The Twentieth century may be remembered as the century of excess. In every area, more things were done in the Twentieth century than in any other century in history, and in many cases, more than in all previous centuries combined. The Twentieth century saw some of the most destructive wars in history, the development of the Atomic Bomb, the beginning of air and space travel, the colonization and decolonization of the Third World, the rise and fall of Communism, dramatic improvements in the standard of living, the population explosion, the rise of the computer, incredible advances in science and medicine, and hundreds of historically unprecedented changes.

The Twentieth century also produced more inflation than any other century in history. Inflation is nothing new. Roman rulers produced inflation in Third Century Rome by debasing their coins, China suffered inflation in the fourteenth century when the Emperors replaced coins with paper money, Europe and the rest of the world suffered inflation when gold and silver started flowing into the Old World from the New World in the sixteenth century, and the French and American Revolutions destroyed currencies in each of those countries.

Nevertheless, as we shall see, the Twentieth century produced the worst inflation in human history. Every single country in the world suffered worse inflation in the Twentieth century than in any century in history. So what caused this inflation to occur, and is further inflation in the Twenty-first century inevitable?

The Nineteenth Century

Amazingly enough, the Nineteenth century was a period of deflation, rather than inflation. From the end of the Napoleonic Wars in 1815 until the start of World War II in 1914, there was no inflation in most countries, and in many cases, prices were lower in 1914 than they had been in 1815. Prices fluctuated up and down from one decade to the next, but overall, prices remained stable.

There were exceptions to this rule. The United States suffered inflation during the Civil War, though the United States also went through deflation after the war in order to bring the economy back onto a gold standard. The Confederate States suffered high inflation since they printed money to pay for the war. The eventual collapse of the Confederate States made their currency worthless.

Countries were able to minimize the amount of inflation they suffered during the Nineteenth century because currencies were tied to commodities (gold and silver) whose supply increased at rates similar to the increase in output. Price stability in gold and silver produced price stability for the world.

The Nineteenth century was a period of bimetallism. Countries chose to back their currency with either gold or silver. The United Kingdom was on the gold standard from the end of the Napoleonic Wars until 1914. Because the British economy grew faster than the supply of gold, prices fell in Britain during that hundred-year period.

Other countries such as France, Russia, Austria, most of Asia, and other countries tied their

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currency to silver. Since the supply of silver was growing faster than economic growth, countries on a silver standard had higher inflation rates than countries on the gold standard. Nevertheless, their inflation was modest by Twentieth century Standards.

Still, other countries such as the United States, primarily for political reasons, tried to balance themselves between gold and silver by tying their currency to both metals, but in the end, gold triumphed. By the beginning of the Twentieth century, every major country in the world had tied its currency to gold.

The result was a century of price and currency stability. The value of the US Dollar relative to the British Pound Sterling was the same in 1914 as it had been in 1830. Because currencies were tied to gold, fluctuations in exchange rates were minimal, rarely moving more than one percent above or below par.

Given this situation, nothing could have prepared the world for the hyperinflations and persistent inflation of the Twentieth century. The purpose of this paper is to both document inflation in the Twentieth century, and to analyze what went wrong.

Why will the Twentieth century be remembered as the century of the worst inflation in human history? How did the Twentieth century differ from the Nineteenth century? Which countries suffered the worst inflation, and why? Which countries suffered the least inflation, and why? And most importantly, will the Twenty-first century be another century of inflation? Or will the world enjoy a century of price and financial stability similar to what occurred during the Nineteenth century?

Exchange Rates and Inflation

It would have been easy to write this paper if every country had kept data on inflation throughout the Twentieth century. Unfortunately, this isn’t the case. Most countries only began keeping data on inflation after World War I, and for smaller countries, data often does not exist before World War II. Inflation data before these dates are often estimates based upon historical price data.

Moreover, the worst inflationary periods often lack any inflationary data at all. It is easy to keep track of inflation when prices are rising at 2% per annum, but more difficult when prices are doubling on a daily basis. In order to compare inflation throughout the world, we have had to rely upon a proxy for inflation: exchange rates.

The theory of Purchasing Power Parity says that in the long run, differences in inflation rates between countries are transmitted through changes in relative exchange rates. If prices double in one country but remain unchanged in another country, the currency of the inflating country will lose half of its value relative to the currency of the stable country. Otherwise, exports from the inflating country would become so expensive that foreigners could not afford to purchase their exports. For this reason, all inflation comparisons will be based upon exchange rate changes over time.

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Inflation in the Twentieth Century

The United Kingdom is the only country for which a complete Consumer Price inflation record is available for the entire Nineteenth century. Prices in the United Kingdom rose during the Napoleonic Wars, and started to decline after 1813, returning to stable pre-war levels by 1822. From 1822 until 1912, consumer prices showed no overall increase. There were periods of moderate inflation and deflation, but no overall inflationary trend. This general pattern holds true for other countries for which inflation data are available.

The Twentieth century is quite another matter. Whereas the Nineteenth century went through periods of moderate inflation and deflation, the Twentieth century was a period of general continual inflation, with some periods worse than others. The only times in which prices fell were the periods right after World War I and the Depression of the 1930s. During all other periods, prices generally rose.

The table below compares the inflation experiences of the United Kingdom and the United States between 1820 and 2000, providing both the index for each country and the annual inflation rates during the 20-year and 10-year periods that are covered. Several facts are immediately obvious.

First, the lack of inflation in the Nineteenth century is clearly visible. Even in the United States during the 1860 to 1880 period when the Civil War occurred, the overall level of inflation was lower than in most of the post-World War II era. Second, both the United States and the United Kingdom had similar inflation experiences throughout the Nineteenth century. By contrast, not only was inflation higher in the Twentieth century in the United States and the United Kingdom, but it was also more variable, both within and between countries. Greater inflation in the United Kingdom in the 1910s led to greater deflation in the 1920s than in the United States. The same was not true after the war. The United Kingdom had greater inflation than in the United States in every decade after 1960.

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Table 1-Inflation in the United Kingdom and United States

	United Kingdom		United States	
Year	Index	Inflation	Index	Inflation
1820	4.87		6.22	
1840	4.63	-0.25	5.74	-0.39
1860	4.73	0.11	5.84	0.09
1880	4.22	-0.54	7.55	1.46
1900	3.58	-0.76	7.45	-0.07
1910	3.77	0.53	9.31	2.50
1920	10.39	17.56	17.78	9.10
1930	6	-4.23	16.1	-0.94
1940	7.68	2.80	14.1	-1.24
1950	9.16	1.93	25	7.73
1960	12.64	3.80	29.8	1.92
1970	19.2	5.19	39.8	3.36
1980	69.9	26.41	86.3	11.68
1990	129.9	8.58	133.8	5.50
2000	172.2	3.26	174	3.00

The table can also show the merits of using Purchasing Power Parity to analyzing inflationary differences between countries. Whereas wholesale prices in the United States increased 14-fold in the Twentieth century, wholesale prices increased 53-fold in the United Kingdom. Prices rose 3.75 times faster in the United Kingdom than in the United States during the Twentieth century. This would predict that the British Pound should have depreciated from 4.85 Dollars to the Pound in 1900 to 1.30 Dollars to the Pound in 2000, which is not far from the current rate of about 1.45 Pounds to the Dollar.

A Brief History of Inflation in the Twentieth Century

The review of inflation in the United Kingdom and the United States showed that inflation varied from one decade to the next. Inflation in the Twentieth century can be divided into a number of

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periods of deflation and inflation. Economic and political events were the primary factors that set the tone for each of these periods. We divide the inflationary experience of the Twentieth century into seven periods:

1900-1914	The Gold Standard and Stability
1915-1924	World War I and Inflation
1925-1939	Interwar Instability and Deflation
1939-1949	World War II, Monetary Controls and Post-war Inflation
1949-1970	Bretton Woods and the Dollar Standard, Moderate Inflation
1971-1979	Floating Exchange Rates, OPEC and Highly Variable Inflation
1980-2000	Greater Central Bank Independence and Disinflation

The first period lasted from 1900 until August 1914. This was a period of relative price stability. All major European countries and many non-European countries were on the gold standard. Weaker economies tied their currency to silver. This period showed modest rates of inflation throughout the world and a large degree of stability on foreign exchange markets between currencies.

The next period, from 1914 until 1924, was a period of instability, inflation, and hyperinflation. Within days of the outbreak of World War I, all countries had left the Gold Standard. Unable to finance the war through taxes alone, countries resorted to printing excessive amounts of money to pay for the war. The result was the highest inflation the world had experienced since the Napoleonic Wars. The overall price level more than doubled in every country involved in the war.

The period immediately after World War I produced even worse inflation than during the war for many countries. Countries that were victorious in World War I, such as the United Kingdom and the United States, deflated after 1920, but countries that had been defeated faced political instability after the war underwent some the worst hyperinflations in human history.

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Table 2-U.S. Dollar Exchange Rates in 1914 and 1924

Country	1914	1924
Austria	4.96	71428
Germany	4.2	420000000000
Hungary	4.96	77000
Poland	5.3*	9330000
Russia	2.35	257500000000

*Poland Marka rates are for 1916

New countries that were created after the war, such as Poland and Hungary, lacked the ability to collect sufficient taxes and paid their bills by printing money. Revolutions rocked Russia and other countries, war indemnities had to be paid by Germany, governments faced new demands for government services, and were burdened with debt from the war. These and other problems made inflation an attractive alternative to cutting services or raising taxes in many of the European countries that had been directly involved in World War II. This solution only created more economic problems. The result was hyperinflation in Germany and other countries that had been fighting on the side of the Axis Powers, or had been occupied by the Axis powers. The table below compares exchange rates to the United States Dollar in 1914 and 1924 for some of these countries.

The period from 1924 until 1939 was one of financial instability and deflation. By 1924, most countries, including Germany, had stabilized. The driving force behind the financial system during the interwar period was the attempt to return to the stability of the pre-war Gold Standard. Germany exchanged 1,000,000,000,000 Marks for 1 Rentenmark, and set the exchange rate for the Rentenmark equal to the pre-World War I rate for the Mark. Britain put the Pound Sterling back on its pre-war Gold parity, and other countries tried to do the same. Instead of returning to economic growth and stability, each country sank into economic depression, accompanied by deflation.

World War II determined the behavior of exchange rates between 1939 and 1949. Most countries avoided the inflation of World War I by introducing price controls. Governments also used exchange rate controls to limit access to foreign exchange, effectively freezing exchange rates during the war. After the war, inflation set in, and the countries that had been devastated by World War II suffered inflation or hyperinflation. As is shown in the table below, China, Hungary, Greece, Romania, and other countries went through hyperinflation that were worse than the ones that followed World War I.

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Table 3-U.S. Dollar Exchange Rates in 1939 and 1949

Country	1939	1949
China	17.5	1.275E+15
Greece	140	5E+14
Hungary	5	4.7E+21
Romania	142	3000000

The period from 1949 until 1973 was the Bretton Woods era. A realignment of currencies in September 1949, which allowed most currencies to initially depreciate against the dollar, created the basis for 25 years of stability among currencies. Though exchange rates were stable, prices were not. The Dollar played the role of the world's Reserve Currency during the Third Quarter of the Twentieth century, just as gold had played this role in the Nineteenth century. However, the United States preferred moderate inflation to the possibility of returning to the high unemployment and deflation of the 1930s.

The Nineteenth Century avoided inflation by tying the financial system to gold. The increase in the supply of gold was less than the increase in the supply of goods in general, so inflation was avoided. By tying all the world's currencies to the US Dollar, the United States had responsibility for maintaining a stable currency, and in this, the United States failed. Between 1949 and 1974, consumer prices in the United States doubled, and consequently, the prices of goods in all countries doubled.

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Table 4-U.S. Dollar Exchange Rates in 1939 and 1979

Country	1939	1949	1979
France*	0.45	3.495	4.02
Germany*	0.25	4.2	1.73
Italy	19	620	800
Japan	4.27	360	240
Switzerland	4.46	4.3	1.6
United Kingdom	0.25	0.357	0.45

*Exchange rates for the French Franc and German Mark have been adjusted for currency changes

During the late 1960s and early 1970s there were strains on the Bretton Woods system. The scarcity of Dollars in the 1950s had turned into a surfeit by 1970. Since currencies were tied to the dollar, but each country had a separate currency and Central Bank, countries suffered different rates of inflation. The exchange rates that had been established in 1949 lost their validity as countries began suffering different rates of inflation, trade patterns changed, and international capital flows increased. In August 1971, the United States devalued the Dollar, and by 1973, most of the world's major currencies were floating against one another. The table below follows the evolution of exchange rates between the world's major currencies during the period from 1939 and 1979.

After countries began floating their currencies in 1973, the OPEC Oil Crisis hit, producing an inflation-inducing supply shock that lasted for the rest of the decade. Most countries suffered their worst peacetime inflation in their history. Governments thought they would avoid unemployment through monetary accommodation during the 1970s, but when the second oil shock hit in 1979, Central Banks saw that during the 1970s, unemployment had risen and growth had declined while inflation got worse. Inflation in developed countries hit double-digits, and inflation in developing countries often hit triple digits. There were few hyperinflations in the 1970s, but countries suffered continuous high rates of inflation resulting from monetary accommodation. Former European colonies that had anchored their currency to European currencies after independence gradually broke the link, eliminating their inflationary discipline. Countries in Africa and Latin America suffered unprecedented rates of inflation.

When Paul Volcker became Chairman of the Federal Reserve in 1979, he decided to fight

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inflation even if the cost was higher unemployment. This determination, along with the weakening of OPEC after 1981, led to a decade of disinflation in the 1980s, and low and moderate inflation in the 1990s. The collapse of Communism produced hyperinflationary bouts in Eastern Europe, but the rest of the world saw decreasing inflation. Even the African and Latin American countries that had suffered high rates of inflation throughout the post-World War II period learned to tame inflation. Argentina, for example, did this by introducing a currency board, linking their currency to the dollar.

At this point, one would expect that the Twenty-first century should be a century of low inflation similar to what occurred during the Bretton Woods period between 1949 and 1969. But this isn’t certain. Several countries, such as Japan and Singapore, have actually gone through deflation in the 1990s, and there is always the risk that economic and political instability in the Twenty-first century will cause inflations similar to what happened in the Napoleonic Wars, World War I and World War II. No one knows what will happen in the century to come, but we can learn lessons from the last century.

Countries that Appreciated Against the Dollar in the Twentieth Century

Despite the fact that prices in the United States increased 23-fold in the Twentieth century, most countries suffered even worse inflation than the United States. Since inflation data are incomplete, we make our comparisons by looking at exchange rate changes during the Twentieth century.

You can literally count on your hand the number of countries whose currencies appreciated against the Dollar in the Twentieth century, and only one currency, the Swiss Franc, appreciated significantly. This means that with a few exceptions, the United States had the best inflation record of any country in the world during the Twentieth century. This occurred despite the United States’ poor record in fighting inflation in the past 100 years.

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Table 5-US Dollar Exchange Rates 1900-2000

	Netherlands	Netherlands Antilles	Singapore	Switzerland
1900	2.48	2.48	1.93	5.19
1920	3.23	3.23	2.47	6.49
1940	1.87	1.87	2.12	4.31
1960	3.77	1.87	3.12	4.31
1980	2.15	1.79	2.09	1.79
2000	2.34	1.78	1.73	1.61

The table below shows the only countries whose currencies appreciated against the United States Dollar during the Twentieth century. Two other currencies should also be mentioned. The Aruba Florin, which was created in 1986 when Aruba separated from the Netherlands Antilles, had a similar exchange rate history to the Netherlands Antilles, and Brunei Darussalem, which has pegged its currency to the Straits Settlement/Singapore Dollar giving it a similar history to that of Singapore.

Switzerland had the least inflation of any country in the past century. Prices increased tenfold between 1900 and 2000. At any point in time, Switzerland's inflationary history was similar to that of the rest of the world, but its actual inflation rates were lower. Switzerland suffered inflation between 1915 and 1920, deflation between 1920 and 1936, and gradual inflation thereafter.

Switzerland has followed an explicit policy of minimizing inflation. The Swiss National Bank is independent of government influence, and because of Switzerland's role as an important international finance center, maintaining a strong currency has been important. Had Switzerland allowed its currency to depreciate, it would have lost its role as a safe haven for funds. Moreover, Switzerland is a federation that lacks a strong central government, and it avoided participation in either of the European World Wars. Switzerland avoided the economic and political chaos that usually accompanies inflation, avoided high government deficits, avoided large increases in government spending, and provided the Swiss National Bank with independence. Because Switzerland has been a small, open country, it has had to focus on maintaining a strong, liquid currency. For this reason, the Swiss Franc was the strongest currency in the Twentieth century.

The Netherlands is also a small, open economy with a long, commercial history. It was neutral in World War I, but was invaded during World War II. Although it is more centralized, and has a larger role for government and social spending than Switzerland, it has avoided the economic and political problems that often plunge countries into inflation. Consumer prices rose 24-fold in the Netherlands during the Twentieth century, almost exactly the same as in the United States, which is why the currencies were almost unchanged against each other during the Twentieth

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century. Of course, the Netherlands has forsaken the Guilder, introducing the Euro in 1999. The European Central Bank will run the Netherlands' monetary policy in the Twenty-first century.

The Netherlands Antilles benefited from linking its currency to the Netherlands from 1900 until 1940 and to the United States from 1940 until 2000. Aruba became a separate country in 1986 and introduced the Florin at par with the Netherlands Antilles Guilder. The Netherlands Antilles is still part of the Netherlands, and it has never pursued an independent monetary policy. There can be no other explanations for its inflationary record.

By contrast, Suriname, which was a Dutch dependency until it gained its independence in 1976, has capitulated to the temptations of inflation. The Suriname and Antillean Guilders were at par to one another until the 1960s, but by 2000, it took 550 Suriname Guilders to get one Antillean Guilder. Sometimes, a lack of independence can be a blessing in disguise.

The final currency that appreciated against the US Dollar was the Singapore Dollar. The Singapore Dollar is a successor to the Straits Settlements Dollar, Malayan Dollar and Malaysian Ringgit. Brunei linked its currency to the Singapore Dollar throughout the Twentieth century, and its currency has mirrored the behavior of the Singapore Dollar.

Singapore is in situation similar to Switzerland. It is a small, open economy, dependent on trade, and has maintained a steady currency as a result. The Singapore Dollar was linked to the British Pound between 1905 and 1970. Since 1970, the Singapore Monetary Authority has maintained control over inflation, causing the Singapore Dollar to appreciate by 55% against the US Dollar. Throughout most of its history, the Straits Settlements/Singapore used a currency board to maintain its stable currency. Prices in Singapore rose only fourfold after World War II, which is why the currency remained so strong. Brunei maintained a strong currency, in part, because of its oil wealth.

This leaves us with the question, why did these countries–Switzerland, Netherlands Antilles/Aruba, the Netherlands and Singapore/Brunei–succeed in controlling inflation during the Twentieth century when other countries failed? We believe the most important factors were:

1. All the countries had small, open economies dependent on trade.
2. They all had independent monetary authorities or currency boards that avoided an overissue of currency.
3. None of them suffered periods of economic or political chaos that might have led to high rates of inflation, even though both the Netherlands and Singapore were occupied during World War II.
4. None of the governments have used large government deficits to fund social and defense programs that could have produced inflation. Although the Netherlands suffered from the "Dutch Disease" in the 1970s, when it used its oil revenues to fund generous social programs, it has since reformed itself and reduced social benefits.

The paradox of fighting inflation is that the best way to control inflation is to minimize control over monetary policy. Large countries should rely upon an independent central bank, dedicated to fighting inflation, and small countries should use a currency board, or some other means, to

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import the monetary policy of a country with anti-inflationary policies. Politics influences economic policy, and minimizing this link is one of the best ways of fighting inflation.

Countries that Suffered the Greatest Inflation in the Twentieth century

Countries that suffered the highest rates of inflation in the Twentieth century endured one or more bouts of hyperinflation, went through decades of high inflation rates, or both. The German economy, for example, almost collapsed in 1923 as a result of hyperinflation in which a meal costing 1 Mark at the beginning of World War I cost 1 trillion marks by the end of 1923. Brazil, on the other hand, had inflation rates of over 10% every year from 1951 to 1995, and over 1000% in some years, but never sank into hyperinflation. The cumulative effect over the decades was a complete and steady devaluation in the various currencies that Brazil issued. The country with the worst inflation record in the Twentieth century, Yugoslavia, suffered both types of inflation: double-digit inflation during most of the 1960s, all of the 1970s and 1980s, and a collapse into hyperinflation in the early 1990s.

The table below lists the countries with the worst inflation in the Twentieth century by showing how many units of its currency was needed to purchase the equivalent of one 1900 United States Dollar in 2000. For example, since it took 2 Japanese Yen to purchase 1 US Dollar in 1900, and 114 Yen in 2000, the Depreciation Factor for the Japanese Yen would be 57. The equivalent amounts for the countries listed below are mind-boggling.

Rather than provide histories of each country, it would be easier to look at the factors that caused these countries to suffer inflation since some of the same causes apply to several countries.

From a geographic point of view, there are several interesting things to note. First, the only Asian country in the list is China, primarily because of the hyperinflation it fell into during the last years of the Nationalist Regime in China. No other Asian countries went through hyperinflationary periods in the Twentieth century, though countries like Indonesia have suffered quite high rates of inflation at different points in time.

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Table 6-Countries with the Greatest Depreciation Against the Dollar, 1900-2000

Country	Depreciation Factor
Yugoslavia	5.34×10^{30}
Hungary	2.83×10^{26}
Russia	7.16×10^{16}
China	2.00×10^{16}
Congo (Zaire)	2.90×10^{15}
Brazil	1.11×10^{15}
Germany	4.94×10^{12}
Argentina	1.00×10^{11}
Nicaragua	6.45×10^{10}
Angola	1.26×10^{10}
Bolivia	2.47×10^{9}
Peru	1.75×10^{9}
Chile	1.98×10^{8}
Poland	1.77×10^{8}

Second, several South American countries are included in the list, but no Central American or North American countries. Central American countries kept their currencies linked to the United States Dollar during most of the century, minimizing their currencies' depreciation and their domestic inflation. Many South American countries, on the other hand, suffered both continuous high rates of inflation and periods of hyperinflation. Unlike Central American countries, they pursued independent monetary policies and suffered as a result. South American countries, in general, had higher average inflation rates than the rest of the world throughout the Twentieth century.

Third, European countries on this list mainly went through a period of hyperinflation either after World War I, World War II, or the collapse of the Soviet Union. During most other time periods, inflation rates were moderate.

Finally, only two African countries are on the list. Most African colonies had Currency Boards until the 1960s that limited inflation by tying their currency to European currencies. The French West African countries that still tie their currency to the French Franc have suffered significantly less inflation than the countries that have chosen independent monetary policies. Congo's inflation occurred under the despotic Mobutu, and Angola's inflation occurred almost exclusively during the 1990s.

As the monetary dictum goes, inflation is everywhere a monetary phenomenon. This rule is especially true in these cases. Every one of the countries listed here was unable and/or unwilling to pay for government expenditures through raising taxes. Each chose to print money, through excessive issues of currency or open market operations, increasing the money supply and causing inflation. Over time, this action became a self-defeating measure as the inflation reduced real government receipts making the deficit even larger until the economy collapsed into hyperinflation.

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We divide our sources of hyperinflation into four categories: post-World War I inflation, post-World War II inflation, post-Soviet Union inflation, and inflationary financing of government deficits leading to a collapse in the currency.

Post-World War I Inflation

After World War I, the Axis countries that lost were in political and financial disarray. Austria-Hungary was broken up into several smaller countries, Poland was recreated, Russia collapsed into civil war, and Germany and other countries fell under severe economic pressures. These countries gradually fell into a vicious circle of government deficits that led to inflation which fed the demand for more government services as economic recession set in leading to even greater inflation. In Poland, Germany, Hungary, Russia and Austria, the government eventually replaced the collapsed paper currencies with new currencies, tying the new currencies to the US Dollar, Gold or some other anchor. Germany's inflation was the worse, and Germany has been hyper-vigilant against inflation ever since. Though Germany and Austria never suffered high rates of inflation again, Hungary suffered the worst inflation in history after World War II, and both Poland and Russia suffered inflationary bouts after Communism collapsed in each country.

None of the Allied countries suffered hyperinflation after World War I. Prices in most countries had doubled, tripled or quadrupled during World War I, but after the war deflation set in. The United Kingdom and other countries tried to return to the Gold Standard, reestablishing the exchange rates that had existed prior to World War I.

Political and economic collapse was the clear source of inflation after the war. Countries such as Germany and Austria that chose to inflate, rather than address their economic problems directly, discovered the costs of hyperinflation and made sure that hyperinflation never occurred again. Other countries, such as Hungary or Romania were unable to avoid inflation and suffered as a result.

Post-World War II Inflation

Fewer countries suffered from inflation after World War II than after World War I. China's inflationary collapse had more to do with the civil war that followed World War II than with the war itself. The Communist parts of China had much lower inflation rates during the Civil War than the Nationalist parts of China. The Communist Yuan fell in value from 3.9 Yuan to the Dollar in 1934 to 47,000 by 1949, but the Nationalist Yuan fell in value to 425,000,000 Yuan to the Dollar. Greece suffered its inflation during World War II, and Romania's inflation was moderate compared to the inflation in Hungary.

The worst inflation in human history occurred in Hungary in 1946 when the Pengo drowned in zeroes. During the spring and summer of 1946, Hungary went through the Pengo, Milpengo

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(equal to 1 Million Pengoe), Bilpengo (equal to 1 Million Million Pengoe) and Adopengo (Tax Pengo which was supposed to avoid the effects of inflation, but failed). When the inflation ended in July 1946, it took 400 quadrillion Pengoe to purchase 1 Forint, the new currency. This inflation was in no way inevitable.

Since other East European countries were in similar economic situations, it should be recognized that poor economic policies created Hungary's hyperinflation, not the events themselves. Similarly, the fact that Taiwan and Communist China suffered much lower inflation rates than Nationalist China shows that the degree of inflation was a political choice. These countries suffered inflation because they were unwilling to deal with the economic problems they were facing.

Table 7-U.S. Dollar Exchange Rates in 1989 and 2000

	1989	2000
Belarus	0.746	12125000
Georgia	0.746	1980000
Poland	507	41280
Romania	14	25910
Russia	0.746	28550
Ukraine	0.746	543440
Yugoslavia	1.5	661,000,000,000,000,000,000,000

Post-Soviet Union Inflation

The collapse of the Soviet Union led to hyperinflations in many of the countries that made up the former Soviet Union and other Eastern European countries. Almost every country that was a member of the Soviet Union has had to introduce a new currency to replace the depreciated currencies that immediately followed the Soviet Ruble. The degree of inflation varied from moderate inflation in the Baltic States and Central Asian Republics to hyperinflation in the Slavic countries. The table below shows some of the worst cases.

The worst inflation occurred in Yugoslavia, primarily during 1993 when the country was under international sanctions and chose to pay its bills through inflationary finance. As a result, Yugoslavia joined Hungary in sharing the record for worst inflations in history. Yugoslavia introduced a new version of the Dinar in October 1993, and two new versions of the Dinar in January 1994. By the end of January 1994, it took 13,000 million million million "Super" Dinars

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to buy one Dinar from September 1993!

Czechoslovakia

One of the interesting case histories for inflation in the Twentieth century is Czechoslovakia/Czech Republic. Czechoslovakia could have collapsed into hyperinflation following World War I, World War II or the collapse of Communism, but maintained relative price stability in each of these cases. Czechoslovakia went through only one currency reform during the Twentieth Century, in 1953, when 10 old Czech Koruna were exchanged for 1 new Czech Koruna. Whereas it took the equivalent of ½ New Czech Koruna to get a US Dollar in 1900, it took 37 Czech Koruna in 2000. This certainly was a large depreciation, but nothing compared to the depreciation of any of its neighbors. If Czechoslovakia chose to avoid inflation, so could have its neighbors. In short, inflation and hyperinflation is a choice.

Inflationary Finance and Currency Collapse

Many of the other countries that suffered severe depreciation of their currency during the Twentieth century accomplished this feat through hard and steady work. No South American country faced the political problems caused by the World Wars or the collapse of Communism, but all of them suffered high rates of inflation throughout the Twentieth century.

The source of this inflation was the unwillingness of governments to balance their books and avoid deficits. Government deficits were paid for with expansions in the money supply, which generated inflation. Argentina, Brazil, Uruguay and other South American countries suffered year after year of double-digit inflation that inevitably led to a collapse of the currency into triple- or quadruple-digit inflation before economic reforms replaced the currency with a new currency. Then the country began a new adventure down the road to inflationary collapse. Brazil went through five currency reforms in the Twentieth century, Argentina three reforms, Bolivia, Chile, Nicaragua, Peru and Uruguay two reforms each.

This inflation was in no way inevitable. Panama tied its currency to the Dollar throughout the Twentieth century and suffered no depreciation. Most Central American countries tied their currencies to the U.S. Dollar until the 1970s and avoided inflation. Although it is difficult to separate the causes and effects of inflation, it is notable that Argentina was richer than most European countries in the 1920s, but is now poorer than most European countries. Latin American countries had faced slower growth than most Asian countries. Although inflation in and of itself didn’t cause this result, it certainly contributed to it.

Many countries not on our list have suffered high annual inflation rates without collapsing into hyperinflation. Countries suffer inflation because they are unwilling to deal directly with the economic problems that create inflation. Using the printing presses to avoid these problems only delays the inevitable and worsens the economic costs of dealing with inflation.

The Costs of Inflation

Inflation reduces economic well-being. There are numerous sources of the costs to inflation.

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Price inflation imposes menu costs (the cost of changing prices), shoe leather costs (the costs of reducing monetary holdings), increased uncertainty among producers and consumers trying to determine the real costs of goods and services, tax distortions, and the cost of adjusting to unexpected changes in inflation. Unexpected inflation redistributes money from creditors to debtors and from employees to employers. In the case of hyperinflation, it can easily wipe out the value of financial assets. This leads to reduced investment and lower economic growth. Variable inflation rates create uncertainty that affects the level of economic output.

All of these inflationary problems result from price inflation of goods and services. Another inflationary problem that is often ignored is asset-price inflation in the stock market, real estate market, or other areas. Asset inflation creates artificial wealth, encouraging firms and consumers to borrow beyond their capacity. When the asset inflation ends, firms and individuals are unable to pay their debts leading to declines in demand and to economic slowdowns. The United States in the 1930s and Japan in the 1990s are examples of this problem. Asset inflation is deceptive because people feel wealthier when it occurs, but when asset values get out of line with the nation's productive capacity, there will be an inevitable period of "catch up" in which asset prices adjust downward to their real levels.

Both price and asset inflation have their costs.

Fighting Inflation in the Twenty-first century

Will inflation in the Twenty-first century be more like the Nineteenth century or the Twentieth century? Of course, it is impossible to predict this. Inevitably, countries that choose not to deal with their underlying economic problems will create inflationary problems for themselves. Most countries returned to single-digit levels of inflation in the late 1990s, even South American, and former Soviet countries, but some countries continued to inflate. Turkey, the Congo Democratic Republic, and Angola are still suffering high rates of inflation.

Nevertheless, countries do learn from their mistakes. Germany has made sure that it never repeated they hyperinflation of the 1920s, most governments chose to control inflation during World War II and avoid the inflationary finance of World War I, and when the second Oil Crisis occurred in 1979, Central Banks chose to fight inflation rather than succumbing to it as they had after the first Oil Crisis in 1973. After the inflation of the Napoleonic Wars, the United States, United Kingdom, France and other countries made sure that paper money inflation did not return for a century. Hence, there is no reason why we cannot use the lessons of the Twentieth century to fight inflation in the Twenty-first century.

Several conclusions can be made.

1. **Inflation is not the inevitable consequence of political and economic uncertainty.**

   Although most countries that suffered inflation did so during a period of political and economic uncertainty, inflation occurred because governments were unwilling to deal with the economic problems they faced. Germany and Austria avoided inflation after World War II, and Czechoslovakia avoided the high inflation rates of its neighbors

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throughout the Twentieth century. Central American countries that tied their currency to the U.S. Dollar avoided the inflationary problems of their South American neighbors. Inflation is a choice.

Government and Central Banks must learn that the economic problems that lead to inflationary finance must be dealt with immediately. Inflation only delays and worsens these economic problems at the cost of economic investment and output.

2. **Independent Central Banks can reduce the Temptation of Inflation**

The countries with the best records on inflation in the Twentieth century were also the countries that had independent Central Banks. Of course, this in and of itself is no guarantee of avoiding inflation. Though Switzerland, the United States, and Germany suffered less inflation than most countries after World War II, they still went through brief periods of double-digit inflation. The Central Bank must have a commitment to fighting inflation at all costs.

The European Central Bank will provide an interesting case study in the Twenty-first century. Unlike the Federal Reserve, it is a supranational Central Bank, controlling the money supply of several sovereign countries. There are other supranational Central Banks that control the money supply for several countries, such as the East Caribbean Central Bank or the Banque Centrale des Etats de l'Afrique de l'Ouest, but these act more like currency boards than central banks.

Despite its independence and supranational character, we cannot conclude that the European Central Bank will be free from political influence. Before its first President, Wim Duisenberg, was chosen, the French made sure that he would "voluntarily" resign after four years to allow a French ECB President to replace him.

Although Central Banks make fighting inflation their primary goal, it is not their only goal. The Federal Reserve tries to balance fighting inflation against internal and economic stability, and its record on fighting price inflation in the 1970s and asset inflation in the 1990s is less than perfect. Independent Central Banks and a stronger commitment to fighting inflation can avoid the inflation of the Twentieth century.

3. **Smaller countries should peg their currency to the Euro or Dollar to avoid inflation.**

The small countries with the best records in avoiding inflation are the countries that have used Currency Boards or Dollarization. This requires them to give up control over the monetary side of their economy.

Currency Boards or Dollarization in and of themselves do not solve a country's economic problems. Argentina, Mexico, Korea and others used the stability of their currency to borrow excessively in U.S. Dollars creating financial and economic problems. Currency Boards combined with conservative macroeconomic policies is the best way to control inflation in small countries.

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This is the best explanation of why African countries suffered little inflation before 1960, but high inflation thereafter, why non-French African countries have suffered higher rates of inflation than French African countries, and why Central America endured less inflation than South America.

Several countries have taken this route. Argentina, Hong Kong and Bulgaria, among others, now use currency boards to control inflation. Ecuador has dollarized, and the U.S. Dollar is legal tender in Panama and Guatemala. This also explains why the Netherlands Antilles has one of the best inflation records in the Twentieth century.

For small countries, currency boards can act as the equivalent of an independent Central Bank and are probably the best solution.

Conclusion

What lies ahead in the Twenty-first century? No one knows, of course. There will be wars, governments will collapse, ideologies will gain control over economic common sense, and governments will be tempted to use inflation to solve their economic and financial problems. We must remember that inflation is a choice that can be avoided.

One prediction we would like to make here is that if the Twentieth century was a century of the proliferation in currencies, the Twenty-first century will be a century that sees a reduction in the number of world currencies. Central Banks were a growth industry during the Twentieth century. Few countries had a Central Bank in 1900, and most countries and colonies linked their currencies to one another through the Gold Standard.

As countries gradually removed gold and silver from their national monetary systems, and replaced them with paper, inflation resulted. The world will never go back to the Gold Standard. But it can return to a world in which most of the world’s currencies are linked to several central currencies, such as the Dollar, Euro and Yen, or possibly to a single Eurodollar currency. Whether these reserve currencies return to relative price stability and can avoid the problems of the Twentieth century remains uncertain, but it is a goal to aim for.

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