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A return to the convertibility principle? Monetary and fiscal regimes in historical perspective. The international evidence

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A RETURN TO THE CONVERTIBILITY PRINCIPLE?
MONETARY AND FISCAL REGIMES IN HISTORICAL PERSPECTIVE.
The international evidence.

Michael D. Bordo and Lars Jonung*

November 2000

Abstract: What is the long-run relationship between monetary and fiscal policies? This paper provides an answer by examining a large set of data covering major economies during the past 115 years. The evidence suggests the existence of a close interaction between the monetary regime, that is the behaviour of the central bank/monetary authorities, and the fiscal regime, that is the tax and spending behaviour of governments as reflected in the evolution of budget deficits and public debt.

In the past, a monetary regime based on the commitment to convertibility of the domestic currency into specie, the 'convertibility principle', was the prevailing pattern in the world economy. According to this principle, the fiscal regime is subordinated to the monetary regime. The monetary regime places binding constraints on fiscal policies. The major exception to this pattern occurred during major wars and their immediate aftermath when fiscal demands determined monetary policy.

Since the mid 1960s and especially after the breakdown of the Bretton Woods system in the period 1971-73, monetary policy has abandoned the 'convertibility principle' and in many countries has been geared towards domestic stabilization goals, especially that of full employment. This led to a build-up of inflationary pressures in the 1970s which has been largely rolled back since the early 1980s. In the same period bond-financed fiscal policy has been used as a stabilization policy tool, when many countries accumulated debt to income ratios sufficient to threaten monetary stability. These results suggest a prediction for the future. If fiscal balance is restored in most major economies, monetary regimes based on either an internal commitment such as the goal of price stability or low inflation or an external commitment to peg to a foreign currency will prevail.

Key words: Gold standard, convertibility, monetary regimes, Bretton Woods.

JEL classification: E5, E6, H6, N1.

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A RETURN TO THE CONVERTIBILITY PRINCIPLE? MONETARY AND FISCAL REGIMES IN A HISTORICAL PERSPECTIVE.

The international evidence.

1. Policy regimes.¹

The stabilization policy doctrines that emerged after World War II combined two elements: monetary and fiscal policies. In this study we will focus on the long run relationship between these two types of policies. As long run patterns are considered, our study is based on the regime concept. It is prominent in several empirical studies of monetary history.²

We define a regime as a set of arrangements and institutions accompanied by a set of expectations - expectations by the public with respect to policymakers' actions and expectations by policymakers about the public's reaction to their actions.³ The behaviour of the monetary authorities is crucial to the performance of the monetary regime just as the behaviour of the fiscal authorities, that is the government or ministry of finance, determines the performance of the fiscal regime. The monetary and fiscal regime jointly determine the prevailing stabilization policy regime. The monetary and fiscal regime are linked. The monetary regime is influenced by the rules governing the fiscal regime and vice versa. The evolution of this interaction over the past 100 years is the theme of this study.

In the present macro-theoretical framework, the private sector, assuming rational expectations, makes forecasts and decisions based on its understanding of the policymakers' underlying model and likely policies consistent with that model. Monetary and fiscal policymakers in turn make their forecasts and decisions based on how they expect the private sector to react. Under such a regime, the private sector's response to expansionary monetary and fiscal policies will differ dramatically in two possible scenarios. First, if the monetary and fiscal process is constrained by adherence to the rule of a fixed price of gold under the gold standard or to a rule restricting the

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² See for example Bordo (1993a, 1993b), Bordo and Jonung (1996, 1997) and Bordo and Schwartz (1997).

³ By incorporating expectations explicitly, a monetary regime differs from the older and more restricted concept of a monetary standard, which referred simply to the institutions and arrangements governing the money supply.

growth rate of the money supply to the long-run growth rate of the economy. Second, if price expectations are based on guessing the monetary and fiscal authorities' actions in a discretionary regime aimed at stabilizing for example the rate of unemployment at less than the natural rate.⁴

Stabilization policy regimes thus encompass the constraints or limits imposed by expectations, customs, and the institutional framework, including the constitution and the political system, on the ability of the monetary and fiscal authorities to influence the evolution of macroeconomic aggregates. These constraints, determining the policy regime, are the key to understanding the dynamic behaviour of nominal variables such as the price level, interest rates and exchange rates as well as policy variables such as the money stock/monetary base and government expenditures and revenues (the budget deficit), and thus ultimately the stock of national debt. They are also important for interpreting the short-run volatility of real income and other real variables such as the rate of unemployment.

The nature of the policy regime helps us to understand how monetary and fiscal policy actions impinge on the economy under "normal" peacetime circumstances as well as how extraordinary historical economic disturbances arise, such as periods of high inflation during and following World War I and II, the Great Depression of the 1930s and the Great Inflation of the 1970s.

Two types of monetary regimes have existed in history, one based on convertibility into specie, that is on an ultimate source of liquidity not under the discretionary control of the monetary authorities, and the other based on fiat.⁵ The former prevailed in various guises until Richard Nixon closed the gold window in August 1971, thereby terminating the gold convertibility feature of the Bretton Woods international monetary system. The latter, that is a paper standard, where the supply of money is under the control of the monetary authorities, is the norm today. Under a fiat money regime, nations can choose either fixed or floating rates. Macroeconomic behaviour during fiat monetary standards may be closely related to the conduct of fiscal policies, e.g. in the case of wartime inflationary finance or in some emerging countries today.

Monetary policy regimes have both a domestic (national) and an international aspect. The domestic aspect pertains to the monetary arrangements, which determine the domestic money supply. The international aspect relates to the monetary arrangements between nations. Generally, there is a close relationship between the domestic and international aspect.

⁴ See Leijonhufvud (1984) and Bordo and Jonung (1996).

⁵ By convertibility we mean the ability to freely convert the national currency into a fixed weight of specie. This differs from the concept of convertibility which developed after the breakdown of the classical gold standard in 1914 and is embedded in the 1944 Bretton Woods Agreement. In the latter sense, convertibility refers to the ability to freely exchange one national currency into another one without exchange controls.

In the design of policy regimes, the choice of a nominal anchor is crucial. A nominal anchor is a nominal variable that serves as a target for monetary and fiscal policy. Under specie-convertible regimes, the rule fixing the currency-price of specie (gold and/or silver coin) is the nominal anchor. Such a standard ensures that price levels will return to some mean value over long periods of time, provided that the relative price of specie remains constant.

A regime with a nominal anchor can be distinguished from one with no nominal anchor, where the monetary and fiscal authorities may, for example, use the inflation tax to meet fiscal needs and where inflation can rise indefinitely. Inflation targeting has been accepted by several central banks in the 1990s. This implies the adoption of a moving nominal anchor, treating the inherited past as bygones. In this regime, although the inflation rate is anchored, the price level will rise indefinitely (Flood and Mussa 1994).⁶

Two types of fiscal policy regimes have prevailed in history. The first type are regimes based on fiscal or budgetary outcomes that have not influenced the money supply process through monetization of public debt. Here the monetary regime dominates the fiscal regime. Even under these circumstances, however, the government may run budget deficits for extended periods of time as long as the public perceives that it will service its debt in the future without resort to borrowing from the central bank.⁷

The second type are regimes based on inflationary finance, where the monetary authorities monetize budget deficits.⁸ Historically, the attempts by governments to finance war efforts by borrowing from central banks have been a major source of inflationary finance. In this case the fiscal regime dominates the monetary regime. The money supply is determined by fiscal policies. In times of peace, budget deficits have been covered by taxation and borrowing from capital

⁶ The distinction between convertible and inconvertible (fiat) regimes and between fixed and moving nominal anchors is related to the distinction between using the price level or the inflation rate as a target for monetary policy. Targeting the price level (Knut Wicksell's norm) in a fiat regime, as some have advocated, is not the same as targeting the price of specie, because of drift in the real price of specie. However, it does produce the same results as the convertible regime of long-run mean reversion of the price level and low long-run price level uncertainty. It does so at the expense of short-run price level variability and uncertainty, however, because the monetary authority has to deflate or inflate to correct past mistakes. In the face of nominal rigidities this can lead to instability in real variables.

Inflation targeting, on the other hand, by building base drift into the price level, leads to increasing price level uncertainty as the time horizon is extended. This cost must be weighed against the benefit of lower short-run price level and output instability. See Bordo and Schwartz (1997).

⁷ Sargent and Wallace (1981) argue that the monetary authority cannot prevent inflation in the case of an irresponsible fiscal authority which generates a continuous stream of primary budget deficits. Eventually they will be monetized. For counterviews, see McCallum (1997).

⁸ Recently Woodford (1996) has argued that under a special set of assumptions bond-financed fiscal policy can be inflationary, holding money growth constant. McCallum (1997), however, argues that the assumptions required to produce this result are questionable.

markets, where the borrowing has been backed by expected future budget surpluses.⁹ Since the early 1970s, deficit finance has become a regular feature in many OECD-countries during peacetime conditions. This new pattern emerged after the breakdown of the last remnants of the gold standard embodied in the Bretton Woods system.

2. Rules vs. discretion in policy regimes

The discussion of alternative monetary and fiscal regimes relates closely to the modern literature on rules versus discretion and the time inconsistency of government policies (Kydland and Prescott 1977). In the simplest sense, government policy is said to be time inconsistent when a policy plan, calculated as optimal based on the government's objectives and expected to hold indefinitely into the future, is subsequently revised.

Discretion, in this context, means setting policy sequentially. The government is assumed to have an incentive to adopt policies that are different from the optimal plan, once market agents rationally incorporate presumptive government actions into their decisions. The usual example of time inconsistency in monetary policy is surprise inflation produced by the monetary authorities in attempting to reduce unemployment. A time inconsistent fiscal policy would be to impose a capital levy or to default on the debt, once the public has purchased it. According to this approach, the government would benefit from having access to a commitment mechanism to keep it from changing planned future policy.

Alternative monetary and fiscal regimes can be classified as following rules or discretion. The convertible metallic monetary regimes that prevailed into the twentieth century were based on a rule -- adherence to the fixed price of specie. The rule served as a commitment mechanism for governments to pursue monetary and fiscal policies that could otherwise be time inconsistent. This commitment mechanism was present in both the domestic and the international aspects of the regime. As an international regime, the key rule was maintenance of specie convertibility at the established par. Maintenance of the fixed price of specie by its adherents ensured fixed exchange rates. Adherence to fixed exchange rates in turn ensured that all countries would observe time consistent domestic fiscal policy rules.

The specie standard convertible rule (with its implicit constraints on inflationary public finance) was also a contingent rule or a rule with an escape clause. Under the contingent rule, specie convertibility could be suspended and the monetary authorities could issue inconvertible paper currency in the event of a well-understood, exogenously created crisis or emergency, such as a

⁹ In many developing countries with shallow financial markets and limited access to foreign capital, seigniorage is a much more important source of government finance. See Flood and Mussa (1994).

war, on the understanding that after the emergency had safely passed, convertibility would be restored, most likely at the original parity. Market agents would regard successful adherence as evidence of a credible commitment and would allow the authorities access to seigniorage (inflation tax) and bond finance at favourable terms (Bordo and Kydland 1996).

Inconvertible regimes can also be based on monetary and fiscal rules if the authorities devise and credibly commit to them. At the domestic level, monetary rules setting the growth rates of monetary aggregates or those targeting the price level can be time consistent. Likewise, budgetary rules or norms such as maintaining a balanced budget either on an annual basis or over the business cycle can be time consistent.

At the international level, fixed exchange rate regimes such as the EMS, based on a set of well-understood intervention principles and the leadership of a country dedicated to maintaining the nominal anchor, can in principle also be time consistent. The planned stability pact for the EMU should be viewed as a substitute for other mechanisms making domestic fiscal policies consistent over time with a monetary regime based on a common European currency, that is on permanently fixed exchange rates.

3. The macroeconomic performance of monetary and fiscal regimes. The international experience.

Next, let us survey the historical experience of monetary and fiscal regimes from the late nineteenth century to the present. We cover both international and domestic (national) aspects of the prevailing policy regimes. As background to our historical survey, we present evidence on key measures of economic performance during the past 115 years for 14 industrialized countries (the United States, United Kingdom, Germany, France, Japan, Canada, Italy, Belgium, the Netherlands, Switzerland, Sweden, Denmark, Finland and Norway).

The comparisons are based on annual data. We group the data according to the following chronology of the international monetary regimes from the 1870s onwards: the classical gold standard (1881-1913), World War I (1914-1919), the interwar period (1920-1938), World War II (1939-1946), the Bretton Woods regime split into two subperiods: preconvertible Bretton Woods period (1947-1958), the convertible Bretton Woods period (1959-1971), and the present regime of floating rates between the principal currencies. This last regime is split into two subperiods: 1973-1982 (high inflation), and 1983-1995 (low inflation). The break in 1982 signifies dramatically changing monetary and fiscal policies among the major economies.

One important caveat is that the historical regimes presented here do not always represent clear examples of fixed and floating rate regimes or alternatively of convertibility rule based and inconvertible discretion regimes. In particular, the interwar period is composed of three regimes: general floating from 1920 to 1925; the gold exchange standard from 1926 to 1931; and a managed float for major countries until the outbreak of World War II. The Bretton Woods regime cannot be characterized as a fixed exchange rate regime throughout its history: the preconvertibility period was close to the adjustable peg envisioned by its architects; the convertible period was close to a de facto fixed dollar standard.

Finally, although the period since 1973 has been characterized as a floating exchange rate regime, at various times it has experienced varying degrees of management. Major countries have allowed their currencies to float against each other while minor countries have tended to tie their currencies to a foreign currency. Moreover the period can be subdivided into two subperiods: a period of high inflation for a number of major countries freed from the 'convertibility principle'; and a period of low inflation with a seeming return to it.¹⁰

In studying the evolution of monetary policies, we focus on the monetary base and the money stock as our measures of the conduct of the monetary authorities.¹¹ The monetary base is our measure of seigniorage as well.¹² To describe the conduct of fiscal policy, we examine a number of fiscal indicators: the growth of nominal central government debt, central government budget deficits as a percentage of national income as well as the ratio of national debt to national income.¹³ These measures reflect the conduct of stabilization policies.¹⁴ We also consider government expenditures as a share of national income as a structural measure.

¹⁰ See note 5 concerning the concept of 'convertibility'.

¹¹ In recent years a number of prominent economists have argued that short-term interest rates are a better indicator of monetary policy than are monetary aggregates because of the problem of variability in velocity induced by financial innovation. However, it is an indisputable fact that to influence short term rates monetary authorities will have to operate on the monetary base (i. e. carry out open market operations and rediscounting), hence our choice of the base as the primary measure of monetary policy, McCallum (1997). It is also impossible to find a complete set of data of the short-term interest rates that the monetary authorities operated on over the 115 years and the 14 countries covered in this study.

¹² We use total central bank note circulation to represent the base. This measure is inferior to a correct measure of the base, defined as currency held by the public plus commercial bank reserves (vault cash plus deposits with the central bank) adjusted for changing reserve requirements, but it is the only measure available across all countries and regimes.

¹³ To simplify the cross country comparisons we ignore local and provincial (state) fiscal measures. This omission may be important, in particular for federal states such as the US and Canada.

¹⁴ The traditional literature on fiscal policy makes an important distinction between discretionary policy and automatic stabilisers. The difference between the two is measured by the concept of full or high employment or structural deficits or surplus. In this paper we do not make this distinction because of the difficulties involved in measuring the structural deficit across time and countries.

To get an impression of the impact on the economy of monetary and fiscal policies we also examine the rate of inflation, long-term nominal interest rates, exchange rates and real per capita growth.

Tables 1 to 11 present descriptive statistics on the macro variables for each of the 14 countries, where available. Figures 1 to 11 display the averages of these macro variables for all the countries in our sample. The data for each variable are converted to a continuous annual series from 1880 to 1995. The definition of the variable used, e.g., M1 versus M2, is dictated by the availability of data over the entire period as shown in the data appendix. In some cases we do not have data for the first few years of the period. If more than half of the observations for a period is missing, we do not report any statistics. For each variable and each country we present two summary statistics: the mean and standard deviation. The data appendix describes the construction of the data used.

For the G-7 countries and for all the countries taken as a group, we show two summary statistics: the grand mean and a simple measure of convergence defined as the standard deviation of each country's summary statistic around the grand means of the group of countries.

Next, we discuss the behaviour of measures of monetary and fiscal policy and other macroaggregates under shifting historical regimes.

3.1. The classical gold standard 1881-1913

The world switched from bimetallism to gold monometallism in the decade of the 1870s. Many nations wished to emulate the example of England, the world's leading commercial and industrial power. When Germany used the Franco-Prussian War indemnity to finance the creation of a gold standard, other prominent European nations followed. Sweden, Denmark and Norway went jointly on gold as part of the Scandinavian monetary union established in the 1870s. By 1880 most countries were on gold.¹⁵

Until 1914 the international monetary regime based on the convertibility principle of the gold standard served as the basic defining framework for national policy regimes. The currencies of most countries were defined de jure and de facto in terms of a fixed weight of gold. The fixed nominal price of gold served as nominal anchor to national monetary systems and via fixed exchange rates to the international monetary system. Within this period, the use of national

¹⁵ Strictly speaking, until 1900 the gold standard period was a mixed one as a number of countries remained on silver e.g. Japan or had inconvertible paper standards e.g. Spain. Moreover, the US only formally joined the gold standard in 1900.

monetary and fiscal policies for peacetime domestic objectives were subordinated to the maintenance of gold convertibility.

Monetary policy. The convertibility requirement of the gold standard provided an effective constraint on monetary policy. This is demonstrated in Table 1 and Figure 1 showing growth rates for the monetary base and Table 2 and Figure 2 for the money stock for different monetary regimes. Base and money stock growth was at a low and stable level during the period 1881-1913. The base and ultimately the money supply was determined by the monetary gold stock under the gold standard and new gold production was limited (by increasing costs) relative to the existing stock. Also under the fixed exchange rates of the classical gold standard regime, discipline was enforced by gold and capital flows. Indeed, monetary policy could be used for domestic purposes only within the gold points that represented a target zone (Bordo and MacDonald 1997).

Fiscal policy. The classical gold standard had important implications for fiscal policy. Under the historic convertible regime, fiscal policy was only used in wartime following the classical principle of tax smoothing - financing of wartime expenditures by borrowing and then peacetime servicing and amortizing the debt by taxation.¹⁶ In the absence of such a policy, the required changes in tax rates would severely reduce the incentives for economic activity in wartime when the need for maintaining such activity was the greatest. Long-run commitment to gold convertibility at the original parity and the implied commitment by the government to redeem and service government debt at the fixed price of gold made such a policy of public finance possible.

During the classical gold standard, fiscal policy was subordinated to the convertibility rule for most countries in our sample, thus restricting the room for fiscal measures.¹⁷ Under the convertible regime, money financed deficits would lead to a gold outflow and a speculative attack at the point when market agents anticipated that international reserves would be exhausted. Bond-financed fiscal deficits would lead to a risk premium reflecting the probability of default and the likelihood that future taxes would not be raised. The risk-premium, other things being equal, would increase the balance of payments deficit leading to gold outflows and a possible speculative attack (Bordo and Schwartz 1996). Thus the gold standard acted as a 'good housekeeping seal of approval' to insure that countries would follow prudent monetary and fiscal policies, (Bordo and Rockoff 1996).

¹⁶ See for example Barro (1987, 1979), Bordo and White (1993), Fregert and Jonung (1996) and Sargent and Velde (1995) for studies of wartime financing through seigniorage.

¹⁷ Countries that were not able to maintain fiscal stability had great problems of adhering to the gold standard. This was the case with inter alia Italy, Spain and Russia (Flandreau and le Cacheux 1997).

From a stabilization policy point of view, the domestic economy was governed by a self-regulating mechanism. There were no periods of prolonged and persistent unemployment during the classical gold standard period comparable to the interwar and post World War II periods. Nor did there exist the knowledge and acceptance of debt financing as part of a belief in "active" fiscal policy.¹⁸ This is seen below in a number of measures of the stance of fiscal policy.

Central government expenditures as a share of national income remained at a fairly stable and low average level for all countries at close to 8 per cent during the classical gold standard period (Table 3 and Figure 3). This is the lowest level for all the regimes during the past 115 years. Central government budget deficits as a percentage of national income was also at the lowest level of all regimes in Table 4 and Figure 4. Central government debt as a share of national income was falling slightly prior to World War I for the US, UK, Canada, France, and Italy. It was stable for Sweden, Norway and Finland and rising from a low level for Germany (Tables 5 and 6 and Figures 5 and 6). The growth of central government debt during the classical gold standard was on average the lowest among the monetary regimes.

The growth in debt in several countries reflected a conscious attempt by governments to finance investments in infrastructure. Much of public debt accumulation in peripheral countries in the Old and New Worlds, e.g. in the Nordic countries, Canada and Australia, occurred in the form of foreign borrowing from the capital markets in the United Kingdom, France and Germany.¹⁹ The decline in US and UK debt ratios in Table 6 reflects amortization of the public debt accumulated during wars.²⁰

The price level, interest rates, exchange rates and real income. The specie-convertible regime provided a stable nominal anchor to the price level judging from Table 7 and Figure 7. The average rate of inflation was close to zero for all the countries in our sample, very similar to the growth rate of the monetary aggregates during the classical gold standard.²¹

Under the gold standard, the operation of the commodity theory of money determined the monetary gold stock. According to that theory, market forces would tend to cause the price level to revert towards its mean level in the face of shocks to the demand for and supply of gold. The

¹⁸ See DeLong (1997).

¹⁹ In Norway and Sweden debt denominated in foreign currencies was often around 80-90 per cent of total public debt.

²⁰ See Barro (1979) for evidence showing a similar pattern for the UK and the US all the way back to the 18th century.

²¹ In addition, the inflation rates show the highest degree of convergence between the 14 countries during the classical gold standard.

process would take many years to achieve, however, so that short-term price level stability was the exception rather than the rule (Klein 1975). Contemporary economists like Irving Fisher, Alfred Marshall and Knut Wicksell were concerned about this and made proposals to improve upon the workings of the gold standard.²² The gold standard thus seemed to anchor price level expectations.

Long-term interest rates were lower under the gold standard than under regimes that followed in the 20th century. Also long-term interest rates showed the highest degree of convergence of the means during the classical gold standard (Table 8). These findings are similar to those of McKinnon (1988), who views them as evidence of capital market integration under fixed exchange rates. Convergence of standard deviations is also highest in the gold standard period.

Exchange rate movements were small during the classical gold standard as most countries adhered to gold. Japan and Italy were exceptions in Table 9.

Real per capita income growth was in the interval between 1 and 2 per cent - a fairly low number compared with the growth performance of the post World War II regimes (Table 10 and Figure 10). Growth was also more variable across countries under the gold standard.

To sum up, most countries shared a common norm guiding the conduct of monetary and fiscal policy during the reign of the classical gold standard. The gold convertibility requirement undergirded monetary and fiscal policies. This model guaranteed stable nominal performance during this period. It also implied that short-run movements in domestic economic activity was an outcome of the adherence to fixed rates and the self-regulating mechanism of the system.

3.2. World War I.

The classical gold standard ended with the outbreak of World War I in 1914. By the eve of the war, the gold standard had evolved de facto into a gold exchange standard. In addition to substituting fiduciary national monies for gold to economize on scarce gold reserves, many countries also held convertible foreign exchange, mainly deposits in London. Thus, the system had evolved into a massive pyramid of credit built upon a relatively shrinking base of gold. The possibility of a confidence crisis, causing a breakdown of the system, increased as the gold reserves of the centre diminished in relative terms. The advent of World War I triggered such a collapse as the belligerents scrambled to convert their outstanding claims on foreigners into gold.

²² See Laidler (1991).

Fiscal policy. The main force producing the end of the gold standard, after the initial confidence crisis at the outbreak of the war, was the unprecedented rapid rise in government expenditures and concomitant rise in budget deficits caused by the war effort (Tables 3 and 4 and Figures 3 and 4). Government expenditures as a percentage of national income trebled for the G-7 countries, from 8 to 24 per cent, while it remained practically constant for countries that remained outside the war like Denmark, Norway and Sweden (Table 3).

Governments facing the sharp rise in expenditures had a choice between raising taxes, increasing borrowing from the public and borrowing from the central bank. Belligerent nations relied on all these methods of finance.²³ As the rise in expenditures was far from covered by increased taxation, budget deficits rose sharply in the belligerent countries (Table 4). These countries resorted to debt financing (Tables 5 and 6 and Figures 5 and 6). The volume of public debt increased dramatically during World War I, primarily among the belligerents but also among the non-belligerents (Table 6).

Monetary policy. The enormous rise in government expenditures due to the outbreak of war in 1914 exerted a profound pressure on the monetary authorities in the belligerents. The convertibility requirement was overruled by budgetary concerns and could no longer function as a restriction on monetary policy.

Monetary policy become subordinated to the demands for immediate financing of the war effort. Monetary aggregates in all countries expanded rapidly (Tables 1 and 2). The monetary base grew by 28.8 per cent per annum as an average for all countries during World War I compared to a growth rate of 2.9 per cent during the classical gold standard. The corresponding number for the money supply is 22 per cent and 4.7 per cent, respectively. The belligerents turned to the use of the inflation tax (seigniorage) as the cost of raising conventional taxes and borrowing mounted. Table 11, displaying seigniorage as a percentage of national income under different monetary regimes, demonstrates the importance of the inflation tax during World War I. seigniorage revenue during the war was more important for Germany (7.3 per cent of national income) and France (6.0 per cent of national income) than for the UK (1.4 per cent of national income) and the US (0.4 per cent of national income) (Table 11). As we argue below, this in turn seriously hampered the ability of the former countries to deflate and establish financial order after the war.

The rise in the money supplies in the warring economies spread to neutral countries as well which experienced a sudden boom in exports and massive inflow of foreign exchange, increasing their money supplies.²⁴

²³ See Eichengreen (1992).

²⁴ A country like Sweden used part of its export revenues to redeem the foreign debt that it had accrued to finance investments during the classical gold standard - one of the beneficial effects of neutrality.

The price level, interest rates, exchange rates and real income. The price level in the world economy rose sharply during World War I in the absence of the golden nominal anchor (Table 7). The rise in prices (20 per cent) is roughly of the same order as the growth in the money supply (22 per cent). Nominal interest rates, however, did not display much movement according to Table 8, rising from 3.6 per cent as an average during the classical gold standard to 4.7 per cent as an average during World War I. The small rise, we conjecture, partially reflects widely held expectations that interest rates would return to pre-war levels after the end of the war, as well as interest pegging policies followed by the US, UK, Canada and other countries.²⁵ Exchange rates displayed wide movements as expected under unstable monetary conditions (Table 9). Real income growth turned negative in most countries engaged in war (Table 10).

To sum up, World War I marked a sharp difference in the conduct of fiscal and monetary policies in the global economy. It destroyed the world that had seen the gold standard evolve into the international monetary system. A return to a stable monetary system was high on the political agenda after the Versailles peace treaty.

3.3. The Interwar Period.

The interwar is a period of several regimes. First, the return to gold which occurred in the mid 1920s, second the short-lived international gold standard and third, the breakdown of the gold standard during the Great Depression in the 1930s.

After World War I governments wanted a return to stable monetary conditions. This step required two major decisions concerning fiscal and monetary policy. First, in several of the belligerent countries a decision had to be made concerning the treatment of public debt, that is over the time path of budget surpluses to amortize debt outstanding. Governments had to make a choice whether to run contractionary fiscal policies, which would retire debt outstanding, or else default explicitly or implicitly via inflation. Any decision would have profound effects on the distribution of income between debtors and creditors.

Germany eventually defaulted on its debt through hyperinflation.²⁶ France defaulted partially by running high inflation. She returned to gold convertibility in 1926 at a greatly devalued parity. The French return to gold occurred after a long period of domestic political fighting over the

²⁵ For the US see Toma (1997).

²⁶ Hyperinflations are closely associated with large budget deficits. Budgetary balance, often budgetary reform, was a necessary step to end hyperinflation after World War I. See e.g. Sargent (1982).

treatment of public debt. The United Kingdom as well as the US honoured their debt by running budget surpluses to amortize it.²⁷

Second, related to the treatment of debt, several countries had to decide to accept the inflation path developed during the war or to carry out a deflationary policy to bring about a return to gold at the pre-war parity rate. That is they had to make a choice of devaluing or deflating their currencies after the wartime inflation. Countries with the highest rates of inflation decided to settle for ex post devaluations, returning to gold at a devalued rate compared to the pre-1914 rate. The cost of deflation was considered too high compared to the benefits.²⁸

The gold standard was reinstated after World War I as a gold exchange standard. Britain and other countries, alarmed by the post-war experience of inflation and exchange rate instability, were eager to return to the halcyon days of gold convertibility before the war. The system re-established in 1925 was an attempt to restore the old regime but to economize on gold in the face of a perceived gold shortage. Based on principles developed at the Genoa Conference in 1922, members were encouraged to adopt central bank statutes that substituted foreign exchange for gold reserves and discouraged gold holdings by the private sector. The new system only lasted for six years, crumbling after Britain's departure from gold in September 1931. The system failed in the face of major economic disturbances because of several fatal flaws in its structure and because it did not embody a credible commitment mechanism.²⁹

After the collapse of the gold exchange standard, the world in the 1930's retreated towards autarky. Policies widely followed include trade restrictions, exchange controls and bilateralism. The disappearance of the gold standard also allowed for new experiments in monetary and fiscal policies. Some countries adopted expansionary fiscal programs, perhaps most prominently Sweden, with its expansionary "crisis policy" based on the explicit idea that the budget should be balanced over the business cycle, not on an annual basis. In a search for a new nominal anchor to replace the gold standard, Sweden also was the first country to introduce a program of price

²⁷ See Ritschl (1996) for a comparison of the debt policies of France, Germany and the UK after World War I.

²⁸ Finland and Sweden makes an interesting comparison. Both countries were facing the same dilemma: should they go back to the original gold parity rate of their currencies in the 1920s? Sweden settled for a return to the pre-1914 dollar rate, bringing about a deep depression, actually deeper than during the 1930s. Finland, as a newly established independent country, after fighting a war with Russia as well as a civil war, decided to go back to a fixed gold rate at the going rate, avoiding deflation and depression (Haavisto and Jonung 1995).

²⁹ The fatal flaws included: the adjustment problem (asymmetric adjustment between deficit countries (Britain) and surplus countries (France and the United States); the failure by countries to follow the rules of the gold standard game, (e.g. both the US and France sterilised gold flows); the liquidity problem (inadequate gold supplies, the wholesale substitution of key currencies for gold as international reserves leading to a convertibility crisis when countries subsequently tried to convert the key currencies back into gold); and the confidence problem leading to sudden shifts among key currencies and between key currencies and gold (Bordo 1993b, Eichengreen 1992).

stabilization based on Knut Wicksell's norm. One of the major arguments proposed for the program was to influence price expectations.³⁰

Monetary base and money stock growth fell back to the lowest average level of all regimes in the interwar period (Tables 1 and 2).³¹ This is reflected in deflation in most countries (Table 7).³² After World War I government expenditures as a share of national income declined, most prominently among the former belligerent countries. The decline, however, did not imply a return to pre-1914 levels. The ratio then started to rise in the 1930s as a result of the Great Depression, reducing national income levels and increasing government expenditures (Table 3 and Figure 3). Budget deficits remained small, however (Table 4 and Figure 4). Central government debt as a share of national income remained at an average level above the level reached during World War I (Table 5). The 1930s was hardly a period of "Keynesian" expansionary fiscal policies judging from the size of budget deficits and growth in the interwar period.³³

Exchange rates exhibited considerable volatility in this period (Table 9). Real growth was at its lowest and most volatile for most major countries as would be expected (Table 10).

3.4. World War II.

The outbreak of war in 1939 caused an immediate and extremely sharp rise in government expenditures, actually sharper than in 1914 (Figure 3). Governments were faced with the same financing problems as during World War I. Budget deficits as a share of national income averaged higher than during World War I (Table 4). Central government expenditures and debt as a percentage of national income reached an all time high for many countries, for example in the UK, US and Canada (Table 5). The monetary aggregates as well as the price level increased sharply, moving on average in a way very similar to the pattern of World War I (Tables 1, 2 and 7), although price controls were used more effectively than during World War I. seigniorage reached high levels in many of the belligerents, while remaining low in the US and the UK as

³⁰ See Jonung (1979) for an account of the Swedish fiscal and monetary programs in the 1930s.

³¹ However, in the US and other countries, for example Germany, M2 declined relative to the base reflecting banking panics.

³² World wide deflation in turn may reflect an overall gold shortage after World War I as argued by for example Gustav Cassel. See Eichengreen (1992).

³³ See DeLong (1997).

was the case during World War I (Table 11).³⁴ Furthermore, both short and long term interest rates were pegged at low levels in all countries to aid the fiscal authorities in financing government expenditures (Table 8).

World War II presents a pattern very similar to World War I. A sudden, exogenously produced rise of government expenditures forced monetary policy to serve the war effort. The same pattern is found among the neutral countries that stayed out of the war.

3.5. The Bretton Woods System.

The Bretton Woods System was designed to incorporate the perceived lessons of the monetary turmoil of the interwar period. Bretton Woods was the last convertible global regime. It can be viewed within the context of the gold standard because the United States (the most important commercial power) defined its parity in terms of gold and all other members defined their parities in terms of dollars.

The Articles of Agreement signed at Bretton Woods, New Hampshire in 1944 represented a compromise between American and British plans. They combined the flexibility and freedom for policy makers of a floating rate system, which the British team, wanted, with the nominal stability of the gold standard rule emphasized by the US. The system established was a system of pegged exchange rates but members could alter their parities in the face of a fundamental disequilibrium. Members were encouraged to use domestic stabilization policy to offset temporary disturbances. Thus the Agreement explicitly made room for discretionary monetary and fiscal policies, whose use at best was minimal under the classical gold standard. These policies would be effective because of the presence of capital controls. The International Monetary Fund was to provide temporary liquidity assistance and to oversee the operation of the system.

Although based on the principle of convertibility and although it became an asymmetric system, with the US rather than England as the centre country, Bretton Woods, differed from the classical gold standard in a number of fundamental ways. First, it was an arrangement mandated by an international agreement between governments, whereas the gold standard evolved more informally in a less centralised way. Second, domestic policy autonomy was encouraged even at the expense of convertibility - in sharp contrast to the gold standard where convertibility was the key feature. Third, capital movements were suppressed by controls.

³⁴ The UK followed Keynes' prescription to finance the war to a large extent by taxes whereas the US and other countries followed classical tax smoothing policies. According to Cooley and Ohanian (1997) this departure from optimal public finance doomed the UK to lower growth after the war than otherwise would have been the case.

The flaws of Bretton Woods echoed those of the gold exchange standard. Adjustment was inadequate, prices were downwardly inflexible and declining output was prevented by expansionary financial policy. Under the rules the exchange rate could be altered but in practice rarely was because of the fear of speculative attacks, which in turn reflected market beliefs that governments would not follow the policies necessary to maintain convertibility (Eichengreen 1996). Hence the system in its early years was propped up by capital controls and in its later ones by G-10 cooperation. The liquidity problems resembled those of the interwar gold exchange standard. As a substitute for scarce gold, the system relied increasingly on US dollars generated by persistent US balance of payments deficits. The French resented the resultant asymmetry between the US and the rest of the world. The growing risk of a run, as outstanding dollar liabilities increased relative to gold reserves, meant that the Bretton Woods system experienced a mounting confidence problem.

The Bretton Woods system collapsed between 1968 and 1971. The United States broke the implicit rules of the dollar standard by not maintaining price stability, that is by expansionary monetary and fiscal policies. The rest of the world did not want to absorb additional dollars and thus accept inflation. Surplus countries (especially Germany) were reluctant to revalue.

Another important source of strain on the system was the unworkability of the adjustable peg as capital mobility increased. Neither traditional policies nor international rescue packages could stop speculation against a fixed parity. The British eventually joined the French in forcing the Americans' hands by converting dollars into gold in the summer of 1971. President Richard Nixon's closing of the gold window on August 15, 1971 ended the impasse.

Bretton Woods, like the gold standard, can be interpreted as a regime following a contingent rule. Unlike the example of Britain under the gold standard, however, the commitment to maintain gold convertibility by the US, the centre country, lost credibility by the mid 1960s. Also the contingency aspect of the rule proved unworkable. Besides being ill defined, devaluations were avoided because they were viewed as an admission that policies lacked credibility because they were accompanied by speculative attack even in the presence of capital controls. Once controls were removed the system was only held together by G-10 Cupertino and once inconsistencies developed between the interests of the US and other members, even co-operation became unworkable.

In conclusion, under Bretton Woods gold still served as a nominal anchor. This link to gold was constraining US monetary policy (at least until the mid 1960s) and therefore that of the rest of the world. This may explain the low inflation rates - see Table 7 - and the low degree of inflation persistence observed in the 1950s and 1960s (Alogoskoufis and Smith, 1991; Bordo, 1993a). However, credibility was considerably weaker than under the gold standard.

The dollar-gold standard was thus not as effective a nominal anchor as the classical gold standard (Giovannini 1993). Moreover, when domestic interests clashed with convertibility, the anchor chain was stretched and then overthrown (Redish 1993). This was evident in the US reduction and then removal of gold reserve requirements in 1965, the closing of the Gold Pool in 1968 and of the gold window itself in 1971. The absolute termination of a role for gold in the international monetary system was the Second Amendment to the Articles of Agreement in 1976.

Monetary Policy. Monetary base and money stock growth began to increase in the US in the mid 1960s, reflecting expansionary policy by the US in the financing of the Vietnam War and the Great Society. This was transmitted to the rest of the world via fixed exchange rates. At the same time European countries began following Keynesian full employment policies.³⁵ The inflation rate began rising in this period. A growing tension between the expansionary monetary policies of the centre country, the US, and the main European countries who imported inflation via persistent balance of payments surpluses, helped precipitate the collapse of the system between 1968 and 1973 (Bordo 1993b).

Fiscal Policy. During the Bretton Woods period fiscal policy was initially consistent with the monetary regime. As in the post World War I period, government expenditures as a share of national income dropped sharply after World War II and stabilized at a level between 15 and 20 per cent of national income in the 1950s and early 1960s (Table 3). A major aim of fiscal policy was to amortize the public debt. Budget deficits reached a low, on average less than 2 per cent of national income (Table 4).

During the convertible phase of the Bretton Woods system from 1959 to 1971, the advanced countries enjoyed exceptional macroeconomic performance. It had the lowest and most stable inflation rate and like the classical gold standard period, long-term interest rates were low, stable and exhibited a high degree of convergence (Table 8). Moreover, real growth rates were the highest and most stable of any modern regime (Table 10).

Although aggregate demand and supply shocks were smaller than under the gold standard, the convertible phase of the Bretton Woods system was short-lived (Bordo 1993a, Bayoumi and Eichengreen 1994). This suggests that the reason for its brief existence was not the external environment but, like the gold exchange standard, structural flaws in the regime and the lack of a credible commitment mechanism.

³⁵ See for example Bispham and Boltho (1982) on demand management policies in post World War II Europe.

3.6. Floating Exchange Rates.

After the breakdown of the Bretton Woods system, the major countries turned to generalized floating exchange rates in March 1973. This meant that major nations used stabilization policy to a larger extent than previously to satisfy domestic goals, paying less attention to external considerations. Although the early years of the floating exchange rate were often characterised as a dirty float, in that monetary authorities intervened extensively to affect exchange rate levels as well as their volatility, by the end of the 1970s, it evolved into a system where exchange market intervention occurred primarily to smooth out fluctuations.

In recent years, floating exchange rates have been assailed from many quarters for excessive volatility in both nominal and real exchange rates, increasing macroeconomic instability and raising the costs of international transactions. Despite these perceived problems, the ability of the flexible regime to accommodate the problems of the massive oil price shocks of the 1970s and other shocks in subsequent years without significant disruption, and the perception that pegged exchange rate arrangements amongst major countries are doomed to failure, the prospects for significant reform of the present system at the world level seem remote. Indeed, the lessons from recent history suggest that major countries are not willing to subject their domestic policy autonomy to that of another country whose commitment cannot be ensured in an uncertain world or to a supranational monetary authority they cannot control.

Monetary policy. Base and money growth increased in the decade following the collapse of the Bretton Woods system (Tables 1 and 2). The 1970s was a period of rapid money growth and high inflation as monetary authorities in most countries, following the two oil price shocks, were unwilling to conduct antiinflationary policies that would jeopardise their primary goal of full employment. At the end of the decade under pressure of an electorate and a professional opinion critical of high inflation, policies were reversed in major OECD-economies.³⁶

After a sharp recession in the early 1980s, inflation returned to the levels prevalent in the early Bretton Woods years. Along with disinflation, nominal interest rates declined significantly during the 1980s. The period of high inflation, followed by disinflation was also associated with lower real growth than under Bretton Woods (Tables 7 and 10).

Fiscal policy. The disappearance of a global regime of fixed exchange rates relaxed the fiscal norm that had accompanied the Bretton Woods system. The negative macroeconomic disturbances caused by the two oil price shocks induced many countries to increase government

³⁶ See for example Thygesen (1982) on monetary policies in Europe. To our knowledge, there is no comparative account of the conduct of monetary and fiscal policies for the OECD-countries for the whole post World War II period.

expenditures - the ratio of government expenditures to national income reached a level above that of World War II in several countries (Figure 5). Many countries resorted to debt finance (Tables 4-6).

On average nominal debt as a percentage of national income increased from 34.5 percent for the convertible Bretton Woods period to 50.2 percent for the period 1983-1995 (Table 5). The ratio did not expand in a uniform way across countries, however. We may distinguish one group of steadily rising ratios from the early 1970s (Japan, Canada, Italy, Belgium, Netherlands, Denmark and Sweden) and one group with stable or falling ratios (US, UK, Germany, France, Finland and Norway) prior to the crises of the 1990s.³⁷

The European Monetary System. After the breakdown of the Bretton Woods system, Europe has been moving towards creating a monetary union with perfectly fixed exchange rates. This reflects the desire of the members of the European Union for economic and political integration. On the road to that end, the Exchange Rate Mechanism within the European Monetary System, established in 1979, was modelled after Bretton Woods (although not based on gold), with more flexibility and better financial resources (Bordo 1993a). It appeared successful in the late 1980s when member countries followed policies similar to Germany, the center country.

The ERM broke down in 1992-93 in a manner similar to the collapse of Bretton Woods in 1968-71. It also collapsed for similar reasons - because pegged exchange rates, capital mobility and policy autonomy do not mix. It collapsed in the face of massive speculative attacks on countries following policies inconsistent with their pegs to Germany and also on countries which seemingly were following the rules, but whose ultimate commitment to the peg in the face of rising unemployment was doubted by agents in financial markets. The policy responses to the reunification of Germany were instrumental in initiating the breakdown of the ERM.

A major problem facing the European countries has been to co-ordinate their fiscal and debt policies. Countries with relatively high public deficits and thus rising public debt like Italy have not been able to pursue as tight monetary policies as Germany. The stability pact now being discussed within the EU is designed to bring about the fiscal discipline deemed necessary for a future EMU.

4. Summary of the empirical evidence

³⁷ There is so far no satisfactory explanation for this divergent pattern (Alesina and Perotti 1995). For the case of Sweden with one of the most volatile debt to income ratios of among OECD countries, see Persson (1996).

Let us briefly summarize the descriptive data displayed in the figures and tables in order to examine the differences and similarities between historical regimes. Before doing so, however, we briefly consider some theoretical issues concerning regime choice.

Traditional theory posits that a convertible regime, such as the classical gold standard which prevailed from around 1880 until the outbreak of World War I, is characterized by a set of self-regulating market forces that tend to ensure long-run price level stability. These forces operated through the mechanism commonly described by the classical commodity theory of money (Bordo 1984). According to that theory, changes in gold production will eventually offset any inflationary or deflationary price level movements. The problem, however, is that unexpected shocks to the supply or demand for gold can have significant short-run effects on the price level.

In an international convertible regime, pegging nations' currencies to the fixed price of gold provides a stable nominal anchor to the international monetary system. Such stability, however, comes at the expense of exposure to foreign shocks, which can produce volatile output and employment. Adherence to the international convertible regime also implies a loss of monetary and fiscal independence since under such a regime the authorities' prime commitment is to maintain convertibility of their currencies into the precious metal and not to stabilise the domestic economy.

In a fiat money regime, in theory, monetary authorities could use open market operations, or other policy tools, to avoid the types of shocks that may jar the price level and real activity under a specie standard and hence provide both short-run and long-run nominal stability. It also allows greater fiscal policy autonomy. In addition to giving the authorities policy independence, adhering to a flexible exchange rate fiat regime provides insulation against foreign shocks.³⁸

As in a convertible regime, countries following fiat money regimes can adhere to fixed exchange rates with each other. The key advantage of doing so is to avoid the transaction costs of exchange in international trade. However, a fixed rate system based on fiat money does not provide the stable nominal anchor of the specie convertibility regime unless all the members define their currencies in terms of the currency of one dominant country, for example the US under Bretton Woods or Germany in the EMS, which in turn follows a rule which requires it to maintain price stability.

³⁸ Theoretical developments in recent years have complicated the simple distinction between fixed and floating exchange rates. In the presence of capital mobility, currency substitution, policy reactions and policy interdependence, floating rates do not necessarily provide complete insulation from either real or monetary shocks (Bordo and Schwartz, 1989). Moreover, according to recent real business cycle approaches, there may be no relationship between the international monetary regime and the transmission of real shocks. (Baxter and Stockman 1989).

Finally, in a fiat money flexible rate regime, the absence of the nominal anchor of the fixed price of specie opens up the possibility that monetary authorities, to satisfy the political goals of the government, for example its fiscal demands or demands to maintain full employment, could use the printing press to engineer high inflation.

The theoretical literature concludes that it is difficult to provide an unambiguous ranking of monetary and fiscal arrangements. Hence, empirical evidence is crucial in assessing the performance of alternative regimes. In what follows we summarize the evidence on the different measures of stabilization policies and the macroaggregates considered in section 3.

Monetary policy.

The monetary base and the money stock. During peacetime conditions, base money and broad money growth (M2) were considerably more rapid across all countries after World War II than before the war (Tables 1 and 2). There is not much difference between Bretton Woods and the subsequent floating regime or between the preconvertibility period and the convertibility period.

The growth rates of the monetary base and the money stock showed the most convergence during the fixed-exchange-rate gold standard and the greatest divergence during the preconvertible Bretton Woods period. The two world wars stand out as a period of high and variable monetary aggregate growth, especially during World War I. In recent years we have seen a decline in monetary aggregate growth and in inflation and thus a return to earlier norms.

Fiscal policy.

Government expenditures less tax revenues. The budget deficit was low during all convertible regimes. Large deficits, which occurred during three episodes: World War I and II and during the floating exchange rate period, were not consistent with fixed exchange rates. The evidence of large deficits during the world wars are consistent with optimal public finance/tax smoothing. Surpluses after both world wars were used to amortize public debt. Large and persistent deficits in peacetime under the managed float, however, are inconsistent with the rules of convertible regimes.

Central government debt. The debt to income ratio prior to 1970 is determined by one major force, the occurrence of war (Figures 3 and 4). After World War I, debt was reduced by governments running surpluses in major countries like the US, UK and Canada as well as the small non-belligerent European countries but not in France, Germany and Italy. After World War II, public debt was largely reduced by inflation, a phenomenon inconsistent with classical tax

smoothing (Grossman 1990). Under the Bretton Woods system, most countries exhibited falling debt to national income ratios.

In the post-Bretton Woods period we observe rising and high ratios. This reflects amongst other things activist stabilization policy, an increased role for governments and the absence of the constraints of a convertible regime. Differences across countries in their debt behaviour in turn is reflected in differences in inflation rates and exchange rate behaviour.

In the 1990s, we observe a decline in the debt to income ratios for some countries as well as a sharp rise in the ratios for others. We conjecture that this pattern reflects inter alia, asymmetric shocks and different policy preferences.

Seigniorage. Seigniorage revenue measured as a share of national income represents a major source of revenue only during World War I and II in our sample of advanced countries (Table 11). Great differences across countries appeared in the wartime deficits financed by seigniorage. Countries like Germany and France, which resorted to inflation finance, had serious difficulties in returning to financial stability after the war.

Seigniorage as defined here is lowest in the 1970s and 1980s when the rate of inflation was relatively high. In our calculations of the inflation tax we ignore the fall in the real value of public debt caused by inflation. Thus our measure gives a minimum estimate of the inflation tax. See Grossman (1990).

Central government expenditures to national income. This structural measure, reflecting the attitude of the electorate towards public/private solutions to economic problems, has been rising since World War I. Following the sharp increase during the war; it declined in the 1920s almost to the pre-1914 level. Then it started on a new increase during the Great Depression, accelerating during World War II, declining after the war to slightly above the pre-war level. Then a large peacetime increase commenced in the late 1960s to be halted by the 1980s.

Inflation. The rate of inflation was lowest during the classical gold standard period (Table 7). This was true for every country except Japan, which did not adopt the gold standard until 1897. During the interwar period, mild deflation prevailed. The rate of inflation during the Bretton Woods period was on average and for every country except Japan lower than during the subsequent floating exchange rate period.

During the Bretton Woods convertible period, the inflation rate in most countries was lower than in the preceding preconvertible subperiod; the reverse was true for Germany, Switzerland and

Denmark. During the floating regime, inflation was much lower on average in the 1980s than in the 1970s.^{39 40}

In general, the descriptive evidence of lower inflation under the gold standard and the Bretton Woods convertible regime than is the case for the other regimes is consistent with the view that convertible regimes provide an effective nominal anchor. The markedly low inflation of the 1990s suggests that the equivalent of the convertibility principle may be operating presently. At the same time, evidence that inflation variability on average was higher in the classical gold standard period than in most other regimes is consistent with the workings of the commodity theory of money and the price-specie-flow-mechanism. Alternatively, stabilization policies in the post World War II period may have contributed to lower inflation variability.

The evidence on inflation and inflation variability is also consistent with the behaviour of two other nominal variables. First, as pointed out above money growth was generally lowest under the classical gold standard and during the interwar period across all countries. Second, long term nominal interest rates were lowest during the classical gold standard period. During Bretton Woods they were lower than in the recent float (also see McKinnon 1988).

Real per capita GNP. Generally, the Bretton Woods period, especially the convertible period exhibited the most rapid output growth of any monetary regime for 14 countries (Table 10). Output variability was also lowest in the convertible subperiod of Bretton Woods, but because of higher variability in the preconvertible period, the Bretton Woods system as a whole was more variable than the floating period. Both pre-World War II regimes exhibit higher variability than their post-World War II counterparts.^{41 42}

³⁹ The dispersion of inflation rates between countries was lowest during the classical gold standard and to a lesser extent during the Bretton Woods convertible subperiod compared to the floating rate period and the mixed interwar regime (Bordo 1993b). This evidence is consistent with the traditional view of the operation of the classical price-specie-flow mechanism and commodity arbitrage under fixed rates and insulation and greater monetary independence under floating rates.

⁴⁰ Supporting evidence is provided in a recent study by Ghosh et al (1996). Classifying the exchange rate systems for 136 countries over the period 1960 to 1990 into pegged, intermediate, and floating, they adopt a methodology similar to that of Table 7. They use a nine category classification scheme, distinguishing between different types of pegged and floating regimes. They find that the unconditional mean inflation rate for countries on pegged exchange rates was significantly lower than for those that did not peg. This result holds up, controlling for the 1960s during which most countries adhered to Bretton Woods. The only exception was high-income floating countries which had lower than average inflation rates. Their results are unchanged when conditioned on a set of determinants of inflation, and when account is taken of possible endogeneity of the exchange rate regime.

⁴¹ The Bretton Woods regime also exhibited the lowest divergence of output variability between countries of any regime, with the interwar regime the highest. The greater convergence of output variability under Bretton Woods may reflect conformity between countries' business fluctuations, created by the operation of the fixed-exchange rate regime. It may also be due to the use of fiscal policies to counteract business fluctuations.

To link rapid growth in the industrialized countries in the quarter century following World War II to the Bretton Woods international monetary system (Bretton Woods Commission 1994), seems less compelling than for various aspects of macroeconomic performance. There is little conclusive evidence linking exchange rate volatility to either trade flows or the level of investment, avenues by which a stable exchange rate regime might have affected economic growth.⁴³

More likely, the Bretton Woods arrangements contributed to post-war growth by being part of the overall package creating political and economic stability - 'the Pax Americana,' that was a reaction to the chaos of the interwar and World War II periods. In this view, rapid post-war growth represented a 'catch up' by the European nations and Japan from low levels of per capita output compared to those of the leading industrial country, the US. The US encouraged the 'catch up' by these nations. They adopted the leader's best-practice technology and hence grew at a much more rapid rate than before (Abramovitz 1986).

Adherence to the convertibility rules of the Bretton Woods system by the US and other industrialized countries may possibly explain the stability of real output in that regime. Money growth, but not the growth of real government spending, was less variable under Bretton Woods than under the succeeding float (Bordo 1993b, Eichengreen 1993). Also demand (transitory) shocks, presumably incorporating policy actions, were lowest under Bretton Woods (Bordo 1993a, Bayoumi and Eichengreen 1994). According to Eichengreen (1993), the credibility of commitment to the nominal anchor, as evidenced by a low degree of inflation persistence under Bretton Woods, made inflationary expectations mean reverting. This produced a flatter short-run aggregate supply curve than under the float where, in the absence of a nominal anchor, inflationary expectations became extrapolative. Under these conditions, stabilization policy could be effective in stabilizing output.⁴⁴

That activist stabilization policy, both monetary and fiscal, was in the main responsible for the low real output variability under Bretton Woods is doubtful. For the US, activist Keynesian policies were a product of the late 1960s and 1970s and, for the other countries, the ongoing

⁴² In their 1960-1990 sample, Ghosh et al. (1996) find little connection between adherence to a pegged exchange rate and growth, once account is taken of the 1960s experience. High-income floaters generally had more rapid growth than low-income floaters. There was little correlation between output volatility and the regime.

⁴³ For other arguments see Bordo and Schwartz (1997).

⁴⁴ We do not consider the connection between unemployment and monetary and fiscal regimes for various reasons in this paper. First, it is difficult to find data on unemployment for all countries for all periods. Second, we are of the opinion that the long run patterns of unemployment rates are primarily due to the structural features of the labour markets, not to regime performance per se.

conflict between internal and external balance dominated policy making. A more likely explanation for real output stability is the absence of serious supply shocks.

In summary, the gold standard and convertible Bretton Woods regime exhibited the most stability of financial variables for the 14 countries. In addition, the Bretton Woods convertible regime exhibited the best overall macroeconomic performance of any regime.⁴⁵ As the summary statistics in the tables show, both nominal and real variables were most stable in this period. However, the floating rate regime on most criteria, was not far behind the Bretton Woods convertible regime.⁴⁶

In sum, these results agree with the views of Axel Leijonhufvud (see Bordo and Jonung 1996) and others that convertibility rules in the past have been associated with superior performance of nominal variables. However, there is little evidence that adherence to convertibility rules has been associated with better real performance as can be seen in a comparison between the recent float and the gold standard.

5. Conclusions.

This paper has surveyed the historical experience of monetary and fiscal regimes during the past century for the developed economies of the world. Our sifting through the evidence suggests a number of conclusions.

First, a salient theme in our survey is that the convertibility rule or 'convertibility principle', whereby monetary authorities attach primary importance to specie convertibility, which dominated both domestic and international aspects of the monetary and fiscal regime before World War I, has since declined in importance, in particular after the breakdown of the Bretton Woods system. This reflects in our opinion primarily the preferences of electorates and policymakers within major nations to give more emphasis to short-run stabilization of the real economy through monetary and fiscal measures.

Policy techniques and doctrine that developed under the pre-World War I convertible regime proved to be inadequate to deal with domestic stabilization goals in the vastly changed environment of the interwar period in which financial, economic and political institutions and

⁴⁵ We do not consider here the characteristics of the business cycle, such as the amplitude of cyclical fluctuations, under different regimes. This is an open issue. Much suggests, however, that the cyclical fluctuations were not significantly larger during the classical gold standard than during the post World War II period.

⁴⁶ Our results differ from those of Baxter and Stockman (1989) who find little differences between macroeconomic variables across regimes. The differences with our results reflect the use of different filters and econometric techniques.

relationships were greatly transformed from that of the pre-1914 world. This transformation set the stage for the decline of the old regime and the search for new monetary, financial and fiscal techniques to stabilise economic behaviour.

In the post-World War II era, the gradual abandonment of the convertibility principle, and its eventual replacement by the goal of full employment in many countries, combined with the legacy of inadequate policy tools and theory developed in the interwar period, paved the way for the Great Inflation of the 1970s, following in the wake of the two oil price shocks. This is also reflected in the large rise in public debt in the 1970s and in particular in the 1980s.

In the 1990s there has been an apparent shift back to the policy preferences and policy behaviour of the pre-1914 period. Thus the concept of a nominal anchor has returned to prominence recently in the form of inflation targeting adopted in several OECD-countries.

Second, the evidence suggests the existence of a close interaction between the monetary regime, that is the behaviour of the central bank/monetary authorities, and the fiscal regime, that is the tax and spending behaviour of governments, as reflected in the evolution of budget deficits and public debt.

Prior to the 1970s a monetary regime based on the commitment to convertibility of the domestic currency into specie, or to a foreign currency, was the prevailing pattern in the world economy. Under this institutional arrangement, the monetary regime disciplined the fiscal regime that is the monetary regime imposed binding constraints on fiscal policies. There was one major exception to this rule where fiscal demands determined monetary policies, that was in the event of a major war and its immediate aftermath.

The 'convertibility principle' was effectively abandoned in the 1960s before the Bretton Woods system was formally terminated in the period 1971-73. Once the Bretton Woods arrangements were abandoned, the constraints over stabilization policies were weakened and monetary policies in a number of countries became subordinated to fiscal demands. After the breakdown of the Bretton Woods system, monetary policies were used to stimulate aggregate demand to maintain full employment. This in turn created inflationary pressure. At the same time debt financed fiscal policies - although not having a direct inflationary impact - posed the threat of inflation, because of the increased likelihood that monetary authorities would have to ultimately finance the deficits. In the event of a debt default, an exorbitant risk premium would develop.

The return to the convertibility principle implies a return to a rule or rule-like behaviour in which monetary policy is geared towards the goal of low inflation and the level of debt is to be kept sufficiently low to avoid threatening monetary stability. In many ways the advent of inflation

targeting has great similarities with the gold standard period. However, there are important differences. The monetary system is today based on a managed fiat system - not on an automatic specie system. The anchor is thus a managed not an automatic one.

For the future our prediction is that if fiscal balance is achieved in most major economies, monetary regimes based on either an internal commitment norm like price stability or an external commitment to a foreign currency will prevail. Thus, a nominal anchor, similar to what was once embodied in the specie convertibility principle will again keep monetary and fiscal policies in check.

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DATA APPENDIX

Belgium

- (1) *Population*. 1880–1988: Mitchell (1992). 1989–95: *IFS*, series 99Z.
- (3) *Real national income growth*. 1880–1920: Not available. 1921–39: GNP, E. Buyst (1997), "New GNP Estimates for the Belgian Economy During the Interwar Period", *Review of Income and Wealth*, vol. 43, pp. 357-375, table 4. 1940–47: Not available. 1948: NNP, Mitchell (1992). 1949–53: GDP, Mitchell (1992), 1954–94: GDP, *IFS*, series 99B.P. 1995: *OECD Economic Outlook*.
- (3) *Nominal national income*. 1880–1912: Not available. 1913–1919: Constructed from CPI and interpolated data on real NNP. 1920–39: GNP, Buyst (1997), table 4. 1940–46: Interpolated for 1940, 1942 and 1944–45. 1946–47: Chained NNP, Mitchell (1992). 1948–52: GDP, Mitchell (1992), 1953–95: GDP, *IFS*, series 99B.
- (4) *Inflation*. 1880–1948: CPI, Mitchell (1992), except 1914–20 and 1941–46: Not available. 1949–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1914: Data supplied by Marc Flandreau. 1915–47: International Monetary Fund. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1969: Yield of long-term Belgian Government Securities (3% Rentes, 4% Unified Debt (No Maturity), 2,5% Rentes and Government Bond Average), Homer and Sylla (1991), tables 30 and 66, except 1914–18: Not available. 1970–95: Government bond yield, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1971: M1, Statistical Appendix in J. Delbeke (1988), *Geld en Bankkrediet in België, 1877–1983*, Klasse der Letteren, Jaargang 50, Nr. 129, Brussel: Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België, table 1.2, column 7 and table 1.3, column 9, except 1914–19 and 1941–46: Not available. 1972–95: Money, *IFS*, series 34.
- (8) *Monetary base growth*. 1880–1950: Bank note circulation, central bank issues, Mitchell (1992). 1951–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1969: Mitchell (1978), except 1913–19 and 1940: not available. 1970–94: *IFS*, series 82 and 81. (Note: Change of definition in 1970.)
- (10) *Central government debt*. 1880–1939: Data supplied by Erik Buyst at the Katholieke Universiteit in Leuven, except 1915–1918: Not available. 1948–1994: *IFS*, series 88A + 89A.

Canada

- (1) *Population*. 1880–1955: M. C. Urquhart and K. A. H. Buckley (1965), *Historical Statistics of Canada*, Montreal: MacMillan. 1956–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1926: GNP, M. C. Urquhart (1986), "New Estimates of Gross National Product, Canada, 1870–1926: Some Implications for Canadian Development" in S. L. Engerman and R. E. Gallman (eds.), *Long-Term Factors in American Economic Growth*, pp. 9-94, Studies in Income and Wealth, Vol. 51, NBER, Chicago: The University of Chicago Press, table 2.9. 1927–48: GNP, Mitchell (1993). 1949–95: GDP, *IFS*, series 99B.R.
- (3) *Nominal national income*. 1880–1925: GNP, Urquhart (1986), table 2.9. 1926–47: GNP, Mitchell (1993). 1948–95: GDP, *IFS*, series 99B.C.

- (4) *Inflation*. 1880–1914: Interurban-Intertemporal CPI, R. C. Allen (1990), *Real Income in the English Speaking World*, University of British Columbia Press. 1915–48: CPI, Urquhart and Buckley (1965). 1949–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1914: Gold standard, rate = unity. 1915–47: Federal Reserve Board (1943 and 1976), *Banking and Monetary Statistics 1 and 2*. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1919: Government of Canada long-term bond yield, E. P. Neufield (1972), *The Financial System of Canada*, Toronto: MacMillan, table 15.2, except 1914–18: M. D. Bordo and L. Jonung (1987), *The Long-Run Behavior of the Velocity of Circulation, The International Evidence*, Cambridge: Cambridge University Press, p. 160. 1920–79: Dominion of Canada, long-term bond yield, Homer and Sylla (1991), table 75. 1980–95: Government bond yield, long-term, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1948: M2, definition and sources are given in Bordo and Jonung (1987), pp. 155-154. 1949–95: Money plus quasi-money, *IFS*, series 35L.
- (8) *Monetary base growth*. 1880–1948: Currency in circulation, Mitchell (1993). 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1947: Mitchell (1993). 1948–94: *IFS*, series 82 and 81.
- (10) *Central government debt*. 1880–99: F. H. Leacy, M. C. Urquhart and K. A. H. Buckley (1983), *Historical Statistics of Canada*, Second Edition, Ottawa: Statistics Canada, series H37 and H38. 1900–95: Statistics Canada, CANSIM matrix 3199.

Denmark

- (1) *Population*. 1880–1988: Mitchell (1992). 1989–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1950: GDP, Mitchell (1992). 1951–95: GDP, *IFS*, series 99B.P.
- (3) *Nominal national income*. 1880–1949: GDP, Mitchell (1992). 1950–95: GDP, *IFS*, series 99B.
- (4) *Inflation*. 1880–1949: CPI, Mitchell (1992). 1950–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1883: Not available. 1884–47: Annual Report of the Bank of Denmark (various issues). 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1947: Rate of interest on consols (yearly average), Danmarks statistik (1969), *Kreditmarkedsstatistik*. 1948–95: Government bond yield, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1971: Borgernes Likviditet (M2), N. Kjærgård (1991), *Økonomisk vækst: En økonometrisk analyse af Danmark 1870–1981*, Copenhagen: Jurist- og Økonomforbundets Forlag, pp. 582-83, table 3, series AM. 1972–95: Money plus quasi-money, *IFS*, series 35L.
- (8) *Monetary base growth*. 1880–1948: Bank note circulation, central bank issues, Mitchell (1992), except 1892: Not available. 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1947: Mitchell (1992). 1948–95: *IFS*, series 82 and 81.
- (10) *Central government debt*. 1880–1978: H. C. Johansen (1985), *Dansk økonomisk statistik 1814-1980*, i H. P. Clausen, S. Ellehöj and S. Mörch (1985) *Danmarks historie, Bind 9*, Copenhagen: Gyldendal. 1979–1995: Danmarks statistik, *Statistisk årsbog* (various issues).

Finland

- (1) *Population*. 1880–1988: Mitchell (1992). 1989–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1980: GDP, Statistical Appendix in R. Hjerppe (1989), *The Finnish Economy 1860–1985, Growth and Structural Change*, Bank of Finland, Helsinki: Government Printing Centre, table 1. 1981–95: GDP, *IFS*, series 99B.P.
- (3) *Nominal national income*. 1880–1979: GDP, Hjerppe (1989), table 2A. 1980–95: GDP, *IFS*, series 99b.
- (4) *Inflation*. 1880–1980: Cost-of-living index, Hjerppe (1989), table 13. 1981–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1910: Not available. 1911–47: Derived from Sveriges riksbank, *Riksbankens årsbok* (various issues), (Annual Report of the Bank of Sweden). 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1960: Not available. 1961–95: Non-central government taxable public bond yield (from 1994, taxable 5-year central government bond yield), *OECD Economic Outlook*, series IRL.
- (7) *Money stock growth*. 1880–1971: M2, T. Haavisto (1992), *Money and Economic Activity in Finland 1866–1985*, Ph.D. thesis, Lund Economic Studies number 48, Lund University, average of end-of-month figures in table 4A.2. 1972–95: Money plus quasi-money, *IFS*, series 35L.
- (8) *Monetary base growth*. 1880–1948: Bank note circulation, central bank issues, Mitchell (1992). 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–81: Not available. 1882–1948: Mitchell (1992). 1949–94: *IFS*, series 82 and 81.
- (10) *Central government debt*. 1880–1974: R. Hjerppe (1996), *Finland's Historical National Accounts 1860–1994: Calculation Methods and Statistical Tables*, Jyväskylä. 1975–1995: Statistics Finland, *Statistisk årsbok* (various issues).

France

- (1) *Population*. 1880–1949: Mitchell (1978). 1950–95 *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1950: GDP, Mitchell (1992), except 1914–20 and 1939–50: GDP, A. Maddison (1995), *Monitoring the World Economy 1820–1992*, OECD, table C-16a. 1951–95: GDP, *IFS*, series 99B.R.
- (3) *Nominal national income*. 1880–1948: GDP, Mitchell (1992), except 1914–19 and 1939–48: Constructed from data on real GDP and CPI. 1949: GNP, Mitchell (1992). 1950–95: GDP, *IFS*, series 99B.C.
- (4) *Inflation*. 1880–1949: CPI, Mitchell (1992). 1950–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1947: M. Saint-Marc (1983), *Histoire Monétaire de la France 1880–1980*, Paris: Presses Universitaires de la France. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1947: Yield of long-term French government securities (3% Rentes), Homer and Sylla (1991), tables 25 and 62. 1948–95: Government bond yield, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1897: M1, Saint-Marc (1983). 1898–1977: M2, J.-P. Patat and M. Lutfalla (1990), *A Monetary History of France in the Twentieth Century*, London: Macmillan, tables 1.4, A2, A3 and A5. 1978–95: M2, *IFS*, series 38NB.

- (8) *Monetary base growth*. 1880–1948: Bank note circulation, central bank issues, Mitchell (1992). 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1949: Mitchell (1992). 1950–95: *IFS*, series 82 and 81.
- (10) *Central government debt*. 1880–1889: Data supplied by M. Flandreau. 1890–1939: P. Villa (1994), *A Century of Macroeconomic Data*. 1940–1950: Not available. 1951–1994: *IFS*, series 88B + 89B.

Germany

- (1) *Population*. 1880–1979: Appendix 2 in A. Sommariva and G. Tullio (1987), *German Macroeconomic History 1880–1979*, London: MacMillan Press, pp. 234–236. 1980–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1979: NNP, Sommariva and Tullio (1987), pp. 226–228. 1980–95: GDP, *IFS*, series 99B.R. (Unified Germany from 1991.)
- (3) *Nominal national income*. 1880–1949: NNP, Mitchell (1992), except 1914–24 and 1939–49: Constructed from data on real NNP and CPI. 1950–95: GDP, *IFS*, series 99B.C. (Unified Germany from 1991.)
- (4) *Inflation*. 1880–1949: CPI, Sommariva and Tullio (1987), pp. 231–234. 1950–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1947: Sommariva and Tullio (1987), pp. 231–234. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1975: High grade bond yield, S. Homer and R. Sylla (1991), *A History of Interest Rates*, New Brunswick: Rutgers University Press, tables 32 and 68, except 1922–23, 1944–47 and 1954–55: Not available. 1976–95: Mortgage bond yield, *IFS*, series 61A.
- (7) *Money stock growth*. 1880–1913: M2, Data underlying M. D. Bordo (1986), "Financial Crises, Banking Crises, Stock Market Crashes and the Money Supply: Some International Evidence" in F. Capie and G. Wood (eds.), *Financial Crises and the World Banking System*, London: Macmillan. 1914–25: Not available. 1926–38: M2, Deutsche Bundesbank (1976), *Deutsches Geld und Bankwesen in Zahlen 1876–1975*, Frankfurt am Main: Fritz Knapp GmbH, pp. 14 and 18. 1939–49: Not available. 1950–71: M2, Deutsche Bundesbank, *Monthly reports* (various issues). 1972–95: Money plus quasi-money, *IFS*, series 35L.
- (8) *Monetary base growth*. 1880–1950: Bank note circulation, total issues, Mitchell (1992), except 1945–48: Not available. 1951–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1951: Mitchell (1978), except 1922–23 and 1935–49: Not available. 1952–95: *IFS*, series 82 and 81. Note: Change of definition in 1970.
- (10) *Central government debt*. 1880–1945: Deutsche Bundesbank (ed.) (1988), *40 Jahre Deutsche Mark. Monetär Statistiken 1948–1987*, Frankfurt am Main: Fritz Knapp. 1946–1949: Not available. 1950–1994: *IFS*, series 88.

Italy

- (1) *Population*. 1880–1975: Istituto centrale di statistica (1976), *Sommario di Statistiche Storiche dell'Italia 1861–1975*, Rom. 1976–95: *IFS*, series 99Z.

- (2) *Real national income growth*. 1880–1951: GNP, Mitchell (1992). 1952–60: GDP, Mitchell (1992). 1961–67: GDP, *IFS*, series 99B.R. 1968–95: GDP, IMF (1997), *International Financial Statistics Yearbook 1997*, Washington D.C., series 99B.R.
- (3) *Nominal national income*. 1880–1950: GNP, Mitchell (1992). 1951–82: GDP, *IFS*, series 99B.C. 1983–95: GDP, IMF (1997), series 99B.C.
- (4) *Inflation*. 1880–1948: CPI, Statistical Appendix in M. Fratianni and F. Spinelli (1991), *Storia Monetaria d'Italia*, Milan: Arnoldo Mondadori Editore, pp. 66-71, series CLI. 1949–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1947: Fratianni and Spinelli (1991), pp. 87-89, series ELUS. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1979: Fratianni and Spinelli (1991), pp. 82-84, series RIL. 1980–95: Government bond yield, Medium-Term, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1980: M3, Fratianni and Spinelli (1991), pp. 48-51, series U1+U2+D. 1981–95: M2, IMF (1997), series 38N.
- (8) *Monetary base growth*. 1880–1955: Bank note circulation, total issues, Mitchell (1992). 1956–71: Reserve money, *IFS*, series 14. 1972–95: Reserve money, IMF (1997), series 14.
- (9) *Central government expenditures and revenues*. 1880–1949: Mitchell (1992). 1950–91: *IFS*, series 82 and 81.
- (10) *Central government debt*. 1880–1947: Fratianni and Spinelli (1991). 1948–1995: *IFS*, series 88.

Japan

- (1) *Population*. 1880–1949: Bureau of Statistics (1957), *Japan Statistical Yearbook*. 1950–95 *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–84: Not available. 1885–1929: GNP, B. R. Mitchell (1991), *International Historical Statistics: Asia*, New York: Stockton Press. 1930–56: GDP, Mitchell (1991), except 1945 and 1952: GDP, Maddison (1995), table C-16a. 1957–95: GDP, *IFS*, series 99B.R.
- (3) *Nominal national income*. 1880–84: Not available. 1885–1929: GNP, Mitchell (1991). 1930–55: GDP, Mitchell (1991), except 1945: Constructed from data on real GDP and CPI. 1956–95: GDP, *IFS*, series 99B.C.
- (4) *Inflation*. 1880–1922: WPI, Mitchell (1991). 1923–48: CPI, Mitchell (1991). 1949–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1947: Data supplied by James Lothian. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1965: Not available. 1966–95: Government bond yield, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1971: M1, data supplied by the Bank of Japan. 1972–95: Money, *IFS*, series 34B.
- (8) *Monetary base growth*. 1880–1953: Bank note circulation, Mitchell (1991). 1954–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1954: Mitchell (1991). 1955–93: *IFS*, series 82 and 81. (Note: Changes of definitions in 1955 and 1976.)
- (10) *Central government debt*. 1880-1970: Calculated from K. Ohkawa and M. Shinohara (1979), *Patterns of Japanese Economic Development, A Quantitative Appraisal*, New Haven and London: Yale University Press, Table A46, pp. 376-378. 1971–1974: Not available. 1975–1990: *IFS*, series 88a + 89a.

Netherlands

- (1) *Population*. 1880–1988: Mitchell (1992). 1989–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1960: GDP, A. Maddison (1995), *Monitoring the World Economy 1820–1992*, OECD, table C-16a. 1961–95: GDP, *IFS*, series 99B.R.
- (3) *Nominal national income*. 1880–1899: Not available. 1900–1947: NNP, Mitchell (1992). 1948–49: GDP, Mitchell (1992). 1950–95: GDP, *IFS*, series 99B.C.
- (4) *Inflation*. 1880–1949: CPI, Mitchell (1992). 1950–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1912: Not available. 1913–14: Data supplied by Marc Flandreau. 1915–47: International Monetary Fund. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1969: 2.5% Perpetual Debt of the Central Government, Homer and Sylla (1991), tables 28 and 64. 1970–95: Government bond yield, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1900: Currency, data supplied by Mr W. F. Vanthoor at De Nederlandsche Bank. 1901–71: M2, Central Bureau voor de Statistiek (1976), *75 Jaar Statistiek van Nederland*. 1972–95: Money, *IFS*, series 34.
- (8) *Monetary base growth*. 1880–1948: Bank note circulation, total issues, Mitchell (1992). 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1899: Not available. 1900–1948: Mitchell (1992). 1949–95: *IFS*, series 82 and 81. Note: change of definition in 1973.
- (10) *Central government debt*. 1880–1899: Not available. 1900–1957: Central Bureau voor de Statistiek (1959), *Zestig jaar statistiek in tijdreeksen*, Voorburg. 1958–1986: Central Bureau voor de Statistiek (1994), *Vijfennegentig jaar statistiek in tijdreeksen*, Voorburg. 1987–95: *IFS*, series 88A + 89A.

Norway

- (1) *Population*. 1880–1988: Mitchell (1992). 1989–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1949: GDP, Mitchell (1992), except 1940–46: Data supplied by J. T. Klovland. 1950–95: GDP, *IFS*, series 99B.P.
- (3) *Nominal national income*. 1880–1948: GDP, Mitchell (1992), except 1940–45: Constructed from data on real GDP and CPI. 1949–95: GDP, *IFS*, series 99B. (Note: Change in definition 1987.)
- (4) *Inflation*. 1880–1948: CPI, Statistisk sentralbyrå (1994), *Historisk statistikk 1994*, Oslo. 1949–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1898: Not available. 1899–1947: Annual Report of the Bank of Norway (various issues). 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1975: Long-term bond yield (15 years), J. T. Klovland (1976), "Obligationsrenten i Norge 1852–1976", *Statsøkonomisk Tidsskrift*, vol. 90. 1976–95: Government bond yield, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1971: M2, J. T. Klovland (1978), *Quantitative Studies in the Monetary History of Norway*, Ph.D. thesis, Bergen: Norwegian School of Economics and Business Administration. 1972–95: Broad money (M2), *IFS*, series 38N.
- (8) *Monetary base growth*. 1880–1948: Bank note circulation, central bank issues, Mitchell (1992), except 1940–45: Not available. 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1953: Mitchell (1992). 1954–94: *IFS*, series 82 and 81.

(10) *Central government debt*. 1880–1992: Statistisk centralbyrå (1994). (Note: Change of definition in 1972.)

Sweden

- (1) *Population*. 1880–1988: Mitchell (1992). 1989–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1950: GDP, O. Krantz and C-A. Nilsson (1975), *Swedish National Product 1861–1970: New Aspects on Methods and Measurements*, Lund: C.W.K. Glerup/Liber Läromedel, table 3.1 and table 1:2, columns 2 + 4 (GDP at factor cost plus indirect taxes and customs duties deflated by the implicit GDP-deflator at factor cost). 1951–95: GDP, Statistics Sweden (1996), *Statistiska Meddelanden SM 9601 N10*, table 1.
- (3) *Nominal national income*. 1880–1949: GDP, Krantz and Nilsson (1975), table 1:2, columns 2 + 4 (GDP at factor cost plus indirect taxes and customs duties). 1950–95: GDP, Statistics Sweden (1996), table 1.
- (4) *Inflation*. 1880–1948: CPI, Statistiska Centralbyrån (1996), *Statistiska Meddelanden P15 SM9501*, p. 22. 1949–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1947: Sveriges riksbank, *Riksbankens årsbok* (various issues), (Annual Report of the Bank of Sweden). 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1921: Effective average return on the total government debt, data supplied by SAF. 1922–47: Market yield on long-term government bonds, Homer and Sylla (1991), table 72. 1948–95: Government bond yield, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1971: Money stock (M2), L. Jonung (1975), *Studies in the Monetary History of Sweden*, Ph.D. thesis, Los Angeles: UCLA, Appendix A, table A-1, column (5). 1972–95: Broad money (M3), *IFS*, series 38N.
- (8) *Monetary base growth*. 1880–1948: Bank note circulation, central bank issues, Mitchell (1992). 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880: Not available. 1881–1947: Mitchell (1992). 1948–95: *IFS*, series 82 and 81. (Note: Change of definition in 1966.)
- (10) *Central government debt*. 1880–1995: *Riksgäldskontorets årsbok* (various issues).

Switzerland

- (1) *Population*. 1880–1988: Mitchell (1992). 1989–95: *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1913: GDP, H. Ritzmann-Blickensdorfer (ed.) (1996), *Historical Statistics of Switzerland*, Zürich: Chronos-Verlag, henceforth *Historical Statistics (1996)*, table Q.1a. 1914–29: Not available. 1930–48: NNP, Mitchell (1992), . 1949–95: GDP, *IFS*, series 99B.R.
- (3) *Nominal national income*. 1880–1913: GDP, *Historical Statistics (1996)*, table Q.1a. 1914–28: Constructed from CPI and interpolated data on real GDP. 1929–47: Chained NNP, Mitchell (1992). 1948–95: GDP, *IFS*, series 99B.C.
- (4) *Inflation*. 1880–90: CPI, *Historical Statistics (1996)*, table Q.1a. 1891–1980: CPI, Federal Office of Statistics (1990), *Statistical Year Book of Switzerland*, Berne, table T 5.7. 1981–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1912: Not available. 1913–14: Data supplied by Marc Flandreau. 1915–47: International Monetary Fund. 1948–95: *IFS*, series RF.
- (6) *Long term interest rate*. 1880–1916: Mortgage bond yield (Taux d'intérêt pour obligations de caisse), *Historical Statistics (1996)*, tables O.18b and O.18c. 1917–47: Government bond yield

(Rendement d'obligation de la confederation), *Historical Statistics (1996)*, table O.18c. 1948–95: Government bond yield, *IFS*, series 61.

(7) *Money stock growth*. 1880–1907: M1, *Historical Statistics (1996)*, table O.3. 1908–1948: M3, *Historical Statistics (1996)*, table O.4. 1949–95: Money plus quasi-money, *IFS*, series 35L.

(8) *Monetary base growth*. 1880–1948: Bank note circulation, total issues, Mitchell (1992). 1949–95: Reserve money, *IFS*, series 14.

(9) *Central government expenditures and revenues*. 1880–1947: Mitchell (1992). 1948–95: *IFS*, series 82 and 81.

(10) *Central government debt*. 1880–1912: Not available. 1913–1971: *Historical Statistics (1996)*, table U.5. 1938–1959: Not available. 1972–1995: *IFS*, series 88. (Note: Change of definition in 1972.)

United Kingdom

(1) *Population*. 1880–1965: C. Feinstein (1972), *National Income, Expenditure and Output of the United Kingdom 1855–1965*, Cambridge: Cambridge University Press, table 1, column 13. 1966–95: *IFS*, series 99Z.

(2) *Real national income growth*. 1880–1948 GDP, B. R. Mitchell (1988), *British Historical Statistics*, Cambridge: Cambridge University Press, pp. 831-835. 1949–95: GDP, *IFS*, series 99B.R.

(3) *Nominal national income*. 1880–1947: GDP, Mitchell (1988), pp. 837-841. 1948–95: GDP, *IFS*, series 99B.C.

(4) *Inflation*. 1880–1948: Feinstein's retail price series, F. Capie and A. Webber (1985), *A Monetary History of the United Kingdom, Volume 1*, London: George Allen and Unwin, table III, column 12. 1949–95: CPI, *IFS*, series 64.

(5) *Nominal exchange rate*. 1880–1947: M. Friedman and A. J. Schwartz (1982), *Monetary Trends in the United States and the United Kingdom*, Chicago: University of Chicago Press. 1948–95: *IFS*, series RF.

(6) *Long term interest rate*. 1880–1966: Rate of interest on consols (3%), D. K. Sheppard (1971), *The Growth and Role of U.K. Financial Institutions, 1880–1967*, London: Methuen and Co., table A.3.7, column II. 1967–95: Government bond yield, long-term, *IFS*, series 61.

(7) *Money stock growth*. 1880–1966: Net money Supply (M2), Sheppard (1986), table A.3.3, column 6. 1967–95: Money plus quasi-money, *IFS*, series 35L.

(8) *Monetary base growth*. 1880–1948: Bank note circulation, central bank issues, Mitchell (1992). 1949–95: Reserve money, *IFS*, series 14.

(9) *Central government expenditures and revenues*. 1880–1947: Mitchell (1992). 1948–95: *IFS*, series 82 and 81.

(10) *Central government debt*. 1880–1939: B.R. Mitchell with the collaboration of P. Deane (1962), *Abstract of British Historical Statistics*, London: Cambridge University Press, pp. 401-403. 1940–1995: Central Statistical Office, *Annual Abstract of Statistics* (various issues), London.

United States

- (1) *Population*. 1880–1957: U.S. Department of Commerce, Bureau of the Census (1975), *Historical Statistics of the United States: Colonial Times to 1970*, Washington D.C., henceforth *Historical Statistics (1975)*, series A6. 1958–95: *International Financial Statistics* on CD-ROM, henceforth *IFS*, series 99Z.
- (2) *Real national income growth*. 1880–1948 GNP, N. S. Balke and R. J. Gordon (1986), Appendix B, Historical data in R. J. Gordon (ed.), *The American Business Cycle, Continuity and Change*, Chicago: The University of Chicago Press, pp. 781-783. 1949–95: GDP, *IFS*, series 99B.R.
- (3) *Nominal national income*. 1880–1947: GNP, Balke and Gordon (1986), pp. 781-783. 1948–95: GDP, *IFS*, series 99B.C.
- (4) *Inflation*. 1880–1948: CPI, *Historical Statistics (1975)*, series E135. 1949–95: CPI, *IFS*, series 64.
- (5) *Nominal exchange rate*. 1880–1995: Unity by definition.
- (6) *Long term interest rate*. 1880–1979: Basic yield on corporate bonds with 10 years to maturity, extension of Macauley’s railroad bond rate, data supplied by NBER. 1980–95: Government bond yield, long-term, *IFS*, series 61.
- (7) *Money stock growth*. 1880–1971: M2, Balke and Gordon (1986), pp.784-786. 1972–95: Money plus quasi-money, *IFS*, series 35L.
- (8) *Monetary base growth*. 1880–1948: Notes in circulation, B. R. Mitchell (1993), *International Historical Statistics: The Americas, 1750–1988*, New York: Stockton Press. 1949–95: Reserve money, *IFS*, series 14.
- (9) *Central government expenditures and revenues*. 1880–1958: Mitchell (1993). 1959–95: *IFS*, series 82 and 81.
- (10) *Central government debt*. 1880–1970: *Historical Statistics (1975)*, series Y493. 1971–1995: US Department of Commerce, Bureau of the Census (1996), *Statistical Abstract of the United States*, 116th edition, Washington D.C.

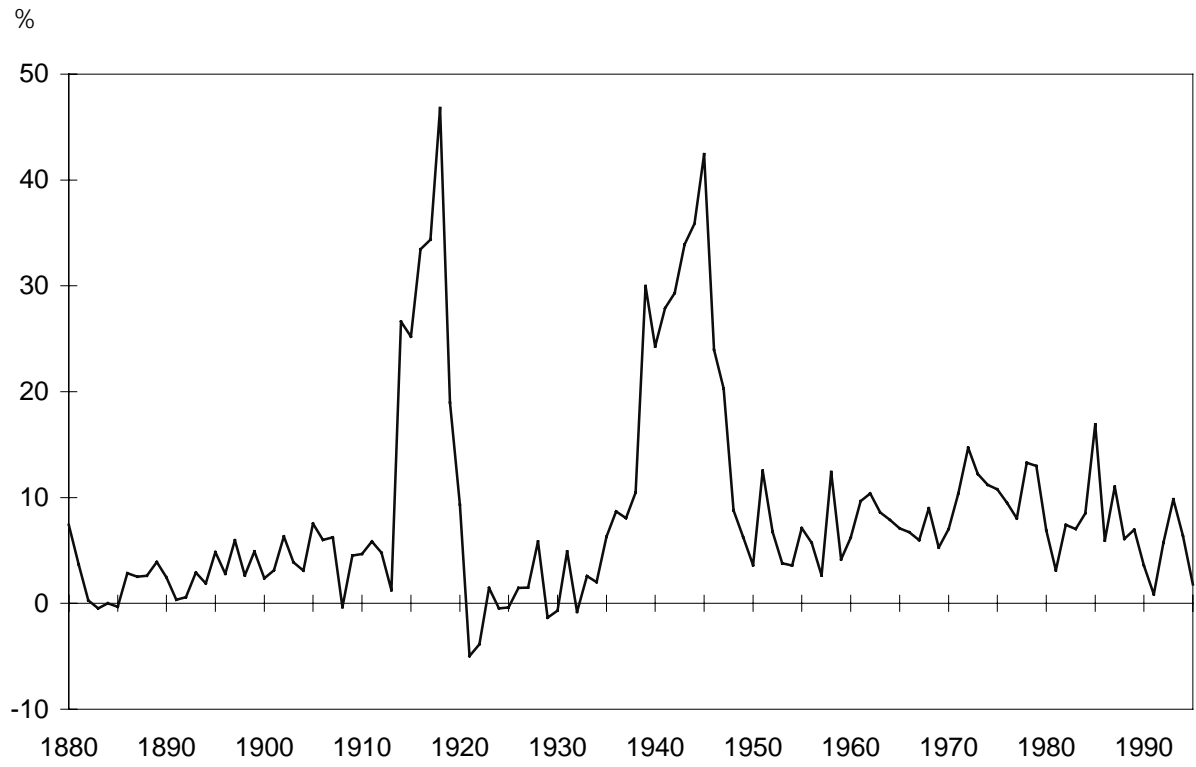
Figure 1. Monetary Base Growth 1881-1995.

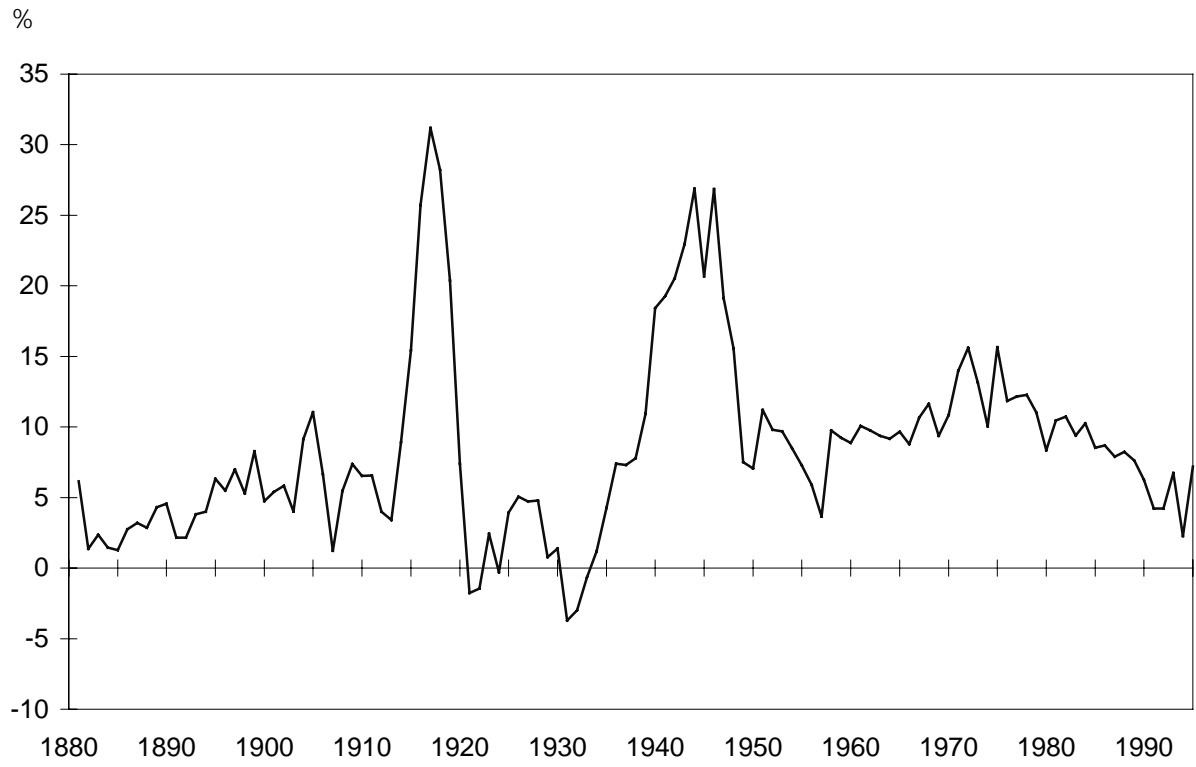
Figure 2. Money Stock Growth 1881-1995.

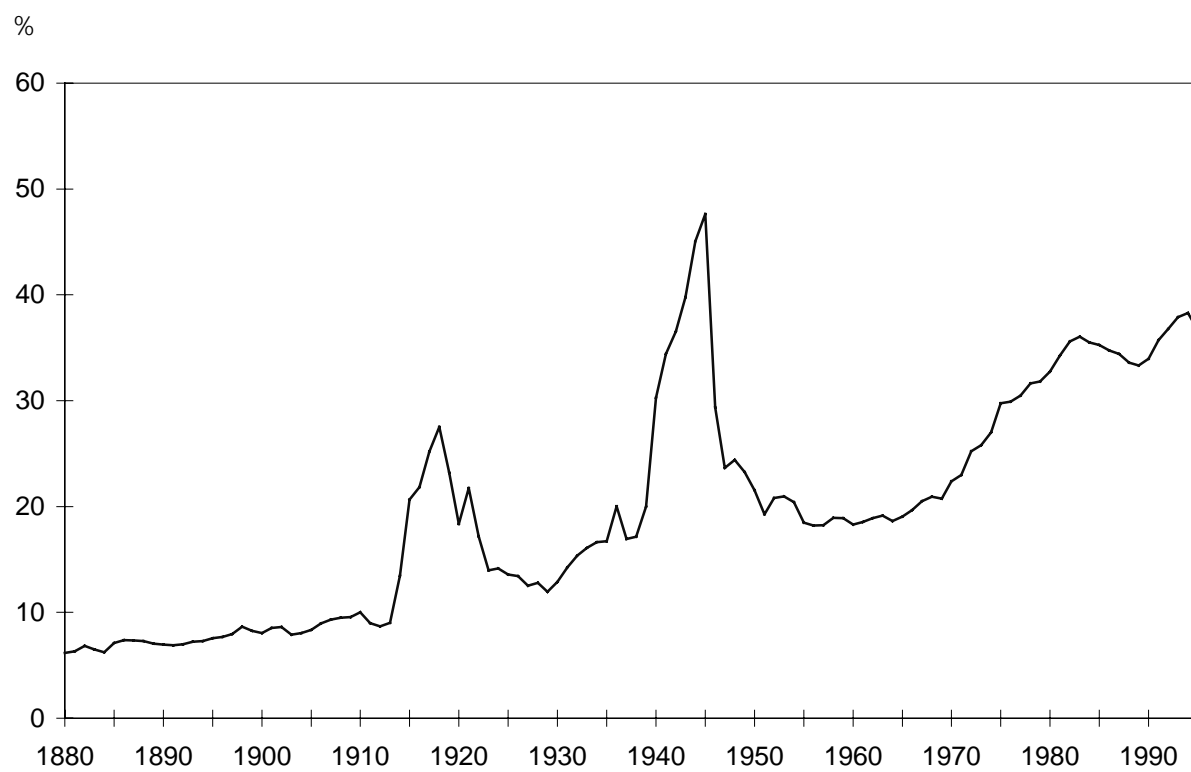
Figure 3. Central Government Expenditures as a Percentage of GDP 1881-1995.

Figure 4. Central Government Budget Deficit as a Percentage of GDP 1881-1995.

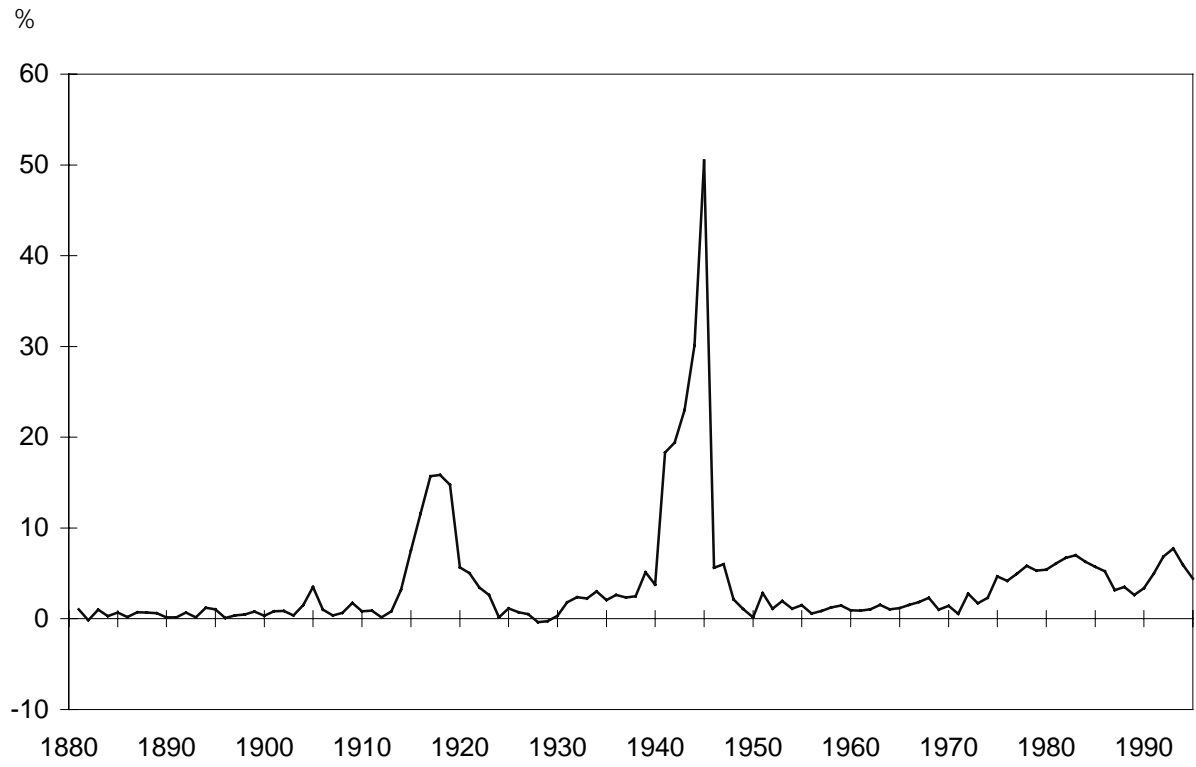


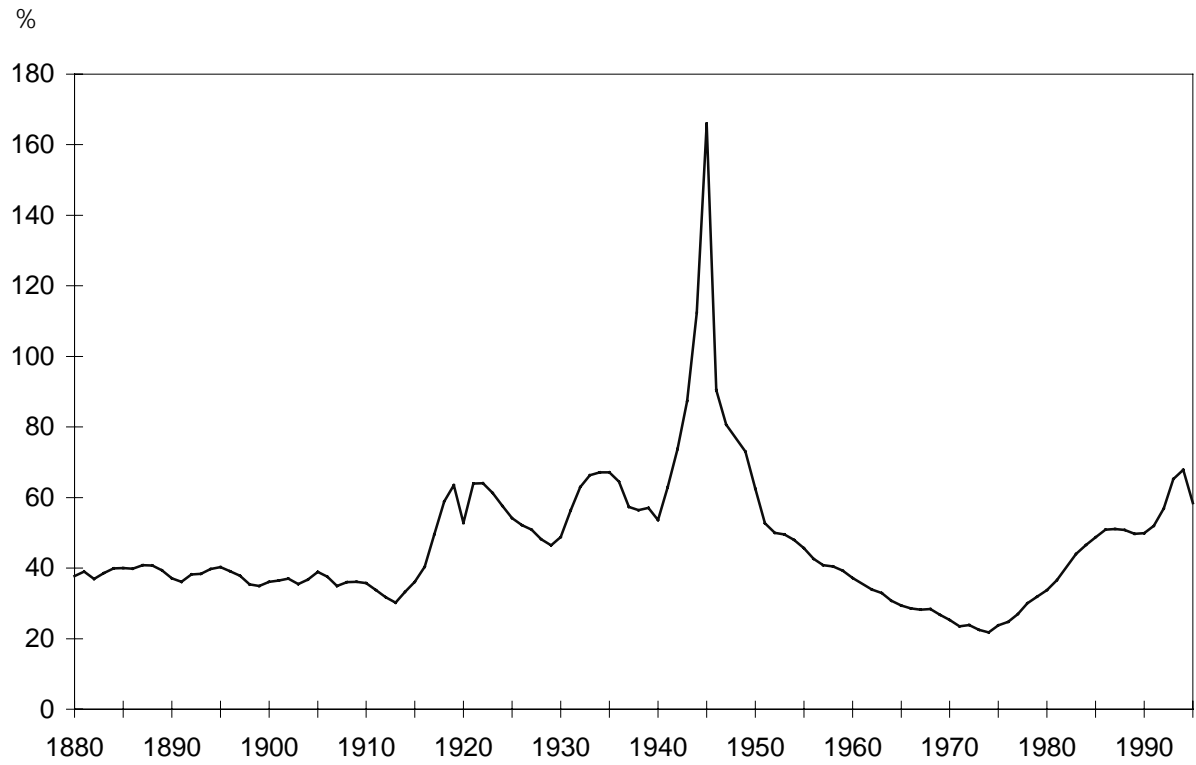
Figure 5. Central Government Debt as a Percentage of GDP 1880-1995.

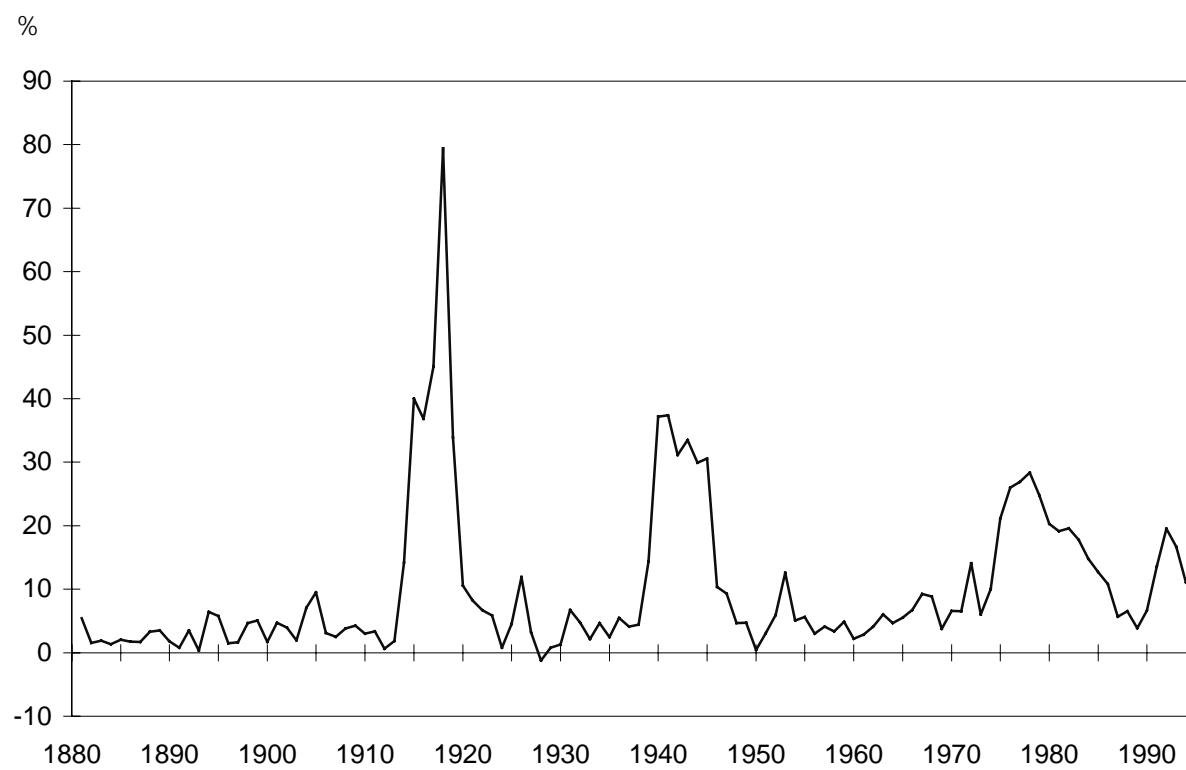
Figure 6. Growth of Nominal Central Government Debt 1881-1995.

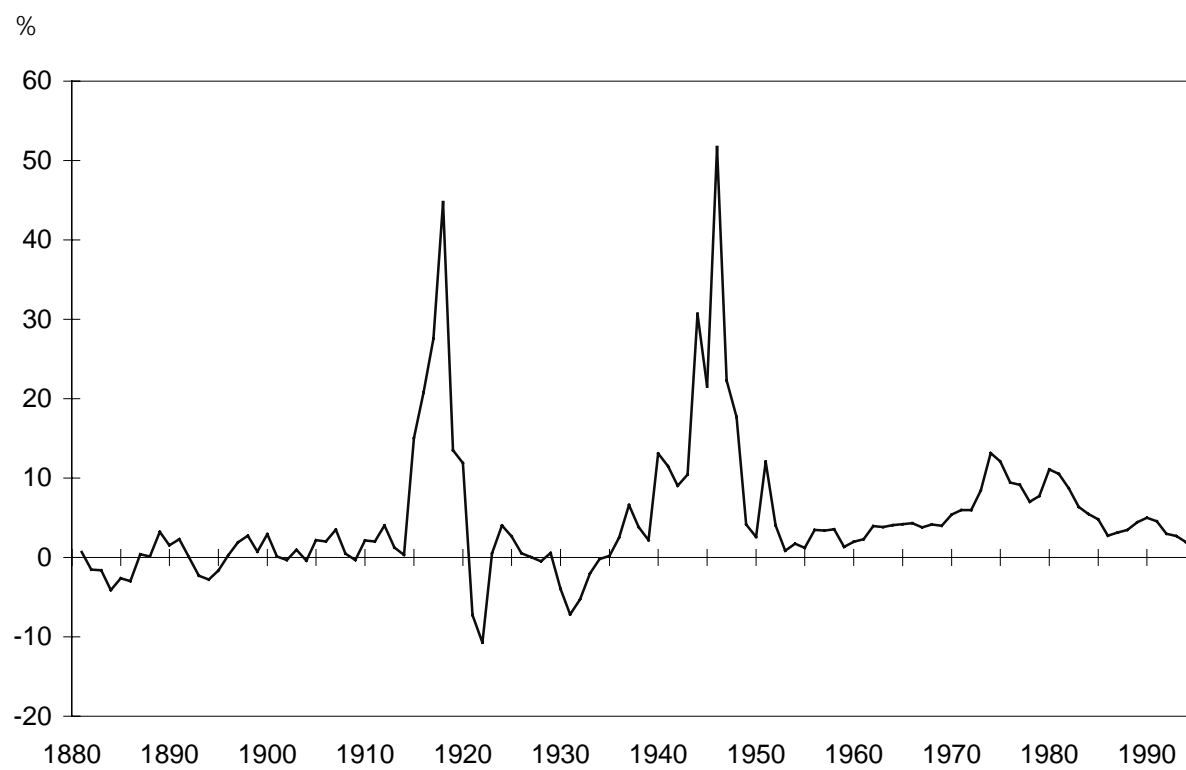
Figure 7. Inflation 1881-1995.

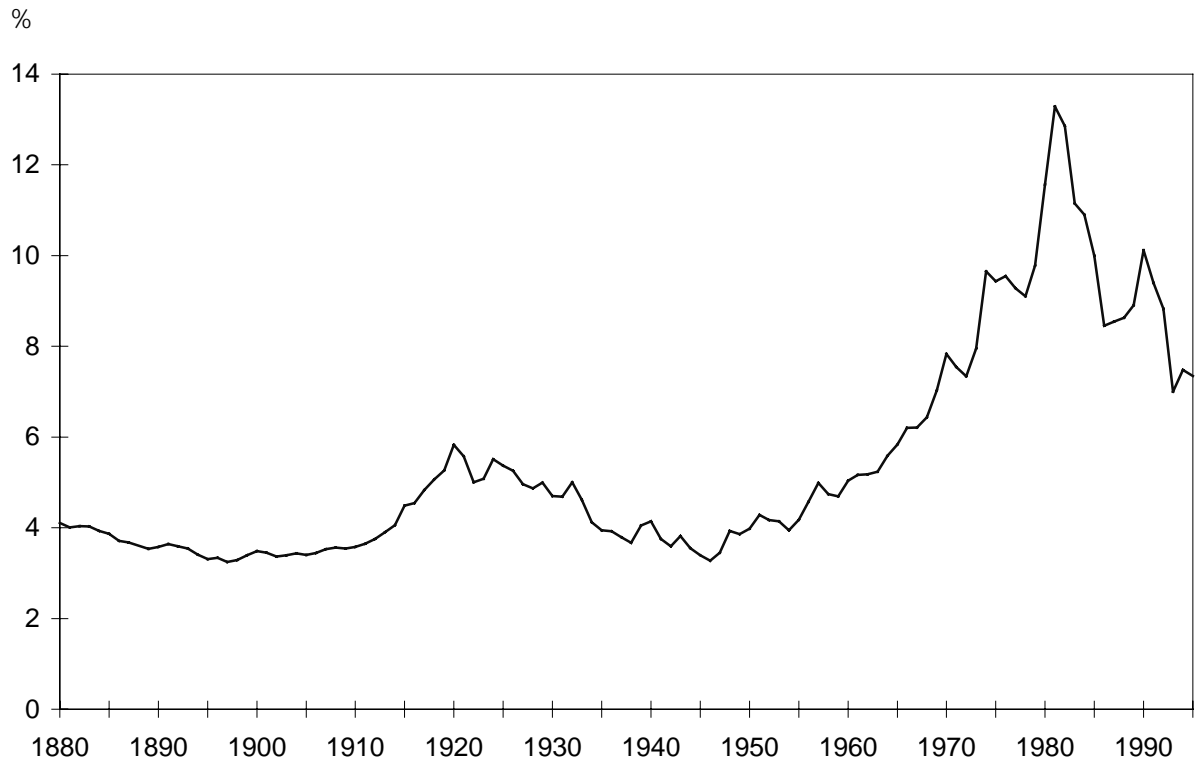
Figure 8. Long Term Interest Rate 1880-1995.

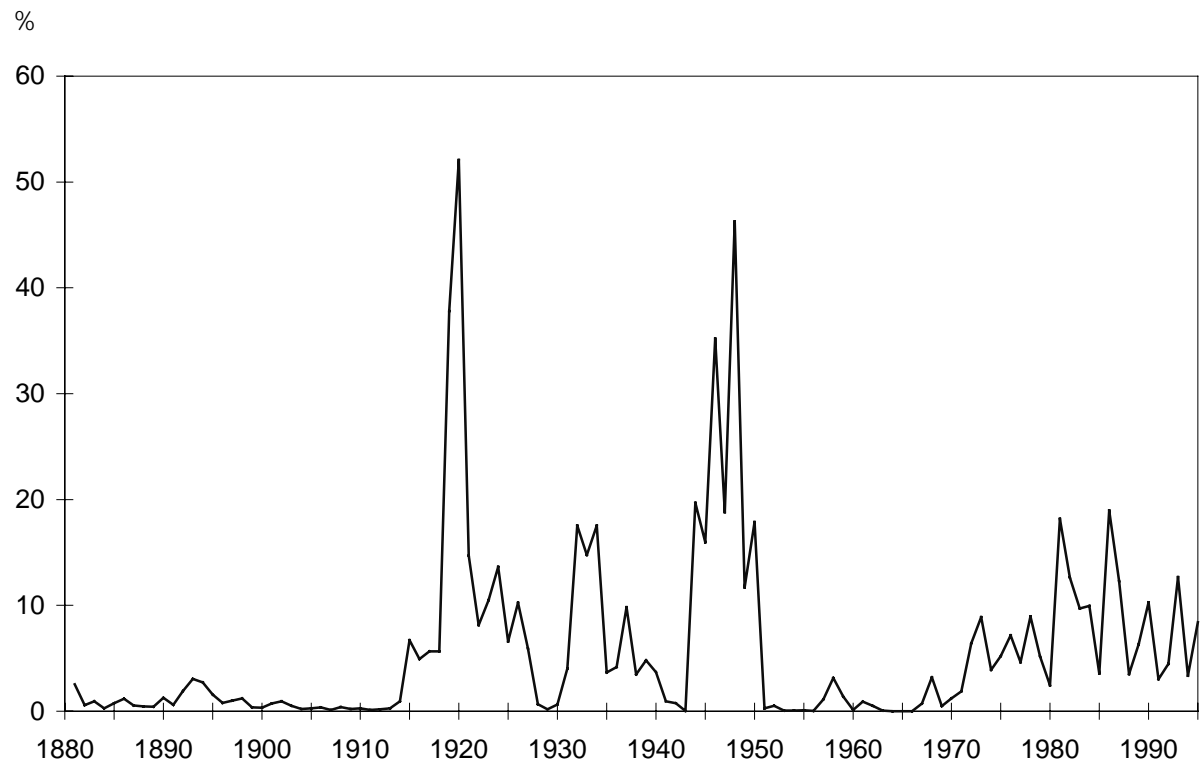
Figure 9. Exchange Rate Volatility 1881-1995.

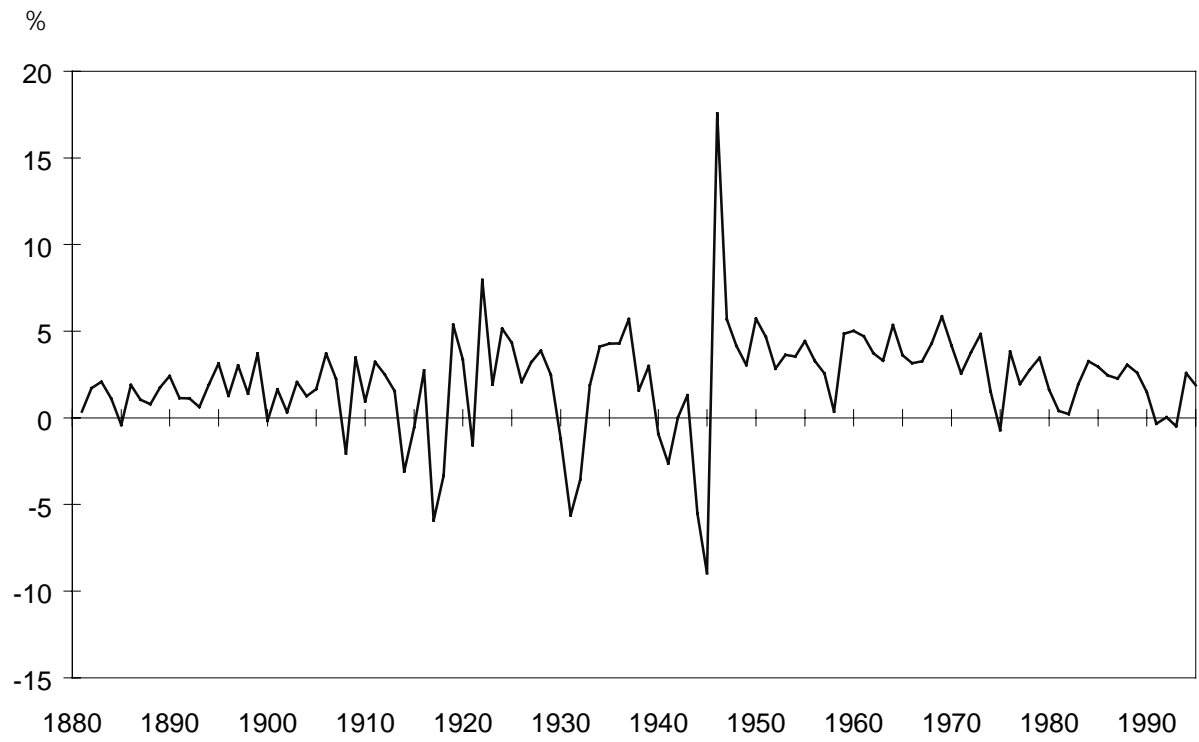
Figure 10. Real per Capita Income Growth 1881-1995.

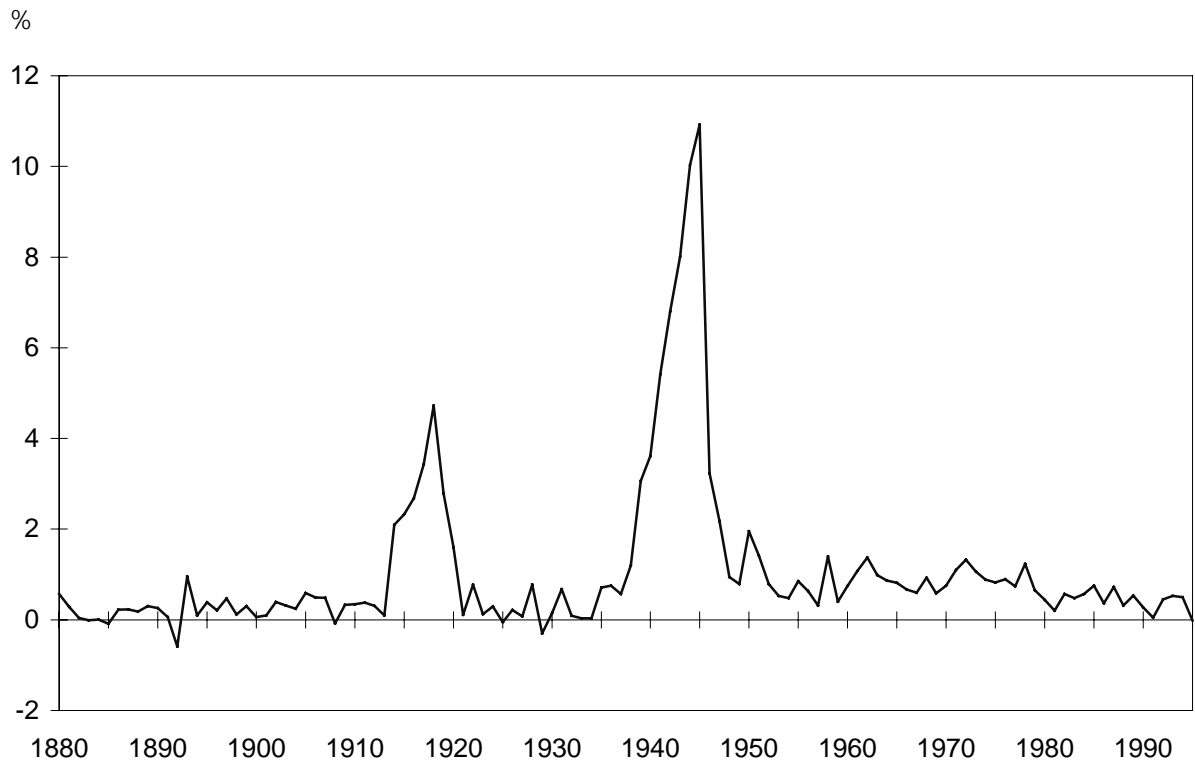
Figure 11. Seignorage 1881-1995.

Table 1 Descriptive Statistics on the Rate of Monetary Base Growth under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar	
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
USA	4,2	5,2	8,2	8,0	2,3	7,9	21,5	11,8	2,5	7,1	0,4	9,4	4,4	3,1	7,2	2,8	7,0	2,2	7,4	3,2	4,7	5,8
UK	0,2	2,0	41,2	21,8	1,0	4,8	13,9	6,6	3,6	4,2	2,6	4,1	4,5	4,2	7,9	9,6	9,6	9,7	6,5	9,7	5,9	7,8
Germany	3,0	3,9	62,3	24,9	6,8	14,9	35,0	11,9	9,9	5,5	11,5	3,2	8,6	6,6	5,3	5,0	4,6	5,5	5,8	4,8	8,0	6,3
France	2,8	3,4	36,0	16,2	6,0	6,5	31,1	7,8	10,4	7,0	13,4	8,0	7,6	4,6	4,4	9,5	7,2	11,0	2,3	8,0	8,0	9,3
Japan	3,4	8,8	27,2	21,6	2,6	8,5	64,0	59,0	20,6	25,9	24,5	37,4	17,0	5,4	8,2	7,4	10,9	9,3	6,1	4,9	14,9	20,1
Canada	4,8	7,8	12,3	10,1	-0,2	6,9	21,6	12,6	5,1	3,7	3,9	3,4	6,3	3,6	6,5	5,1	10,4	4,6	3,6	3,1	6,0	4,6
Italy	1,6	4,3	38,0	13,1	1,9	17,0	52,3	36,3	15,3	17,7	16,8	18,1	13,9	17,9	12,0	10,5	19,2	8,3	6,4	8,5	13,7	14,5
Belgium	3,6	2,7	38,6	63,1	8,7	9,4	33,9	24,0	4,2	3,0	4,2	3,4	4,1	2,7	3,2	4,2	5,6	3,6	1,4	3,8	3,9	3,9
Netherlands	1,5	3,8	22,9	16,8	-0,2	7,1	41,4	27,9	5,4	4,4	4,9	5,6	5,7	3,1	6,9	8,5	7,7	2,9	6,3	11,2	6,2	6,6
Switzerland	4,1	9,7	23,1	17,8	3,4	12,9	11,3	5,1	6,5	5,1	4,1	3,8	8,6	5,3	1,4	6,9	3,4	6,8	-0,1	6,9	4,1	6,5
Sweden	6,0	10,0	22,7	19,1	2,1	7,5	13,6	9,7	5,8	4,2	5,5	5,8	6,1	2,3	12,0	15,0	12,4	14,3	11,6	16,2	8,8	11,1
Denmark	2,4	4,1	22,1	12,8	-0,3	7,5	22,1	12,0	4,6	8,9	2,6	9,7	6,3	8,1	13,6	35,1	7,5	12,9	18,2	45,6	8,8	25,0
Finland	3,1	10,4	50,1	35,3	4,0	10,8	38,1	24,1	8,2	7,0	9,9	7,6	6,6	6,3	17,5	19,1	18,2	18,0	16,9	20,6	12,7	14,6
Norway	3,3	5,3	27,9	16,7	0,6	8,2			5,1	6,4	4,1	8,9	6,1	2,6	7,2	5,4	9,9	5,0	5,2	5,0	6,1	5,9
G7 mean	2,5	4,4	28,2	14,5	2,5	8,3	29,9	18,3	8,4	8,9	9,1	10,5	7,8	5,7	6,4	6,2	8,6	6,3	4,8	5,3	7,7	8,5
G7 converg.	1,7	2,9	20,5	8,4	2,6	5,4	20,6	19,5	7,0	8,6	8,9	12,2	5,5	5,3	3,4	3,7	5,6	3,9	2,6	3,3	4,8	6,2
Total mean	2,9	5,4	28,8	19,8	2,6	8,7	28,5	17,8	7,1	7,3	7,2	8,6	7,1	5,1	7,6	9,6	8,9	7,6	6,5	10,1	7,5	9,5
Total converg.	1,6	3,2	16,1	14,4	2,8	4,1	17,2	15,5	5,2	6,4	6,8	9,0	4,0	4,1	4,7	8,5	5,1	5,0	5,4	11,2	4,0	6,6

Note: Banknote circulation 1881-1948, M0 1949-1995. Germany excluded 1920-24. Denmark, France and Netherlands excluded 1945. Belgium excluded 1944.

Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 2 Descriptive Statistics on the Rate of Money Stock Growth under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar		
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean
USA	6,5	5,0	12,2	5,5	2,3	8,3	15,2	6,1	5,2	2,8	3,2	1,8	7,1	2,1	7,4	3,8	9,7	2,5	5,6	3,7	6,4	3,5	
UK	2,2	2,0	15,4	4,0	1,1	4,4	12,0	3,9	4,0	4,9	2,0	5,4	5,8	3,8	13,3	6,3	15,3	6,6	11,8	6,0	8,9	7,8	
Germany	5,7	4,9			4,5	10,3			14,8	6,7	19,1	6,8	11,8	4,9	7,4	3,4	7,6	2,6	7,2	4,0	10,9	6,4	
France	2,7	3,9	27,6	13,6	6,4	9,1	27,2	10,3	14,8	5,5	16,0	7,1	13,7	3,5	8,7	6,5	14,4	3,6	4,4	4,4	12,0	6,7	
Japan	6,3	15,9	25,6	15,7	2,9	10,5	59,0	45,8	23,2	23,3	29,0	32,4	17,8	7,6	7,3	4,8	9,1	5,5	5,9	3,7	15,8	18,6	
Canada	7,5	5,7	10,4	6,5	1,5	4,7	12,8	4,6	7,1	4,1	5,5	3,1	8,6	4,5	11,3	6,0	16,0	5,3	7,6	3,5	9,2	5,5	
Italy	3,3	3,2	26,7	13,3	4,6	6,6	38,8	16,2	16,6	9,7	19,8	13,4	13,6	2,3	12,8	6,8	18,0	6,5	8,5	3,1	14,9	8,5	
Belgium	3,1	5,2			6,5	11,3			4,7	3,5	3,1	3,7	6,1	2,9	5,3	3,8	5,9	4,3	4,9	3,5	5,2	3,8	
Netherlands	1,8	3,5	27,5	12,6	0,0	8,1	22,7	39,0	6,2	5,2	3,5	6,0	8,7	2,8	7,3	5,0	7,7	6,8	7,0	3,1	6,9	5,3	
Switzerland	4,2	4,2	10,8	4,2	3,2	4,7	6,1	2,8	7,6	3,4	4,9	1,8	10,1	2,3	5,9	5,7	6,4	7,8	5,5	3,6	6,8	4,6	
Sweden	5,7	3,8	20,7	11,7	-0,3	4,9	8,3	4,3	7,6	3,7	6,5	3,3	8,5	4,0	8,0	4,9	11,5	4,0	5,3	3,8	7,9	4,3	
Denmark	4,9	4,7	21,6	13,0	-0,7	4,5	11,8	7,5	7,0	4,7	3,9	3,7	9,9	3,6	10,1	8,4	12,0	5,6	8,6	10,0	8,6	6,8	
Finland	7,2	6,6	33,8	23,0	5,7	6,4	21,3	10,2	12,0	4,8	12,7	6,2	11,3	3,3	11,8	6,6	15,4	3,6	9,0	7,1	12,0	5,7	
Norway	5,1	3,1	27,3	20,3	-1,9	5,4	13,8	11,6	6,7	3,6	5,0	2,7	8,4	3,7	10,6	4,7	13,0	2,4	8,7	5,2	8,6	4,5	
G7 mean	4,9	5,8	19,7	9,8	3,3	7,7	27,5	14,5	12,2	8,2	13,5	10,0	11,2	4,1	9,7	5,4	12,9	4,7	7,3	4,1	11,2	8,1	
G7 convergence	2,1	4,6	7,9	5,0	1,9	2,5	18,6	16,0	7,0	7,0	10,2	10,6	4,2	1,9	2,7	1,4	4,0	1,7	2,4	0,9	3,4	4,9	
Total mean	4,7	5,1	21,6	11,9	2,6	7,1	20,8	13,5	9,8	6,2	9,6	6,9	10,1	3,7	9,1	5,5	11,6	4,8	7,1	4,6	9,6	6,6	
Total converg.	1,9	3,3	7,8	6,1	2,7	2,5	15,1	14,1	5,6	5,2	8,3	7,9	3,3	1,4	2,6	1,4	3,9	1,8	2,1	1,9	3,2	3,8	

Note: Germany excluded 1920-25 (missing data).
Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 3 Descriptive Statistics on the Central Government Expenditures as a Percentage of National Income under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar		
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean
USA	2,3	0,3	7,8	9,0	5,9	2,7	26,5	16,1	17,3	1,9	16,5	2,4	18,0	1,1	21,8	1,6	20,6	1,5	22,8	0,7	19,5	2,9	
UK	7,1	1,0	44,3	15,7	17,8	1,2	51,0	12,5	28,4	2,0	27,8	2,0	29,0	1,9	38,4	2,8	37,5	2,6	39,2	2,9	33,2	5,5	
Germany	5,5	1,2	38,1	10,5	15,3	12,1			15,1	3,0	14,6	2,0	15,4	3,6	30,5	2,1	29,2	2,1	31,4	1,6	23,0	8,1	
France	11,7	1,2	43,5	14,2	19,5	4,3	35,6	10,0	22,7	2,7	22,7	3,7	22,6	1,2	41,4	4,3	37,5	3,5	44,4	1,6	31,7	10,0	
Japan	17,8	9,1	22,1	3,8	35,5	11,0	91,7	41,7	24,1	18,0	36,0	20,3	13,2	1,5	17,2	3,2	15,7	3,1	18,5	2,7	20,8	13,7	
Canada	6,4	1,2	14,3	2,6	9,7	2,4	31,8	14,2	15,8	1,4	15,8	1,3	15,8	1,5	22,5	2,1	20,7	1,4	24,0	1,0	19,0	3,7	
Italy	14,0	1,9	38,6	15,7	25,2	10,3	34,5	9,6	18,4	2,4	19,1	3,1	17,8	1,4	33,4	7,3	27,9	5,7	39,6	0,9	24,8	9,0	
Belgium					22,2	8,1	32,5	6,1	25,8	5,2	24,6	5,6	26,9	4,7	49,9	4,8	47,7	5,9	51,7	2,8	37,1	13,0	
Netherlands	8,5	0,3	17,4	4,8	15,9	3,7	59,0	26,7	26,0	4,1	27,0	5,7	25,1	1,7	52,4	4,4	49,9	5,1	54,3	2,5	38,4	13,9	
Switzerland	2,2	0,4	5,9	0,4	5,1	0,9	16,9	3,3	8,6	1,3	9,6	1,3	7,8	0,5	9,5	0,7	9,5	0,8	9,5	0,6	9,0	1,1	
Sweden	6,6	0,5	9,7	4,5	9,6	2,0	20,8	4,1	21,1	4,2	18,4	2,4	23,6	4,0	40,3	6,1	35,6	5,6	44,0	3,5	30,3	10,9	
Denmark	6,2	1,2	6,6	2,3	6,7	1,0	8,2	1,1	18,4	5,9	13,9	1,2	22,5	5,6	39,1	4,2	36,0	4,3	41,5	2,2	28,4	11,5	
Finland	9,1	2,3	14,5	4,2	16,6	1,8	41,8	11,3	21,7	2,0	22,2	2,7	21,2	1,0	31,4	5,9	27,5	2,3	34,5	6,1	26,2	6,4	
Norway	7,6	1,4	7,0	2,5	9,2	1,6	17,4	6,6	19,3	1,7	19,0	1,9	19,6	1,6	38,9	2,5	37,2	2,0	40,2	2,0	28,6	10,0	
G7 mean	8,1	2,0	26,1	8,9	16,1	5,5	38,7	14,9	17,7	3,9	19,1	4,3	16,5	1,5	25,7	2,9	23,6	2,5	27,5	1,4	21,5	6,6	
G7 convergence	6,0	2,9	17,3	6,2	11,2	4,9	27,9	12,9	8,5	5,8	10,5	6,5	8,3	1,0	13,4	2,2	12,4	1,7	14,4	1,0	10,2	4,4	
Total mean	7,5	1,6	19,3	6,4	14,2	4,2	33,4	11,7	18,9	3,7	19,2	3,7	18,6	2,1	31,1	3,5	28,8	3,1	33,1	2,1	24,7	8,0	
Total converg.	4,7	2,2	15,4	5,5	9,1	4,1	23,1	11,1	7,2	4,3	8,4	4,8	7,5	1,6	14,6	2,1	13,7	1,9	15,4	1,5	10,2	4,5	

Note: Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 4 Descriptive Statistics on the Central Government Budget Deficit as a Percentage of National Income under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar			
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
USA	-0,2	0,5	5,1	7,0	1,0	2,8	15,2	13,2	0,6	1,6	0,0	1,9	1,2	1,0	4,4	1,6	3,1	1,1	5,5	1,0	2,4	2,5		
UK	-0,3	1,3	24,1	14,8	0,6	2,7	20,2	12,5	1,8	4,0	2,3	5,5	1,4	1,7	4,0	2,8	5,1	2,3	3,2	2,9	2,9	3,6		
Germany	0,5	0,4	23,5	11,8	2,7	3,3	45,3	35,4	1,0	1,8	1,8	2,7	0,5	0,5	2,4	1,6	2,0	0,7	2,7	2,0	1,7	1,8		
France	0,9	1,8	33,1	16,8	5,4	6,9			2,8	7,5	6,8	11,3	0,3	0,9	2,8	1,8	2,1	2,0	3,3	1,4	2,7	5,2		
Japan	3,3	6,8	1,3	1,6	5,0	3,9	41,1	32,1	1,9	4,2	3,0	2,7	0,8	5,1	5,4	3,6	6,4	4,5	4,2	1,7	3,3	4,3		
Canada	1,1	1,5	11,4	4,6	0,9	2,7	17,3	10,3	1,6	2,3	0,2	2,5	2,8	1,1	5,6	1,7	4,9	1,8	6,1	1,5	3,5	2,8		
Italy	1,4	1,4	28,0	16,4	3,5	6,5	24,2	8,6	4,6	5,6	6,1	7,8	3,2	1,5	11,5	1,9	10,9	1,8	12,0	1,8	7,8	5,4		
Belgium					5,4	9,5			2,5	1,4	2,2	1,6	2,8	1,1	8,9	4,3	6,8	3,7	10,5	4,1	5,6	4,4		
Netherlands			7,2	2,9	1,2	3,6	50,3	82,2	0,4	8,8	-0,6	12,9	1,4	0,9	3,8	2,2	3,3	2,2	4,3	2,2	2,0	6,6		
Switzerland			4,0	0,8	0,4	1,5	6,7	3,4	-0,4	1,0	-0,7	1,4	-0,1	0,5	1,3	1,4	1,5	1,6	1,2	1,3	0,5	1,5		
Sweden	0,5	0,7	2,4	1,8	0,6	1,2	6,3	4,9	1,3	1,2	1,5	1,1	1,1	1,3	6,6	5,0	6,9	3,9	6,3	5,8	3,8	4,4		
Denmark	0,4	1,0	1,6	1,3	0,3	1,3	0,2	0,8	0,8	1,3	1,6	1,5	0,0	0,3	5,5	5,9	7,1	6,5	4,3	5,4	3,0	4,8		
Finland	0,4	1,1	4,4	6,2	0,6	3,3	15,7	9,6	0,9	1,5	1,0	1,7	0,8	1,3	3,8	5,4	1,4	1,5	5,5	6,7	2,2	4,1		
Norway	0,7	1,5	2,2	2,4	0,3	1,6	8,0	6,4	0,8	2,7	-0,3	3,5	1,8	1,1	3,4	4,1	4,5	3,7	2,3	4,3	2,2	3,8		
G7 mean	0,9	2,0	18,1	10,4	2,7	4,1	27,2	18,7	2,0	3,8	2,9	4,9	1,5	1,7	5,2	2,1	4,9	2,0	5,3	1,8	3,5	3,6		
G7 convergence	1,2	2,2	12,1	6,1	2,0	1,8	12,8	11,8	1,3	2,2	2,7	3,5	1,1	1,5	3,0	0,8	3,1	1,2	3,2	0,6	2,0	1,4		
Total mean	0,8	1,6	11,4	6,8	2,0	3,6	20,9	18,3	1,5	3,2	1,8	4,2	1,3	1,3	5,0	3,1	4,7	2,7	5,1	3,0	3,1	3,9		
Total converg.	1,0	1,8	11,5	6,0	2,0	2,4	16,4	22,8	1,2	2,5	2,3	3,8	1,0	1,2	2,7	1,6	2,7	1,6	3,0	1,9	1,8	1,4		

Note: The budget deficit is defined as the change in end of year government debt. Germany excluded 1923-24.
Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 5 Descriptive Statistics on the Central Government Debt as a Percentage of National Income under Different Monetary Regimes. 14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar		
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean
USA	7,6	3,8	10,0	11,2	29,4	9,5	73,6	37,0	60,9	21,4	78,7	16,4	44,4	7,4	45,3	13,0	33,5	1,1	54,4	10,2	53,0	19,3	
UK	38,5	8,4	72,9	41,3	162,2	12,6	161,7	47,3	125,8	50,7	168,1	39,3	86,8	16,8	43,2	4,7	45,1	2,6	41,8	5,5	85,6	54,9	
Germany	6,8	3,0	56,8	32,3	16,2	12,2	146,4	136,1	8,2	1,4	8,9	1,8	7,7	0,7	19,8	7,4	13,1	4,3	24,9	4,6	14,0	7,9	
France	95,6	13,5	135,2	46,0	118,2	29,1			25,0	8,7	33,9	1,0	19,6	6,4	20,7	10,3	11,2	3,9	28,1	7,0	22,5	9,9	
Japan	38,9	20,3	44,2	15,4	57,4	18,9	145,8	104,1	16,4	4,9	19,0	3,7	14,1	4,7	39,7	20,1	26,1	17,0	56,7	3,3	25,6	17,9	
Canada	37,4	9,9	47,5	15,9	65,2	14,6	105,6	32,7	62,1	21,5	76,6	23,4	48,8	4,6	55,1	15,7	39,7	3,3	67,0	9,5	58,4	19,0	
Italy	110,1	15,5	117,0	22,1	100,2	21,0	103,7	29,1	42,1	8,0	48,4	6,8	36,3	3,2	75,2	24,2	52,6	6,2	93,9	15,5	57,3	23,9	
Belgium					90,1	24,6			60,5	14,8	62,2	19,9	59,0	8,3	84,7	35,6	49,6	12,2	113,9	16,0	71,3	29,0	
Netherlands			51,5	4,7	59,9	11,5	204,1	149,9	71,2	56,1	111,7	58,1	33,9	6,8	42,9	18,4	23,6	6,6	57,6	6,5	56,9	44,2	
Switzerland			13,2	3,8	22,3	3,2	45,1	11,9	22,3	13,4	34,5	7,6	11,0	4,4	15,1	3,7	13,3	3,7	16,6	3,1	18,7	10,6	
Sweden	16,5	1,5	17,1	1,5	20,8	4,0	41,9	11,6	28,6	7,2	34,3	4,4	23,4	4,7	51,2	19,6	34,4	12,9	64,0	12,9	39,1	18,3	
Denmark	18,6	3,3	13,5	0,9	20,3	3,1	11,1	1,9	12,4	4,5	15,2	3,2	9,8	3,9	47,3	26,4	21,8	19,4	66,9	5,9	28,6	25,4	
Finland	12,9	1,2	12,8	6,2	15,6	5,4	53,5	18,3	15,7	7,7	20,3	8,9	11,5	2,0	18,2	18,8	7,0	3,3	26,9	21,2	16,7	13,9	
Norway	19,5	4,5	14,5	3,3	31,6	6,8	44,6	22,7	27,8	7,5	31,4	9,6	24,5	2,0	34,4	6,2	38,1	5,7	30,7	4,4	30,8	7,6	
G7 mean	47,8	10,6	69,1	26,3	78,4	16,8	122,8	64,4	48,7	16,6	61,9	13,2	36,8	6,3	42,7	13,6	31,6	5,5	52,4	8,0	45,2	21,8	
G7 convergence	40,3	6,3	43,6	13,7	51,6	6,7	33,7	44,7	39,9	16,9	53,8	14,2	27,0	5,1	19,3	6,9	15,7	5,3	23,9	4,2	25,5	15,6	
Total mean	36,6	7,7	46,6	15,7	57,8	12,6	94,8	50,2	41,4	16,3	53,1	14,6	30,8	5,4	42,3	16,0	29,2	7,3	53,1	9,0	41,3	21,6	
Total converg.	34,9	6,4	41,1	15,4	45,1	8,2	59,4	50,6	32,1	16,8	44,0	16,4	22,7	3,9	20,6	9,2	14,9	5,7	27,7	5,5	22,4	13,7	

Note: Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 6 Descriptive Statistics on the Growth of Nominal Central Government Debt under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar			
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
USA	-1,5	6,1	94,8	125,7	2,4	8,9	30,7	29,3	1,7	2,8	0,2	2,0	3,1	2,8	11,2	3,9	10,1	3,7	12,0	4,1	6,3	5,8		
UK	-0,4	3,5	55,2	37,8	0,4	1,9	15,0	11,2	1,4	2,4	1,2	2,5	1,6	2,3	10,4	7,6	13,2	6,5	8,3	8,0	5,8	7,0		
Germany	10,3	10,2	90,2	76,7	23,6	38,3	53,9	14,8	10,6	18,7	16,0	29,6	7,2	6,3	15,0	8,7	19,3	9,2	11,6	7,0	12,9	14,2		
France	1,0	2,0	32,8	15,3	4,2	5,3			4,3	6,1	9,4	4,5	1,6	5,2	18,1	17,3	23,6	25,0	13,8	5,6	11,2	15,1		
Japan	9,2	19,8	4,6	5,4	9,5	6,0	38,2	16,2	18,0	12,6	18,9	15,8	17,0	9,0	17,2	12,7	27,5	11,3	8,2	3,8	17,7	12,5		
Canada	3,2	5,1	33,7	12,0	1,1	3,8	22,3	12,5	3,7	4,3	0,9	3,9	6,3	2,8	12,2	5,0	14,2	4,8	10,6	4,6	7,8	6,2		
Italy	1,3	1,3	33,0	23,2	3,1	7,1	32,4	11,6	8,8	4,2	7,6	2,4	9,8	5,1	19,8	7,4	26,0	3,4	15,1	5,9	14,5	8,1		
Belgium	8,3	10,5			5,6	10,8			4,3	2,2	3,5	2,5	4,9	1,7	12,9	5,9	15,3	5,3	11,0	5,9	8,5	6,1		
Netherlands			16,1	6,1	2,0	6,0	27,2	27,6	1,5	6,7	-2,3	7,5	5,0	3,4	11,6	7,8	15,3	8,6	8,7	6,0	6,3	8,7		
Switzerland			53,4	28,5	1,7	7,1	18,6	9,3	-1,0	4,0	-2,0	3,4	-0,1	4,4	10,3	11,2	13,9	13,2	7,6	9,1	5,1	11,0		
Sweden	3,3	4,6	16,8	14,4	2,7	5,6	22,2	23,3	5,1	5,0	4,8	4,0	5,4	6,0	16,6	11,5	23,9	8,4	11,0	10,4	10,7	10,3		
Denmark	2,4	6,0	14,4	12,4	2,5	7,6	3,0	8,5	6,9	11,0	13,4	12,6	0,8	3,6	24,0	29,5	45,6	33,1	7,3	9,2	15,1	23,1		
Finland	3,5	9,7	74,4	131,0	5,7	19,5	57,4	57,4	5,9	9,8	4,4	6,4	7,3	12,2	24,8	27,4	26,0	28,2	23,8	27,8	14,5	22,1		
Norway	4,1	8,2	20,5	24,6	2,0	5,9	23,2	19,2	5,0	8,5	1,4	10,0	8,3	5,2	11,2	12,3	13,6	10,8	8,8	13,8	8,8	12,6		
G7 mean	3,3	6,9	49,2	42,3	6,3	10,2	32,1	15,9	6,9	7,3	7,7	8,7	6,7	4,8	14,8	8,9	19,1	9,1	11,4	5,6	10,9	9,8		
G7 convergence	4,6	6,4	33,1	43,8	8,2	12,6	13,4	6,8	6,0	6,1	7,5	10,4	5,5	2,4	3,7	4,6	6,8	7,6	2,6	1,5	4,5	4,0		
Total mean	3,7	7,3	41,5	39,5	4,7	9,5	28,7	20,1	5,4	7,0	5,5	7,6	5,6	5,0	15,4	12,0	20,5	12,2	11,3	8,7	10,4	11,6		
Total converg.	3,7	5,0	29,8	43,6	5,9	9,2	15,5	13,6	4,7	4,7	6,7	7,6	4,4	2,8	4,9	7,8	9,2	9,5	4,3	6,2	4,0	5,5		

Note: Germany excluded 1923-24.
Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 7 Descriptive Statistics on the Rate of Inflation under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar	
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
USA	0,1	2,1	9,9	7,7	-0,9	6,0	4,2	4,1	3,0	3,3	3,5	4,5	2,6	1,8	5,8	3,2	8,8	2,7	3,6	1,0	4,4	3,5
UK	-0,1	2,5	13,5	8,1	-1,5	6,7	5,6	4,1	4,1	2,4	4,2	2,5	4,0	2,3	8,9	5,9	14,2	5,0	4,8	2,1	6,4	5,0
Germany	0,9	2,4	31,5	18,9	-0,2	4,9	4,6	7,4	2,3	2,8	1,9	4,0	2,6	1,1	3,7	2,0	5,2	1,4	2,5	1,5	3,0	2,5
France	0,1	1,3	17,9	9,6	6,0	13,9	26,2	15,9	9,3	14,3	14,7	19,6	4,3	1,4	7,0	4,3	11,1	2,1	3,8	2,4	8,1	10,6
Japan	2,4	5,4	24,7	22,6	-3,4	9,5	76,3	177,1	13,1	27,0	21,6	37,8	5,3	1,9	4,7	5,4	8,7	6,0	1,5	1,1	9,0	19,9
Canada	0,7	3,9	8,7	6,8	-1,1	6,1	2,5	2,3	3,3	3,4	4,2	4,7	2,5	1,3	6,3	3,4	9,6	1,7	3,7	1,7	4,7	3,7
Italy	0,1	2,2	19,1	18,8	3,0	10,2	72,4	114,5	5,8	12,1	8,2	17,4	3,6	2,1	10,9	5,7	16,3	3,2	6,8	3,0	8,2	9,7
Belgium	0,2	5,0			3,4	10,7			2,8	3,5	2,8	4,9	2,8	1,4	5,3	3,4	8,1	2,9	3,2	2,0	4,0	3,6
Netherlands	-0,2	3,6	10,2	7,4	-2,0	5,1	8,0	7,4	4,3	2,9	4,6	3,7	4,1	2,2	4,2	3,1	7,1	2,1	2,0	1,3	4,3	3,0
Switzerland	0,8	1,6	14,6	9,5	-2,4	5,3	5,5	5,8	2,4	2,0	1,6	2,0	3,1	1,7	3,8	2,5	4,9	3,1	2,9	1,6	3,1	2,4
Sweden	0,4	3,2	18,4	13,0	-2,4	5,7	4,6	5,7	4,2	3,2	4,3	4,2	4,1	2,0	7,7	3,2	10,0	2,1	5,9	2,8	5,9	3,6
Denmark	0,2	3,7	15,0	6,0	-1,0	8,1	6,1	8,7	4,5	2,7	3,7	3,0	5,2	2,3	6,8	4,0	10,8	1,9	3,6	1,8	5,6	3,5
Finland	0,6	4,8	63,0	94,9	0,9	6,7	22,0	18,9	7,5	8,8	10,5	11,9	4,7	2,7	7,7	4,8	12,1	3,4	4,4	2,4	7,6	7,0
Norway	0,6	3,3	17,7	14,0	-1,8	8,1	6,1	6,9	4,1	4,0	4,1	5,3	4,1	2,5	6,9	3,4	9,6	2,5	4,9	2,5	5,5	3,9
G7 mean	0,6	2,8	17,9	13,2	0,3	8,2	27,4	46,5	5,8	9,3	8,3	12,9	3,6	1,7	6,7	4,3	10,6	3,2	3,8	1,8	6,3	7,8
G7 convergence	0,9	1,4	8,2	6,6	3,2	3,2	33,1	70,3	4,0	9,2	7,2	13,0	1,0	0,4	2,5	1,5	3,7	1,7	1,7	0,7	2,3	6,2
Total mean	0,5	3,2	20,3	18,3	-0,2	7,6	18,8	29,1	5,0	6,6	6,4	9,0	3,8	1,9	6,4	3,9	9,7	2,9	3,8	1,9	5,7	5,8
Total converg.	0,7	1,3	14,2	23,6	2,7	2,6	25,7	53,5	3,0	7,0	5,6	10,0	0,9	0,5	2,0	1,2	3,1	1,3	1,4	0,6	1,9	4,8

Note: Germany excluded 1920-24.
Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 8 Descriptive Statistics on the Long Term Interest Rate under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar			
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
USA	3,8	0,3	4,3	0,3	4,2	0,6	2,6	0,1	4,1	1,4	3,0	0,4	5,2	1,2	9,0	2,1	9,7	2,3	8,5	1,9	6,5	3,0		
UK	2,9	0,2	4,2	0,5	4,1	0,7	3,1	0,3	5,5	1,8	4,0	0,7	6,8	1,4	11,2	2,2	13,4	1,3	9,6	1,1	8,2	3,5		
Germany	3,7	0,2	5,3	0,5	6,8	1,7			6,4	0,8	5,9	0,5	6,8	0,8	7,9	1,4	8,7	1,5	7,2	1,1	7,2	1,4		
France	3,2	0,3	4,6	0,5	4,6	0,9	3,3	0,4	5,7	0,9	5,6	0,7	5,9	1,1	10,1	2,4	11,0	2,8	9,4	2,0	7,8	2,8		
Japan															6,5	2,0	8,1	1,1	5,2	1,5	6,6	1,8		
Canada	3,5	0,4	4,6	0,7	4,5	0,9	3,0	0,2	4,7	1,6	3,3	0,5	5,9	1,0	10,2	2,0	10,5	2,6	9,9	1,4	7,3	3,3		
Italy	4,2	0,5	4,8	0,7	5,9	0,6	6,2	0,9	6,1	0,7	6,4	0,4	5,8	0,8	12,9	3,5	13,8	4,5	12,2	2,3	9,3	4,2		
Belgium	3,2	0,2			4,7	0,8	4,2	0,3	5,4	1,1	4,5	0,2	6,2	1,0	9,4	2,0	10,0	2,3	9,0	1,6	7,3	2,5		
Netherlands	3,2	0,3	4,2	0,5	4,0	0,7	3,3	0,4	4,4	1,4	3,4	0,4	5,4	1,3	8,2	1,4	9,2	1,2	7,5	1,0	6,3	2,3		
Switzerland	3,7	0,3	5,0	0,6	4,7	0,9	3,4	0,3	3,5	0,9	3,0	0,3	4,0	0,9	4,9	1,0	5,0	1,2	4,9	0,9	4,2	1,2		
Sweden	3,8	0,3	4,3	0,3	4,2	0,8	3,4	0,4	4,7	1,5	3,4	0,5	5,9	1,0	10,7	1,7	10,2	2,1	11,1	1,4	7,6	3,4		
Denmark	3,7	0,2	4,9	0,3	4,9	0,6	4,2	0,5	6,3	1,9	5,0	0,7	7,6	1,8	12,4	3,6	15,3	2,9	10,2	2,2	9,3	4,1		
Finland													7,9	0,6	10,1	1,5	9,9	0,9	10,3	1,8	9,4	1,6		
Norway	4,0	0,3	5,8	0,7	5,0	0,7	3,5	1,0	4,2	1,1	3,4	0,9	4,9	0,6	9,9	2,6	8,8	2,4	10,7	2,6	6,9	3,4		
G7 mean	3,5	0,3	4,6	0,5	5,0	0,9	3,7	0,4	5,4	1,2	4,7	0,5	6,1	1,1	9,7	2,2	10,7	2,3	8,9	1,6	7,6	2,8		
G7 convergence	0,5	0,1	0,4	0,2	1,1	0,4	1,5	0,3	0,9	0,5	1,4	0,1	0,6	0,2	2,1	0,6	2,2	1,2	2,2	0,5	1,0	1,0		
Total mean	3,6	0,3	4,7	0,5	4,8	0,8	3,7	0,4	5,1	1,3	4,2	0,5	6,0	1,0	9,5	2,1	10,2	2,1	9,0	1,6	7,4	2,7		
Total converg.	0,4	0,1	0,5	0,1	0,8	0,3	1,0	0,3	0,9	0,4	1,2	0,2	1,1	0,3	2,2	0,7	2,6	1,0	2,1	0,5	1,4	1,0		

Note: Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 9 Descriptive Statistics on Exchange Rate Volatility under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar	
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
USA																						
UK	0,2	0,2	2,1	3,0	6,9	8,5	2,5	4,7	2,4	7,2	3,4	9,6	1,4	4,1	8,7	6,0	9,7	6,6	8,0	5,7	5,3	7,3
Germany	0,2	0,1	47,6	88,9	25,5	57,2	0,1	0,1	3,1	8,3	5,0	11,6	1,4	2,3	8,9	7,0	8,9	7,2	8,8	7,1	5,9	8,1
France	0,3	0,2	12,6	21,5	18,4	19,8	21,9	46,8	8,9	31,8	16,0	45,6	2,3	5,1	10,0	7,3	10,9	8,4	9,3	6,6	9,4	23,1
Japan	3,0	4,8	1,2	0,7	7,5	10,8	24,7	42,7	25,0	79,9	51,9	111,4	0,2	0,7	8,2	6,9	7,4	6,5	8,8	7,4	16,9	57,3
Canada	0,0	0,0	0,8	1,2	2,6	3,4	1,5	2,1	2,2	2,3	2,9	2,6	1,5	1,9	3,6	2,4	3,4	2,5	3,8	2,4	2,9	2,4
Italy	1,4	1,5	9,2	5,5	16,4	31,9	52,4	84,9	5,4	18,0	11,1	25,3	0,2	0,3	10,1	9,9	10,6	11,8	9,7	8,6	7,6	14,6
Belgium	2,7	3,1	12,5	10,3	12,7	15,4	5,8	14,3	0,6	2,1	1,1	3,0	0,1	0,5	9,7	7,6	9,9	9,0	9,5	6,8	5,1	7,1
Netherlands			6,0	8,0	5,6	7,9	5,6	14,4	1,9	6,1	3,3	8,7	0,6	1,3	8,9	6,8	8,7	6,9	9,1	7,1	5,3	7,3
Switzerland			7,4	7,0	6,4	9,4	0,6	0,8	0,3	1,1	0,1	0,5	0,4	1,5	9,6	7,5	9,7	8,1	9,5	7,4	4,8	7,0
Sweden	0,2	0,2	9,3	11,0	6,9	10,2	0,8	1,7	2,3	8,4	4,8	11,8	0,1	0,3	8,8	8,7	7,5	8,0	9,8	9,4	5,5	9,0
Denmark	0,2	0,1	8,2	11,4	10,6	12,8	3,5	3,6	2,3	6,9	4,0	9,6	0,7	2,2	9,1	7,0	8,9	7,9	9,2	6,6	5,6	7,6
Finland			19,2	27,5	15,7	28,2	19,1	35,8	5,5	10,6	8,9	13,3	2,3	6,2	8,9	6,5	6,0	4,6	11,2	7,0	7,0	8,9
Norway			7,7	9,6	12,4	13,4	3,5	4,6	1,9	6,3	3,9	8,8	0,1	0,3	7,4	4,8	6,5	5,2	8,0	4,5	4,6	6,1
G7 mean	0,7	1,0	10,5	17,3	11,0	18,8	14,7	25,9	6,7	21,1	12,9	29,4	1,0	2,1	7,1	5,6	7,3	6,2	6,9	5,4	6,9	16,1
G7 convergence	1,1	1,8	17,0	32,5	9,3	20,0	19,7	33,1	8,6	28,1	18,0	39,4	0,9	2,0	3,8	3,3	4,1	3,9	3,6	3,1	5,4	19,7
Total mean	0,8	1,0	10,3	14,7	10,6	16,3	10,1	18,3	4,4	13,5	8,3	18,7	0,8	1,9	8,0	6,3	7,7	6,6	8,2	6,2	6,1	11,8
Total converg.	1,1	1,7	12,0	22,7	6,8	14,6	14,8	25,2	6,4	20,8	13,3	29,1	0,8	2,0	2,8	2,5	3,0	2,9	2,9	2,4	3,8	14,1

Note: Absolute rate of change. Germany excluded 1922-23.
Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 10 Descriptive Statistics on the Real per Capita Income Growth under Different Monetary Regimes.
14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar		
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean
USA	1,5	5,0	1,1	8,6	0,5	8,1	5,5	10,3	1,9	2,8	1,3	3,6	2,4	1,7	1,4	2,2	0,9	2,8	1,8	1,7	1,7	2,5	
UK	0,9	3,0	0,3	5,1	0,8	4,3	1,5	6,4	2,1	1,7	1,7	2,0	2,5	1,4	1,8	2,5	1,4	3,0	2,2	2,2	2,0	2,1	
Germany	1,8	2,9	-8,8	2,9	5,9	12,5	-5,2	14,3	5,0	3,4	6,3	4,0	3,8	2,3	2,0	2,1	1,9	2,8	2,2	1,4	3,6	3,2	
France	1,6	3,2	-2,9	14,0	2,8	6,9	0,1	23,8	4,9	2,1	5,0	2,9	4,8	1,2	1,8	1,6	2,2	1,6	1,4	1,5	3,4	2,4	
Japan	1,7	3,9	5,0	3,1	2,5	6,5	-6,5	17,6	7,8	3,0	6,8	3,1	8,7	2,6	2,8	1,9	2,9	2,1	2,7	1,9	5,4	3,5	
Canada	2,8	4,7	-1,0	8,7	1,0	8,2	5,9	7,9	2,6	2,6	2,0	3,3	3,1	1,7	1,8	3,0	2,3	2,9	1,4	3,2	2,2	2,8	
Italy	0,9	3,9	-1,2	1,9	1,5	4,1	-1,0	25,4	5,2	2,6	5,9	3,1	4,6	2,1	2,5	2,3	3,0	3,1	2,0	1,4	3,9	2,8	
Belgium					1,7	3,6			3,4	2,1	2,3	2,3	4,2	1,4	2,0	2,0	2,3	2,5	1,7	1,5	2,7	2,1	
Netherlands	0,8	4,9	0,8	11,6	1,4	3,8	1,0	28,8	4,4	3,4	4,5	4,3	4,4	2,7	1,7	1,6	1,3	2,1	2,0	1,2	3,1	3,0	
Switzerland	1,4	4,0					1,1	5,1	3,0	3,0	2,4	4,0	3,5	1,7	0,8	2,3	0,7	3,0	0,9	1,6	1,9	2,9	
Sweden	2,2	2,2	-1,1	6,3	3,5	3,7	2,0	3,0	3,2	1,6	2,7	1,3	3,6	1,7	1,3	1,9	1,5	1,7	1,2	2,1	2,3	1,9	
Denmark	1,8	1,7	0,0	7,7	2,2	3,9	2,0	19,3	3,3	2,5	2,8	2,8	3,8	2,2	1,8	2,0	1,4	2,5	2,0	1,6	2,6	2,4	
Finland	1,9	3,0	-3,2	13,0	4,2	3,9	0,3	6,0	4,1	2,7	3,6	2,7	4,6	2,8	2,0	3,3	2,8	2,5	1,3	3,8	3,2	3,2	
Norway	1,5	1,7	1,3	8,8	2,8	5,0	0,4	8,6	3,6	2,6	3,7	3,5	3,6	1,4	3,1	1,9	3,5	1,9	2,8	1,9	3,4	2,2	
G7 mean	1,6	3,8	-1,1	6,3	2,2	7,2	0,0	15,1	4,2	2,6	4,1	3,1	4,3	1,9	2,0	2,2	2,1	2,6	2,0	1,9	3,2	2,8	
G7 convergence	0,6	0,8	4,2	4,3	1,8	2,8	4,8	7,5	2,1	0,5	2,4	0,6	2,2	0,5	0,5	0,5	0,8	0,5	0,5	0,6	1,3	0,5	
Total mean	1,6	3,4	-0,8	7,7	2,4	5,7	0,5	13,6	3,9	2,6	3,6	3,1	4,1	1,9	1,9	2,2	2,0	2,5	1,8	1,9	3,0	2,7	
Total converg.	0,5	1,1	3,3	4,0	1,5	2,6	3,5	8,6	1,5	0,6	1,8	0,8	1,5	0,5	0,6	0,5	0,8	0,5	0,5	0,7	1,0	0,5	

Note: Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.

Table 11 Descriptive Statistics on Seignorage as a Percentage of National Income under Different Monetary Regimes. 14 Countries, 1881-1995. Annual Data: Mean and Standard Deviation.

	Gold Standard		WW I		Interwar		WW II		(Total)		Bretton Woods (Preconvertible)		(Convertible)		(Total)		Floating Exchange (High Inflation)		(Low Inflation)		Postwar	
	(1881-1913)		(1914-1919)		(1920-1938)		(1939-1946)		(1947-1971)		(1947-1958)		(1959-1971)		(1973-1995)		(1973-1982)		(1983-1995)		(1947-1995)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
USA	0,3	0,3	0,4	0,4	0,1	0,5	1,5	0,8	0,2	0,8	0,0	1,1	0,3	0,2	0,4	0,1	0,4	0,1	0,4	0,2	0,3	0,6
UK	0,0	0,0	1,5	0,4	0,1	0,4	1,2	0,5	0,4	0,4	0,3	0,5	0,4	0,4	0,4	0,6	0,6	0,7	0,2	0,3	0,4	0,5
Germany	0,2	0,2	7,3	3,1	2,0	4,1	5,6	3,5	0,9	0,5	1,1	0,3	0,8	0,6	0,5	0,5	0,5	0,5	0,5	0,5	0,8	0,6
France	0,3	0,3	7,2	2,9	1,1	1,2	13,9	7,4	1,5	1,1	2,0	1,3	1,0	0,6	0,3	0,7	0,4	1,0	0,1	0,4	0,9	1,1
Japan	0,5	0,9	2,0	1,6	0,2	0,8	13,0	22,6	1,6	1,9	1,9	2,8	1,2	0,3	0,7	0,6	0,9	0,7	0,6	0,5	1,2	1,5
Canada	0,2	0,4	0,6	0,5	0,0	0,3	1,1	0,5	0,3	0,2	0,3	0,3	0,4	0,2	0,3	0,3	0,6	0,3	0,1	0,1	0,3	0,3
Italy	0,2	0,6	6,3	2,1	0,1	2,7	10,2	8,8	2,0	2,0	1,7	1,7	2,2	2,2	1,7	1,5	2,8	1,2	0,9	1,1	1,9	1,7
Belgium			2,7	4,0	1,6	1,8	20,1	13,4	1,9	5,0	3,0	7,2	0,8	0,5	0,3	0,4	0,7	0,5	0,1	0,2	1,1	3,6
Netherlands			3,1	1,7	0,0	1,4	13,0	11,3	0,7	0,7	0,8	0,9	0,6	0,4	0,5	0,7	0,5	0,2	0,5	0,9	0,6	0,7
Switzerland	0,3	0,7	1,8	1,3	0,4	1,5	2,4	1,0	1,6	1,2	1,1	1,1	2,0	1,2	0,3	1,4	0,7	1,6	0,0	1,1	1,0	1,4
Sweden	0,3	0,4	1,3	1,2	0,1	0,6	1,3	0,7	0,5	0,4	0,6	0,6	0,5	0,1	0,8	1,2	0,8	1,0	0,8	1,3	0,7	0,9
Denmark	0,2	2,0	1,4	0,8	-0,1	0,6	1,7	0,8	0,3	0,8	0,2	1,0	0,5	0,6	0,5	1,3	0,3	0,5	0,6	1,7	0,4	1,0
Finland	0,2	0,8	5,1	4,1	0,2	0,6	3,4	1,4	0,4	0,3	0,5	0,4	0,3	0,3	0,7	1,0	0,5	0,5	0,9	1,3	0,5	0,7
Norway	0,2	0,3	1,5	0,7	0,0	0,6			0,7	1,3	0,7	1,9	0,7	0,3	0,5	0,4	0,8	0,4	0,3	0,3	0,6	0,9
G7 mean	0,2	0,4	3,1	1,4	0,4	1,2	5,8	5,5	0,9	0,9	0,9	1,0	0,8	0,6	0,5	0,5	0,8	0,6	0,4	0,4	0,7	0,8
G7 convergence	0,2	0,3	3,2	1,2	0,7	1,4	5,8	7,7	0,7	0,7	0,9	0,9	0,7	0,7	0,5	0,5	0,9	0,4	0,3	0,3	0,6	0,6
Total mean	0,2	0,5	2,8	1,6	0,4	1,1	6,3	5,2	0,9	1,1	0,9	1,4	0,8	0,5	0,5	0,7	0,7	0,6	0,4	0,7	0,7	1,0
Total converg.	0,1	0,5	2,5	1,3	0,6	1,1	6,4	6,7	0,7	1,2	0,9	1,8	0,6	0,6	0,4	0,5	0,6	0,4	0,3	0,5	0,5	0,9

Note: Seignorage is defined as the change in banknote circulation 1881-1948 and the change in M0 1949-1995. Germany excluded 1920-24, Belgium 1944, Denmark, France and Netherlands excluded 1945.

Convergence is defined as the standard deviation of each country's summary statistic around the grand mean of the group of countries.

Data Sources: See Data Appendix.