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A Reconsideration of the Twentieth Century[†]

By R. A. MUNDELL*

By comparison with past centuries, the twentieth has produced extremes. Its earliest part was a benign continuation of the pax of the nineteenth century. But this calm before the storm was followed by World War I, communism, hyperinflation, fascism, depression, genocide, World War II, the atom bomb, and the occupation of Eastern Europe. There followed a period of comparative stability, punctuated by the balance of terror of the Cold War, the NATO Alliance, and decolonialism. Toward the end of the century the Cold War ended, the Soviet Empire was dismantled, democracy emerged in Eastern Europe, the *Pax Americana* flourished, and the euro came into being. The clue to the twentieth century lies in the links between its first and last decades, the bookends of the century.

In 1906, Whitelaw Reid, the U.S. Ambassador to Britain, gave a lecture at Cambridge University with the title, *The Greatest Fact in Modern History*, in which the author, a diplomat, journalist, and politician, was given as his subject, the rise and development of the United States!¹ It cannot have been obvious then that the rise of the United States was the “greatest fact in modern history” but it was true that in a matter of only two centuries a small colony had become the biggest economy in the world. The

first decade of the century hinted at what the last decade confirmed, viz., American preponderance. Forget the 75 years between 1914 and 1989!

An underlying theme of my lecture today is the role of the United States in what has been aptly called the “American century.” I want to bring out the role of the monetary factor as a determinant of political events. Specifically, I will argue that many of the political changes in the century have been caused by little-understood perturbations in the international monetary system, while these in turn have been a consequence of the rise of the United States and mistakes of its financial arm, the Federal Reserve System.

The twentieth century began with a highly efficient international monetary system that was destroyed in World War I, and its bungled recreation in the interwar period brought on the Great Depression, Hitler, and World War II. The new arrangements that succeeded it depended more on the dollar policies of the Federal Reserve System than on the discipline of gold itself. When the link to gold was finally severed, the Federal Reserve System was implicated in the greatest inflation the United States has yet known, at least since the days of the Revolutionary War. Even so, as the century ends, a relearning process has created an entirely new framework for capturing some of the advantages of the system with which the century began.

The century can be divided into three distinct, almost equal parts. The first part, 1900–1933, is the story of the international gold standard, its breakdown during the war, its mismanaged restoration in the 1920’s, and its demise in the early 1930’s. The second part, 1934–1971, starts with the devaluation of the dollar and the establishment of the \$35 gold price and ends when the United States took the dollar off gold. The third part of the century, 1972–1999, starts with the collapse into flexible exchange rates and continues with the subsequent outbreak of massive inflation and stagnation in the 1970’s, the

[†] This article is a revised version of the lecture Robert A. Mundell delivered in Stockholm, Sweden, December 10, 1999, when he received the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel. The article is copyright © The Nobel Foundation 1999 and is published here with the permission of the Nobel Foundation.

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¹ The Publisher’s Note reads:

The following paper was prepared at the invitation of Cambridge University by the American Ambassador to Great Britain and delivered in the Senate House ... The University authorities named the subject. The Ambassador said at the time he never should have chosen it for that audience, but when it was chosen for him he was unwilling to run from it ...

blossoming of supply-side economics in the 1980's, and the return to monetary stability and the birth of the euro in the 1990's. The century ends, however, with our monetary system in deficit compared to the first decade of the century and that suggests unfinished business for the decades ahead.

I. Mismanagement of the Gold Standard

The international gold standard at the beginning of the twentieth century operated smoothly to facilitate trade, payments, and capital movements. Balance of payments were kept in equilibrium at fixed exchange rates by an adjustment mechanism that had a high degree of automaticity. The world price level may have been subject to long-term trends but annual inflation or deflation rates were low, tended to cancel out, and preserve the value of money in the long run. The system gave the world a high degree of monetary integration and stability.

International monetary systems, however, are not static. They have to be consistent and evolve with the power configuration of the world economy. Gold, silver, and bimetallic monetary standards had prospered best in a decentralized world where adjustment policies were automatic. But in the decades leading up to World War I, the central banks of the great powers had emerged as oligopolists in the system. The efficiency and stability of the gold standard came to be increasingly dependent on the discretionary policies of a few significant central banks. This tendency was magnified by an order of magnitude with the creation of the Federal Reserve System in the United States in 1913. The Federal Reserve Board, which ran the system, centralized the money power of an economy that had become three times larger than either of its nearest rivals, Britain and Germany. The story of the gold standard therefore became increasingly the story of the Federal Reserve System.

World War I made gold unstable. The instability began when deficit spending pushed the European belligerents off the gold standard, and gold came to the United States, where the newly created Federal Reserve System monetized it, doubling the dollar price level and halving the

real value of gold.² The instability continued when, after the war, the Federal Reserve engineered a dramatic deflation in the recession³ of 1920–1921, bringing the dollar (and gold) price level 60 percent of the way back toward the prewar equilibrium, a level at which the Federal Reserve kept it until 1929.

It was in this milieu that the rest of the world, led by Germany, Britain, and France, returned to the gold standard. The problem was that, with world (dollar) prices still 40 percent above their prewar equilibrium, the real value of gold reserves and supplies was proportionately smaller. At the same time, monetary gold was badly distributed, with half of it in the United States. In addition, uncertainty over exchange rates and reparations (which were fixed in gold) increased the demand for reserves. In the face of this situation would not the increased demand for gold brought about by a return to the gold standard bring on a deflation? A few economists, like Charles Rist of France, Ludwig von Mises of Austria, and Gustav Cassel⁴ of Sweden, thought it would.⁵

² From a formal point of view it could be argued that the United States suspended the gold standard when, between September 1917 and June 1918, President Wilson barred the free export of gold, using, "oddly enough," the Espionage Act of June 1917 (Roy Jastram, 1981 p. 124). However, the domestic convertibility of notes into gold remained legal so that as far as the public was concerned, the gold standard remained in force.

³ It was this episode of instability of the dollar and gold that led John Maynard Keynes, in his *A Tract on Monetary Reform* (Keynes, 1923), to pounce on the conflict between "internal" and "external" stability. With the value of gold falling in half, and then soaring in the postwar deflation, it seemed to be an unstable anchor for other currencies. On the basis of this episode, Keynes championed internal stability (a stable price level) over external stability (a fixed exchange rate or gold price), largely on the basis that the Federal Reserve Board would dominate an international system and that it had not yet proved its capacity for capable management.

⁴ I have discussed this issue in my paper delivered on the occasion of the centenary of the birth of Jacques Rueff. (See Mundell, 1996.) Mention should also be made of John Parke Young, a young Princeton professor, who was appointed as a kind of one-man Gold Commission, and showed a considerable recognition of the problem raised by Cassel, Rist, and von Mises. (See Young, 1925.)

⁵ There was ample evidence from monetary history that a restoration of a specie standard would introduce deflationary tendencies, as when Britain put India on the silver standard in the middle of the eighteenth century, when Britain and other countries returned to gold or silver standards after the Napoleonic Wars, and when countries shifted

Cassel (1925) had been very explicit even before Britain returned to gold:

The gold standard, of course, cannot secure a greater stability in the general level of prices of a country than the value of gold itself possesses. Inasmuch as the stability of the general level of prices is desirable, our work for a restoration of the gold standard must be supplemented by endeavours to keep the value of gold as constant as possible ... With the actual state of gold production it can be taken for certain that after a comparatively short time, perhaps within a decade, the present superabundance of gold will be followed, as a consequence of increasing demand, by a marked scarcity of this precious metal tending to cause a fall of prices

After gold had been restored, Cassel pursued his line of reasoning further, warning of the need to economize on the monetary use of gold in order to ward off a depression. In 1928 he wrote:

The great problem before us is how to meet the growing scarcity of gold which threatens the world both from increased demand and from diminished supply. We must solve this problem by a systematic restriction of the monetary demand for gold. Only if we succeed in doing this can we hope to prevent a permanent fall of the general price level and a prolonged and world-wide depression which would inevitably be connected with such a fall in prices.⁶

Rist, Mises, and Cassel proved to be right. Deflation was already in the air in the late 1920's with the fall in prices of agricultural products and raw materials. The Wall Street

crash in 1929 was another symptom, and generalized deflation began in 1930. That the deflation was generalized, if uneven, can be seen from the percentage loss of wholesale prices in various countries from the high in 1929 to September 1931 (the month that Britain left the gold standard): Japan, 40.5; The Netherlands, 38.1; Belgium, 31.3; Italy, 31.0; United States, 29.5; United Kingdom, 29.2; Canada, 28.9; France, 28.3; Germany, 22.0.⁷

The dollar price level hit bottom in 1932 and 1933. The highlights of the price level from 1914 to 1934 are given in Table 1.

For decades economists have wrestled with the problem of what caused the deflation and depression of the 1930's. The massive literature on the subject has brought on more heat than light. One source of controversy has been whether the depression was caused by a shift of aggregate demand or a fall in the money supply. Surely the answer is both! But none of the theories—monetarist or Keynesian—would have been able to predict the fall in the money supply or aggregate demand in advance. They were rooted in short-run, closed-economy models which could not pick up the gold standard effects during and after World War I. By contrast, the theory that the deflation was caused by the return to the gold standard was not only predictable, but was actually, as we have noted above, predicted.

The gold exchange standard was already on the ropes with the onset of deflation. It moved into its crisis phase with the failure, in the spring of 1931, of the Viennese Creditanstalt, the biggest bank in Central Europe—bringing into play a chain reaction that spread to Germany, where it was met by deflationary monetary policies and a reimposition of controls, and to Britain, where, on September 21, 1931, the pound was taken off gold. Several countries, however, had preceded Britain in going off gold: Australia, Brazil, Chile, New Zealand, Paraguay, Peru, Uruguay, and Venezuela, while Austria, Canada, Germany, and Hungary had imposed controls. A large number of other countries followed Britain off gold.

from silver to gold after the breakdown of bimetallism in the early 1870's.

⁶ Later in the same year, Keynes had become alerted to the significance of restoration of the gold standard (which he had earlier opposed on grounds that the Federal Reserve might not keep gold stable) on the demand for gold and he became concerned especially about the implications of the 1928 French monetary law, which in effect required gold cover for every new franc note. Governor Moreau began to convert even existing balances into gold, embarrassing the Bank of England. For a thorough discussion of the French monetary law, see H. Clark Johnson (1997).

⁷ The figures are from the U.S. Bureau of Foreign and Domestic Commerce, *Commerce Reports*, November 9, 1931 p. 301, quoted in Jastram (1981 p. 99).

TABLE 1—U.S. PRICE LEVEL, SELECTED YEARS, 1914–1933 (1930 = 100)

1914	1920	1921	178.7	113	112.1
78.4	178.7	113.0	112.1	84.1	76.2

Source: Wholesale Price Index, U.S. Bureau of Labor Statistics. Adapted from Table 21 in Jastram (1981 p. 206).

Meanwhile, the United States hung onto the gold standard for dear life. After making much of its sensible shift to a monetary policy that sets as its goal price stability rather than maintenance of the gold standard, it reverted back to the latter at the very time it mattered most, in the early 1930's.

Instead of pumping liquidity into the system, it chose to defend the gold standard. Hard on the heels of the British departure from gold, in October 1931, the Federal Reserve raised the rediscount rate in two steps from 1 ½ to 3 ½ percent, dragging the economy deeper into the mire of deflation and depression and aggravating the banking crisis. As we have seen, wholesale prices fell 35 percent between 1929 and 1933.

Monetary deflation was transformed into depression by fiscal shocks. The Smoot-Hawley tariff, which led to retaliation abroad, was the first: between 1929 and 1933 imports fell by 30 percent and, significantly, exports fell even more, by almost 40 percent. On June 6, 1932, the Democratic Congress passed, and President Herbert Hoover signed, in a fit of balanced-budget mania, one of its most ill-advised acts—the Revenue Act of 1932, a bill which provided the largest percentage tax increase ever enacted in American peacetime history. Unemployment rose to a high of 24.9 percent of the labor force in 1933, and GDP fell by 57 percent at current prices and 22 percent in real terms.⁸

The banking crisis was now in full swing. Failures had soared from an average of about 500 per year in the 1920's, to 1,350 in 1930, 2,293 in 1931, and 1,453 in 1932. Franklin D. Roosevelt, in one of his first actions on assuming the presidency in March 1933, put an em-

bargo on gold exports. After April 20, the dollar was allowed to float downward.

The deflation of the 1930's was the mirror image of the wartime rise in the price level that had not been reversed in the 1920–1921 recession. When countries go off the gold standard, gold falls in real value and the price levels in gold countries rise. When countries go onto the gold standard, gold rises in real value and the price levels fall. The appreciation of gold in the 1930's was the mirror image of the depreciation of gold in World War I. The dollar price level in 1934 was the same as the dollar price level in 1914.⁹ The deflation of the 1930's has to be seen, not as a unique “crisis of capitalism,” as the Marxists were prone to say, but as a continuation of a pattern that had appeared with considerable predictability before—whenever countries shift onto or return to a monetary standard. The deflation in the 1930's has its precedents in the 1780's, the 1820's, and the 1870's.

What verdict can be passed on this third of the century? One is that the Federal Reserve System was fatally guilty of inconsistency at critical times. It held onto the gold standard between 1914 and 1921 when gold had become unstable. It shifted over to a policy of price stability in the 1920's that was successful. But it shifted back to the gold standard at the worst time imaginable, when gold had again become unstable. The unfortunate fact was that the least experienced of the important central banks—the new boy on the block—had the awesome power to make or break the system by itself.

The European economies were by no means

⁸ The establishment of the National Industrial Recovery Act in 1933 did more damage when it suspended the anti-trust laws, encouraged cartels and labor unions, diminished wage differentials, limited hours of work to 35 hours a week, and imposed minimum wages, before it was declared unconstitutional in 1935.

⁹ It was, of course, partly a coincidence that the price levels in 1914 and 1933 were about the same. Had the international gold standard remained in force over the period with or without the catastrophe of the world war, the real price of gold could have changed for the same reasons it changed over the history of the gold standard. Nevertheless, the broad influence of the restoration of the gold standard in bringing prices back down can hardly be disputed.

blameless in this episode. They were the countries that changed the status quo and moved onto the gold standard without weighing the consequences. They failed to heed the lessons of history—that a concerted movement off, or onto, any metallic standard brings in its wake, respectively, inflation or deflation. After a great war, in which inflation has occurred in the monetary leader and gold has become correspondingly undervalued, a return to the gold standard is only consistent with price stability if the price of gold is increased. Failing that possibility, countries would have fared better had they heeded Keynes' advice to sacrifice the benefits of fixed exchange rates under the gold standard and instead stabilize commodity prices rather than the price of gold.

Had the price of gold been raised in the late 1920's, or, alternatively, had the major central banks pursued policies of price stability instead of adhering to the gold standard, there would have been no Great Depression, no Nazi revolution, and no World War II.

II. Policy Mix Under the Dollar Standard

In April 1934, after a year of flexible exchange rates, the United States went back to gold¹⁰ after a devaluation of the dollar.¹¹ This

¹⁰ The devaluation of the dollar and the rise in the dollar price of gold in 1934 had been accompanied by measures eliminating the operation of the gold standard inside the United States. The dollar was no longer redeemable and U.S. citizens were forbidden to hold gold; the dollar was convertible only for foreign monetary purposes; the Federal Reserve was required to keep only a percentage (initially 40 percent) of gold cover behind notes and liabilities; and the Supreme Court had rendered null and void all gold clauses.

¹¹ The decision to devalue was strongly influenced by George F. Warren, Professor of Economics at Cornell University and one of the President's advisors. There were three possible, but related, benefits expected to follow from it. One was that an increase in the price of gold would raise the domestic price level, starting with an increase in the prices of imports and exports, but then expanding throughout the economy; this theory, which would be standard today for a small open economy, was then based on the long-run correlation of monetary gold stocks and the price level. A second was that higher gold prices would result in increased gold purchases which would increase the high-powered reserve base of the monetary system. A third was that devaluation, to the extent that exchange rates changed, would make the U.S. products more competitive in world

markets. It turned out wholesale prices did rise by almost 30 percent between 1933 and 1937, then fell back about 10 percent in 1938–1940, before doubling by the end of 1948.

decreased the gold value of the dollar by 40.94 percent, raising the official price of gold 69.33 percent, to \$35 an ounce. How history would have been changed had President Herbert Hoover devalued the dollar three years earlier!¹²

France held onto its gold parity until 1936, when it devalued the franc. Two other far-reaching events occurred in that year. One was the publication of Keynes' *General Theory*; the other signing of the Tripartite Accord among the United States, Britain, and France. One ushered in a new theory of policy management for a closed economy; the other, a precursor of the Bretton Woods agreement, established some rules for exchange-rate management in the new international monetary system.

The contradiction between the two could hardly be more ironic. At a time when Keynesian policies of national economic management were becoming increasingly accepted by economists, the world economy had adopted a new fixed exchange-rate system that was incompatible with those policies.

In the new arrangements, which were ratified at Bretton Woods in 1944, countries were required to establish parities fixed in gold and maintain fixed exchange rates to one another. The new system, however, differed greatly from the old gold standard. For one thing, the role of the United States in the system was asymmetric.

¹² One argument against devaluation was that the United States was the world's largest creditor and its claims were largely fixed in dollars; only later was it realized that the debts would be uncollectible. The avoidance of deflation should have sufficed but in the absence of a coherent theory that gold was undervalued, the argument might not have been convincing. No one knew in advance how far down prices would proceed. An opportunity arose when Britain left gold, but U.S. gold reserves were still the largest in the world. Had the Federal Reserve, however, been following a sufficiently expansionary monetary policy, gold would have flowed out and the situation would have become obvious.

A specious argument frequently raised against devaluation is that it is a "beggar-thy-neighbor" policy, in the sense that it creates employment at home at the expense of employment abroad. But this is precisely what was needed: competition to increase employment. If all countries devalue competitively, the price of gold could rise to eliminate the undervaluation and create the conditions for a revival.

A special clause¹³ allowed any country the option of fixing the price of gold instead of keeping the exchange rates of other members fixed. Because the dollar was the only currency tied to gold it was the only country in a position to exercise the gold option. There thus came into being the asymmetrical arrangements in which the United States fixed the price of gold whereas other countries fixed their currencies to the dollar.¹⁴ Another difference of the new system from the old was that not even the United States was on anything that could be called a full gold standard. The dollar was no longer in the old sense “anchored” to gold; it was rather that the world price level, and therefore the real price of gold, was heavily influenced by the United States. Gold had become a passenger in the system.

Was a new system created at Bretton Woods? From the early planning it seemed that this would be the case. The British and American plans both contained provisions for a world currency: John Maynard Keynes had his “banco,” and Harry Dexter White had his “unitas.” But these forward-looking ideas were soon buried. No doubt the Americans came to believe that a world currency would clip the wings of the dollar.¹⁵ There was not therefore a Bretton Woods “system” but rather a Bretton Woods

“order” outlining the charter of a system¹⁶ that already existed.

World War II brought a repetition of the monetary imbalances of World War I. The devaluation of the dollar and gathering war clouds in Europe made the dollar a safe haven and the recipient of gold to pay for war goods. The United States sterilized the gold imports and imposed price controls. It was therefore able to run deficits without going off gold. Because gold was still “overvalued” in this era of “dollar shortage,” interest rates remained incredibly low. By 1945, the public debt had soared to 125 per cent of GDP.

At the end of the war, the U.S. price level doubled as a result of the end of price control, the unleashing of pent-up demand, and the expansionary monetary policies of the Federal Reserve System that continued to support the bond market. The postwar inflation halved the real value of the public debt, increased tax revenues as a result of “bracket creep” in the steeply progressive income tax system (which rose to 92.5 percent), halved the real value of gold, and eliminated its overvaluation. After further inflation during the Korean War and the onset of steady “secular” inflation, gold became undervalued.

Meanwhile, Germany and Japan, in the aftermath of their paper-money inflations, under the auspices of the U.S. occupation authorities, had currency reforms in which 10 units of old money were exchanged for 1 unit of new currency; both reforms took place in 1948, with the exchange rate for Germany set at DM 4.2 = \$1, and for Japan at ¥360 = \$1. The exchange rates later proved to undervalue German and Japanese labor and the two economies performed spectacularly in the postwar period, fulfilling their destiny of overtaking Britain and France as the second and third largest economies in the world.

Until the 1960's, U.S. macroeconomic policy was based more on closed-economy principles than on the requirements of an international monetary system. Monetary and fiscal policy were directed at the needs of internal balance and the balance of payments was all but ig-

¹³ Article IV (4)-b of the Articles of Agreement of the International Monetary Fund. This clause was put in at the last minute to accommodate the United States, which had never, as a general practice, fixed exchange rates and was not about to do so now: what a headache it would be to fix all currency prices in the New York foreign-exchange market!

¹⁴ There was, however, still another unresolved problem. Would Britain, France, and every other of the 44 members of the Fund have to intervene in 43 exchange markets? As the Fund got started, its Executive Board had to grope toward a ruling that any country that was fixing its currency to a “convertible currency” was deemed to be fulfilling its function under the Articles. In conjunction with the gold clause, this by-law established the asymmetrical system by which the United States fixed the price of gold and the rest of the world fixed, directly or through a third currency, the dollar. That this asymmetry was not widely understood even as late as the 1960's can be seen from a discussion between myself and Sir Roy Harrod at a Brookings Institution conference in 1965.

¹⁵ See Mundell (1995) for a discussion of how the plans for a world currency came to be dropped from the agenda at Bretton Woods.

¹⁶ I have discussed the distinction between “system” and “order” in Mundell (1972).

nored. In 1949 the United States had peaked at over 700 million ounces of gold, more than 75 percent of the world's monetary gold. Gold losses began soon after, but the effect of these sales on the money supply was sterilized by equivalent purchases of government bonds by the Federal Reserve System. The gold losses were at first looked upon as a healthy redistribution of the world's gold reserves but toward the late 1950's they were recognized as dangerous.

The Federal Reserve System was required to keep a 25-percent (reduced from 40 percent in 1945) gold cover behind its currency and deposit liabilities. If gold reserves fell below this level, interest rates would have to be raised. If the fall in gold reserves reached the level of required reserves, the United States would be forced to take account of its balance-of-payments constraint like any other country. The problem of the appropriate mix for monetary and fiscal policy came to the foreground during the administration of President John F. Kennedy, who took office in 1961.

At this time I played a part in the story. Newly arrived in the Research Department at the International Monetary Fund (IMF) in the fall of 1961, I was asked to look into the theoretical aspects of the monetary-fiscal policy mix.¹⁷ The main problem in this post-Sputnik era was sluggish growth and subpar employment in the United States in contrast to Europe and Japan (precisely the reverse of the situation today), and a now-worrisome balance-of-payments deficit. Three schools of thought had emerged. Keynesians, led by Leon Keyserling, the first Chairman of the Council of Economic Advisers, pushed for easy money and an increase in government spending. The Chamber of Commerce argued for fiscal constraint and tighter money. The Council of Economic Advisers, following the Samuelson-Tobin "neoclassical synthesis," advocated low interest rates to spur growth and a budget surplus to siphon off excess liquidity and prevent inflation.

In my analysis, I showed that none of the above policies would work, and would lead the economy away from equilibrium. The correct

policy mix was to lower taxes to spur employment, and tighten monetary policy to protect the balance of payments. My paper was circulated by the IMF to its members in November 1961 and published in *IMF Staff Papers* in March 1962.

It gradually came to be realized that the policies of the Kennedy administration were not working: the wrong policy mix had produced increasingly disequilibrating effects: a steel strike, a stock market crash, and stagnation. At the end of 1962, Kennedy announced a reversal of the policy mix, with tax cuts to spur the economy and interest rates to protect the balance of payments. Legislative delays meant that the tax cut had to wait until the summer of 1964, but its anticipation positioned the economy for the great expansion of the 1960's.¹⁸

The adoption of my policy mix helped the United States to achieve rapid growth with stability. It was not intended to, and could not, solve the basic problem of the international monetary system, which stemmed from the undervaluation of gold. Nevertheless the problem of the U.S. balance of payments was intricately tied up with the problem of the system. With very little excess gold coming into the stocks of central banks from the private market, and the U.S. dollar the only alternative component of reserves, the U.S. deficit was the principal means by which the rest of the world was supplied with additional reserves. If the United States failed to correct its balance-of-payments deficit, it would no longer be able to maintain gold convertibility; on the other hand, if it corrected its deficit, the rest of the world would run short of reserves and bring on slower growth or, worse, deflation. The last scenario hinted at a repetition of the problem of the interwar period.¹⁹

Two basic solutions were consistent with preserving the system.²⁰ One solution was to raise

¹⁸ In June 1963, I was put on the IMF Article VIII Consultations team headed by Jacques J. Polak, with a U.S. team that included Under-Secretary Robert V. Roosa (who co-chaired the sessions with Polak) and Paul Volcker, then Director of the Treasury's Office of Financial Analysis.

¹⁹ The problem came to be known as the "Triffin Dilemma," named after the distinguished Belgian economist, Robert Triffin, Professor of Economics at Yale University.

²⁰ The G-32 academic study group, in which I took part, outlined four possible solutions for the system: (a) return to

¹⁷ I had already worked on models appropriate to solving the problem in earlier articles. See especially Mundell (1961c).

the price of gold. The founding fathers of the IMF had put a provision in the IMF Articles of Agreement for dealing with a gold scarcity or surplus: a change in the par values of all currencies, which would have changed the price of gold in terms of all currencies and left exchange rates unchanged. In the 1968 election campaign, candidate Richard M. Nixon chose Arthur Burns as his emissary on a secret mission²¹ to sound out European opinion on an increase in the price of gold. It turned out to be favorable and Burns recommended prompt action immediately after the election. Nothing, however, came of it.

The other option was to create a substitute for gold. This course was in fact adopted. In the late summer of 1967, international agreement was reached on an amendment to the IMF articles to allow the creation of Special Drawing Rights (SDRs), gold-guaranteed bookkeeping reserves made available through the IMF, with a unit value equal to one gold dollar, or $\frac{1}{35}$ of an ounce. Somewhat less than SDR 10 billion were allocated to member countries in 1970, 1971, and 1972, but they proved to be inadequate—too little and too late—to meet the main problems of the system.²²

On August 15, 1971, confronted by requests for conversion of dollars into gold by the United Kingdom and other countries, President Nixon took the dollar off gold, closing the “gold window” at which dollars were exchanged for gold with foreign central banks. The other countries now took their currencies off the dollar and a period of floating began.

But floating made the embryonic plans just forming for European monetary integration²³ more difficult, and in December 1971, at a meeting at the Smithsonian Institution in Washington, DC, finance ministers agreed on a restoration of the fixed-exchange-rate system without gold convertibility. A few exchange rates were changed and the official dollar price of gold was raised, but the act was almost purely nominal since the United States was no longer committed to buying or selling gold.

The world thus moved onto a pure dollar standard, in which the major countries fixed their currencies to the dollar without a reciprocal obligation with respect to gold convertibility on the part of the United States. But U.S. monetary policy was too expansionary in the following years and, after another ineffective devaluation of the dollar, the system was allowed to break up into generalized floating in

a gold standard; (b) creation of a world central bank; (c) a new reserve asset to replace or supplement gold; and (d) flexible exchange rates.

²¹ Burns' account of the mission, quoted in William R. Neikirk (1987 pp. 143–44), is as follows:

I went on a secret mission for Richard Nixon to test European opinion on the issue of raising the price of gold. I went about it very discreetly. I gave no indication to anyone, first, that I was Nixon's emissary and, second, that he or I had anything like that in mind. I came to the conclusion that this would be accepted by Europeans. I recommended prompt action right after the election [to raise the price of gold]. I did that on a plane trip with Nixon during the campaign. The poor man had his mind on the speech and the election and then probably forgot about it. In any case, he did nothing about it. And that was the time to do it, right after the election.

²² Prior to 1968, the dollar price of gold had been kept fixed between margins near \$35 an ounce in the London gold market; any excess supply in the private market was rationed out among the eight members of the gold pool. In the summer of 1967, however, private demand closed the gap and soon there was an excess demand. France dropped out of the gold pool and the other countries, rather than

supply the market with coveted gold reserves, let the gold price rise above the London limits, giving rise to the “two-tier system” as it was quaintly called. Thereafter, central banks were reluctant to sell gold at the official price when the market valued it at a much higher price. Gold reserves therefore became immobilized, creating a shock to the system and an explicit excess demand for gold that was not taken into account by the international monetary authorities. In the face of this shock to the system, the issues of SDRs were inadequate to make up the difference, let alone solve the problems of the system. A less timid issue—perhaps double the actual issues—might have saved the system.

²³ I had introduced the issue of “Optimum Currency Areas” in Mundell (1961a). Europe had embarked on its path to monetary integration at the Hague Summit in December 1969. In the same month, I presented to a New York audience a plan for a European currency that was circulated in Brussels, as a consequence of which I was invited to consult with the European Commission to evaluate alternative approaches to monetary union, which I did the following June. A revised version of my paper was presented at the Optimum Currency Areas Conference in Madrid in March 1970 and published in the proceedings of the conference in Harry G. Johnson and Alexander K. Swoboda (1973). My recent thoughts on the optimum currency area issue are expressed in Mundell (1997a, b).

the spring of 1973. Thus ended the dollar standard.

What lessons can be learned from the second third of the century? One is that the policy mix has to suit the system. Another is that a gold-based international system cannot survive if war-related inflation makes gold undervalued and the authorities are unwilling to adjust the gold price and create a sufficient quantity of gold substitutes. A third lesson is that the superpower cannot be disciplined by the requirements of convertibility or any other international commitment if it is at the expense of vital political objectives at home; the tail cannot wag the dog. A fourth lesson is that a fixed-exchange-rate system can work only if there is mutual agreement on the common rate of inflation. Europe was willing to swallow the fact that the dollar was not freely convertible into gold in the 1960's, but when U.S. monetary policy became incompatible with price stability in the rest of the world (and in particular Europe), the costs of the fixed-exchange-rate system were perceived to exceed its benefits.

A final lesson is that political events, and in particular the Vietnam War, soured relations between the Atlantic partners and created a tension in the 1960's that can only be compared with the pall cast over the international system by disputes over reparations in the 1920's. Fixed-exchange-rate systems work better among friends than rivals or enemies.

III. Inflation and Supply-Side Economics

With the breakdown of the system, money supplies became more elastic, accommodating not only inflationary wage developments but also the monopolistic pricing of internationally traded commodities. Each time the price of oil was raised in the 1970's, the Eurodollar market expanded to finance the deficits of oil-importing countries; from deposits of \$223 billion in 1971 they would explode to \$2,351 billion in 1982 (International Monetary Fund, *IMF International Statistics Yearbook*, 1988 p. 68).

Inflation in the United States had now become a major problem. It had taken 20 years, from 1952 to 1971, for U.S. wholesale prices to rise by less than 30 percent. But after 1971, it took only 11 years for U.S. prices to rise by 157 percent! This mainly peacetime inflation was greater than the war-related inflations from

World War II (108 percent over 1939–1948), World War I (121 percent over 1913–1920), the Civil War (118 percent over 1861–1864), or the War of 1812 (44 percent over 1811–1814). The greatest inflation in U.S. history since the War of Independence took place after the United States left gold in the decade after 1971.

That inflation in the 1970's was worldwide can be seen from the price indexes of the G-7 countries in Table 2, noting the index values for 1971 in comparison with the standard base of 100 in 1980. Only in Germany did consumer prices in the decade of the seventies fall short of doubling. In Italy and the United Kingdom, prices more than tripled. The breakdown in monetary discipline was worldwide, engulfing all the G-7 countries and to an even greater extent most of the rest of the world.

In the United States, three back-to-back years of two-digit inflation (1979–1981) created a crisis situation. The price of gold hit \$850 an ounce in early 1980, and silver went to \$50 an ounce. On March 14, 1980, President Jimmy Carter announced his new program: an oil import fee, and credit controls. The plan was a disaster and real output plummeted in the second quarter. In December 1980, a month after the presidential elections, the prime interest rate hit a record of 21.5 percent! The United States seemed to be on the brink of financial disaster.

Gone were the days when, with David Ricardo, economists could think of money as a "veil." The existence of big government and progressive income taxes guarantees nonneutrality. One route was through the fiscal system. With steeply progressive tax rates, rising from zero to 70 percent at the federal level, and up to 85 percent counting state and local taxes, inflation was pushing taxpayers into higher and higher tax brackets even at unchanged real incomes. Taxes had to be paid on interest receipts even though the bulk of the high interest rates represented inflation premiums. Soaring tax revenues coupled with government's high marginal propensity to spend led to an increasing share of government in the economy. No wonder the stock market hated inflation!

Supply-side economics began as a policy system alternative to short-run Keynesian and monetarist demand-side models. It was based on a policy mix that delivered price stability through monetary discipline, and economic

TABLE 2—CONSUMER PRICES IN G-7 COUNTRIES, SELECTED YEARS, 1950–1998

Country	1950	1971	1980	1985	1990	1998
United States	29.2	49.1	100	130.5	158.5	197.8
Japan	16.3	44.9	100	114.4	122.5	134.4
United Kingdom	13.4	30.3	100	141.5	188.7	243.6
Germany	39.2	64.1	100	121.0	129.4	144.8
France	15.6	42.1	100	157.9	184.2	213.7
Italy	13.9	28.7	100	190.3	250.6	346.3
Canada	28.4	47.5	100	143.0	177.9	203.7

Source: IMF *International Financial Statistics* (International Monetary Fund, various years).

stimulation of employment and growth through the tax and regulatory systems. It was partly a continuation of my work on the policy mix in the early 1960's.²⁴ In the spring of 1974 I presented a paper at a conference on global inflation in Washington, an excerpt of which was reported (Rowland Evans and Robert Novak, 1981 p. 63) as follows:

While the Ford administration was insisting that only a tax increase could fight inflation, Mundell argued that an immediate \$10 billion *reduction* was essential to avoid even bigger budget deficits fueled by "stagflation," the lethal combination of inflation and stagnation inherited from Nixon by Ford ...

With my arrival at Columbia University in the fall of 1974, a "club" of what later would become dubbed as "supply-siders" met from time to time at a Wall Street restaurant to discuss economic policy and particularly what to do about the rising inflation and unemployment. The conclusion was that cuts in marginal tax rates were needed to create output incentives to spur the economy, and tight money would pro-

duce price stability.²⁵ The need for tax cuts and tight money became more urgent as inflation increased in the late 1970's and inflation, via "bracket creep," was pushing taxpayers into ever-higher income tax brackets.²⁶ Within a short time, a political convert, Jack F. Kemp, congressman from Buffalo, parlayed the ideas into a bill calling for a 30-percent tax cut, most of which would be enacted in a sweeping 23-percent tax cut spread over three years, followed by an indexing of the tax brackets for inflation. In the election campaign of 1980, Kemp was a candidate for the presidency but bowed out after Ronald W. Reagan agreed to incorporate the Kemp-Roth bill in his agenda for the economy. After Reagan's election, the first phase of the new policy mix was introduced with the Economic Recovery Act of 1981.

Meanwhile, the Federal Reserve, under the chairmanship of Paul Volcker, at long last woke up and tightened monetary policy. After a steep, but short, recession, the economy embarked on one of its longest-ever expansions at the same time that inflation was increasingly brought under control. The new policies shifted the Phillips curve downward and to the left, allowing unemployment and inflation to decrease at the same time.²⁷

²⁴ In 1968, with inflation beginning to break out, I was urging (not with much success) tighter monetary policies combined with a tax cut to prevent the disinflation from turning into a recession (Mundell, 1971). As it turned out, Congress passed, and President Lyndon B. Johnson signed, a bill in the summer of 1968 that imposed a 10-percent "tax surcharge." Later in the fall, the task force for the new Nixon administration recommended, incorrectly in my opinion, tight monetary and fiscal policies. In Canada during 1972–1974, I recommended the enactment of an "inflation-immune tax system" which would adjust tax brackets to offset "bracket creep," a policy which the Canadian government implemented in 1973.

²⁵ See Jude Wanniski (1978) for his account of supply-side economics, Martin Anderson (1988) for the related account of the Reagan Revolution, and Robert Bartley (1992) for an analysis of the role of supply-side economics during the 1980's.

²⁶ The best account of my thinking on supply-side economics in the fall of 1974 is contained in Wanniski (1974).

²⁷ The Reagan experience also provided a test of the Mundell-Fleming model under flexible exchange rates. For this model see Mundell (1960, 1961b, 1961c, 1962, 1963, 1964) and J. Marcus Fleming (1962). Prior to its development of this model in the early 1960's, there was no way of

There was a sequel to the tax cut, the arms buildup, the policy of disinflation, and Reagan's landslide reelection. The Tax Reform Act of 1986, the second phase of the supply-side revolution, lowered the marginal tax rate in the highest tax bracket to 28 percent, the lowest top marginal rate since 1932.²⁸ The 1982–90 expansion was the second longest up to that time and, along with the arms buildup, helped to convince the leaders of the Soviet Union to leave Eastern Europe free to choose its own system.

Growth continued until the nine-month downsizing recession of 1990–1991, which probably cost President George H. W. Bush reelection. Expansion resumed in the spring of 1991 and continued at least until the end of the decade, making the combined period 1982–2000 the greatest expansion in the history of any country. Over the period no less than 37 million new jobs were created! The Dow-Jones average soared from below 750 in the summer of 1982 to over 11,000 by the turn of the century.

Meanwhile, the withdrawal of the Soviet Union from Eastern Europe—itsself, as already noted, partly due to the success of supply-side economics—made unification of Germany possible and brought with it renewed impetus for European monetary and political integration. The fiscal spending associated with German spending on its new states gave a jolt to the exchange-rate mechanism (ERM) of the Euro-

pean Monetary System (EMS).²⁹ A few countries left the exchange-rate mechanism, and others opted for devaluation within it. Nevertheless, by January 1, 1994, the European Monetary Institute came into being and, by the middle of 1998, so did its successor, the European Central Bank. On January 1, 1999, the euro was launched with 11 members. A new era in the international monetary system was unfolding.

The introduction of the euro redraws the international monetary landscape. With the euro—upon its birth the second most important currency in the world—a tri-polar currency world involving the dollar, euro, and yen came into being. The exchange rates among these three islands of stability will become the most important prices in the world economy.

The creation of the euro will doubtless lead to its widespread adoption in Central and Eastern Europe as well as the former CFA franc zone in Africa and along the rim of the Mediterranean. Expansion of the wider euro area—counting not only currencies entering with an enlargement of the European Union, but also currencies fixed to the euro—will eventually give it a transactions area larger than that of the United States and will, inevitably, provoke countervailing expansion of the dollar area in Latin America and parts of Asia. Other currency areas are likely to form, adapting to local needs the example of Europe. But stability for the near future will be best assured by stabilization with one of the “G-3” areas.

The 1970's was a decade of inflation, but the

analyzing the effects of monetary or fiscal stimulus in a framework that took account of exchange rates, interest rates, the balance of payments, and budget deficit. The Mundell-Fleming model predicted that fiscal stimulus combined with tight money would lead to an increased budget deficit, an increase in interest rates, a capital inflow, an appreciation of the currency, and a worsening of the current account deficit and trade balance. All these consequences emerged after the Reagan fiscal stimulus of increased spending and sharp cuts in tax rates in the period 1982–1984.

²⁸ In Reagan's first term, the appreciation of the dollar had been successful in bringing inflation under control, but, with growth slowing at the end of the period, the high dollar no longer served the interest of the United States. A shift in the policy mix toward easier money in 1984 and early 1985 brought the dollar down, but not enough to satisfy the administration. In the fall of 1985, at a G-5 meeting at the Plaza Hotel in New York, the five “SDR” countries organized a more concerted depreciation, bringing the dollar closer to 1980 levels.

²⁹ In the late 1980's, Germany had been lending, mainly to Western Europe, about 4 percent of its GDP abroad with a corresponding current account surplus. The unification of Germany led to massive government expenditure in East Germany of more than \$100 billion a year. This fiscal shock led to a large bond-financed deficit and higher interest rates that reversed the capital outflow and internalized Germany's savings, turning the large current account surplus into a small deficit. To resist inflationary pressure, the Bundesbank kept credit conditions firm and, faced with a surging demand for money, the mark soared, lifting with it all the other currencies that were in the exchange-rate mechanism. The appreciation helped to stabilize the German economy, but at the expense of some of its partners. The episode constituted another test of the Mundell-Fleming model, with similar results to that under Reagan except for the absence in Germany, and the presence in the United States, of supply-side growth effects.

1980's was a decade of correction, and the 1990's a decade of comparative stability. The experiment with flexible exchange rates in the 1970's started off as a disaster, from the standpoint of economic stability, but nevertheless, it set in motion a learning mechanism that would not have taken place in its absence. The lesson was that inflation, budget deficits, big debts, and big government are all detrimental to public well-being and that the cost of correcting them is so high that no democratic government wants to repeat the experience. Consequently, virtually all of the developed OECD countries had drastically reduced budget deficits and whittled inflation rates down toward those of the pre-1914 international gold standard.

In many respects economic performance in the 1990's compares well with that of the first decade of the century. Prudent finance then as now produced similar effects. But in two respects our modern arrangements—I am trying to avoid the word “system”—compares unfavorably with the earlier system: the current volatility of exchange rates and the absence of a global currency.

The volatility of exchange rates is especially disturbing among countries each of which have achieved, according to local definitions and indexes, price stability. The volatility therefore measures real-exchange-rate changes and involves dysfunctional shifting between domestic and international-goods industries and aggravates instability in the financial markets.

How much flexibility is good? If we think of the euro as the “ghost of the mark,” could we look at past variations in the mark-dollar rate as an augur of the dollar-euro rate in the future? Between 1971 and 1980 the mark doubled against the dollar, to \$1 = DM1.7; between 1980 and 1985, it halved, to \$1 = DM 3.4; between 1985 and the crisis of 1992, it more than doubled, to \$1 = 1.39; and it has since fallen to \$1 = DM 1.9. The mark-dollar rate has fluctuated up and down by more than 100 percent, a mountain of volatility that would make the ERM crisis of 1992 seem like a little hillock. Comparable movements of the dollar-euro rate would crack Euroland apart.

Nor does looking at the yen-dollar rate give us more comfort. The dollar has gone down from 250 yen in 1985 to 79 yen in 1995, and then it went up to 148 yen in 1998 (with fore-

casters expecting it to hit 200!), and down to 105 yen in early 2000.

The twentieth century will not see fixed exchange rates again among the G-3. But it is entirely possible that a new international monetary system will emerge in the twenty-first century. Convergence of inflation rates has become remarkable, better than that associated with parts of the Bretton Woods era, comparable to the gold standard itself, as Table 3 shows.

It may seem a long way off, but I believe that given the degree of inflation convergence some sort of monetary union of the three areas would not be impossible. The same conditions would result from a three-currency fixed-exchange-rate system with agreement over a common inflation rate and a fair distribution of seigniorage. If such a fixed-exchange-rate arrangement among countries that had converged is conceivable, it would not be such a far step toward a reformed international monetary system with a world money of the kind initially proposed back in the days of Bretton Woods.

To conclude this section, what lessons can we take from the last third of the twentieth century? One is that flexible exchange rates, at least initially, did not provide the same discipline as fixed rates. A second is that the costs of inflation are much higher in a world with progressive income tax rates. A third is that the need for, and means of, attaining monetary stability can be learned. A fourth is that the policy mix can shift the Phillips curve.

Experience breeds its own reaction: Plato the inflationist gave birth to Aristotle, the hard-money man. The reaction in the 1980's gave a boost to central-bank independence. Governments forced into the Maastricht mold had to cut back on spending growth as well as deficits. Supply-side economics pointed to one of the mechanisms for strapping down ministers of finance.

One lesson, however, has yet to be learned. Flexible exchange rates are an unnecessary evil in a world where each country has achieved price stability.

IV. Conclusions

It is time to wrap up the century in some conclusions. A first conclusion is that the international monetary system depends on the power

TABLE 3—INFLATION RATES AMONG THE BIG THREE

	1995	1996	1997	1998	1999		
					I	II	III
United States	2.8	2.9	2.3	1.6	1.7	2.1	2.3
Japan	−0.1	0.1	1.7	0.6	−0.1	−0.3	0.0
Euro area*	1.8	1.5	1.8	1.0	0.8	1.0	1.1

Sources: IMF *International Financial Statistics* (International Monetary Fund, January 2000 p. 57).

* German cost-of-living index for 1995–1998, the European Monetary Union Index of Consumer Prices for 1999.

configuration of the countries that make it up. Bismarck once said that the most important fact of the nineteenth century was that England and America spoke the same language. Along the same lines, the most important fact of the twentieth century has been the rise of the United States as a superpower. Despite the incredible rise in gold production, Gresham's Law³⁰ came into play and the dollar elbowed out gold as the principal international money.

The first third of twentieth-century economics was dominated by the confrontation of the Federal Reserve System with the gold standard. The gold standard broke down in World War I and its restoration in the 1920's created the deflation of the 1930's. Economists blamed the gold standard instead of their mishandling of it and turned away from international automaticity to national management. The Great Depression itself let to totalitarianism and World War II.

The second third of the twentieth century was dominated by the contradiction between national macroeconomic management and the new international monetary system. In the new system, the United States fixed the price of gold and the other major countries fixed their currencies to the convertible dollar. But national macroeconomic management precluded the operation of the international adjustment mechanism and the system broke down in the early 1970's when the United States stopped fixing the price of gold and the other countries stopped fixing the dollar.

The last third of the twentieth century started off with the destruction of the international monetary system and the vacuum sent officials

and academics into a search for "structure." In the 1970's the clarion call was for a "new international monetary order" and in the 1990's a "new international monetary architecture." The old system was one way of handling the inflation problem multilaterally. Flexibility left each country to control inflation on its own. Inflation was the initial result, but a learning mechanism gradually educated a generation of monetary officials on the advantages of stability and by the end of the century fiscal prudence and inflation control had again become the watchword in all the rich and many of the poor countries.

Today, the dollar, the euro, and yen have established three islands of monetary stability, which is a great improvement over the 1970's and 1980's. There are, however, two pieces of unfinished business. The most important is the dysfunctional volatility of exchange rates that could sour international relations in time of crisis. The other is the absence of an international currency.

The century closes with an international monetary system inferior to that with which it began, but much improved from the situation that existed only two-and-a-half decades ago. It remains to be seen where leadership will come from and whether a restoration of the international monetary system will be compatible with the power configuration of the world economy. It would certainly make a contribution to world harmony.

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³⁰ Gresham's Law was well known by the ancient Greeks and even used humorously in Aristophanes' play, *The Frogs*. For a recent analysis see Mundell (1998).

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