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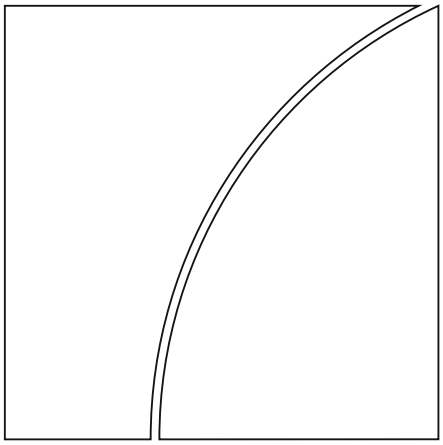

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Reforming the international monetary system in the 1970s and 2000s: would an SDR substitution account have worked?

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Reforming the international monetary system in the 1970s and 2000s: would an SDR substitution account have worked?

Robert N McCauley and Catherine R Schenk[1]

Abstract

This paper analyses the discussion of a substitution account in the 1970s and how the account might have performed had it been agreed in 1980. The substitution account would have allowed central banks to diversify away from the dollar into the IMF's Special Drawing Right (SDR), comprised of US dollar, Deutsche mark, French franc (later euro), Japanese yen and British pound, through transactions conducted off the market. The account's dollar assets could fall short of the value of its SDR liabilities, and hedging would have defeated the purpose of preventing dollar sales. In the event, negotiators were unable to agree on how to distribute the open-ended cost of covering any shortfall if the dollar's depreciation were to exceed the value of any cumulative interest rate premium on the dollar. As it turned out, the substitution account would have encountered solvency problems had the US dollar return been based on US Treasury bill yields, even if a substantial fraction of the IMF's gold had been devoted to meet the shortfall at recent, high prices for gold. However, had the US dollar return been based on US Treasury bond yields, the substitution account would have been solvent even without any gold backing.

Keywords: Special Drawing Right, substitution account, reserve currency, foreign exchange reserves; International Monetary Fund

JEL classification: E4, F3, N2

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1. Introduction

The global financial crisis of 2008 prompted calls to reform the international monetary system (IMS) as well as to overhaul the supervision and regulation of global banking. These calls came notwithstanding the unexpected nature of the crisis and the surprising performance of the dollar during the crisis. Before the crisis, many had fretted that the global "imbalances" that emerged in the 2000s were increasing the fragility of the international economy, in particular through the massive accumulation of dollar-denominated assets in Asia. As the dollar depreciated and liquidity of the euro markets deepened, on the eve of the crisis Chinn and Frankel (2008) could easily foresee circumstances in which the dollar would yield the status of leading global currency to the euro.

In the end, the global financial crisis was trans-Atlantic in nature, rather than trans-Pacific. Analyses that had, before the crisis, emphasised current account imbalances around the Pacific basin added gross capital flows across the Atlantic (Bernanke et al (2011)). Others argued that global imbalances had little to do with the crisis (Borio and Disyatat (2011), Shin (2012)).

The crisis provided new evidence of the US dollar's dominance in international finance even as it renewed discussion of alternatives to the dollar. As banks scrambled to retain dollar funding for their huge global dollar assets, a dollar shortage broke out (McGuire and von Peter (2009), McCauley and McGuire (2009)). Borrowing dollars became expensive, whether in cash markets or in the forward currency markets, where the dollar is used on one side in over 90% of transactions. New evidence for the stability of the dollar's role in the foreign exchange market arrived from the edge of the euro area, where the forward exchange markets for the Polish and Hungarian currencies shifted from dollar to euro in late 2008, only to shift back (BIS (2010)). Evidently, the dollar's dominance derives not only from inertia, but also from the reinforcement of its use elsewhere (network externalities). To ease the dollar shortage, the Federal Reserve extended dollar credit to various central banks, in some cases without limit.

At the same time, the global financial crisis brought back into the spotlight a long-standing alternative to the dollar as a global reserve asset, the Special Drawing Right (SDR). To counter a contraction in international financing (or liquidity) provided by financial markets, the US Treasury accepted the proposal of Edwin (Ted) Truman (2009a;b) to support a one-time increase in the allocation of SDRs to International Monetary Fund (IMF) members in August 2009. However, the US$ 250 billion, or SDR 161 billion, increase left SDRs still only a single-digit percentage of global foreign exchange reserves (Obstfeld (2011)).

More generally, the demonstration of the pervasive role of the dollar raised again the long-standing issue of the costs and benefits of the IMS's reliance on a single national currency. An engineer schooled in the need for resilient systems with back-ups might see the dollar's role as the potential single point of failure. Following Charles Kindleberger, Eichengreen (2011), James (2009), McKinnon (2012) and others have argued that a dollar-denominated system could enjoy stability as a result of US leadership. Others view "dollar hegemony" as a challenge to the virtues of pluralism. These virtues were thought to include collective, rather than national, control of global liquidity (however defined), a fair sharing of any rents, rather than national privileges, and protection against errors or self-dealing of the so-called hegemon.

The widely read March 2009 statement of Xiaochuan Zhou, governor of the People's Bank of China, invoked the Triffin dilemma in arguing for "an international reserve currency that is disconnected from individual nations and is able to remain stable in the long run, thus removing the inherent deficiencies caused by using credit-based national currencies" (Zhou (2009)), perhaps by developing the scope of the SDR.[2] This was not the dilemma in its original form: the use of the dollar to finance growing world trade must lead to an increase in short-term US liabilities that at some point undermine the dollar's link to gold. Instead, it was more like the generalised dilemma as stated by Padoa-Schioppa (2010): national control of global liquidity however defined would be unlikely to produce an outcome that would be optimal for the world. Zhou also advocated centralised management of reserves by the IMF through "an open-ended SDR-denominated fund based on the market practice, allowing subscription and redemption in the existing reserve currencies." IMF (2011) showed interest.

With central bank balance sheets swollen from the purchase of domestic or foreign currency bonds, those who seek pluralism and lesser reliance on the dollar are hard pressed to argue merely for further SDR issues. Instead, movement away from the dollar in official foreign exchange reserves would need to be accomplished by a transformation of existing dollar reserve holdings into holdings denominated in other currencies. Accomplishing this in an off-market transaction, so as not to depress the dollar's exchange rate, was the core idea of the substitution account.

Policymakers active in the 1970s, when the dollar was weak and too many dollars seemed to be behind global inflation, have recalled this device for transforming liquid assets from the dollar to other currencies: the substitution account (Bergsten (2007), Camdessus (2009), Padoa-Schioppa (2010), Wijnholds (2009), Palais-Royal Initiative (2011)).[3] On the US side, participants in the late 1970s discussion of the proposal for a substitution account have revisited the issues (Bergsten (2007a,b), Cooper (2009), Kenen (1980, 1983, 2005, 2010a,b,c)).[4] Another generation assembled as Angeloni et al (2011, pp 37, 61, 70, 75) entertains the introduction of the substitution account in some scenarios, although Farhi et al (2011, p 45) consider that there is "no satisfactory answer" to who should bear the exchange risk.

[2] See United Nations (2009). The commission responsible for the UN report, which included Yu Yongding of the Chinese Academy of Social Sciences, did not mention the substitution account in chapter 5's discussion of "international financial innovations."

[3] At least two organisations have formed to renew debate on the reform of the IMS. The Reinventing Bretton Woods Committee has sponsored a series of events thanks to the indefatigable Marc Uzan (http://rbwf.org/cms/index.php). The Palais-Royal Group was formed on the Orion's Belt of Michel Camdessus, Alexandre Lamfalussy and (the late) Tommaso Padoa-Schioppa (Palais-Royal Initiative (2011)). André Icard, former Banque de France director of research and former deputy general manager, BIS, headed its secretariat. Formerly known as the Airlie Group after a conference centre in northern Virginia, it became the Palais-Royal Initiative and its report is lodged on the Banque de France's website on the IMS, http://global-currencies.org/smi/gb/telechar/news/Rapport_Camdessus-integral.pdf. The report concluded: "The scope for supporting the orderly diversification of reserves via a mechanism allowing their conversion into SDR-denominated claims could be re-examined. This objective underlays work on a substitution account in the 1970s. While efforts at the time faltered, alternative designs for a substitution account could be explored" (p 14). See also Boorman and Icard (2012). For a proposal akin to a substitution account, see Greenwald and Stiglitz (2010, pp 334–336).

[4] Not all participants in the substitution account discussions of the late 1970s are in favour. Truman (2012, p 29) describes it as a "solution in search of a problem."

This paper seeks to inform the renewed interest in the substitution account by analysing how it would have handled the exchange rate risk had it been set up along the lines discussed in the international dialogue that ended in 1980. Kenen (2010a,b) undertook such an exercise and concluded that the substitution account would have had to have been "topped up" by the United States by about US$ 475 billion to break even from 1980 to 2008. Nevertheless, he held that this cost would have been small relative to the US economy and would warrant adopting a similar scheme today.

We contend that he did not do justice to the issues that divided policymakers in 1980 or to the sensitivity of outcomes to the date when the account were established. The issues include the related questions of the interest rate to be paid by the US Treasury on dollars placed into the account and the means for sharing possible shortfalls arising from a failure of uncovered interest parity to hold over any given horizon. The archival record shows that the IMF projected at the time that the account could well run substantial deficits over the long term, so that participants would have had to somehow make them good.

In what follows, we first describe in section 2 the substitution account proposal as it developed from 1973 to 1980. A longer perspective is important to understand why the idea was ultimately rejected in 1980. Next, we profile in section 3 the main outstanding issues, again relying not only on published accounts like Sobol (1979), Wallich (1980), Gowa (1984) and Boughton (2001) but also on archival sources from the IMF, the BIS and the UK Treasury. In section 4, we undertake simulations that show how the substitution account would have performed on different assumptions about the resolution of the outstanding issues *and* different starting points. We then draw conclusions in section 5.

2. What was the substitution account?

The concept of exchanging dollar-denominated reserve assets for a reserve unit issued by the IMF or another multilateral agency had a long period of gestation towards what was ultimately a stillbirth. From the early 1960s, there was widespread concern over the sustainability of the Bretton Woods system of using national currencies as reserve assets. This was most closely associated with the Triffin dilemma, which predicted a loss of confidence in the gold value of the US dollar as the value of liquid claims on the United States in the form of dollar foreign exchange reserves increased. More generally, Triffin argued for the need to choose the rate of global reserve growth collectively rather than allow it to be a by-product of national decisions.

Very early on, many schemes shared common characteristics, including a neutral unit of account issued by a multilateral fund (either the IMF or a new institution embedded in the IMF) against the deposit of foreign exchange reserve assets.[5] At first, US unwillingness to consider any scheme that would replace the

[5] For example, under the British Chancellor of the Exchequer Reginald Maudling's Mutual Currency Account scheme of 1962, the IMF would create a separate pool to which countries in surplus would contribute foreign exchange reserves in return for claims on the account. These interest-bearing assets with a gold value guarantee would form part of the donors' national reserves. See Schenk (2010, pp 245–252) and Sobol (1979, pp 41-42).

dollar blocked progress, but from 1965, as the American balance of payments problems appeared more protracted, the administration of President Lyndon B Johnson embraced the reform discussions then underway in the Group of 10 (G10).

With the obstacle of US reticence removed, the talks gained traction and culminated in a resolution that met half of the goal: the creation of a new reserve unit that could be deliberately created by IMF members, but not a way to replace existing foreign exchange reserve assets. Rather than replacing an existing *stock* of assets, the reform was aimed at collective control over some of the *flow* of future reserve creation.

The SDR in 1967 was a triumph of ambiguity over clarity of purpose, a compromise driven by the need to meet expectations that had been built up for an announcement at the Rio IMF Annual Meeting in September of that year. Careful terminology avoided the label of reserve asset and the SDR was designed to add to rather than replace existing reserves. US and UK officials referred to it publicly as front-line reserves while French officials assigned it a lesser role as a new limited form of credit (with "reconstitution" requirements analogous to requiring repayment after use). Ambiguous in concept and requiring a super-majority of IMF votes to make further allocations, SDR issuance remained very limited. As a result, the SDR neither contributed significantly to international official reserves nor replaced foreign exchange as the primary reserve asset. Nor did it fulfil the hope that it might preserve the Bretton Woods system. In 1971, the United States withdrew from its pledge to convert dollars into gold, and the dollar began to float against other major currencies by early 1973.

The evident failure of the SDR to resolve the weaknesses in the Bretton Woods system alongside the growth of an apparently persistent global imbalance between the United States, on the one hand, and Japan and West Germany, on the other, led to renewed proposals for reform. The advent of flexible exchange rates had transformed the Triffin dilemma into a problem of possibly unstable demands for fiat reserve currencies. The prospect of a destabilising rush of official reserves out of the US dollar, against the backdrop of resistance by the German and Japanese authorities to wider international use of their currencies, led the Committee of Twenty (representing the executive directors of the IMF) to consider a substitution account in 1973-1974.

The plan would allow (or in some early versions require) official reserve holders to replace a portion of their foreign exchange reserves with SDRs issued by a special account overseen by the IMF.[6] By February 1973, the US Treasury was prepared to envisage a one-time conversion of some existing US dollar reserves into SDRs, replacing liabilities to sundry national creditors with a liability to an IMF-based substitution account. The US Treasury, however, remained wary of either undertaking a new financial obligation by guaranteeing the SDR value of the account or of paying better yields to the account than it was offering the public. If the terms were too generous, particularly considering the huge scale of possible liabilities to the account, the US Treasury (and Congress) would be unable to agree to the proposal. They thus kept an open mind on the need to transform US dollar reserves while pressing for a symmetrical global adjustment mechanism to discipline countries in persistent surplus. Others, particularly in Europe, hoped to devise a system that forced the US economy to

[6] The formal name of the Committee of Twenty was the Committee on Reform of the International Monetary System and Related Issues; it attempted to broaden the governance of the IMS beyond the G10.

reduce its deficits and redeem its liabilities in some form other than more dollar liabilities. In February 1973, the IMF's US executive director, William B Dale, dismissed the substitution account as an interesting academic exercise noting that "while the broad analytical issues were of great interest, the more fundamental questions lay in the obligations of debtors and creditors" and "unless the proponents of the various schemes had some practical way of dealing with the problem of financial obligation on the part of the reserve centers [(ie the United States)], little progress could be made."[7] Certainly without American support or at least acquiescence, no arrangement to transform US dollar reserves could go forward.

Nevertheless, the Committee of Twenty's final report in June 1974 included an illustrative proposal for a substitution account, leaving open the contested questions of interest rates payable on assets and liabilities, the disposition of any profit or loss and the terms of liquidation. In the end, these were the same issues that eventually scuppered the 1980 substitution account. Lurking behind these issues was the European desire to require the US Treasury to amortise the dollar assets in the fund over time by exchanging them for SDRs. Europeans saw such settlement of dollar obligations in a medium not created by the United States (formerly gold, now SDRs) as making the IMS more symmetric and as exerting collective control over international liquidity.[8] By the time the Committee of Twenty's report was completed, the urgency of responding to the oil crisis, inflation, floating exchange rates, development challenges and the deficits of less-developed countries pushed the complex and longer-term topic of a substitution account down the IMF agenda. There was little political support for it and it was ignored in the proposals to reform the Articles of Agreement agreed in 1976.

A depreciating dollar and negotiations for fresh allocations of SDRs revived the discussion of a substitution account at the end of 1977.[9] In this context, the controversy over the potential expansionary effect of fresh allocations of SDRs on international liquidity prompted IMF Managing Director Johan Witteveen to propose in February 1978 that developed countries (including the United States) might deposit an amount of dollars equivalent to the amount of SDRs they were allocated into a "substitution account" in order to neutralise the impact on international liquidity and to increase the proportion of global reserves denominated in SDR. The IMF would invest the proceeds in long-term US Treasury securities.[10] The United States was initially non-committal, although the British and Belgians supported the scheme as a way to increase the use of the SDR.[11] After

7 IMF Archives (IMFA) Executive Board Minute (EBM) /73/19, 23 February 1973. Sobol (1979) states that the proposal died for lack of support owing to the below-market rate of return then paid on the SDR and a lack of consensus on adjustment obligations as between debtor and creditor countries.

8 See Final Report and Outline of Reform of the Committee of Twenty, 14 June 1974. Rueff (1972, p 78) summarised the asymmetry with a simile: "If I had an agreement with my tailor that whatever money I pay him he returns to me the very same day as a loan, I would have no objection at all to ordering more suits from him."

9 See Boughton (2001, pp 937-938), Solomon (1982, p 285).

10 Telegram, 24 February 1978 from W Ryrie at IMF Washington. The National Archives (TNA), London, T382/102; telegram from UK IMF Director, W Ryrie, to Treasury. TNA T381/130.

11 Telegram from UK Treasury to UK Director IMF (Ryrie) 5 July 1978. TNA T381/130. Prime Minister James Callaghan (April 1976-May 1979) was an enthusiast for developing the SDR and reform of the IMS but his successor Margaret Thatcher (and her Financial Secretary Nigel Lawson), who took office while the final discussions of the account took place, was not.

months of deliberation, the United States rejected the proposal on three grounds: it would require the US Treasury to borrow the dollars to deposit in the account, it would be too small to make much of a difference to the distribution of global reserves and might further weaken confidence in the dollar. The European reaction was also "remarkably negative".[12] The Germans, French and Italians rejected Witteveen's plan early on as too lenient to the Americans in terms of both the low interest they would pay on the US Treasury securities and the lack of arrangements to amortise the funds in the account (ie for the United States to pay off its liabilities).[13] In the end, a further modest allocation of SDRs for the next three years was agreed without such an offset and Witteveen's initiative was deferred for future study.

These early iterations of a substitution account as a vehicle to increase the role of the SDR in the IMS clearly exposed the key obstacles that remained unresolved in 1980:

- The importance of US enthusiasm to the success of any scheme, but, at the same time, the equivocal position of the US Treasury and administration over setting up a rival to the US dollar as a reserve currency.
- The appropriate return on SDR assets in the account.
- The need for the United States to take on a major burden of any scheme.
- The desire of the Europeans that the United States amortise its obligations, imparting symmetry to the system.

At the beginning of November 1978, the United States reversed its benign neglect of the dollar exchange rate and took a tough set of measures that halted the dollar's decline. This change in US policy opened an opportunity to revisit the role of the dollar in the IMS. It seemed that US opinion on reducing the role of the dollar might have changed given the investment of policy in its stabilisation.

By December, the new IMF managing director, Jacques de Larosière, was taking soundings on a fresh and more ambitious scheme for the next Interim Committee of the IMF scheduled for March 1979.[14] The goal was still enhancing the SDR and reducing dependence on the US dollar as a reserve currency, but the mechanism became more elaborate to overcome the objections to Witteveen's scheme and to target those countries that wanted to diversify their existing stock of reserve holdings. As reported by William Ryrie, the UK's IMF executive director, "what was needed was a voluntary arrangement which would give countries which felt they had dollars in excess the opportunity to deposit them in exchange for some acceptable instrument and he (de Larosière) was thinking in terms of an SDR-denominated asset issued by the Fund."[15] The IMF would then invest the account's dollars in long-term US securities. US Treasury Under-Secretary Anthony Solomon

[12] Telegram from Ryrie at IMF Washington, 24 February 1978, reporting a lunch meeting of European IMF directors with Witteveen. TNA T382/182.

[13] Telegram from Ryrie to London, 14 July 1978. TNA T381/130. Paper for Ken Couzens, end-January 1979. Bank of England paper, 23 March 1978. TNA T382/102.

[14] The Interim Committee comprised ministers of member states and so had greater political weight and decision-making powers than the executive board comprised of officials.

[15] Telegram from Ryrie in Washington reporting a discussion with de Larosière, 13 December 1978. TNA T381/130.

had been guarded when de Larosière approached him informally, but was willing to consider the plan while de Larosière quietly sought further opinion from a select group of other countries. In order to make a more substantial contribution to reforming the reserves system, the total amount of the account would perhaps be about US$ 20 billion, much greater than Witteveen's earlier proposal for about half of that amount.[16]

Despite these preparations, the IMF executive directors in February 1979 received the proposal with caution rather than enthusiasm, although the US representative, Sam Cross, pledged to keep an "open mind."[17] Cross's agnostic view was partly a ruse to avoid raising expectations. Solomon privately told his British and German counterparts that his main concern was the potential effect of prolonged and public discussion of these reform proposals on the US dollar and urged that a group smaller than the IMF should take the discussions forward.[18] Solomon's long-term goal was to promote the SDR as a replacement for private rather than official holdings of dollars, but he conceded that a substitution account aimed at central banks would take a step towards this goal by creating new SDR-denominated assets. German Finance Minister Manfred Lahnstein remained among the most prominent sceptics: although he "feared too much allure for journalists in the substitution account," and also "feared nothing would come of it," he agreed to continue deliberations in a small group. The lukewarm response of the Interim Committee in March 1979 kicked the scheme into the long grass of further investigation by the executive board. The non-committal public statement of the Interim Committee was drafted by the British by the end of February, weeks before the Committee met.[19] Meanwhile, ministers of the Group of Five (G5) (the United States, the United Kingdom, Japan, West Germany and France) agreed to meet secretly among themselves and through deputies to discuss the technicalities out of public earshot.

This archive-based account contradicts both Boughton's (2001, p 938) claim that "the most pronounced enthusiasm came from European countries itching to diversify their reserves" and Robert Solomon's (1982, p 286) contention that the enthusiasm of Anthony Solomon also added momentum. Some further insight is available from the British account of the G5 working group that the UK Treasury chaired.[20] In June 1979, Solomon was reported to be warming to the proposal and the UK negotiator in the G5 group noted that "the US seemed prepared to go along with the creation of a substitution account" so long as the *United States did not bear more than half of the exchange risk*, eventual liquidation was conditional on US agreement and the SDR assets did not have a fixed maturity (ie the scheme was open-ended). Furthermore, the plan had to be presented as an enhancement of the SDR rather than as a support for the US dollar against destabilising diversification of

16 DJS Hancock memorandum 26/2/79, TNA T381/130.

17 Telegram from Ryrie (Washington) to UK Treasury, 14 February 1979. TNA T385/248.

18 Secret and Personal note of discussion of Kenneth Couzens with Solomon and Lahnstein, 15 February 1979. TNA T385/248.

19 Kenneth Couzens was invited by Jacques Polak to draft the conclusions of the Interim Committee and this was sent to the UK Chancellor of the Exchequer (Chair of the Interim Committee) on 5 March 1979. TNA T385/248.

20 The following paragraph draws on a Brief for Incoming Chancellor of the Exchequer, Geoffrey Howe, by M Hedley-Smith, 7 June 1979. TNA T382/102.

global reserves. The Germans disagreed, insisting that the purpose was to avoid a flight from the dollar to, for example, the Deutsche mark and they resisted bearing any exchange risk. The timing of the necessary legislation was also an obstacle given the need to approve the European Monetary System. They also wanted the United States to agree to redeem some of the dollars in the account over time (so-called amortisation). The French agreed with the Germans on sharing the exchange risk and amortisation and predicted difficulty in getting the French parliament to enact appropriate legislation. They also argued that the success of the account would depend on a reduction of US balance of payments deficits since "it is no good taking dollars out of the system without assurance that they won't be created all over again." This was clearly resisted by the Americans. The Japanese position was "quiet."

The British Labour government (1974–1979) sought to promote use of the SDR and international monetary reform, but Margaret Thatcher's Conservative government, elected in May 1979, had other priorities. In June 1979, Nigel Lawson (then financial secretary to the Treasury) scathingly commented, "we should not waste valuable manpower on matters such as the IMF substitution account. Over the years I can recall no aspect of the financial scene where so much high-powered effort has been expended to so little return."[21] The British were not alone in their scepticism.

The Americans continued to resist bearing more than half of the exchange risk or committing to amortising the assets. The UK representative described the 3 August executive board meeting as "fairly fractious and did not conclude until almost midnight."[22] He reported "widespread feeling that a substitution account would not aid in the international adjustment process" and the recommendations from the Board to the Interim Committee remained inconclusive. The British delegation was frustrated that ministers would not receive a more definitive steer, but there was no consensus on the complex set of alternative variations of the technical aspects, particularly interest payments, burden of exchange risk and the terms of liquidation. The IMF ministers' meeting in Belgrade in October 1979 coincided with a crisis in market confidence in the US dollar. This was not the time for a bold policy departure and differences over the technicalities remained unresolved. By April 1980, the proposal for a substitution account had been abandoned for a third time.

With respect to the 1980 iteration of the substitution account, Kenen (2010a) states that "the proposal was widely discussed at the time but was not adopted for two reasons: the strengthening of the dollar in foreign-exchange markets at the start of the 1980s and, more importantly, the refusal of the United States to take sole responsibility for maintaining the dollar value of the SDR-denominated claims on the proposed account." While the impetus for reform did recede with the dollar's recovery and the burden-sharing of risk was an important issue, this synopsis understates the technical, political and institutional obstacles to the scheme. It is clear that there was no firm expectation that the United States would take the sole exchange rate risk, although agreement over the burden-sharing remained elusive. The Europeans sought to constrain the United States to reduce its official liabilities

[21] Nigel Lawson to Geoffrey Howe (Chancellor of the Exchequer), 13 June 1979. Howe minuted "I … have reached similar conclusions." TNA T382/102.

[22] Telegram from Washington to UK Treasury, 6 August 1979. TNA 382/102.

as a price of transforming and solidifying them and, in the face of resistance, stiffened their position on yields and exchange-risk sharing. Moreover, it became clear that participating in the account would require national legislation in many cases, which would be politically contentious as well as time-consuming. Ultimately, given the uncertainties over the future performance of such an account and plans for a monetary union in Europe (the European Monetary System with its European Currency Unit (Dammers and McCauley (2006)) was launched in March 1979), there was no political will to embark on an elaborate and possibly expensive scheme to retire a proportion of dollar reserves.

So far, we have characterised the evolving proposal for a substitution account in political terms as a case of failed international financial diplomacy. In economic terms, the solvency or possibility theorem of the substitution account is one of the central theorems of international finance. The open economy version of Irving Fisher's hypothesis holds that over time, currency movements offset interest differentials so that higher yielding currencies depreciate. While this hypothesis boasts a fine pedigree, the data over the years have treated it very badly. In fact, the simulations reported below show that US Treasury bill yields over the last 30 years have not been high enough to offset the decline of the US dollar against the other SDR currencies. This finding is consistent with the simulations undertaken in 1980 by the IMF, which suggested the possibility of a substantial shortfall that would need to be met either by extra capital committed by members or from IMF resources.[23] Since the SDR interest rate is based on the component treasury bill rates,[24] the version of the substitution account in which the United States paid treasury bill rates on the account's assets sets up a particular form of the test of uncovered interest parity. While most studies of interest parity over the past generation have used short-term bank rates for major currencies, earlier tests used government bill yields (Aliber (1973)). The simulations of the substitution account reported by Kenen (2010a,b), therefore, may be regarded as tests of uncovered interest parity in a multi-currency setting using (mostly) government bill rates.

What we have learned about uncovered interest parity since 1980 has uneven application to the SDR against the dollar. What we now know is that higher yielding currencies over many sample periods actually rise against lower yielding currencies. If this finding applied to the dollar/SDR, the substitution account would have fared well.[25] On average, the SDR has yielded 5.17% in the period from mid-1980 to end 2010, while the US dollar has yielded slightly more at 5.37%. (Recall that the dollar amounts to something approaching half of the valuation of the SDR, so an interest differential of 0.2% means that the differential between the US dollar and the weighted average of euro, sterling and yen is more like 0.5%.) From the average yield advantage, one might expect the dollar to have risen against the SDR over 1980–2010, but it did not. Perhaps periods of weak US growth when the dollar yielded less than the SDR, in 1981-1982, 1986, 1989–1993, 2001–03 and 2007–2010, made the difference (Graph 1). In any case, the average yield advantage of US

[23] Memo for Executive Board, "Substitution Account – results of a simulations study of the Account's financial balance." April 2, 1980, IMFA SM/80/83.

[24] See below, however, for a post-euro qualification of this statement.

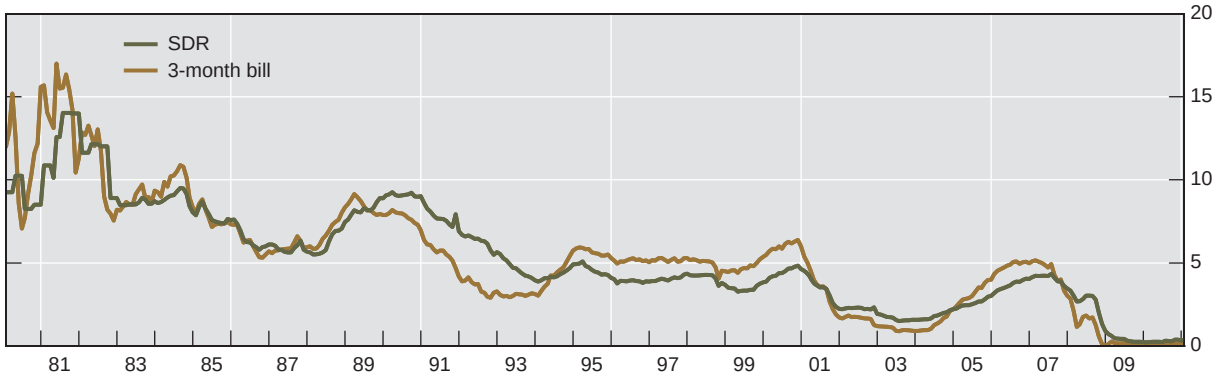
[25] Regressions over 1980 to 2000 of the dollar's change against the SDR component currencies, Deutsche mark, pound sterling and the Japanese yen, all show this tendency with significance; only the movement of the French franc does not (Chinn and Meredith (2004)). See also Clarida and Pedersen (2009).

Treasury bills over SDR rates would have kept the substitution account in balance despite a slight trend towards dollar depreciation. In the event, as we shall see, the trend depreciation of the dollar went well beyond the yield cushion.

Graph 1

SDR and US Treasury bill yields, 1980–2010

In per cent



Source: IMF.

3. What were the major unresolved issues?[26]

Any revival of the substitution account would inevitably have to deal with the unresolved issues of the 1980 negotiations. These include the interest rates on its assets and liabilities and the means to assure its solvency in the event of dollar weakness against the other currencies included in the SDR basket.

3.1 The interest rates on account assets and liabilities

The substitution account would invest its dollars in non-marketable US Treasury securities, but their maturity and yields remained unresolved. Interest payable could be related to a range of US marketable securities but the British, Dutch and others also sought to ensure that the United States paid a premium to reflect the non-marketability of these assets (and to promote the account's solvency).[27] The April 1980 simulations by the Fund staff showed that using the US three-month Treasury bill rate could lead to deficits in the account unless additional capital commitments amounting to 20% of the value of the account (35% if interest was paid in new SDR claims rather than US dollars) were committed up front. The IMF staff had a very tough assignment. From 1964 to 1979 the US Treasury bill rate had remained below the weighted average of the SDR components even as the dollar depreciated and would have needed to be, on average, 3% higher to have made up for the dollar

[26] The final form of the proposal is in the Executive Board report to the Interim Committee, 15 April 1980. IMFA ICMS/Doc/80/3.

[27] Executive Board Minutes, 7 April 1980. IMFA EBM80/62. While non-marketable Treasury securities might be held as assets by the account, the discussion foresaw the possibility of transfers of claims on the account among holders.

depreciation. The Fund staff attributed this to the special circumstance of initially high confidence in the stability of the US dollar and unlikely-to-be repeated "lags in the adjustment of financial markets." For their simulations, IMF staff allowed the US Treasury bill rate to fall a more modest 0.5%, 1% or at most 1.5% short of compensating for a US dollar depreciation of 1% per annum against the other SDR currencies over the next 30 years. They also factored in some cyclical and random disturbances.[28] These simulations clearly highlighted the importance of interest rates payable on assets and liabilities of the account to the costs of sustaining it. Getting the interest rates right would reduce the commitment of extra capital by members or of IMF resources such as gold.

Another bone of contention was the interest payable on SDR-denominated assets issued by the account. These would need to be attractive enough to encourage the voluntary deposit of dollars. In April 1980, the IMF Executive Board (at the same meeting that dismissed the substitution account) agreed to narrow the SDR basket from 16 to five currencies (effective 1 May 1981) to match the five currencies used to determine the SDR interest rate (see Box 1). Some Europeans argued that the yield on SDR-denominated liabilities of the substitution account would need to compete not only with US Treasury rates but also with eurodollar market rates since reserve managers also invested dollars in banks outside the United States. Of course, higher yields on SDR liabilities would increase the chances that the earnings of the account on its dollar assets would not cover its SDR liabilities, for a given US dollar/SDR exchange rate. Higher SDR yields would leave room for a smaller dollar depreciation against the SDR before the account would run into losses.

[28] Memo for Executive Board, "Substitution Account – results of a simulations study of the Account's financial balance," April 2, 1980, IMFA SM/80/83. The amount of capital required at the outset to ensure that the account's liabilities would not fall short of its assets at the end of 30 years in 19 of 20 cases if interest was paid in US dollars was about 12% to cover interest differentials, exchange rate movements and cycles plus about 7% to cover random disturbances in exchange rates.

Box 1: The substitution account and reserve management practice

The discussion of the substitution account was complicated by the ongoing shift of US dollar reserve management away from US Treasury bills. The construction of the SDR yields out of treasury bill yields (see Box 2) reflected reserve management practice of another day. Thus, while investing the dollars in the account in treasury bills would make for a symmetrical treatment of assets and liabilities, it would not have accorded with reserve management circa 1980. By then, reserve managers outside the United States had diversified considerably from US Treasury bills.

By 1980, official reserve holdings of US dollar bank deposits, much of them outside the United States, were about twice the value of holdings of US Treasury bills (McCauley and Fung (2003, p 42)).* At the same time, official reserve managers had extended maturities to the point where their holdings of US Treasury coupon securities were about equal to their holdings of US Treasury bills. Eventually, medium-term treasury bonds would become the modal holding (Genberg et al (2005)).

This diversification influenced the debate over the yield to be paid by the US Treasury on the dollars placed in the account. Thus, it is not surprising (though still incoherent in the mixing of sovereign and bank risk) that there were suggestions that the US Treasury pay interest on dollars in the substitution account at eurodollar yields. Indeed, as shown in the Annex Table, the higher yield from the dollar London inter bank offered rate (Libor) rather than the treasury bill rate on the dollars would have done wonders for the finances of the account, leaving it in deficit only for two years in the mid-1990s. This scenario is interesting because of the suggestion that eurodollar interest rates be used, even though it is hard to imagine the US Treasury agreeing to pay such a private sector rate. And it is equally unsurprising that there were suggestions that the US Treasury pay interest on the substitution account at Treasury bond yields. The upshot is the would-be beneficiaries of the account suggested returns on the dollar assets of the substitution account that differed in duration or credit from the returns on the SDR liabilities — basically those on risk-free government bills. But this mismatch reflected contemporary dollar reserve management practices, that themselves can be seen as an adaptation to the pressure for income on reserve assets to offset the decline of the US dollar. By placing funds in the private eurodollar market rather than in strictly safe government bills, contemporary reserve management had changed the nature of the dollar as a reserve asset and thus complicated negotiations over a purely public sector arrangement.

* This is observed despite the G10 agreement not to add to eurodollar placements. See Toniolo (2005).

3.1.1. The proposal to pay the higher of Treasury bill or 20-year bond yields

The majority of the IMF Executive Board took the view that the United States should pay interest on the account's assets at the higher rate of either the market yield on three-month Treasury bills or longer-term (20-year) bonds, to reflect the non-marketability of the assets. Cross, the US executive director, objected that this amounted to asking the US Treasury to pay a premium and insisted that the rate should be equivalent to the market yield on three-month Treasury bills "or such other maturities as may be agreed between the Fund and the US."[29] Cross suggested an alternative in which the rate would be set in line with the market interest rate on US debt corresponding to the chosen maturities of the non-marketable securities in the account. Most participants vigorously objected and sought a floating rate, in which the interest would be determined each quarter at the higher of the short and long current market yields.

Members of the Executive Board actually disagreed whether the higher of three-month or 20-year rates amounted to a "premium." Even if the securities in the substitution account were not meant to be marketable, the market valuation of this

[29] Minutes of Executive Board, 7 April 1980, IMFA EBM/80/63 and EBM/80/63 for the discussion on this issue.

option is of interest in understanding the bargaining at the time.[30] After all, the US Treasury could have attached such an option to its public issues of 20-year Treasury bonds and received a higher price than otherwise. Moreover, any Treasury proposal to give such an option to foreign official holders of dollars but not to domestic investors would have been difficult to defend domestically.

In the event, the seemingly more innocent proposal to pay a floating rate corresponding to the 20-year bond yield would have been more expensive to the US Treasury than the ex post cost of adding the higher of the three-month yield as an option. Put differently, with hindsight, basing the Treasury's dollar interest payments to the substitution account on the 20-year bond yield would have done wonders for the solvency of the scheme, while paying the three-month bill rate on the few occasions when that would have been higher would have had little incremental effect on its solvency.

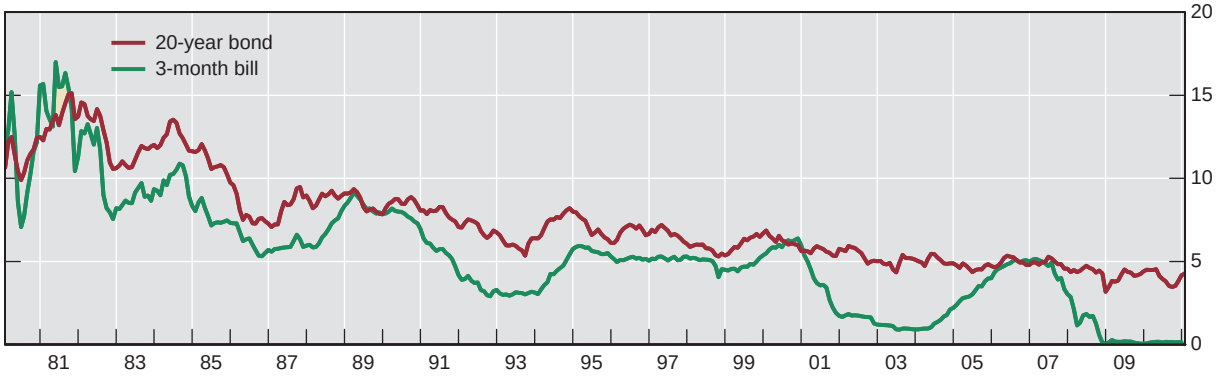
3.1.2 Ex ante value of the option and ex post value of the option

The technology to evaluate the cost of the option of a floating rate set at the maximum of the three-month Treasury bill rate and the 20-year bond rate was just becoming available at the time of these discussions. The Vasicek term structure model (1977), essentially conceiving of the short-term interest rate movements as Brownian motion, had been around for several years.[31] Technology has since moved on and today so-called yield curve options are valued using other characterisations of the evolution of interest rates. We have seen no record of the IMF or the US Treasury or anyone else in the discussion attempting to price this option. Presumably the US Treasury could have gained access to the latest technology through the primary dealers of the time, including Salomon Brothers.

Graph 2

US Treasury bill and bond yields

In per cent



Note: Due to data break from January 1987 through September 1993, the 10-year bond yield is used instead.

Source: Federal Reserve Economic Data.

[30] The question of the market value might also have become significant in the event of liquidation. In that event, the US Treasury securities might have been redeemed at face value (in the case of undated securities) or "market value" (if there was a range of maturities). See page 18 of 15 April version of IMFA ICMS/80/3.

[31] Given the high level of interest rates at the time, its failure to exclude zero or negative interest rates was not such a practical problem.

Our approach below is to consider the ex post value of the option that was discussed in 1980. At the time of Volcker's disinflation, with Treasury bill rates well into the teens, yield curve inversion — short-term yields above long-term yields — was the order of the day (Graph 2). One might guess that the value of this option was overstated then.

3.1.3 A floating rate bond based on long-term yields: a Japanese example

To our knowledge, the world had never seen a competitively auctioned floating rate security paying interest based on long-term yields in 1980. So the countries proposing such a servicing scheme for the dollars in the substitution account had, at best, a back-of-the envelope idea of the value of such a proposal.

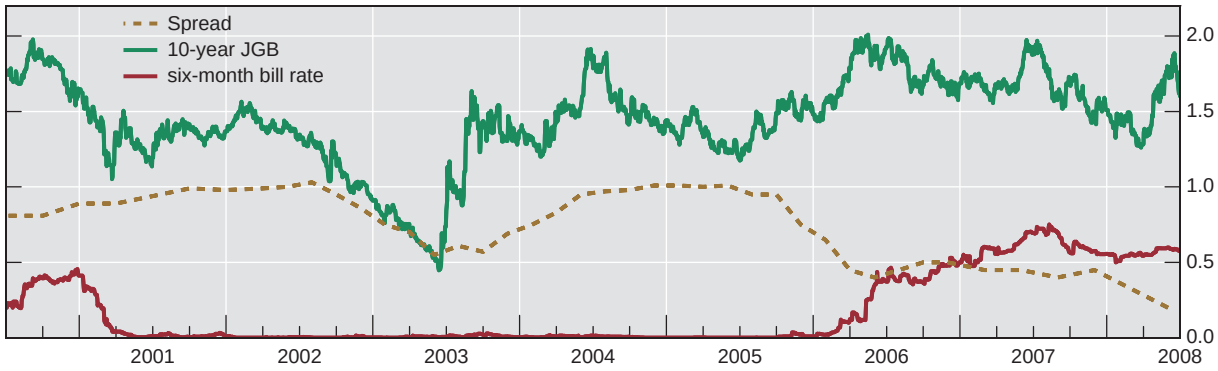
The Japanese Ministry of Finance (MoF) introduced a 15-year bond in 2000, with a coupon, payable every half year, set equal to half the average 10-year Japanese government bond auction yield over the prior six months less an issue-specific number of basis points. The absolute value of this spread ranged from 81 basis points in the first auction, to a peak of over 100 basis points in 2005, to 40–50 basis points in 2007.[32] In the eight years from June 2000 through June 2008, the absolute value of this spread averaged 76 basis points, 60% of the average spread between the 10-year bond and six-month bill of 127 basis points (Graph 3). In the section 4.3, "Account pays US Treasury bond rate" below, we assess how a similarly priced instrument based on the US Treasury bond would have affected the account's position over the 1980–2010 period.

Even from the pricing in low-yield yen, it is evident that the proposal for the US Treasury to pay a floating rate based on the 20-year bond without any such spread was extremely favourable to the US creditors. Their view at the time, however, was that a premium was due them owing to the non-marketability of the Treasury securities to be held by the substitution account (although there might be agreed transfers among participants).

Graph 3

Japanese Government 10-year bond yield and spread on floating rate bonds

In per cent



Note: Absolute value of spread is plotted; spread was uniformly negative. When the 10-year bond yield over the previous period fell below the absolute value of the spread, the floating rate note paid a zero coupon.

Source: Japanese MoF.

[32] From mid-2007, market pricing of these floating rate bonds fell below their "theoretical" values, by as much as 10% in late 2008, and the MoF cancelled issuance for the balance of the 2008-2009 fiscal year. See McCauley and Ueda (2009).

3.2 How to meet any shortfall of dollar returns below SDR returns

Technical differences in the proposals arose from domestic political constraints on participants and from differences in the desired international adjustment process. If the US dollar were to depreciate against the SDR, and this was not fully compensated for by higher US interest rates, the financial balance of the account would quickly deteriorate. As noted above, the IMF staff ran a series of simulations for the account in late 1979 and early 1980 based on historical and hypothetical future interest and exchange rates, all of which showed that liabilities were likely to exceed assets over the medium and longer term since depreciation of the dollar was expected to exceed interest differentials.[33] The viability of the account therefore depended on the United States following economic policies conducive to a strong dollar, but if this was the case then there was less incentive to replace the dollar as a reserve asset. Thus, in January 1980, Robert J Whitelaw (Australia) noted "Ultimately, the substitution account could be effectively guaranteed only if the US Government followed economic policies that tended to maintain the value of the dollar."[34] Europeans worried that, with a substantial share of their dollar liabilities immobilised in the account, the United States might actually feel less pressure to adjust its balance of payments.

Could the US Treasury be induced to promise to maintain the dollar's SDR value to sustain solvency of the account? In Cooper's (2009, p 4) phrase, this "would be a show-stopper for the United States, since no Congress would provide an unconditional guarantee of value for assets, that, though issued by the US government, were issued in US dollars and voluntarily acquired by foreign parties."[35] If the US Treasury had to bear all the risk, it might as well, as suggested by Governor Henry Wallich of the Federal Reserve Board, issue SDR-denominated liabilities itself rather than going through the complexities of a substitution account (Solomon (1982,p 289)).[36] If the United States were unwilling, would the claimants on the substitution account be prepared to bear the risk in order to restore some stability to the IMS? If so, unless the account solved a prisoners' dilemma among dollar holders, they might as well continue to hold the dollars themselves and save the bother of the account. Somehow the risk had to be shared and the United States took a firm position that other participants would have to shoulder at least half of the burden of exchange risk.[37]

One politically expedient way would be to use the IMF's resources, which in a certain sense would share any losses among the participants without explicitly burdening any party. Would Europeans and less developed countries agree that IMF gold should be used to maintain the dollar's SDR value? To some Europeans, such

[33] Memo for Executive Board, "Substitution Account: results of a simulations study of the Account's financial balance," 2 April 1980, IMFA SM/80/83.

[34] This view was echoed by Lamberto Dini (Italy) representing also Greece, Malta and Portugal; and Francisco Garces (Chile) representing a range of South American members. IMFA Executive Board Seminar 80/2, 7 January 1980.

[35] Although this is what the United Kingdom did to try to "retire" sterling reserves in the 1960s (Schenk (2010)).

[36] In the event, after November 1978 the United States sold "Carter bonds" denominated in Deutsche mark and Swiss franc (but not sterling) in an (ultimately profitable) effort to prop up the US dollar.

[37] Brief for Chancellor of the Exchequer, Sir Geoffrey Howe, by M Hedley-Miller (she chaired the G5 meeting in London), 7 June 1979, TNA T382/102.

an approach would allow the United States a free hand to adopt policies that would weaken the dollar since losses would be met by the IMF gold. For less developed countries, using the IMF's gold to prop up an account that would benefit mainly rich participating countries (ie those with large dollar reserves) would contradict the agreement reached in 1976 to use the IMF's gold to create a trust fund for the poorest members. For these reasons, many of the parties involved were convinced that, to ensure equity and discipline on US policy, the United States had to bear part of the burden of any losses in the account arising from valuation or interest rate changes.

3.2.1 Sharing rules

The distribution of any burden between depositors, the United States and the IMF was highly contentious. The IMF staff simulation of the account's performance over 30 years allowed the dollar's downward trend to continue and examined the consequences of the interest rate differentials in favour of the dollar not affording a sufficient offset.[38] The discussion tended to consider the flow problem of balancing interest payments separately from possible currency valuation losses. The valuation losses would only need to be realised if the account were liquidated and there were ongoing hopes among the Germans, for example, that the United States could be convinced to amortise the account over time by buying back the dollars using its own foreign reserves. Most discussion focused on the flow problem and members sought a solution whereby the United States would bear at least half of the shortfall of interest income from the account's dollar assets in relation to required interest payment on SDR liabilities. The rest of the burden could be borne by depositors themselves or by IMF resources, particularly by latent profits on gold holdings, although the US Treasury hoped that any shortfall of interest earned over interest paid might be met through the IMF merely issuing more SDR claims.[39] However, Europeans worried that, if the United States bore no share of potential losses, US policymaking could face perverse incentives (ie moral hazard). This aspect of the account was complicated by the uncertain nature of how the account would perform. At the time of the discussions, the US dollar was weakening, which suggested that there might be substantial losses to be met.

One set of solutions required all participants (including the United States) to commit to contributing a maximum amount of "callable capital," although the distribution of burden between the United States and others was never agreed. In addition, there was no consensus over whether these contributions should be called only after profits from IMF gold sales had been exhausted. An alternative required a decision about liquidation or continuation to be made once the gold profits were exhausted. Only in the event of a majority vote to continue the account would further capital be called. If there was no agreement to make contributions, then the account would be liquidated and the losses distributed among participants. The extent of burden on participants during the lifetime of the account (for both the United States and others) clearly depended on whether and how the IMF's gold reserves could be devoted to ensuring that the account remained solvent on an ongoing basis.

[38] Memo for Executive Board, "Substitution Account: results of a simulations study of the Account's financial balance," 2 April 1980, IMFA SM/80/83.

[39] Minute of meeting at UK Treasury with German, French, Japanese Treasury representatives, 30 November 1979. TNA T382/102.

3.2.2 Profits on gold sales

The amount of gold that would need to be pledged to support the account depended on assumptions of the relative dollar price of gold and the dollar exchange rate. At the time that the plan was being discussed, the rise in the dollar price of gold had far exceeded the declining value of the US dollar, which meant that only a proportion of the account's value in gold would be necessary to insure against any shortfall. The early simulations undertaken by IMF staff at the end of 1979 led them to suggest that one-third of the Fund's remaining gold supply (about 32 million ounces) would be required to cover the potential risk of liabilities exceeding assets if the account amounted to a total of SDR 50 billion.[40] This would cover a potential 10% fall in the dollar vis-à-vis the SDR plus a further 5% of interest rate shortfall. The staff added a further 5% cushion to arrive at an amount of gold equivalent to about 20% of the size of the substitution account. As background, from 1976 the IMF had agreed to a programme to sell about one-third of its gold (then 50 million ounces) as part of the collective resolution to reduce the role of gold in the IMS under Article V. To accomplish the divestment, half was sold at market prices and the profits were vested in a trust fund for developing economies.[41] With this precedent, the disposition of the IMF's remaining gold reserves was highly contentious (developing countries wanting gold for development and European members wanting the gold sold back to members at historic values well below the market price[42]), and an 85% majority was required to approve further gold sales. By April 1980, the IMF staff estimated that only 20–25 million ounces of gold would need to be committed if the account were to have an initial size of SDR 50 billion.[43] This new estimate brought the commitment to the substitution account into line with the volume of gold that had recently been sold to the benefit of the developing countries.

There were three proposals: one was that part of the IMF's gold would be sold when needed at market prices so that the profit from any price over SDR 35 per ounce could bring the assets of the account back into line with its liabilities. This proposal directly paralleled how IMF gold was used to support less developed countries in 1976. Alternatively, a similar share of the IMF's gold could be transferred directly to the substitution account's balance sheet and either sold immediately or retained until it was needed. A third alternative (if the transfer of gold proved illegal under the IMF Articles) was discussed outside the IMF by treasury representatives from the United Kingdom, the United States, Germany, France and Japan in November 1979; the IMF gold could be sold to member

[40] IMFA SM/79/294. Discussed at Executive Board Seminar 80/2, 7 January 1980. According to Boughton (2001, p 941), Managing Director de Larosière mooted a gold backing for the SDR 50 billion substitution account ranging from 23 to 32 million ounces.

[41] The trust fund was terminated in April 1981 and its resources transferred to the Supplementary Financing Facility Subsidy Account.

[42] So-called restitution involved the sale of the IMF's gold stock to those who were member countries as of April 1978 at the former official price of SDR 35 per ounce, in proportion to their quotas as of that date. It was clearly of benefit to US, UK and European members.

[43] Minutes of the Interim Committee of the Board of Governors on the International Monetary System, 25 April 1980. IMFA ICMS/Meeting 14 (1980). Gowa (1984) cites this range as well.

countries along the rules of restitution (ie at US$ 35/oz) and the members would sell this gold back to the IMF.[44]

A wide range of members strongly resisted the commitment of the IMF's gold resources to the substitution account, since the benefits would not be distributed equitably. Joaquin Muns (Spain) and Lamberto Dini (Italy) stressed that this was a potentially illegal use of the Fund's gold, which was committed to equitable treatment of all members.[45] As the influential Brazilian Director Alexandre Kafka put it, "the Fund's gold was in the last analysis owned by individual countries but would be used only to help the participants in the substitution account."[46] Muns and Jacques de Groote (Belgium) also expressed concern that giving the account a "gold backing" might resurrect the role of gold in the IMS, which would reverse the recent decision to reduce that role. Conversely, Cross (United States) and Gerhard Laske (West Germany) favoured the transfer of gold to the account, or even its immediate sale to provide liquid and interest-earning assets and to avoid the risk that the gold price would fall in the future.[47] Cross stressed that all countries would benefit from a stronger IMS so the equitable treatment constraint didn't arise, but C D Deshmukh (India) and Jahangir Amuzegar (Iran) expressed scepticism. At the Executive Board seminar on the use of gold in the account in early January 1980, those executive directors rejecting the use of gold or expressing severe reservations accounted for just under 30% of the votes in the IMF, which did not bode well for achieving an 85% approval. Without the IMF's gold as backstop, participants would find it difficult to agree on a distribution of the burden among themselves and then to sell the agreement to their national parliaments.

3.2.3 Liquidation

Since any losses on the account would not be realised unless the account was liquidated, the timing and mechanism for liquidation was also highly contested. There was clearly an understanding that the balance of assets and liabilities would be monitored on an annual basis and topped up, perhaps through gold sales or earmarked gold profits in the first instance. If "at any time" liabilities exceeded assets plus the hypothecated value of the reserved gold profits, then consideration of either calling up further contributions or liquidation would begin. If the deficit rose beyond the value of assets plus gold profits plus callable capital, then the account would immediately be liquidated. This has important implications for the simulations since there are prolonged periods in which the account would have been in sustained deficit (up to half of the time), which brings into question its viability even if the losses were hypothetically turned around in the longer term.

[44] Minute of meeting at UK Treasury, 30 November 1979. TNA T382/102.

[45] Statement by Mr Muns on the Use of part of the Fund's gold in support of the Substitution Account, IMFA EBM 80/38, 7 March 1980. Circulated in advance on 6 March 1980 as 80/60.

[46] IMFA Executive Board Seminar 80/1, 7 January 1980. Kafka represented Brazil and eight other South and Central American members with 3.19% of IMF votes.

[47] IMFA Executive Board Seminar 80/2, 7 January 1980.

4. Simulations of the substitution account performance

We first present our baseline scenario, finding that the substitution account would have been in recurrent difficulty. Then we consider whether a different starting time – which was never explicitly discussed – would have helped and find that 1980 would have been among the best times to start from the standpoint of the solvency of the account. Then we consider the variations that were discussed and find that the *flow* question of the interest rate payable by the US Treasury would have made a huge difference while the *stock* question of a larger commitment of gold would not have made much difference.

Each scenario assumes reinvestment of interest earnings. In other words, the rise in both assets and liabilities reflects total returns, including both cumulative interest and currency valuation effects. The exchange-rate revaluations are limited to the asset side, since the simulations are reported in SDR terms.

4.1 Baseline scenario

Our baseline simulation assumes that the account amounted to the proposed SDR 50 million, that it began in mid-1980 (when the US dollar was in a trough against major currencies) and that the potential profit from sales of the proposed 25 million ounces of IMF gold was allocated to support the account. With hindsight, even this favourable combination was a recipe for trouble. Our simulation differs from that of Kenen by sticking more closely to the original proposal whereby the deficits would be offset by IMF gold rather than Kenen's annual "topping up" by the United States to keep the account in balance.

This simulation shows steady growth in liabilities but an unsteady balance between these and assets (Table 1 with all amounts in SDR billion). The liability of SDR 50 billion would have cumulated to a liability of SDR 262 billion by 2010. Compounded at Treasury bill yields, dollar assets equivalent to SDR 227 billion would have fallen short of liabilities by SDR 35 billion or 14%. This is a bit more optimistic than the IMF's projections at the time, which suggested a possible 20% shortfall after 30 years if dollar interest accrued at the three-month Treasury bill rate. Importantly for the prospects of a sustainable account, deficits recurred. In particular, the account would have needed the support of gold as early as the Plaza Accord era in 1987, throughout the 1990s and again for the years after the dollar's peak in early 2002.

Applying the IMF's gold reserves would only have made a difference for a while. On-balance sheet profits on gold of as much as SDR 20 billion from 25 million ounces would have sufficed to fill the gap between assets and liabilities in the late 1980s and late 1990s. However, they would have fallen short in most of the 1990s and all of the years since 2002. This would have prompted liquidation discussions in the 1990s, requiring the calling up of contributions from participants. Remarkably, even the historically high price of gold in the last few years would not have restored balance.

As a visual summary of this baseline result, the top panel of Graph 4 shows the assets and liabilities of the account under this scenario, as well as the gold profits at current market prices. The bottom panel shows the deficit as a percentage of assets, with and without the profits from the gold.

Baseline scenario: start July 1980, pay US Treasury bill rate, 25 million ounces of gold

(in billions of SDRs) Table 1

End-year	SDR yield[1]	3m US T-bill yield[1]	Accu-mulated US$ assets	Accu-mulated SDR liabil-ities	US$/ SDR	Surplus or deficit				
						w/o gold		*Gold price*	*w/ 25 m oz gold*	
						In SDR	*% of assets*		*In SDR*	*% of assets*
1980	8.8	15.6	54.3	52.4	1.28	1.9	3.4	590	12.5	23.1
1981	14.7	11.3	69.5	58.9	1.16	10.6	15.2	400	18.3	26.3
1982	9.2	8.2	82.5	66.9	1.10	15.5	18.8	448	24.8	30.1
1983	8.9	9.4	95.0	73.2	1.05	21.9	23.0	382	30.1	31.7
1984	8.8	8.3	112.6	80.2	0.98	32.4	28.8	309	39.4	35.0
1985	7.8	7.3	108.9	87.1	1.10	21.8	20.0	327	28.4	26.1
1986	6.2	5.7	104.5	93.3	1.22	11.1	10.7	391	18.3	17.5
1987	6.1	6.0	95.8	99.1	1.42	-3.4	-3.5	487	4.3	4.5
1988	7.4	8.4	107.9	105.3	1.35	2.5	2.4	410	9.3	8.6
1989	9.1	7.9	120.5	114.2	1.31	6.3	5.3	401	13.1	10.9
1990	9.3	7.0	120.7	125.3	1.42	-4.6	-3.8	392	1.5	1.2
1991	7.6	4.2	127.7	136.2	1.43	-8.5	-6.6	353	-3.2	-2.5
1992	5.8	3.3	138.0	145.8	1.38	-7.8	-5.6	333	-2.6	-1.9
1993	4.2	3.1	142.6	153.5	1.37	-10.8	-7.6	391	-4.6	-3.2
1994	4.8	5.7	139.7	160.1	1.46	-20.4	-14.6	383	-14.7	-10.5
1995	4.3	5.3	145.3	167.9	1.49	-22.6	-15.5	387	-16.9	-11.7
1996	3.9	5.0	158.5	174.9	1.44	-16.4	-10.4	370	-10.9	-6.9
1997	4.4	5.3	177.9	182.1	1.35	-4.2	-2.4	289	0.3	0.2
1998	3.8	4.5	179.6	190.2	1.41	-10.6	-5.9	288	-6.4	-3.6
1999	3.8	5.4	193.1	197.0	1.37	-3.9	-2.0	291	0.6	0.3
2000	4.9	6.0	215.9	205.6	1.30	10.3	4.8	273	14.7	6.8
2001	2.4	1.7	233.6	214.2	1.26	19.4	8.3	277	24.0	10.3
2002	2.2	1.2	219.8	219.3	1.36	0.5	0.2	343	6.0	2.7
2003	1.6	0.9	203.2	223.3	1.49	-20.1	-9.9	417	-13.9	-6.8
2004	2.2	2.2	196.8	227.2	1.55	-30.3	-15.4	438	-24.1	-12.3
2005	3.0	4.0	220.2	232.8	1.43	-12.6	-5.7	513	-4.5	-2.0
2006	4.1	5.0	219.3	241.0	1.50	-21.7	-9.9	635	-12.1	-5.5
2007	3.7	3.0	219.0	251.4	1.58	-32.4	-14.8	836	-20.1	-9.2
2008	1.4	0.0	228.9	259.5	1.54	-30.7	-13.4	862	-17.6	-7.7
2009	0.3	0.0	225.2	261.3	1.57	-36.2	-16.1	1096	-19.6	-8.7
2010	0.4	0.1	229.5	262.0	1.54	-32.6	-14.2	1418	-10.4	-4.5

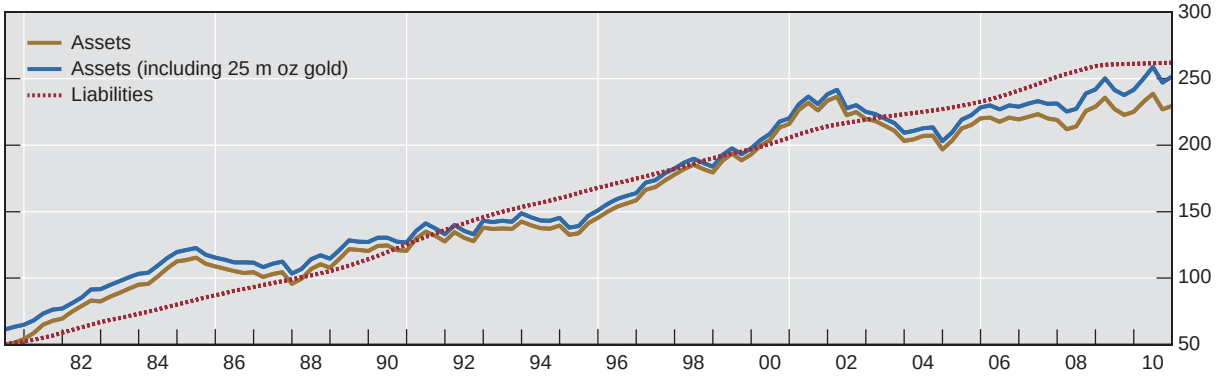
[1] Bond equivalent yield basis.

Sources: IMF; authors' estimates.

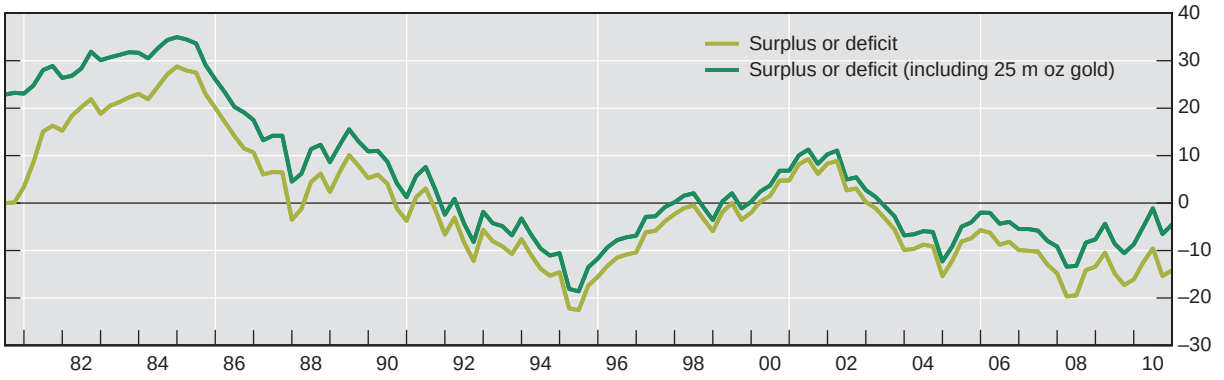
Graph 4

Substitution account's solvency: baseline scenario

In billions of SDRs



As a percentage of assets

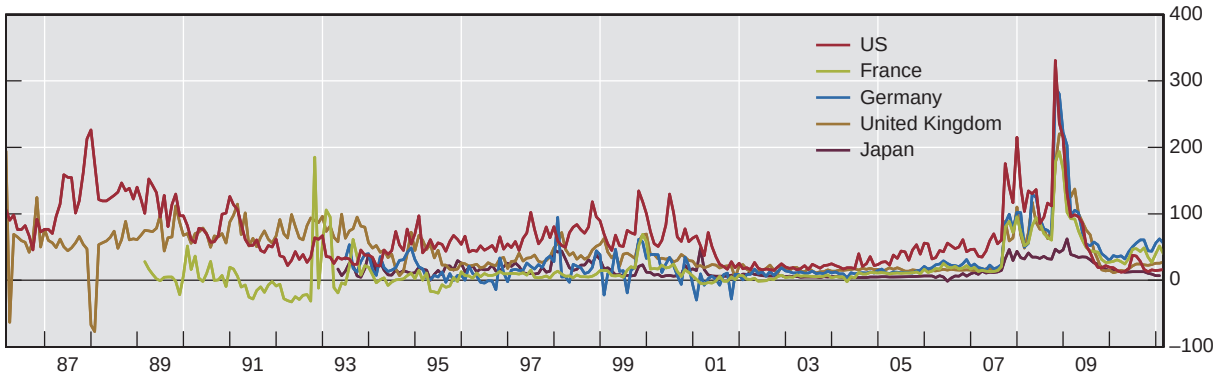


Sources: IMF; authors' estimates.

As noted, this result suggests that over long periods the yield premium on US dollars did not compensate for the dollar's trend depreciation. One possible reason is that US Treasury bills offer a particularly low yield owing to their status as one of the world's most liquid securities. The substitution account would then suffer from the compounding of government bill rates if the US Treasury pays particularly low rates on its bills. Is it possible that the substitution account would have retained a balance between assets and liabilities had the dollar returns been based on eurodollar deposit rates rather than Treasury bill rates? Graph 5 and Table 2 suggest that there is something to this supposition. The Treasury-eurodollar ("Ted") spread is wider for the US dollar than for the other SDR currencies. The Annex Table shows that, if the substitution account's dollar assets yielded US dollar LIBOR rather than Treasury bill rates, then the account would have performed in a satisfactory fashion even without any resort to gold. In particular, the account would have had only two years, 1994-1995, when US dollar assets would have fallen below SDR liabilities. Then, as recently, however, "LIBOR would be disadvantageous to [US] Treasury as it would subject the government's financing costs to bank funding risks" (Treasury Borrowing Advisory Committee (2012)). This was never a likely scenario.

Graph 5

Treasury-eurocurrency spreads



Sources: Bloomberg; Datastream.

Treasury-eurocurrency spreads

(in basis points) Table 2

	Periods	Average spread
USD	1986-2010	65.54
EUR (France)	1989-2010	17.07
EUR (Germany)	1993-2010	28.95
GBP	1986-2010	44.90
JPY	1993-2010	15.31

Sources: Bloomberg; Datastream.

4.2 Alternative start date

The marked cycling of the value of the US dollar since the substitution account was proposed means that the choice of starting point can make a big difference to the outcome. Indeed, the substitution account appeals precisely when the US dollar is weak and there are doubts about the sustainability of its role as a reserve asset. One might almost say that when officials come around to discussing such an account, the dollar has reached its trough (1974, 1980, 2011?). The exception seems to be the 1995 trough of the dollar, when there was no substantive support for a substitution account.[48]

The cycles of the dollar against the SDR correspond to those of the dollar in general, as measured by either the Federal Reserve or the BIS nominal exchange rate indices (Graph 6). Run the data from 1980 or 1995, and the substitution account had an outside chance to produce satisfactory results. Run the analysis of the

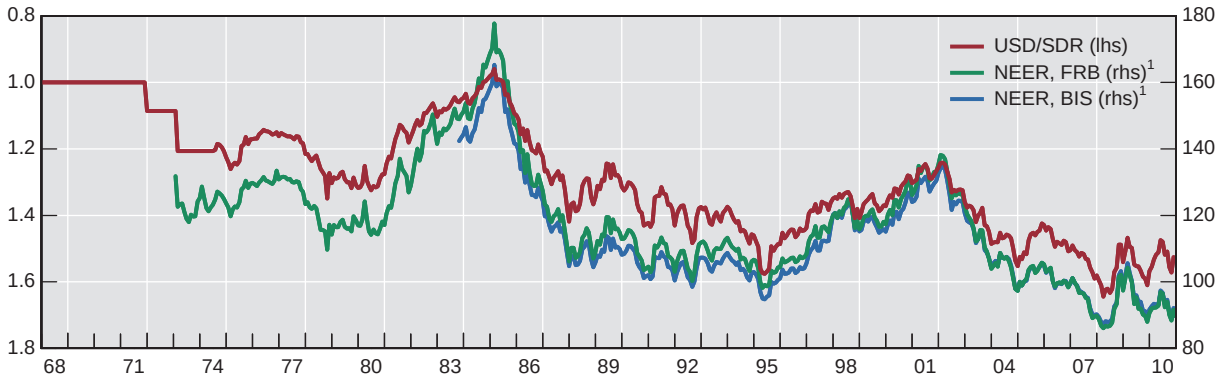
[48] Although a substitution account did form part of the deliberations at a seminar of academics, Treasury and central bank officials held at the IMF in March 1996; see Mussa, Boughton and Isard (1996). This conference responded to calls from the Group of Seven and Interim Committee meetings of 1995 for the IMF to review the role and functions of the SDR.

substitution account from near the dollar peaks of 1985 or 2002, and the account will be in chronic trouble.

Graph 6

The US dollar/SDR rate and the US dollar nominal effective exchange rate

End-of-period



[1] 2005 = 100.

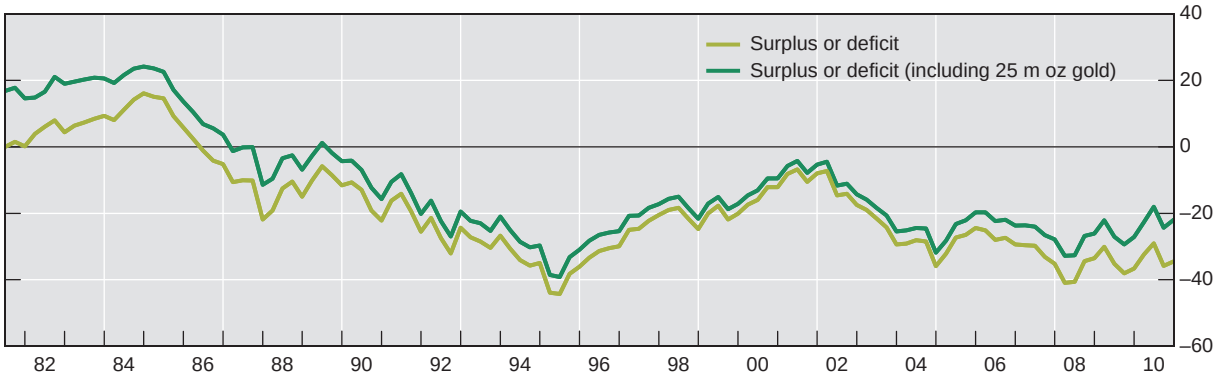
Sources: Board of Governors of the Federal Reserve System; IMF; BIS.

Thus, the choice by Kenen (2010a) of 1980 and 1995 as starting points produce unrepresentatively favourable results. He notes that his historical simulation "begins in 1980, chosen in part because that was the year in which the proposal for a Substitution Account was not in fact adopted." Given that the negotiations continued well into 1980, it is not likely that a substitution account could have been implemented before the end of that year, in view of the time required to gather "widespread" participation and political approval. We argue that 1981 is historically a more realistic starting point if all the obstacles discussed above could have been overcome.

Graph 7

Account's solvency: start mid-1981; pay Treasury bill rate

In billions of SDRs



Sources: IMF; authors' estimates.

In the event, even this subtle difference in timing would have had important implications for the account's performance. Graph 7 shows how much worse the account's solvency would have proved had it started in mid-1981. This finding underscores the importance of the initial conditions and, more generally, the risks posed by exchange rates to the whole venture. In this simulation, the account would

have been insolvent within five years and would not have recovered, even after taking substantial gold profits into account.

4.3 Account pays US Treasury bond rate

If gold in the amounts that might have been agreed could not keep the balance of the account, perhaps a more favourable outcome was possible if the US Treasury paid one of the alternative yields on the account's US dollar assets. In principle, compounding using a bond yield adds a term premium. In practice, any adaptive element in the inflation expectations embedded in bond yields would have boosted yields in a period of declining trend inflation. Table 3 shows that if the United States had somehow been convinced to pay interest on its liabilities in the substitution account at the 20-year bond rate, as was suggested by some protagonists at the time, the account would have performed much more satisfactorily and there would have been a considerable surplus.

Indeed, the margin of solvency would have been wide enough to permit the 20-year yield to have been shaved in a manner parallel to that of the Japanese government floating-rate bond as described above. A fortiori, the investment of dollars in fixed-rate Treasury bonds in 1980 or 1981, then carrying double-digit yields, as proposed by US Executive Director Cross, would have done wonders.

This finding helps put in new perspective the shift by reserve managers towards longer-dated US Treasury obligations in the years since 1980 (McCauley and Rigaudy (2011)). The largest reserve managers tend to finance (or "sterilise") their own reserve holdings with short-term, domestic currency obligations (somewhat akin to the short-term yields on euro, yen and sterling embodied in SDR returns). By receiving medium- or long-term yields on their US dollar holdings, they have been better able to offset the decline of the US dollar's exchange rate on the total returns on their foreign exchange reserves.

Scenario 1: Start July 1980, Pay 20-year Bond Yield, 25 million ounces of gold

(in billions of SDRs) Table 3

End-year	SDR yield1	20-Y US bond yield1,2	Accu-mulated USD assets	Accu-mulated SDR liabilities	USD/ SDR	Surplus or deficit				
						w/o gold		*Gold price*	*w/ 25 m oz gold*	
						In SDR	*% of assets*		*In SDR*	*% of assets*
1980	8.8	13.1	54.8	52.4	1.28	2.4	4.4	590	13.1	23.9
1981	14.7	14.4	69.0	58.9	1.16	10.1	14.7	400	17.9	25.9
1982	9.2	11.1	83.7	66.9	1.10	16.7	20.0	448	26.0	31.1
1983	8.9	12.6	98.8	73.2	1.05	25.6	26.0	382	33.9	34.3
1984	8.8	12.2	120.2	80.2	0.98	40.0	33.3	309	47.0	39.1
1985	7.8	10.1	120.4	87.1	1.10	33.3	27.7	327	39.9	33.1
1986	6.2	7.5	117.7	93.3	1.22	24.4	20.7	391	31.5	26.8
1987	6.1	9.5	110.1	99.1	1.42	10.9	9.9	487	18.6	16.9
1988	7.4	9.3	127.1	105.3	1.35	21.7	17.1	410	28.5	22.4
1989	9.1	8.2	142.3	114.2	1.31	28.2	19.8	401	34.9	24.5
1990	9.3	8.7	143.3	125.3	1.42	18.1	12.6	392	24.1	16.8
1991	7.6	7.6	154.9	136.2	1.43	18.8	12.1	353	24.1	15.5
1992	5.8	6.9	173.4	145.8	1.38	27.6	15.9	333	32.8	18.9
1993	4.2	6.6	185.6	153.5	1.37	32.1	17.3	391	38.4	20.7
1994	4.8	8.3	188.0	160.1	1.46	27.9	14.9	383	33.6	17.9
1995	4.3	6.3	198.7	167.9	1.49	30.8	15.5	387	36.4	18.3
1996	3.9	6.9	220.3	174.9	1.44	45.4	20.6	370	50.9	23.1
1997	4.4	6.3	251.6	182.1	1.35	69.5	27.6	289	73.9	29.4
1998	3.8	5.5	255.8	190.2	1.41	65.7	25.7	288	69.9	27.3
1999	3.8	6.9	279.1	197.0	1.37	82.1	29.4	291	86.5	31.0
2000	4.9	5.8	313.8	205.6	1.30	108.2	34.5	273	112.5	35.9
2001	2.4	5.9	344.5	214.2	1.26	130.3	37.8	277	135.0	39.2
2002	2.2	5.1	337.0	219.3	1.36	117.8	34.9	343	123.2	36.6
2003	1.6	5.2	324.0	223.3	1.49	100.7	31.1	417	106.8	33.0
2004	2.2	5.0	326.4	227.2	1.55	99.2	30.4	438	105.4	32.3
2005	3.0	4.9	371.9	232.8	1.43	139.1	37.4	513	147.2	39.6
2006	4.1	4.9	371.7	241.0	1.50	130.6	35.1	635	140.3	37.7
2007	3.7	4.7	372.1	251.4	1.58	120.6	32.4	836	133.0	35.7
2008	1.4	3.3	399.6	259.5	1.54	140.1	35.1	862	153.2	38.3
2009	0.3	4.5	408.6	261.3	1.57	147.2	36.0	1096	163.8	40.1
2010	0.4	4.3	433.6	262.0	1.54	171.5	39.6	1418	193.7	44.7

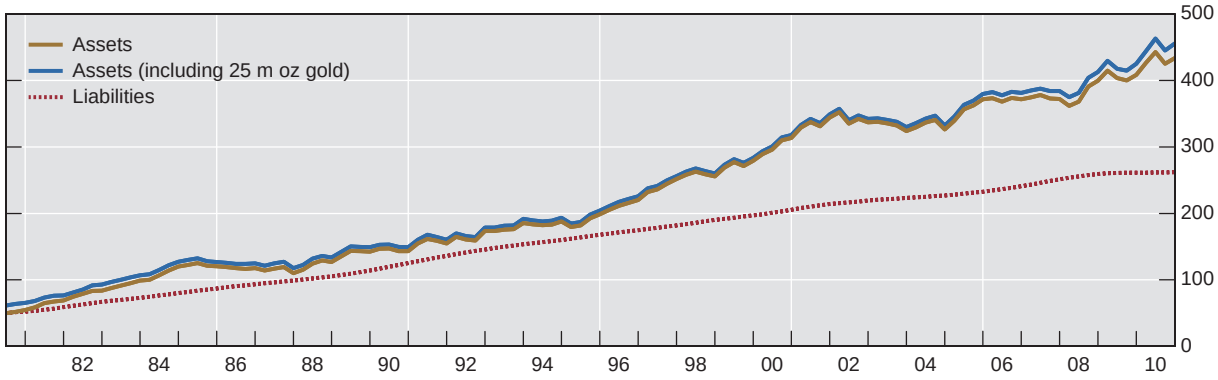
[1] Bond equivalent yield basis. [2] From January 1987 through September 1993, the 10-year bond yield is used to fill the break in the time series of the 20-year bond yield.

Sources: IMF; authors' estimates.

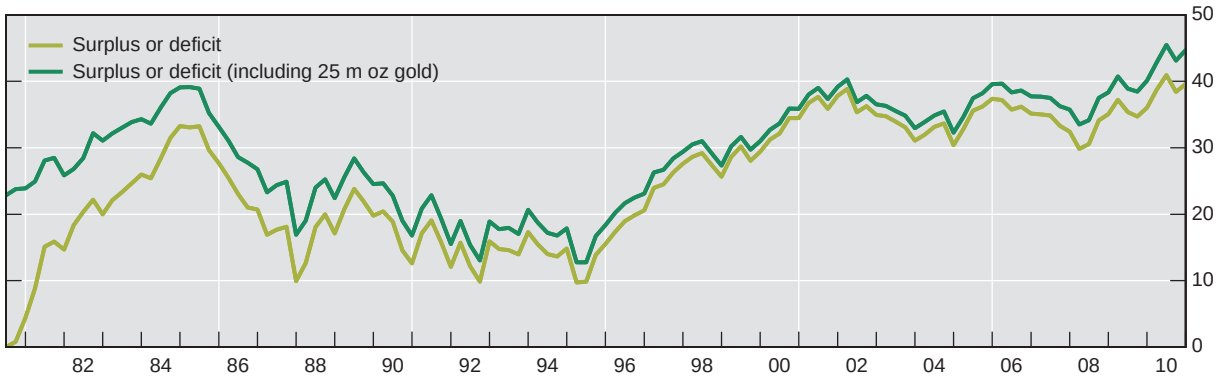
Graph 8

Substitution account's solvency: start 1980; pay Treasury bond yield

In billions of SDRs



As a percentage of assets



Sources: IMF; authors' estimates.

4.4 More gold?

Rather than relying on higher yields on dollar assets, it is possible that the shortfall in Table 1 could have been offset by committing more of the IMF's gold to the account. The greatest amount of gold proposed to be committed to the account was the 32 million ounces that de Larosière pitched in January 1980 (Boughton (2001, p 941)). As noted above, even the subsequent commitment of 25 million was highly controversial, but the larger amount would have added the profits on another seven million ounces to the account. Even with profits of another SDR 6 billion in recent years, the scenario in Table 1 based on US Treasury bill rates would not be qualitatively different. Nor, for that matter, would be the scenario of Table 3 based on US Treasury bond yields. In short, another seven million ounces would not have made a telling difference despite very high prices of gold.

Box 2: What is the SDR interest rate and what difference does it make?

The SDR started life in 1969 bearing an interest rate of 1.5% but in June 1974 the rate was increased to 5%. From July 1974, when the SDR valuation was changed from a gold value to a basket of 16 currencies, the SDR yields were taken from five main international currencies, which were predicted to give a good approximation of the total weighted yields from short-term assets from all participating currencies (the SDR actually underperformed the full weighted average of the original 16 currencies' yields). The SDR rate was set at 50% of a weighted average of market yields on US and UK Treasury bills and three-month German and French interbank rates. The Japanese yen contribution was the rate on uncollateralised call money until 1 May 1981 and thereafter that on two-month private bills. The heterogeneity of the basis of the yields — US and UK Treasury bills versus private yields in the Deutsche mark, French franc and Japanese yen — reflected differences in money market development that have persisted in one form or another to this day. When the French and Japanese treasuries began regular bill issuance, these joined the US and UK Treasury bills in the setting of the SDR yield, but the Bundesbank's opposition to floating rate government debt left the Deutsche mark yield an interbank rate. From 1976, the factor was raised from 50% to 60% and then from the start of 1979 to 80% and then from May 1, 1981 to 100%. These steps from half to full market yield were taken to make the SDR a more attractive reserve asset (IMF Annual Reports 1980 and 1981). The rates were set quarterly from 1976 (previously half-yearly).

The arrival of the euro, however, disturbed even this uneven mapping from currencies to governments. The three-month German interbank rate and the three-month French Treasury bill rate continued to be used until the regular five-year review in 2000. Then, the basis of the SDR yield was changed from membership (ie France and Germany) to currency (ie the euro). In the absence of a euro-wide government bill, the euro's yield was taken as three-month Euro Inter Bank Offered Rate (Euribor), that is, an unsecured interbank money market rate.*

The subsequent quinquennial review narrowed but did not eliminate the gap between the government bill rates for the dollar, sterling and yen and the private bank rate used for the euro. The European Central Bank proposed that a secured private sector rate, the three-month eurepo rate, would better approximate the (low) risk profile of a sovereign short-term debt instrument. As the IMF (2005, p 16) reported: "The Eurepo was introduced in 2002 as a reference rate for secured (collateralised) money market transactions. It is the rate at which one prime bank offers funds in euro to another prime bank if in exchange the former receives from the latter 'Eurepo general collateral' (GC) as collateral. The GC is widely accepted due to its homogeneous composition of government paper."

Still, the eurepo rate has tended to be higher than the yields on the bills of the best-rated euro area sovereigns. For instance, in a recent calculation of the SDR rate from the IMF (Box 2 Table), the euro interest rate from the European Banking Federation's survey of three-month eurepo was 80.71 basis points, while the three-month German government ("Bubill") and French government ("BTF") bill rates were about 20 basis points lower at around 60 basis points.

* As reported by IMF (2005, p 17): "Staff considered alternatives to the use of the Euribor, since it is not a treasury-type financial instrument, but rather a reference rate for the banking sector. Possible alternatives explored were: (i) a weighted average of three-month treasury bill rates; (ii) a representative repo rate; (iii) a bid rate in the unsecured market; and (iv) the rate on the ECB three-month refinancing facility. The Euribor was ultimately chosen at the time of the 2000 review, since the alternatives compared unfavourably when benchmarked against the guidelines for the inclusion of interest rate instruments in the SDR interest rate basket. The main problems encountered with alternative instruments were highly segmented and largely domestically oriented markets, therefore reducing the representativeness of such instruments for the wider euro area, the fact that six countries in the euro area did not issue treasury bills, and the limited response to changes in underlying credit conditions. However, there remained misgivings by some Directors concerning the risk characteristics of the Euribor."

Box 2 Table: SDR interest rate for the week of 1 to 7 November 2010

(As of Friday 29 October 2010, in per cent)

Currency	Currency amount	Exchange rate against the	SDR interest rate	Product
Euro	0.4100	0.881609	0.8071	0.2917
Japanese Yen	18.4000	0.0078955	0.1100	0.0160
Pound Sterling	0.0903	1.01299	0.5100	0.0467
US Dollar	0.6320	0.636219	0.1200	0.0483
Total				0.4027
SDR Interest Rate				0.40

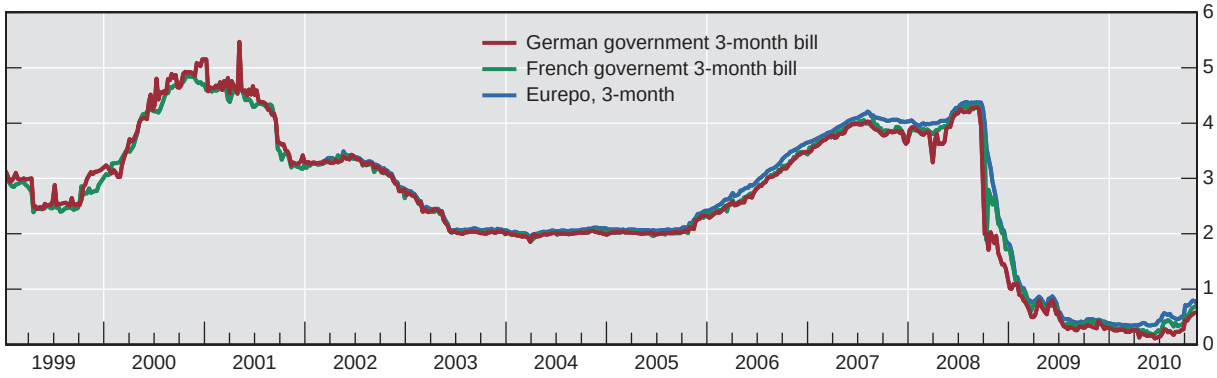
Source: IMF

The implication of the use of a repo rate for the euro for the substitution account is that, since 1999, it is slightly less likely that the excess of US dollar interest rates over SDR yields offsets any depreciation of the dollar against the SDR. The Box Graph plots the three-month Eurepo against the three-month French and German government bills. While the gap in normal times is narrow, it can widen appreciably during periods in which private market participants flee to quality. Any such widening of European private sector yield spreads over government bill rates is permanently impounded in the SDR cumulative returns that matter for the solvency of the substitution account. The element of private risk in the SDR yield raises the hurdle for the account.

Box 2 Graph

Three-month rates for the euro

On government bills and on repos against euro area government bonds



Source: Bloomberg.

5. Conclusions

The conceptual attractions of a substitution account to absorb unwanted US dollar reserves and increase the role of the SDR have attracted IMS reformers for over 30 years. In the 1970s, part of the appeal of such schemes was to develop a mechanism that might ultimately require the United States to redeem its liabilities in SDR, or at the very least would create an SDR-denominated reserve asset that could rival the dollar. Repeated efforts to design such an institution have stumbled over

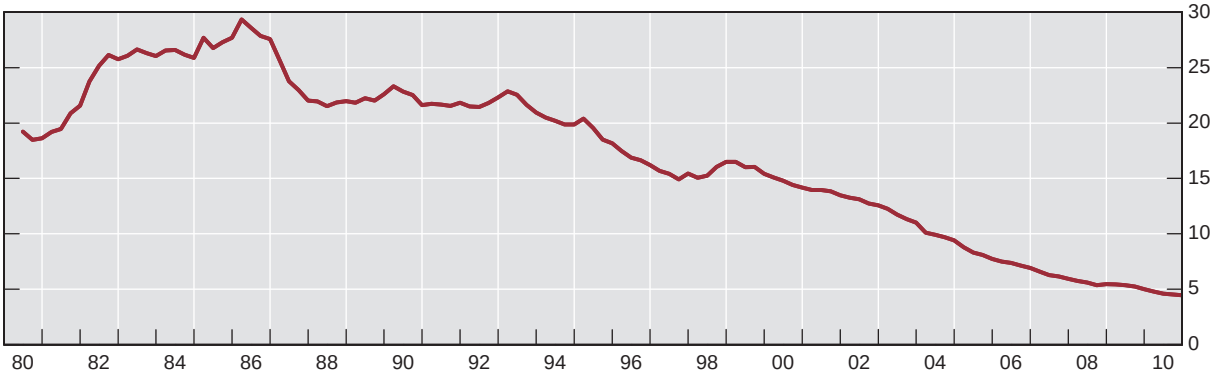
technical and political obstacles. Kenen (2010a) points to the refusal of the United States to bear the sole burden of losses as a key reason why the substitution account was not adopted, but it was how to cover any losses rather than an expectation that they would all be borne by the United States that was at issue. This posed important obstacles that proved insurmountable, including the use of gold reserves, the returns on the liabilities and assets of the account and the obligation of the United States ultimately to redeem their outstanding US dollar liabilities. In April 1980, the IMF predicted that a considerable amount of extra resources would be required from the outset to ensure that the account remained balanced. Moreover, we have argued that even if these issues had been resolved, and the IMF's gold had been committed to the account, it would not have broken even with US Treasury bill returns.

To have eroded the share of dollars in global reserves substantially, the substitution account would have to serve as a process for converting dollars into SDR rather than a one-shot deal. As it was conceived in 1980, the substitution account would have immobilised a substantial fraction of global reserves. In mid-1980, SDR 50 billion represented about 16% of global foreign exchange reserves outside of those held by the United States and a third of US dollar reserves. On our baseline scenario, the initial SDR 50 billion would have grown fivefold. Yet by the end of 2010, this compounded sum would have fallen to less than 5% of global reserves (Graph 9). Thus, although the substitution account was aimed at resolving the "stock" problem of large existing balances of US dollar reserves, its benefit measured in stock terms would have eroded steadily over time. Thus, our hypothetical substitution account would have had to have been re-opened in order to keep the presumed problem from re-appearing.

Graph 9

Share of substitution account liabilities in non-US foreign exchange reserves, 1980–2010

In per cent, an initial SDR 50 billion, compounded at the SDR interest rate



Source: IMF; authors' estimates.

Conceiving of a substitution account instead as a perpetually open exit from US dollar reserves turns it from addressing a "stock" to a "flow" problem. This may have been (and be) what the proposers were (and are) really after, ie a way to turn the SDR into a more important reserve asset. Indeed, in the 1980 proposal there was a provision to re-open the account once it had reached SDR 50 billion. However, it is hard to imagine the account being upsized unless it was at least in balance. As we have seen, this would have been rare in the case of the US Treasury paying interest at its bill rate. Moreover, additional "deposits" would have to have been well-timed at or near US dollar troughs to maintain the performance of the account, as is clear

in the comparison of starting it in 1980 or six months later. In our simulations, the substitution account fails a particular test of uncovered interest parity. As is well known, such tests depend for their results on the sample period chosen. However, since the dollar was near the bottom of its cycle in 1980, this seems a fair test.

The upshot is that those who suggest a substitution account again must deal with an inconvenient fact — the account would not have added up even with a substantial endowment of gold profits and a favourable start date unless the United States would have committed to pay a bond yield on the account's assets. Indeed, given the preference on the part of modern reserve managers for bond investments, it is hard to imagine how negotiations for a substitution account would not focus on the US Treasury paying the two- to five-year note yields that correspond to the most usual official investment in US Treasury obligations today. How such negotiations would proceed, and what results might be obtained over time, with the Federal Reserve using large-scale bond purchases to lower the returns payable, are interesting questions. Choosing the right moment to open such an account and anticipating the possible rhythm of deficits as well as surpluses on its balance sheet would be significant challenges.

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Annex Table

Alternative scenario: Start July 1980, pay dollar LIBOR rate, 25 million ounces of gold
(in billions of SDRs)

End-year	SDR yield[1]	3m USD LIBOR	Accu-mulated US$ assets	Accu-mulated SDR liabil-ities	US$/ SDR	Surplus or deficit				
						w/o gold		*Gold price*	*w/ 25 m oz gold*	
						In SDR	*% of assets*		*In SDR*	*% of assets*
1980	8.8	16.6	55.1	52.4	1.28	2.6	4.8	590	13.3	24.2
1981	14.7	14.5	71.6	58.9	1.16	12.7	17.7	400	20.4	28.5
1982	9.2	10.0	86.9	66.9	1.10	20.0	23.0	448	29.3	33.7
1983	8.9	9.9	100.8	73.2	1.05	27.7	27.4	382	35.9	35.6
1984	8.8	9.8	119.9	80.2	0.98	39.7	33.1	309	46.7	39.0
1985	7.8	8.2	116.7	87.1	1.10	29.7	25.4	327	36.2	31.0
1986	6.2	6.2	112.7	93.3	1.22	19.4	17.2	391	26.5	23.5
1987	6.1	8.0	103.9	99.1	1.42	4.8	4.6	487	12.5	12.0
1988	7.4	9.0	118.3	105.3	1.35	12.9	10.9	410	19.7	16.6
1989	9.1	8.6	132.9	114.2	1.31	18.7	14.1	401	25.4	19.2
1990	9.3	8.1	133.4	125.3	1.42	8.1	6.1	392	14.1	10.6
1991	7.6	5.0	141.8	136.2	1.43	5.7	4.0	353	11.0	7.7
1992	5.8	3.6	153.8	145.8	1.38	8.0	5.2	333	13.2	8.6
1993	4.2	3.4	159.2	153.5	1.37	5.8	3.6	391	12.0	7.5
1994	4.8	6.0	156.0	160.1	1.46	-4.0	-2.6	383	1.7	1.1
1995	4.3	5.9	162.8	167.9	1.49	-5.2	-3.2	387	0.5	0.3
1996	3.9	5.5	177.9	174.9	1.44	3.0	1.7	370	8.5	4.8
1997	4.4	5.8	200.5	182.1	1.35	18.4	9.2	289	22.9	11.4
1998	3.8	5.3	203.3	190.2	1.41	13.2	6.5	288	17.4	8.6
1999	3.8	6.1	219.7	197.0	1.37	22.7	10.3	291	27.1	12.3
2000	4.9	6.7	246.5	205.6	1.30	40.9	16.6	273	45.3	18.4
2001	2.4	2.1	268.4	214.2	1.26	54.2	20.2	277	58.9	21.9
2002	2.2	1.5	253.0	219.3	1.36	33.7	13.3	343	39.2	15.5
2003	1.6	1.2	234.5	223.3	1.49	11.2	4.8	417	17.3	7.4
2004	2.2	2.3	227.4	227.2	1.55	0.2	0.1	438	6.4	2.8
2005	3.0	4.3	254.7	232.8	1.43	21.9	8.6	513	30.0	11.8
2006	4.1	5.4	254.1	241.0	1.50	13.1	5.1	635	22.8	9.0
2007	3.7	5.0	255.2	251.4	1.58	3.8	1.5	836	16.1	6.3
2008	1.4	2.7	271.1	259.5	1.54	11.6	4.3	862	24.7	9.1
2009	0.3	0.3	269.8	261.3	1.57	8.5	3.1	1096	25.1	9.3
2010	0.4	0.3	275.6	262.0	1.54	13.6	4.9	1418	35.7	13.0

[1] Bond equivalent yield basis.

Sources: IMF; authors' estimates.