1.

1925–1931: “Chile, Net Production at 1940 Prices, Total,” UN 1951, Table 8A, p. 287, col. 5 (source for alternative data).

1940–1959: “Gross domestic product at market prices” (1961 prices converted to 1985 prices), Mamalakis 1985, vol. V, Table 5, row I, pp. 43–45.

1960–1980: “Gross Dom. Prod. 1985 prices,” IFS.

France

Specie

1878–1909: Sum of “Estimation de la Masse Monetaire Metallique,” Sicsic 1989, Table 11, p. 732, and figures of “L’Encaisse de la Banque de France,” *ibid.*, pp. 720–722.

1919–1936: Sum of “Encaisse, Or,” INSEE 1966, Chapter 49, Table 3, col. 1, p. 517; “Encaisse, Argent,” *ibid.*, col. 2; and “Monnaie Metallique,” *ibid.*, Table 1, col. 1, p. 515.

Monetary base

1878–1909: Sum of “Estimation de la Masse Metallique,” Sicsic 1989, Table 11, p. 732; “Billets en Circulation en France,” Saint Marc 1983, p. 28; and “Comptes Courants Particulaires, Solde Moyen,” INSEE 1966, Chapter 49, Table 3, col. 8, pp. 516–517.

1910–1937: Sum of “Monnaie Metallique,” INSEE 1966, Chapter 49, Table 1, col. 1, p. 515; “Billets en Circulation en France,” Saint Marc 1983, p. 28; and “Comptes Courants Particulaires, Solde Moyen,” INSEE 1966, Chapter 49, Table 3, col. 8, pp. 516–517.

1938–1948: Sum of “Monnaies Divisionnaires en Circulation,” INSEE 1966, Chapter 49, Table 2, col. 1, p. 515; “Billets en Circulation en France,” Saint Marc 1983, p. 28; and “Comptes Courants Particulaires, Solde Moyen,” INSEE 1966, Chapter 49, Table 3, col. 8, pp. 516–517.

1949–1994: “Reserve Money,” IFS.

M2

1875–1909: “M2,” Patat and Lutfalla 1990, Table 1.4, row 1, pp. 17–18, adjusted for Sicsic specie circulation.

1910–1913: “M2,” Patat and Lutfalla 1990, Table 1.4, row 1, p. 18.

1914–1918: Continuation of previous series with net changes in M2 found in Patat and Lutfalla 1990, Table 2.3, p. 25.

1919–1944: “M2,” Patat and Lutfalla 1990, Table 3.3, row 1, p. 45.
 “M2,” Patat and Lutfalla 1990, Table 4.3, row 1, p. 57.
 “M2,” Patat and Lutfalla 1990, Table 5.4, row 1, p. 75.
 “M2,” Patat and Lutfalla 1990, Table 6.3, row 1, p. 85.
 “M2,” Patat and Lutfalla 1990, Table 7.2, row 1, p. 106.

1945: Continuation of previous series with percent change in M2 found in Patat and Lutfalla 1990, Table 9.1, p. 121.

1946–1977: “Money Stock M2,” Patat and Lutfalla 1990, Table A.3 (a), col. 12, p. 274.
 “Money Stock M2,” Patat and Lutfalla 1990, Table A.3 (h), col. 12, p. 281.
 “M2,” Patat and Lutfalla 1990, Table 13.8, row 2, p. 216.
 “M2,” Patat and Lutfalla 1990, Table 14.1, row 2, p. 236.

1978–1994: “M2,” Federal Reserve System.

Prices

1820–1913: “Cost of Living,” Lévy-Leboyer and Bourguignon 1990, Table A–IV, col. 13.

1914–1950: “Indices des Prix de Detail,” INSEE 1966, Chapter 41, Table 28, cols. 5–8, p. 405.

1951–1994: “CPI,” Federal Reserve System.

Output

1815–1895: “Toutain Indice,” Saint Marc 1983, Annexe 1, col. 3, pp. 99–100.

- 1896–1962: “Index of Production,” Carré, Dubois, and Malinvaud 1975, Table 1.3, p. 24.
- 1963–1994: “GDP 1980 prices,” Federal Reserve System.

Germany

Specie

- 1876–1913: The sum of “Goldmunzen,” Deutsche Bundesbank (DBB) 1976, p. 14, col. 7; “Scheidemunzen,” DBB, p. 14, col. 8; “Gold in Barren and Munzen, Reichsbank” DBB, p. 36, col. 2; and “Deutsche Scheidemunzen, Reichsbank,” DBB, p. 36, col. 3.

Monetary Base

- 1876–1923: The sum of
 “Goldmunzen,” DBB, p. 14, col. 7;
 “Scheidemunzen,” DBB, p. 14, col. 8;
 “Reichsbanknoten,” DBB, p. 14, col. 2;
 “Reichskassenscheine,” DBB, p. 14, col. 4;
 “Darlehnskassenscheine,” DBB, p. 14, col. 5;
 “Spareinlagen, Sparkassen,” DBB, p. 16, col. 7;
 “Einlagen Kreditinstitute, Wirtschaft und Privat, Reichsbank” DBB, p. 37, cols. 5 and 6.
- 1948–1992: The sum of “Bargeldumlauf” or “Currency in circulation” and “Central bank, domestic bank deposits.” For 1948–1974 the source is DBB, p. 49, “Passiva,” col. 12. For 1975–1992 the source is Deutsche Bundesbank, pp. 8–9.

M2

- 1876–1923: The sum of
 “Goldmunzen,” DBB, p. 14, col. 7;
 “Scheidemunzen,” DBB, p. 14, col. 8;
 “Reichsbanknoten,” DBB, p. 14, col. 2;
 “Privatbanknoten,” DBB, p. 14, col. 3;
 “Reichskassenscheine,” DBB, p. 14, col. 4;
 “Darlehnskassenscheine,” DBB, p. 14, col. 5;
 “Spareinlagen, Sparkassen,” DBB, p. 16, col. 7;
 “Depositen und Kreditoren, Hypothekenbanken,” DBB, p. 16, col. 5;
 “Kreditoren, Staatliche and provinzielle Bodenkreditinstitute,” DBB, p. 16, col. 6;
 “Depositen und Kreditoren, Aktien-Kreditbank,” DBB, p. 16, col. 2;
 “fremde Gelder, Kreditgenossenschaften,” DBB, p. 16, col. 9;
 “Postscheckguthaben, Postscheckamter,” DBB, p. 16, col. 11;
 “Einlagen, Privatnotenbanken,” DBB, p. 38, col. 11;

“Einlagen insgesamt, Reichsbank” DBB, p. 37, col. 4;

Less

“Einlagen Kreditinstitute, Wirtschaft und Privat, Reichsbank,” DBB, p. 37, cols. 5 and 6.

1945–1974: “M2,” DBB, p. 28, bottom table, col. 2.

1975–1992: “M2,” Deutsche Bundesbank, p. 4.

Prices

1820–1913: Provided by the *Economist*.

1924–1990: Provided by the *Economist*.

1914–1923: December values of “German Wholesale Prices, Price Index,” Sargent 1982, Table G1, pp. 74–75.

Output

1830–1947: “GDP . . . (1913 = 100),” Maddison 1991, Table A.5, pp. 206–218, col. 8.

1950–1992: “Bruttoinlandsproduct—Real,” in 1991 prices, Deutsche Bundesbank.

Italy

Specie

1861–1935: Sum of “Circolazione (Metallica) Nelle Mani del Pubbico,” De Mattia 1967, Table 14, col. 9, pp. 509–510; “Giacenze Nelle Casse del Tesoro,” *ibid.*, col. 8; and “Oro Decimale,” *ibid.*, Table 19, items 1–10, 16, 21, 22, 24, 25, 27, 29, pp. 611–806.

Monetary base

1947–1954: Sum of “Circolazione,” Banca d’Italia 1965, Table 1, col. 1, pp. 144–145; “Conti Correnti, Liberi,” *ibid.*, col. 3; “Conti Correnti, Vincolati,” *ibid.* col. 4; and “Biglietti e Moneta di Stato,” *ibid.*, Table 8, col. 10, p. 153.

1955–1993: “Reserve Money,” IFS.

M2

1862–1963: “Money Supply,” Spinelli 1980, Appendix Table, col. 1, pp. 101–102.

1963–1994: “M2,” Federal Reserve System.

Prices

- 1861–1947: “Costo Vita,” Istituto Nazionale di Statistica 1994, Table 17.16, col. 1, p. 444.
- 1948–1994: “Consumer Prices,” IFS.

Output

- 1867–1925: Quotient of “Income,” Spinelli 1980, Appendix Table, col. 2, p. 102, and “Price Index,” *ibid.*, col. 4.
- 1926–1959: “Reddito Nazionale Netto (de lire 1938, 1963),” Istituto Centrale di Statistica 1976, Table 132, col. 8, p. 125.
- 1960–1994: “GDP 1985 prices,” Federal Reserve System.

Japan*Specie*

- 1871–1919: Sum of “(Total) Coins in Circulation,” Asakura 1974, Table “Coins,” pp. 404–431, final column, and “Conversion Reserves,” *ibid.*, cols. 3 and 4.

Monetary base

- 1868–1948: “Currency in Circulation,” Emi, Ito, and Eguchi 1988, Table 18, pp. 214–216, col. 1.
- 1949–1966: Sum of “Currency in Circulation,” Emi, Ito, and Eguchi 1988, Table 18, pp. 216–217, col. 1, and “Financial Institutions’ Deposits,” *Economic Statistics Annual, 1966*, Table 12, p. 28, col. 2.
- 1967–1978: Sum of “Currency in Circulation,” Bank of Japan 1994, Table 1, p. 35, col. 3 and “Deposits from Deposit Money Banks,” Bank of Japan 1978, Table 7, p. 14, col. 10.
- 1979–1994: Sum of “Total (Currency in Circulation),” Bank of Japan 1994, Table 1, p. 35, col. 3, and “Deposits from Deposit Money Banks,” Bank of Japan 1994, Table 5, p. 47, col. 9.

M2

- 1868–1884: Sum of “(a)–(b)–(c)” (Currency in Hands of Public), Emi, Ito, and Eguchi 1988, Table 18, p. 214, col. 4, and “Total of Deposit Money,” *ibid.*, p. 215, col. 8.

- 1885—1940: “ME,” Emi, Ito, and Eguchi 1988, Table 48, p. 301, col. 6.
- 1941—1970: Sum of “(a)–(b)–(c),” (Currency in Hands of Public) Emi, Ito, and Eguchi 1988, Table 18, p. 216, col. 4, and “Total of Deposit Money,” *ibid.*, p. 217, col. 8.
- 1971—1994: “M2,” Federal Reserve System.

Prices

- 1885—1940: “Gross National Expenditure (Deflator),” Ohkawa, Takamatsu, and Yamamoto 1974, Table 30, p. 232, col. 6.
- 1941—1960: “Gross National Expenditure (Deflator),” Ohkawa, Takamatsu, and Yamamoto 1974, Table 30–A, p. 233, col. 8.
- 1961—1994: “GDP Deflator,” Federal Reserve System.

Output

- 1885—1940: “Gross Domestic Product,” Ohkawa, Takamatsu, and Yamamoto 1974, Table 25, p. 277, col. 7.
- 1941—1960: “Gross National Expenditure at Market Prices,” Ohkawa, Takamatsu, and Yamamoto 1974, Table 18–A, p. 214, col. 7.
- 1961—1994: “GDP 1985 Prices,” Federal Reserve System.

Netherlands

(Data on money, prices, and output were kindly provided by Willem Boeschoten of De Nederlandsche Bank.)

Specie

- 1864—1936: The sum of “coins, gold” and “coins, silver.”

Monetary Base

- 1864—1992: The sum of “notes and coins (M0)” and “coins, currency notes and banknotes held by money-creating institutions.”

M2

- 1864—1992: “M1.” (We use the series for M1 since the M2 series is only available beginning with 1957.)

Prices

1817–1992: “Consumption prices, index 1980 = 100.”

Output

1900–1992: “Volume of net national income at market prices (1980 prices).”

Norway*Specie*

1846–1931: The sum of: “Coin in Circ,” Klovland 1984, Table A2, Part I, col. (2-2), averages of quarterly figures, for the years 1846–1918; or Table A2, Part II, col. (2-2), averages of monthly data, for the years 1919–1931, plus “Gold and silver, Norges Banks,” Central Bureau of Statistics of Norway 1968, Tabell 246, col. 1, for the years 1846–1913; or “Gullfondet, Norges Banks,” *ibid.*, Tabell 247, row 1, for the years 1914–1930; or “Gullfondet, Norges Bank,” *ibid.*, Tabell 247, row 1; plus “Midlertidig gullbeholdning, Norges Banks, *ibid.*, Tabell 247, row 2, for the year 1931.

Monetary Base

1848–1978: “Mon Base Adjusted,” Klovland 1984, Table A6, col. (6-3).

M2

1848–1978: “M2,” Klovland 1984, Table A6, col. (6-9).

Prices

1850–1899: “General Index Figures, Cost of living index for working class families in Christiania (base 1910 = 100),” Minde and Ramstad 1986, Appendix 2, col. L (adjusted to base 1985 = 100).

1900–1947: “Consumer price index (base 1959 = 100),” Central Bureau of Statistics of Norway 1968, Tabell 282, col. 2 (adjusted to base 1985 = 100).

1948–1992: “Consumer price index (base 1985 = 100),” IFS.

Output

1865–1948: “Bruttonasjonalprodukt, At current prices,” Central Bureau of Statistics of Norway, Central Bureau of Statistics of Norway 1965, Tabell 49, row 11, pp. 340–343, divided by “Bruttonasjonalprodukt, Price indexes. 1961 = 100,” *NA*, Tabell 52, row 11, pp. 352–355.

1949–1992: “Gross Dom. Prod. 1985 prices,” IFS.

Portugal*Specie*

1854–1912: The sum of “Moeda de Ouro,” Reis 1990, Tabela 5, col. 1; “Moeda de Prata,” *ibid.*, Tabela 5, col. 2; and “Moeda de Cobre, Bronze e Niquel,” *ibid.*, Tabela 5, col. 3.

Monetary Base

1932–1957: The sum of the fourth quarter values for “Currency,” Santos 1985, Table A1, col. 1, and “Reserves,” *ibid.*, Table A1, col. 2, spliced to the series obtained from the Bank of Portugal using the values for 1958.

1958–1989: December values for the “Monetary base” from Bank of Portugal.

M2

1854–1912: “M1,” Reis, Tabela 6, col. 5. (No M2 series is available.)

1932–1955: “M2,” Santos, Table A1, col. 6, spliced to the series obtained from the Bank of Portugal, data described below using the values for 1956.

1956–1964: December 31 values for “Total of money supply” from Bank of Portugal, spliced to the M2 series obtained from the Bank of Portugal, data described next using the values for 1965.

1965–1989: December values for “M2” from Bank of Portugal.

Prices

1833–1912: “Surrogate index of the cost of living,” Nunes, Mata, and Valério 1989, pp. 321–322, base 1912 = 98, which is equivalent to a base of 1914 = 100.

1913: “Lisbon index of the cost of living,” Nunes, Mata, and Valério 1989, p. 322, base 1914 = 100.

1914–1960: “Index of the cost of living,” Nunes, Mata, and Valério 1989, p. 322, base 1914 = 100.

1961–1990: “Consumer price index” (base 1985 = 100), IFS, converted to base of 1914 = 100.

Output

1833–1965: “Gross domestic product market 1914 prices,” Nunes, Mata, and Valério 1989, Table 1, col. 3, pp. 292–295.

1966–1991: “Gross Dom. Prod. 1985 prices,” IFS.

Spain*Specie*

1874–1935: The sum of “Gold stock,” Martín Aceña 1990, Table 1, col. 1, and “Silver stock,” *ibid.*, Table 1, col. 2.

Monetary Base

1872–1980: “Agregados monetarios, 1874–1980, Base monetaria,” Martín Aceña 1989, Cuadro 9.7, col. 1.

M2

1872–1980: “Agregados monetarios, 1874–1980, Disponibilidades liquidas,” Martín Aceña 1989, Cuadro 9.7, col. 3.

Prices

1812–1912: “Indice general de precios al por mayor, 1812–1928 (1913 = 100),” Maluquer de Motes 1989, Cuadro 12.11.

1913–1935: “Indice general de precios al por mayor, Simple,” Maluquer de Motes 1989, Cuadro 12.16, col. 1.

1940–1980: “Indice de precios de consumo, Enlace,” Maluquer de Motes 1989, Cuadro 12.16, col. 4.

Output

1849–1935: “Carreras Gasto Nacional Bruto (1913 = 100),” Carreras 1989, Cuadro 13.7, col. 1, pp. 556–557.

1940–1960: “Schwartz PIB a c.f. (10⁶ ptas. constantes de 1958),” Carreras 1989, Cuadro 13.7, col. 5, pp. 557–558.

1963–1991: “Gross Dom. Prod. 1985 prices,” IFS.

Sweden*Specie*

(No data were found.)

Monetary Base

1948–1994: “Reserve Money,” IFS.

M2

1871–1947: “Money Stock,” Jonung 1975, tab. A–1, col. 2, pp. 208–210.

1948–1994: “Money Plus Quasi Money,” IFS.

Prices

1732–1860: “Generalindex, oreduc.,” Åmark 1921, tab. 6, col. 5, pp. 20–22.

1861–1986: GDP deflator, data kindly supplied by Pierre Siklos. The series were linked using the averages of each for the period 1861–1870.

1987–1994: Quotient of “GDP Gross Domestic Product,” IFS, and “Gross Dom. Product 1990 Prices,” *ibid.*

Output

1861–1949: “Y,” Backus and Kehoe 1992, Worksheets.

1950–1994: “Gross Dom. Product 1990 Prices,” IFS.

United Kingdom*Specie*

1870–1931: Assumed to be the sum of coin in circulation and bullion in the Bank of England. Coin in circulation is December values of “Coin in Circulation,” Capie and Webber 1985, Table III(1), col. I, pp. 350–374. Bullion in the Bank of England is obtained by subtracting permissible fiduciary issue from December values of “Bank of England Notes Outstanding,” *ibid.*, Table III(1), col. II, pp. 350–374. Permissible fiduciary issue was 14 million in 1844 and 18.5 million by 1928. Values for years in between were obtained by linear interpolation. For 1928 through 1931, fiduciary issue was assumed to be 245.8 million, the amount of Treasury notes assumed by the Bank of England (*ibid.*, pp. 211–212).

Monetary Base

1870–1981: December values of “Money Base,” Capie and Webber 1985, Table I(1), pp. 54–60, less December values of “Reserves of Notes and Coin,” *ibid.*, Table III(2), col. V, pp. 408–430. Reserves of notes and coin at the Bank of England were subtracted from Capie and Webber’s monetary base series in order to make it consistent with the Bank of England’s. See *ibid.*, p. 12.

1982–1990: December values of “Wide monetary base,” Bank of England.

M2

- 1870–1969: December values of “M3,” Capie and Webber 1985, Table I(3), col. I, pp. 82–95.
- 1970–1988: December values of “M3,” Bank of England (the 1970 value is for the fourth quarter, not December).

Prices

- 1600–1991: “Composite Commodity Price Index (1860),” McCusker 1992, Table B–1, col. 5, pp. 337–350.

Output

- 1870–1954: “Gross National Product,” Capie and Webber 1985, Table III.(12), col. I, pp. 535–536, divided by “Gross National Product Deflator (1913 = 100),” same table, col. III (series converted to 1985 prices).
- 1955–1988: “Gross Dom. Prod. 1985 prices,” IFS.

United States

Specie

- 1820–1866: “Specie, stock,” Friedman and Schwartz 1970, Table 13, pp. 218–225, col. (1). End-of-year values are used, and averages are taken when two values are given.
- 1878–1933: The sum of “Gold Outside the Treasury and Federal Reserve Banks,” “Gold Held in the Treasury and Federal Reserve Banks,” “Silver Outside the Treasury and Federal Reserve Banks,” and “Silver Held in the Treasury and Federal Reserve Banks,” all computed by the NBER from Annual Reports of the Secretary, U.S. Department of the Treasury. The NBER series for each of these items has two parts: one for 1878–1914 and one for 1914–1933. These two parts are not the same in 1914, the series for the latter time period being smaller. Therefore we assumed that the NBER series was correct for 1878 and gave the gross amount of specie for the other years in the earlier period. We obtained the series used in this paper for 1979–1913 by applying a depreciation rate of 0.6796 percent per year to the NBER series for the earlier period.

Monetary Base

- 1862–1866: The sum of “Specie, Held by Public,” Friedman and Schwartz 1970, Table 13, pp. 218–225, col. (4), and “Gov’t. Currency Issues,” *ibid.*, Table 13, pp. 218–225, col. (5), less “Specie, Held by Treas.,” Table 13, pp. 218–225, col. (2).
- 1878–1960: “High-Powered Money,” Friedman and Schwartz 1963, Table B-3, pp. 799–808, col. (1). For 1878–1880, values are for February of the succeeding year. For 1881–1906, values are averages of June values for the year and the succeeding year. For 1907 on, December values are used.
- 1961–1991: “Monetary base, unadjusted,” Federal Reserve System.

M2

- 1820–1866: The sum of “Specie, Held by Public,” Friedman and Schwartz 1970, Table 13, pp. 218–225, col. (5); “Bank Notes, Held by Public,” *ibid.*, Table 13, pp. 218–225, col. (12); and “Deposits, Total Excluding Interbank,” *ibid.*, Table 13, pp. 218–225, col. (14). End-of-year values are used, and averages are taken when two values are given.
- 1878–1960: “Summations, Cols. 1, 4, 5, and 6,” Friedman and Schwartz 1963, Table A–1, pp. 704–722, col. (9). This summation includes currency held by the public and deposits in commercial banks, mutual savings banks, and the postal savings system. For 1878–1880, values are for February of the succeeding year. For 1881–1906, values are averages of June values for the year and the succeeding year. For 1907 on, December values are used.
- 1961–1991: “M2” from Federal Reserve System.

Prices

- 1820–1991: “Composite Commodity Price Index (1860),” McCusker 1992, Table A–2, col. 6, pp. 323–332.

Output

- 1820–1860: “Estimates of Gross Domestic Product per Capita (valued in 1840 prices), Variant B Narrow GDP,” Weiss 1992, Table 1.2, col. 2, p. 27, multiplied by “Total resident population,” U.S. Bureau of the Census 1975, Series A7, p. 8 (converted to 1860 prices using the ratio for 1859–1860 of per capita “GDP-Narrow,” expressed in current dollars, to per capita “Narrow GDP,” expressed in 1839–1840 dollars, contained in Tables XVI and XVIII of Myers 1992).
- 1878–1879: “GNP, 1860 Prices” decade average value for 1874–1883, from Gallman 1966, Table A–1, col. 2, p. 26 (converted to 1958 prices using the ratio for the 1879–1888 decade average of “Gross National Product, 1958 Prices, Total,” from U.S. Bureau of the Census 1975, Series F3, p. 224, to the value from Gallman 1966).
- 1889–1933: “Gross National Product, 1958 Prices, Total,” U.S. Bureau of the Census 1975, Series F3, p. 224.
- 1933–1991: “Gross Dom. Prod. 1985 prices,” IFS.

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