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Current Account Surpluses and the Interest Rate Island in Switzerland

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Abstract

This paper describes some long-run aspects of the Swiss balance of payments, highlighting two macroeconomic phenomena that make Switzerland stand out among other countries: first, it has had a persistent current account surplus and the largest ratio of net foreign assets to GDP in the world; second, its real interest rates have been significantly lower than those of most other industrialized countries, earning it the label "interest rate island". These two distinctive features may be related, and ultimately both may result from an excess of national savings over investment for many years. The real interest differential may largely be attributed to a foreign exchange rate risk premium, which compensates Swiss residents for holding net assets in foreign currency and foreign residents for bearing net liabilities in Swiss francs.

JEL Classification Numbers:

E43, F21

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1/ This paper is a shorter version of Chapter II of the supplement to SM/95/2, which provides further statistical information, and was prepared as background material for the 1994 Article IV consultation in Switzerland. I am grateful to S. Henry for suggesting the topic and extensive comments, T. Van der Willigen for comments, K. Habermeier and H. Vittas for suggestions and P. Kunzel and J. Stefanska for research assistance.

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Summary

This paper describes the various components of the Swiss balance of payments in historical perspective and compares them to those of other countries. It also describes the long-run evolution of Switzerland's net foreign asset position as a proportion of GDP.

Two macroeconomic phenomena make Switzerland stand out among other countries: first, it has had a persistent current account surplus and the largest ratio of net foreign assets to GDP in the world; and second, its real interest rates have been significantly lower than those of most other industrialized countries, earning it the label "interest rate island."

The paper attempts to bring these two distinctive features of the Swiss economy within a consistent framework. It argues that they may be related, and that ultimately both may result from an excess of national savings over investment for many years. The paper also briefly discusses possible determinants of the Swiss investment and saving ratios, both of which are high by international standards.

The real interest differential is decomposed into deviations from uncovered interest rate parity (UIP) and deviations from ex ante relative purchasing power parity. In common currency terms, assets denominated in Swiss francs have yielded less than similar safe assets denominated in other currencies over the past two decades. Thus, the sign and large magnitude of this deviation from UIP suggest that a foreign exchange rate risk premium compensates Swiss residents for holding net assets in foreign currency and foreign residents for bearing net liabilities in Swiss francs.



## I. Introduction

Two macroeconomic phenomena make Switzerland stand out among leading industrialized countries: first, it has had a persistent current account surplus and the largest amount of net foreign assets--as a proportion of GDP--in the world; second, its real interest rates have been significantly lower than those of most other industrialized countries. Understanding both these phenomena is important to the formulation of policy. On the one hand, the current account surplus is sometimes interpreted as a sign that economic welfare could be improved if domestic absorption increased--an interpretation that clearly has policy implications. On the other hand, unusually low real interest rates are a major advantage of the Swiss economy, and the evaluation of policies requires an assessment of their likely causes. This paper attempts to bring these two distinctive features of the Swiss economy within a coherent framework. It argues that they may be related, and that ultimately both may result from the continued excess of national savings over domestic investment for many years.

For over a decade, Switzerland has had extremely high private and government saving, by international standards. It has also had high investment, but not as high as the national saving rate, so that the current account has been in surplus. The fundamental determinants of saving and investment rates are notoriously difficult to analyze. Though no firm conclusions can be reached on the determinants of the private saving rate, there are (as suggested in Section 3 below) some indications that the social security system--a considerable portion of which is fully funded--may have played a role in keeping savings high.

The phenomenon of relatively low Swiss real interest rates may also be partly explained by the long-run tendency to save more than to invest, that is, to accumulate net foreign assets, displayed by Swiss residents. Both components of the real interest differential (as analyzed in Section 4 below), namely foreign exchange rate risk premium and real exchange rate appreciation, seem to be considerable in the case of Switzerland. It clearly may be argued that for Swiss investors to hold net positive foreign assets in foreign currency, as we observe they do, the return on assets denominated in Swiss francs must be lower than the expected return on equivalent assets denominated in foreign currency. In other words, Swiss residents holding assets denominated in foreign currency receive a foreign exchange rate risk premium.

The paper is structured as follows. Section 2 describes the various components of the Swiss balance of payments and compares them to those of other countries. It also reviews historical trends in these items in Switzerland. It discusses the foreign asset position of Switzerland and compares it to that of other countries, and analyzes the composition of Swiss foreign assets. Section 3 analyzes the determinants of the high Swiss current account surplus. It compares the saving and investment rates in Switzerland with those of other countries, and discusses possible long-run determinants of saving and investment. Section 4 addresses the phenomenon

of relatively low Swiss interest rates. It shows that real interest rates have historically been lower in Switzerland than in other countries, including its main trading partner--Germany. To analyze this further, real interest rate differentials are split into two components: deviations from uncovered interest parity and deviations from purchasing power parity. A number of potential reasons for deviations from these two useful benchmarks are reviewed. It is suggested that the accumulation of net foreign assets in the presence of imperfect asset substitutability may have been one of the main contributing factors underlying the relatively low real interest rates in Switzerland. Section 5 concludes.

## II. The Swiss balance of payments

### 1. Overview

Switzerland has traditionally had a current account surplus, which has averaged almost 5 percent of GDP since 1981 and reached a peak of Sw F 27 billion, or 8 percent of GDP, in 1993. Indeed, there appears to have been a slight upward trend in the current account and in the trade balance since the 1960s, which has persisted during the 1980s and early 1990s. During the recent recession, the worsening of the government deficit was more than offset by the increase in household savings and the sharp fall in investment (Chart 1). <sup>1/</sup> The small trade surplus of 1993, which was partly due to low demand for imports, was the first since 1953, and followed moderate deficits throughout the previous four decades. Over the post-war period, the nonfactor service balance has generally displayed large surpluses: tourism has constituted roughly half of nonfactor service revenues and has been in surplus; other nonfactor services, which include banking services, have registered very large surpluses. The factor income account also has had very large surpluses: the net labor services balance has been negative, owing to foreign workers' remittances from Switzerland; however, this item has been overwhelmed by the substantial surplus on the capital services balance, which has reflected returns on the extremely large stock of net foreign assets resulting from the excess of savings over investment for many years. Between 1979 and 1991, net capital income was larger than the overall current account surplus.

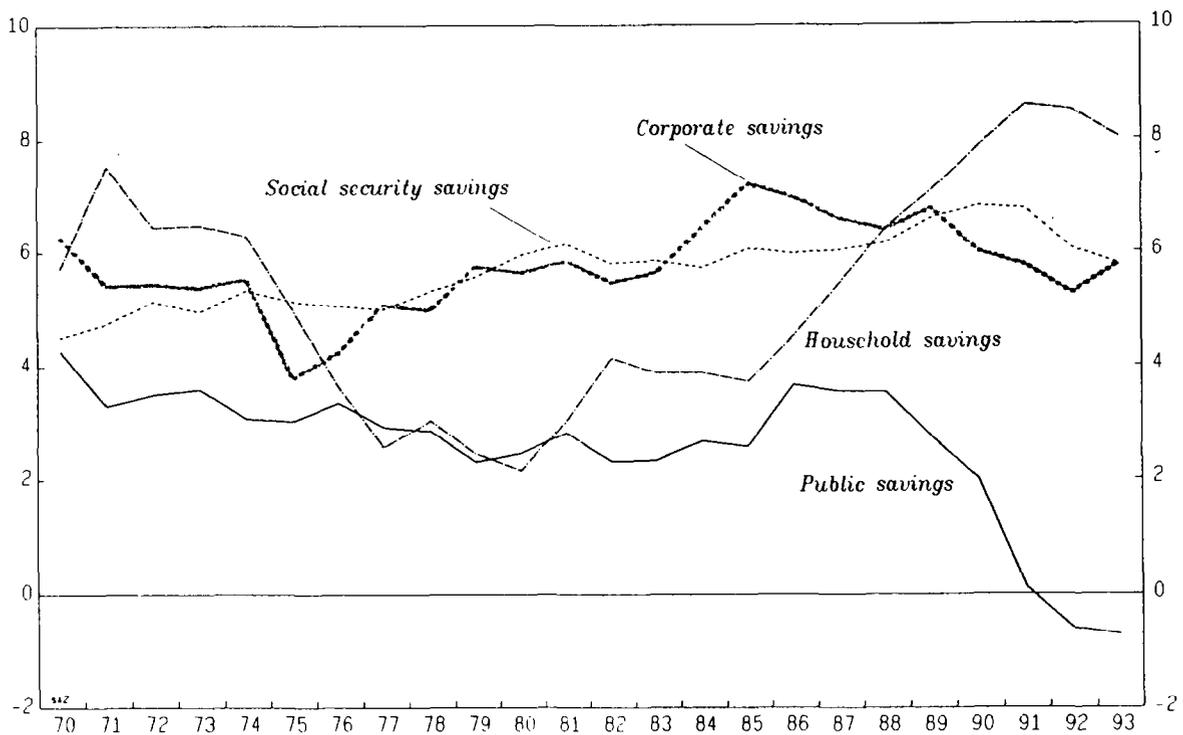
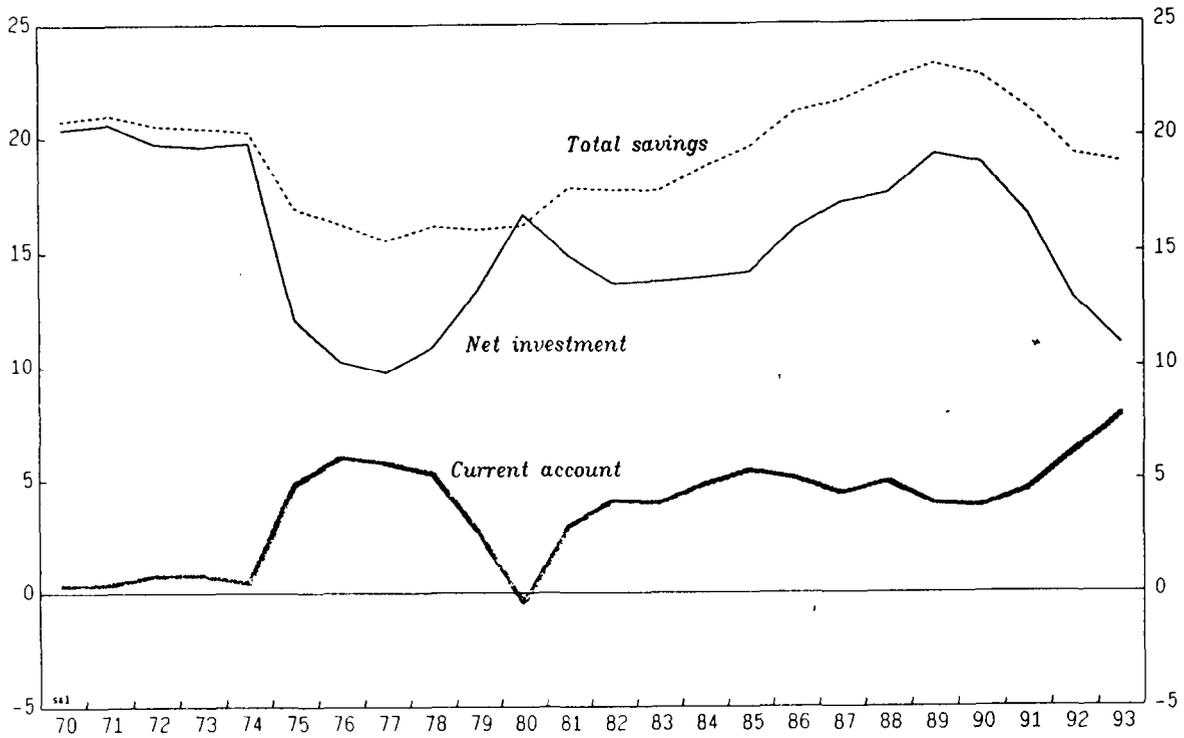
Particularly since 1981, large current account surpluses seem to have been the norm. Yet, although never becoming more negative than one percent of GDP in the past thirty-five years, the current account has experienced

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<sup>1/</sup> Government saving fell from 3 percent of GDP in 1989 to -1 percent in 1993, net investment fell from 19 percent to 11 percent, and household saving increased from 7 percent to 8 percent (continuing its upward trend from 4 percent in 1985), while corporate and social security saving remained roughly unchanged at 6 percent of GDP.

CHART 1  
Switzerland

Savings, Investment, and the Current Account  
(In percent of GDP)



Source: Bundesamt für Statistik, konto 5.

wide fluctuations, in near-unison with the trade balance (Chart 2). For example, the second oil price shock brought about a small current account deficit in 1980, largely due to a deficit on the trade balance of 7 percent of GDP. In contrast, the nonfactor services surplus has been fairly stable at around 4 percent of GDP for the past thirty-five years. The factor income surplus had gradually risen from 2 percent of GDP in 1960 to 6 percent in 1984, before decreasing to 4 percent of GDP in 1993.

Table 1 provides a set of international comparisons of the Swiss external accounts with those of other OECD countries. <sup>1/</sup> The current account surplus in Switzerland is the largest as a proportion of GDP. What makes Switzerland stand out is the surplus on the nonfactor service and factor income account. Net nonfactor services display a large surplus, by international standards, reflecting Switzerland's strong position in services such as tourism and banking. Similarly, factor incomes display a very large surplus, compared with other countries, as the surplus on capital services more than offsets a relatively large deficit on labor services. The remainder of this section analyzes the main components of the balance of payments in further detail.

## 2. Trade composition, direction, and performance

Over the last decades, Switzerland has tended to display small trade deficits, with relatively moderate changes over time mainly due to changes in trading partners' and Swiss incomes. Both Swiss exports and imports have been subject to a considerable degree of cyclicality. Belongia and Hermann (1989) find the elasticity of Swiss total exports with respect to trade-weighted partner income to be considerable (1.2). <sup>2/</sup> At the same time, the trade balance has not been unusually cyclical by international standards, partly because Switzerland's economic fluctuations have been fairly well-synchronized with those of its trading partners. Standard adjustment of the Swiss trade balance for the effects of output gaps in Switzerland and in trading partner countries yields estimates which do not differ much from actual values.

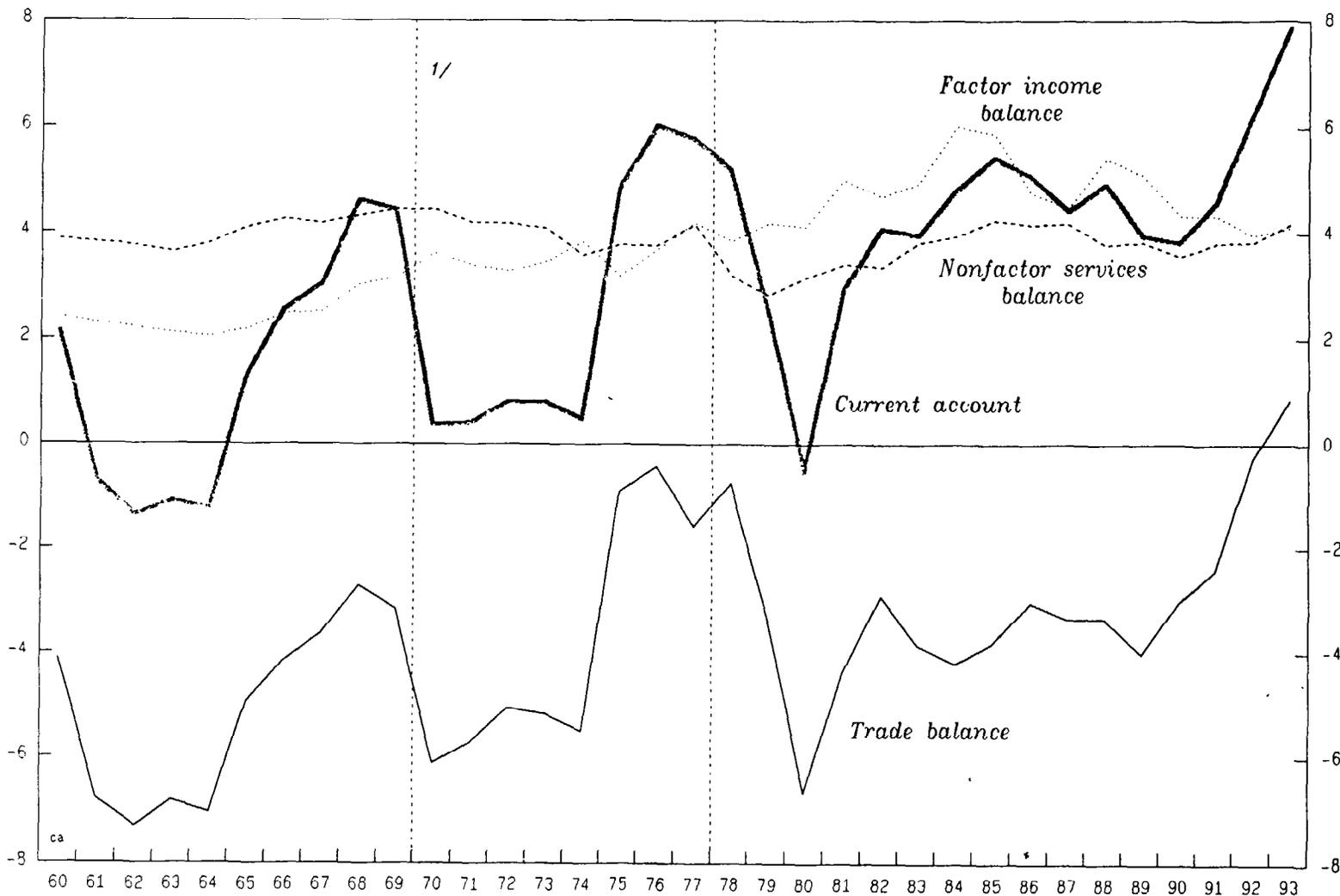
The fact that Swiss exports are quite strongly dependent on trading partners' incomes is partly due to the fact that a substantial proportion (29 percent in 1993) of exports consists of capital goods. The main exports are chemicals, machinery, and precision instruments. Similarly, the relatively high cyclicality of imports is partly explained by the fact that the main imports are inputs for the above industries, in addition to vehicles, food, and energy. Switzerland is a net exporter of equipment

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<sup>1/</sup> The data are 1988-1993 averages in order to reduce the influence of cyclical factors and to concentrate on longer-run differences among countries.

<sup>2/</sup> They also find the elasticity of Swiss exports to the United States with respect to U.S. GNP to be quite large (2.3). Both elasticities are positive at the conventional levels of statistical significance.

CHART 2  
 Switzerland  
 The Current Account  
 (In percent of GDP)



Sources: Bundesamt für Statistik (1960-1977); Swiss National Bank (1978-1993); Swiss Institute for Business Cycle Research, data tape.

1/ The current account does not include net transfer payments before 1970.

Table 1. Switzerland: International Comparisons of Components of the Current Account

(Average 1988-1993, in percent of GDP)

	Switzerland	Austria	Denmark	France	Germany	Italy	Japan	Netherlands	United Kingdom	United States
Trade balance	-2.0	-4.6	3.7	-0.5	3.8	0.6	3.0	3.6	-3.2	-2.0
Exports of goods	28.5	24.9	27.5	16.9	23.2	15.5	9.1	41.7	18.1	7.0
Imports of goods	30.5	29.5	23.8	17.4	19.3	15.0	6.0	38.1	21.3	9.0
Nonfactor services balance	3.8	5.5	2.3	1.4	-1.6	--	-1.3	0.5	0.7	0.6
Export of nonfactor services	7.9	15.1	11.1	8.7	4.3	4.9	1.4	9.3	5.7	2.7
Import of nonfactor services	4.1	9.6	8.8	7.3	5.9	4.9	2.7	8.8	4.9	2.0
Factor income balance	4.5	-0.7	-4.0	-0.4	0.8	-1.3	0.9	-0.1	0.5	0.2
Factor income from the rest of the world	12.4	5.1	7.9	5.4	3.8	1.7	3.6	8.9	12.8	2.4
Factor payments to the rest of the world	7.9	5.8	11.9	5.8	2.9	3.0	2.8	9.0	12.3	2.2
Net unrequited transfers	-1.1	-0.2	-0.7	-0.7	-1.6	-0.4	-0.2	2.9	-2.7	-1.5
Current account surplus	5.2	--	1.3	-0.2	1.4	-1.1	2.4	2.9	-2.7	-1.5

Sources: World Economic Outlook, International Monetary Fund.

goods and a net importer of consumer goods. Similarly, it is a net exporter of high-technology goods and a net importer of the raw materials required to produce them.

There are some indications that the extent to which Swiss exports are subject to cyclical demand fluctuations may be on a downward trend, as Switzerland's trade pattern becomes increasingly geographically diversified. Traditionally, Switzerland's main trading partners have been the large European economies at its borders (Germany, France, and Italy) and the United States. 1/ In recent years, exports to the Far East have increased, and in 1993 amounted to 2 3/4 percent of GDP. As the cyclical fluctuations of the East Asian countries tend to be less closely synchronized with those of the European trading partners, the increased weight of Asia in overall Swiss exports may play a stabilizing role on exports and output. 2/ Strong demand by such new outlets for Swiss exports (together with continued high demand from Germany, still partly due to the effects of unification) has contributed to mitigating the effects of the recent recession.

The fact that Swiss exports tend to be concentrated in high-technology goods suggests that exports in particular may not be very sensitive to changes in conventional measures of competitiveness such as the real exchange rate. The real effective exchange rate (based on consumer prices and weighted by exports to the fifteen major trading partners) has appreciated since 1973, with a particularly sharp rise until 1978; thereafter, it has shown considerable fluctuations; in particular, it has been on an upward trend since mid-1992. At the same time, since the beginning of the most recent recession the real exchange rate based on manufacturing unit labor costs has risen by less than the real exchange rate based on consumer prices, owing to a combination of real wage restraint and productivity improvements (particularly in the tradable sector).

In spite of these fluctuations in a number of indicators of competitiveness, the trade balance has been relatively stable, except for the worsening at the time of the second oil price shock and the gradual improvement since the recession began in 1989. There is little evidence of a relationship between the contemporaneous real exchange rate and the trade balance, and only a weak relationship between the trade balance and the

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1/ Switzerland tends to have a trade deficit with the industrial countries (Germany in particular) and a trade surplus with the developing countries.

2/ Similar considerations apply to the eastern European countries, with which Switzerland has signed a number of free trade agreements in recent years.

lagged exchange rate. 1/ Thus the real exchange rate appears to play a relatively limited role in determining trade volumes. This impression is confirmed by Belongia and Hermann (1989), who find that total real exports are not significantly affected by the real effective exchange rate. 2/ Other factors, such as changes in the product composition of worldwide demand and in the quality of Swiss exports of goods and nonfactor services may be much more crucial determinants of changes in export volumes than is the real exchange rate.

Switzerland's record on technological innovation has been quite good. 3/ Its research and development (R&D) expenditure is fairly high: it amounted to 3.1 percent of GDP in 1989, before declining slightly during the recession. For some decades, Switzerland has filed more patents per capita than any other country in the world. The number of citations of Swiss scientific articles is well above the average for comparable countries. Nevertheless, some authors have expressed concern about likely future developments in Switzerland's competitiveness, because--in their view--the export sectors in which the country specializes are mature, possibly declining ones and present few opportunities for technological advances and growth in the future. Beck (1990) argues that Swiss export products lost some of their innovative content in the 1980s, though such losses were small compared to those of Switzerland's main competitors. It is unclear whether the fact that Switzerland's R&D spending and additions to its portfolio of patents are concentrated in less dynamic fields such as machinery, chronometry, and textiles (rather than in fast-growing sectors such as biotechnology) is an indicator of poor export performance in the future. While measures of innovation such as the number of patents ought to be monitored, it seems too early to argue that the choice of technological sector by Swiss firms has been suboptimal.

In spite of the considerable exchange rate appreciation since mid-1992, there are so far no clear signs that the state of Swiss competitiveness, with its potential implications for exports and thereby for output, ought to be a cause for immediate concern. Switzerland's exports have performed fairly well, even after its major trading partners (Germany, France, Italy, and the United States) entered recessions. The real exchange rate is not unusually high by historical standards, especially when calculated on the basis of unit labor costs; a number of previous empirical findings suggest that the exchange rate does not seem to have a strong effect on the trade

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1/ There seems to be some evidence that exchange rate appreciation may lead the value of both imports and exports to fall, as the Swiss franc prices of imported and exported goods fall. To the extent that imports rise, they do so because of J-curve effects.

2/ They also find that the elasticity of real exports to the United States with respect to the real bilateral exchange rate against the U.S. dollar--while statistically significant--is rather low.

3/ The data in this paragraph were provided by the Bundesamt für Konjunkturfragen.

balance; and, in the face particularly of the rise of the newly industrializing countries, Switzerland's loss of export market shares has been similar to that of its main European trading partners. 1/ Finally, while competitiveness indicators should continue to be monitored, the recent appreciation of the Swiss franc may not be undesirable, as increases in the net foreign asset position appear likely over the medium-term (see Section 2.g). 2/

### 3. Nonfactor services

Nonfactor services usually display a large surplus, which rose to 4 percent of GDP in 1993. Tourism accounts for around one half of total revenues from and three quarters of expenditures on nonfactor services. Net revenue from tourism is about 1 percent of GDP. The remainder of the nonfactor service surplus (amounting to 3 percent of GDP) is largely due to financial services. In spite of the large role played by tourism, there is no clear relationship between the nonfactor services balance and the real exchange rate.

### 4. Factor incomes

Foreign workers' earnings remitted abroad have typically been large, of the order of 2 percent of GDP, though they have fallen slightly since 1991. Part of this recent decline may be attributed to the rise in unemployment in Switzerland, which has affected foreign workers considerably. Changes in immigration policies might be expected to have a substantial impact on this item and on private unrequited transfers.

Net capital services are very large by international standards, at 6 percent of GDP, reflecting the extremely large net foreign asset position.

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1/ OECD (1994, pp. 29-31). Market share outcomes reflect quality developments and other factors which are not captured by indicators of competitiveness such as relative unit labor costs or price-based real exchange rates.

2/ While no estimation of the "equilibrium" exchange rate for Switzerland was attempted, in the spirit of the "desired equilibrium exchange rate" approach (see Bayoumi et al., 1994) and to the extent that the current ratio of net foreign assets to GDP of 100 percent is seen as appropriate, it may be argued that some appreciation of the Swiss franc is desirable if the likely increases in the foreign asset position in the next five years are to be contained.

Casual inspection suggests that capital income and payments are fairly closely associated with worldwide movements in nominal interest rates. 1/

A considerable proportion of Swiss foreign assets is in the form of multinational firms, and a portion of the factor income surplus is due to the fact that these Swiss-owned firms are located abroad rather than in Switzerland. While their total profits are accounted as part of Swiss GNP and saving, the physical investment corresponding to the profits they reinvest abroad is not accounted as Swiss investment. The contribution that foreign reinvested profits by multinational firms make to the overall current account surplus is considerable: on average over 1988-1993, it amounted to Sw F 2.7 billion, or about 0.8 percent of GDP. 2/ (Section 2.e briefly reviews some of the reasons why Swiss firms choose to locate some of their operations abroad.)

#### 5. Capital movements and composition of foreign assets and liabilities

The various components of the capital account are much more volatile over time than items in the current account. This seems to reflect changing investment strategies in the light of interest rate and other macroeconomic developments, as well as changes in tax regulations. For example, following the worldwide decrease in interest rates, Sw F 14 billion (equivalent to 4 percent of GDP) of fiduciary funds were repatriated in 1993, and presumably reinvested abroad in assets such as stocks, which may account for the especially large amount of portfolio investment outflows in the same year. 3/

In spite of the considerable year-to-year volatility of the various items in the capital account, it is possible to discern some long-run developments in the composition of the stocks of foreign assets and liabilities. The main components of net foreign assets are portfolio investments, direct investments, fiduciary funds, assets of the public

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1/ In a country like Switzerland, where the stock of net foreign assets is positive and large, in years of high inflation, the item "net capital income" is large because nominal interest rates are high. Yet, nominal interest payments are high partly to compensate the lending country for the capital loss it is incurring. Therefore, through the effect of inflation on this item, the current account surplus is an overestimate of the change in real net foreign assets for Switzerland in years of high inflation. For the counterpart of this argument in the case of highly-indebted countries, see Sachs (1981).

2/ The annual average profits that foreign multinationals reinvested in Switzerland were only Sw F 0.4 billion.

3/ Fiduciary funds are accounts care of Swiss banks, mainly consisting of short-term assets denominated in foreign currency. They are off-balance-sheet items as they reflect operations undertaken on behalf of and at the risk of the client. Their popularity is due to their fiscal advantages.

sector (mainly reserves of the central bank) and assets of banks. 1/ A residual item, which is negative, includes real estate. Though the ratio of foreign assets to GDP has remained fairly stable, their composition has changed somewhat. In particular, net foreign assets of the banking system have fallen considerably since the mid-1980s, as fiduciary funds have gradually substituted for on-balance-sheet items. 2/

A considerable proportion of Swiss net foreign assets is in the form of "direct investment," that is, mainly multinational firms. There are a number of reasons for this. First, Switzerland is a relatively small economy and it seems natural that firms would want to become multinational in order to obtain better access to foreign markets (including by jumping protectionist barriers). This is especially the case in more advanced sectors, where economies of scale are particularly important. 3/ Second, as real wages are relatively high in Switzerland, multinational firms may be able to reap the benefits of lower wages abroad.

#### 6. Errors and omissions

The item "errors and omissions," which represents the discrepancy between current account, capital account, and central bank account data, has been positive in almost every year since the 1960s. Over the last five years, it has amounted to 1 1/2 percent of GDP annually, reflecting current account receipts or capital inflows which have not been recorded.

#### 7. Net foreign asset position

Though several countries had larger gross stocks of assets, at the end of 1993, Switzerland had the third--after Japan and Germany--largest absolute amount of net foreign assets (US\$239 billion) and by far the highest ratio of net foreign assets to GDP in the world (102 percent, or five times as high as its closest competitor, the Netherlands) (Table 2). This strong position results from the almost uninterrupted series of current account surpluses which Switzerland has experienced for many years.

Official data on stocks of foreign assets and liabilities are available for Switzerland only since 1984, when the ratio of net foreign assets to GDP was 100 percent, roughly the same as today. 4/ Picchi (1992) reconstructs

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1/ As foreign direct investment is considered at book value, it may be underestimated (see Schlup, 1989).

2/ Net foreign assets of the banking system have fallen from Sw F 40 billion in 1985 to Sw F 6 billion in 1992, while fiduciary funds have risen from Sw F 44 billion to Sw F 93 billion over the same period.

3/ The historical origins of Swiss multinationals date back to the 1920s, when Swiss firms were forced to set up plants abroad in order to avoid protectionism by other countries (Picchi, 1992).

4/ By contrast, balance of trade data have been available since 1885 and current account data since 1948.

Table 2. Switzerland: International Comparisons of Foreign Assets and Liabilities

(1992, in percent of GDP) <sup>1/</sup>

	Switzerland	Belgium	Denmark	France	Germany	Italy	Japan	Netherlands	United Kingdom	United States
Foreign Assets	270	327	83	61	65	30	55	139	169	32
Foreign Liabilities	168	321	118	67	50	42	41	120	166	42
Net Foreign Assets	102	6	-36	-6	16	-11	14	19	3	-10

Sources: Monthly Bulletin, Swiss National Bank, Economic Outlook, OECD, and International Financial Statistics, IMF.

<sup>1/</sup> 1993 for Switzerland, 1991 for Denmark, 1990 for Netherlands and Belgium (includes Luxembourg).

the series for net foreign assets on the basis of current account data as far back as 1974. 1/ Although this method is imprecise, and for instance does not capture valuation adjustments, it seems safe to conclude that the ratio of net foreign assets to GDP has been between 85 and 105 percent of GDP since 1974, and was probably around 80 percent of GDP in the 1960s. Thus, current account surpluses in the past twenty years appear to have been just sufficient to maintain a relatively stable ratio of net foreign assets to GDP.

How this arises is seen by recalling that the ratio of foreign assets to GDP evolves according to the identity:

$$\frac{d\left(\frac{NA}{Y}\right)}{dt} = \frac{CA}{Y} - g \frac{NA}{Y} \quad (1)$$

where  $NA$  are net foreign assets,  $Y$  is GDP,  $CA$  is the current account surplus, and  $g$  is the growth rate of GDP. 2/ Between 1984 and 1993, the average nominal GDP growth rate was 5.4 percent and the average current account surplus 5.1 percent of GDP. From (1), it is clear that such current account surpluses and GDP growth rates are consistent with a relatively stable ratio of net foreign assets to GDP.

The underlying reasons for the near-constancy of the ratio of net foreign assets to GDP in the past may be further described using a more detailed identity. Expression (1) can be rewritten as:

$$\frac{d\left(\frac{NA}{Y}\right)}{dt} = \frac{TSB}{Y} + \left(r_A \frac{A}{Y} - r_L \frac{L}{Y}\right) - g \frac{NA}{Y} \quad (2)$$

where  $TSB$  is the current account surplus minus net capital income,  $A$  are foreign assets,  $L$  are foreign liabilities,  $r_A$  is the rate of return on foreign assets, and  $r_L$  is the rate of return on foreign liabilities. On average over 1984-1993, the current account balance excluding net capital income was -1.6 percent of GDP and net capital income (the item in brackets) was 6.7 percent of GDP. Net capital income has been high not only because of the large stock of net foreign assets, but also because the return on assets (4.9 percent) has been higher than the return on liabilities

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1/ Iklé (1972) constructs estimates for 1960, 1965 and 1968.

2/ The variables can be either all in real terms or all in nominal terms. Expressions (1) and (2) abstract from valuation adjustments (which in practice do take place, for instance, owing to changes in the exchange rate).

(3.6 percent). The observation on relative rates of return is consistent with the phenomenon of lower interest rates and rates of return on capital in Switzerland than in other countries. That rates of return on both assets and liabilities are rather low (and relatively stable) perhaps reflects the fact that only a small proportion of assets and liabilities are in equities. Overall, the ratio of net foreign assets to GDP has been roughly constant because Switzerland's earnings on its net foreign assets have almost exactly offset the effects of the small current account deficits that would occur in their absence and the effects of the growth of GDP.

The ratio of net foreign assets to GDP is not expected to undergo large changes in the near future. The outlook for the immediate future of the current account is affected by the recovery which began in mid-1993, but the current account surplus is not expected to fall much below 7 percent of GDP in 1994 and 1995--although some uncertainties remain as to whether the high level of household saving will persist and whether fiscal policy measures will be such as to bring about significant changes in government saving. Although the ratio of the current account surplus to GDP is likely to remain larger than nominal GDP growth over the medium-term, long-run aging of the population may be expected eventually to begin to lower the national saving rate, thus reducing the stock of net foreign assets. 1/ The next section considers the determinants of saving and investment behavior, though it focuses on long-run cross-country differences rather than changes over time due to the economic cycle.

### III. Savings and investment

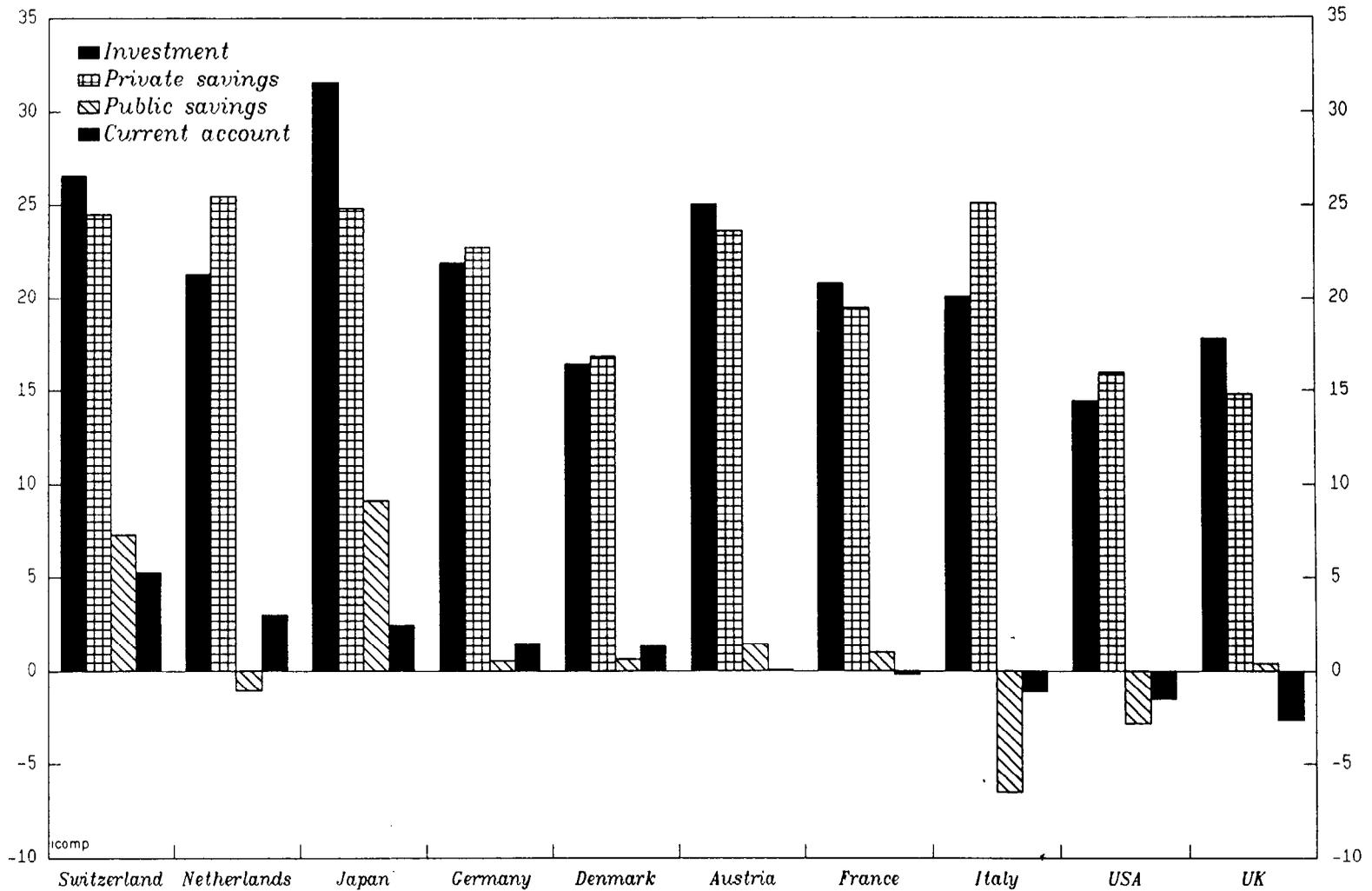
The large current account surpluses in Switzerland may be attributed to its very high national saving, both by the government and by the private sector. Domestic investment is also high by international standards, but not enough to counterbalance such high savings. Chart 3 and Table 3 provide international comparisons of private saving, government saving, (domestic) investment, and the current account, for 1988-1993. 2/ Switzerland has had the highest current account surplus among the countries considered. Its investment rate is the second highest, after that of Japan. Its private and total saving rates are almost as high as those in Japan, and its public saving rate in particular is considerably higher than in all remaining

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1/ Section 3 below briefly analyzes the consequences of aging of the population on national saving.

2/ On average, the cyclical position of the countries considered were roughly comparable over this period.

CHART 3  
 Switzerland  
 Saving, Investment, and Current Account  
 (1988-1993 averages, in percent of GDP)



Source: IMF, World Economic Outlook database.

Table 3. Switzerland: International Comparisons of Savings, Investment, and the Current Account

(Average 1988-1993)

	Switzerland	Austria	Denmark	France	Germany	Italy	Japan	Netherlands	United Kingdom	United States
Gross private savings	24.5	23.6	16.8	19.4	22.7	25.1	24.8	25.5	14.7	16.0
Of which:										
Household saving ratio	12.0	12.5	7.4	12.7	12.7	18.3	14.5	13.6	9.2	4.5
Gross public savings	7.3	1.4	0.6	1.0	0.5	-6.5	9.1	-1.1	0.4	-2.9
Gross capital formation	26.5	25.1	16.4	20.8	21.8	20.1	31.5	21.3	17.8	14.4
Current account surplus	5.2	--	1.3	-0.2	1.4	-1.1	2.4	2.9	-2.7	-1.5
Memorandum item:										
General government balance	-1.4	-2.6	-1.7	-2.7	-2.2	-10.6	1.9	-3.9	-2.8	-2.8

Sources: World Economic Outlook, International Monetary Fund.

economies in the sample. 1/ Its household saving rate, though relatively high, is not unusual by international standards, as it is lower than in Japan and several European economies including Germany and France. 2/ Thus, attempts to explain the phenomenon of large Swiss current account surpluses involve addressing the difficult question of why the overall Swiss saving rate, and the corporate and social security funds saving rates in particular, are so high. Although a great deal of effort has been made in the literature to uncover the determinants of differences in investment and--especially--saving rates across countries, few firm results have been obtained, so this section must necessarily be exploratory. The literature does suggest, however, a number of potential determinants of saving and investment rates. Based on this work, this section briefly reviews a number of factors which may be relevant to the Swiss case.

A number of factors such as political stability, efficient bureaucracies, and good infrastructure make Switzerland a good environment for investment activity to take place, and may contribute to explaining Switzerland's high domestic investment rate. Yet, as there are diminishing marginal returns to investment projects in Switzerland, it is more profitable to allocate part of the large pool of domestic savings to investment projects in other countries, particularly where labor costs are lower and there are fewer structural rigidities. However, as investment abroad may involve additional risk, which includes foreign exchange rate risk, Swiss residents may be willing to undertake domestic projects whose expected return is lower than the return they could obtain abroad. This is consistent with two observations. First, the rate of return in the business sector is low by international standards, perhaps because of structural rigidities (see Chapter III, SM/95/2). 3/ Second, the ratio of the real per capita GDP growth rate to the investment rate is the second lowest among OECD countries. 4/

The high saving rate is more difficult to explain. A number of potential factors have received attention in the empirical literature attempting to explain cross-country saving rates. These factors include

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1/ Switzerland's investment rate would be close to that of Japan and its private and total saving rates would be even higher than those of Japan, on the basis of OECD National Accounts data on net savings and investment. However, estimates of net saving and investment should be treated with special caution because of the difficulty of comparing physical capital depreciation across countries.

2/ International comparisons of household saving rates from national accounts data should be treated with caution, because the importance of unincorporated businesses varies across countries.

3/ This measure represents the rate of return on the average--rather than on the marginal--investment project in the business sector; and international comparisons of rates of return must in any case be interpreted with caution.

4/ This finding is reported in Chapter III, SM/95/2.

levels and growth rates of national income, demographic variables such as the population growth rate or the dependency ratio (Modigliani, 1970), the social security system (Feldstein, 1980), the structure of financial markets and household credit and mortgage markets in particular (Jappelli and Pagano, 1994), the inflation rate, the degree of uncertainty, the type of tax incentives. A review of this literature is provided by Bosworth (1993), who concludes that these variables "appear to do very little to explain variations in rates of saving across countries" (p. 78).

Switzerland does not seem to be truly unusual with respect to any of these economic, demographic, or institutional variables. In addition, some peculiarities of the Swiss economy seem to point in the direction of low--rather than high--savings: its low degree of uncertainty would imply a limited precautionary motive for saving; its relatively low growth rates of income and population would imply low saving rates in the original version of the life-cycle model (Modigliani, 1966; subsequent literature has challenged these results: see Bosworth, 1993, for a review); its high wealth (high net foreign assets in particular) would also tend towards high consumption relative to income, that is, a low saving rate.

On the other hand, some features peculiar to the Swiss economy might contribute to explaining its high saving rate. These might include the structure of its domestic financial markets, its social security system, and its high per capita income levels. The first two features are of particular relevance to current policy issues and are briefly discussed in turn. 1/

Though Switzerland is an important international financial center, its domestic financial institutions might offer more restricted borrowing opportunities to consumers and firms than is the case in other countries such as the United States. 2/ The presence of borrowing constraints might raise the private saving rate. The extent to which Swiss consumers may be liquidity constrained is estimated in Annex 1, by adopting the conventional methodology used in tests of "excess sensitivity" of consumption. The proportion of consumers who are liquidity constrained in Switzerland is found to be significantly positive, and higher than that in the United States, but lower than that in Italy, Spain, or Greece. Therefore, it seems unlikely that borrowing constraints provide a complete explanation for the phenomenon of relatively high private savings in Switzerland.

The social security system may play a significant role in bringing about high saving rates in Switzerland. The public social security system is complemented by numerous other funds, which in 1990 accounted for around

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1/ It is sometimes argued that high income per capita levels make individuals more willing to wait before consuming. A full discussion of this relationship is beyond the scope of this paper.

2/ Further information on the structure of Swiss financial markets is provided in Chapter III, SM/95/2.

40 percent of all pension disbursements. 1/ These supplementary funds are subject to public supervision, but generally receive no transfers from the public sector and are for the most part fully funded. Membership in one of the employment-related pension funds (the "second pillar") has been mandatory for most employees since 1985. While the saving of the public social security funds has typically not amounted to more than 1 percent of GDP in recent years, the saving of the private funds has regularly been of the order of 5 percent of GDP. In addition, there are tax incentives in favor of saving towards a life insurance which is convertible into a pension (Kapitallebens-Versicherung). 2/

These considerations seem to suggest that the social security system is a significant factor underlying the high Swiss saving rate. Quantification of these effects is difficult, as the precise extent to which discretionary private saving falls as a result of mandatory saving into a pension fund is a matter of debate. 3/ Nevertheless, the likely decline of the net saving of the second pillar funds (due to the aging of the population and estimated by Wechsler and Savioz (1993) to be from 4 percent of GDP at present to 1 percent of GDP in 2024) may be expected to have substantial consequences on the overall saving rate; similarly, reform of the social security system should take into account its potential effects on national savings. 4/ Aging will be a particularly severe phenomenon in Switzerland, where the proportion of the population aged 65 or over in the total population is projected to be the highest among OECD countries by 2010.

Overall, it seems difficult to provide a full explanation of the high Swiss saving rate on the basis of economic and institutional variables. As a consequence, popular debate often resorts to attributing the high saving rate in Switzerland to the "thriftiness" of the Swiss. Of course, this tautology merely amounts to admitting ignorance. In addition, in an empirical study, Carroll et al. (1994) fail to find any evidence in favor of the contention that national "culture" determines saving behavior. 5/

Most of the previous explanations focus on private (and more precisely, household) savings. High government savings are the result of the policy

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1/ See Chapter I, SM/95/2, for a full description of the pension system. The investment policies of the supplementary pension funds are extremely conservative. They invest a large proportion of their assets domestically, in government bonds--as well as real estate. Meier (1983) argues that this may provide an explanation for Switzerland's relatively low interest rates.

2/ After about ten years, contributions to Kapitallebens-Versicherung become tax-exempt.

3/ A survey is provided by Munnell (1987).

4/ See Chapter I, SM/95/2, for a discussion of the prospects for the public social security funds.

5/ The study by Carroll et al. (1994) tests the hypothesis that cultural factors influence saving by comparing saving patterns of immigrants to Canada from different cultures.

choices made by the government. For purposes of policy discussion, these may be taken to be exogenous. To the extent that one may want to endogenize them, they might be attributed to the institutional structure of Swiss government and--for example--to its high degree of political stability.

Whether Switzerland's high national savings constitute a problem or not is a question that can be approached either from an international or from a national perspective. From either perspective, there does not seem to be a sense in which savings can be described as "too high." From an international point of view, the persistent external surplus might be undesirable only if it was due to trade restrictions (combined with inflexible exchange rates), which is not the case in Switzerland. 1/ In addition, the contribution high Swiss savings make to global savings needs to be recognized. A substantial proportion of Swiss savings is channeled to investments in other countries, where their marginal product is higher, as suggested by Table 4. From a national perspective, savings decisions by Swiss individuals do not seem to be unduly distorted by market imperfections. In particular, there is no evidence that borrowing constraints in Switzerland are particularly high by international standards. Furthermore, it may be argued that high national savings and their persistence for many years may have contributed to the low real interest rates from which Switzerland has benefited, compared with other countries. Section 4 is concerned with reviewing evidence on this point.

#### IV. Interest rates

Switzerland has often been referred to as an "interest rate island." This description usually refers to the following two features of Swiss interest rates. First, real interest rates have been lower in Switzerland than in most other industrialized countries. Second, Swiss interest rates seem to be "decoupled" from the "world" interest rate to a greater extent than is the case for interest rates of other countries. 2/ In particular, the covariance between Swiss and U.S. interest rates is often thought to be comparatively low. Therefore, Swiss business has benefited from low interest rates and the Swiss economy has been relatively sheltered from fluctuations in the "world" interest rate. These two features, although perhaps not unrelated, are analyzed in turn.

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1/ See Section VI.5 of the report on Recent Economic Developments.

2/ There is still some debate on this point in the literature. For example, Cumby and Mishkin (1986) are unable to reject the hypothesis that Swiss real interest rates are unaffected by U.S. real interest rates. By contrast, Kirchgassner and Wolters (1987) find that Swiss interest rates in the 1980s react even more quickly than German rates do to changes in U.S. interest rates.

Table 4. Switzerland: International Comparisons of Interest Rates and Rates of Return

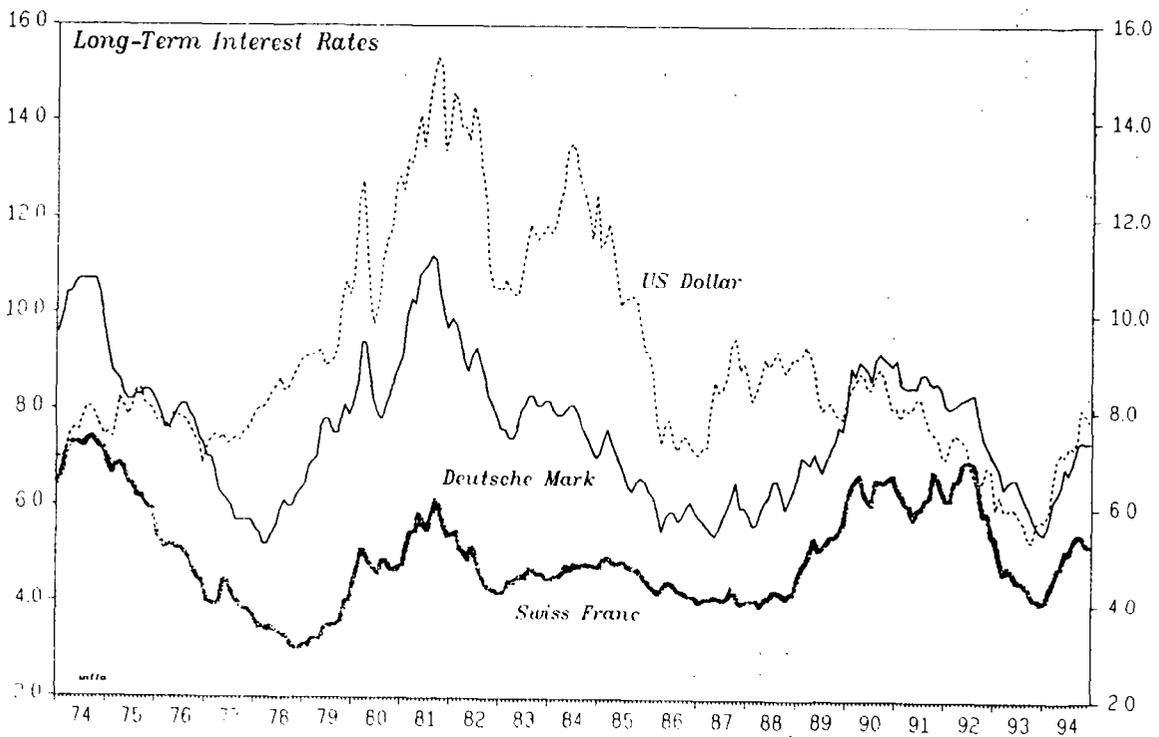
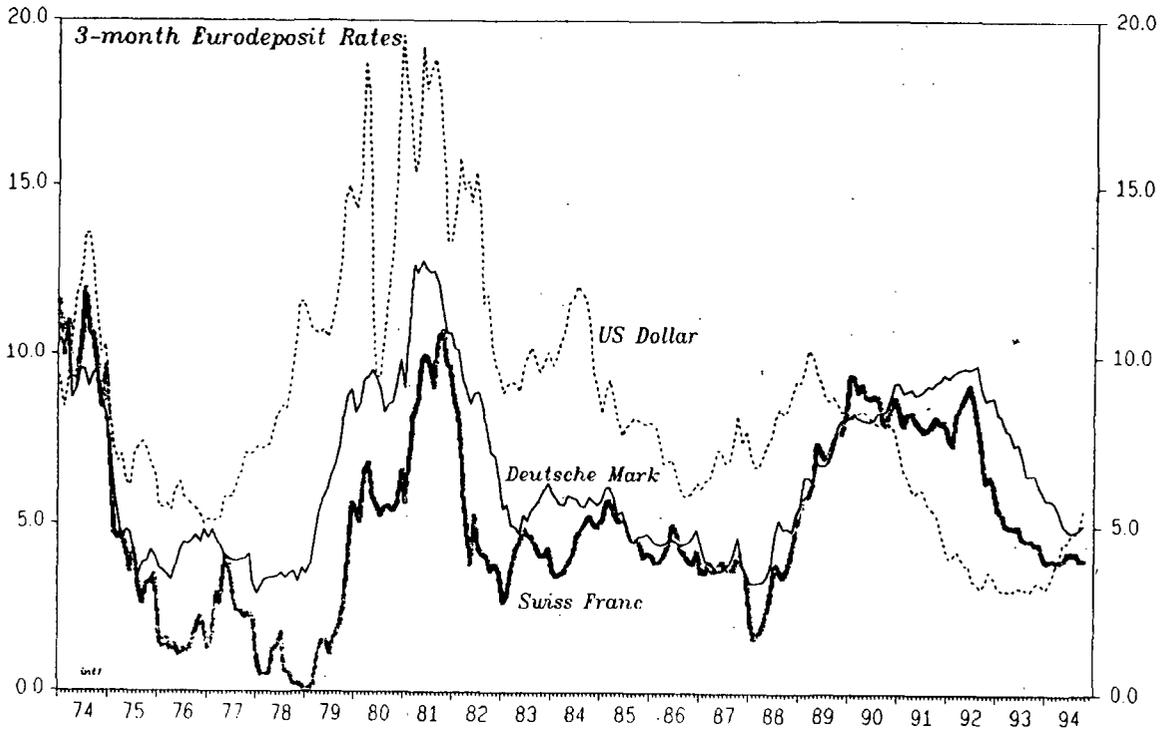
(Average 1980-1994, in percent)

	Switzerland	Austria	Belgium	Denmark	France	Germany	Italy	Japan	Netherlands	United Kingdom	United States
<b>Interest Rates</b>											
<b>Nominal rates</b>											
Short term	5.0	7.3	9.8	11.1	10.2	6.4	13.8	5.6	6.7	11.1	7.5
Long term	4.9	8.0	9.9	12.6	10.6	7.7	14.0	6.3	7.9	10.5	9.5
Inflation	3.5	3.6	4.2	5.3	5.8	3.3	9.3	2.4	2.8	6.4	4.9
<b>Real rates</b>											
Short term	2.0	3.7	5.5	5.8	4.5	3.7	4.5	3.3	4.8	4.8	2.5
Long term	1.4	4.5	5.6	7.3	4.8	4.4	4.7	3.9	5.0	4.1	4.6
<b>Rate of return in the business sector</b>											
Nominal	9.1	10.8	11.6	9.7	12.6	12.5	12.8	14.3	16.8	10.0	15.8
Real	5.6	7.2	7.4	4.4	6.9	9.2	3.4	11.9	14.0	3.6	10.9

Sources: World Economic Outlook, International Monetary Fund, and OECD Economic Outlook.

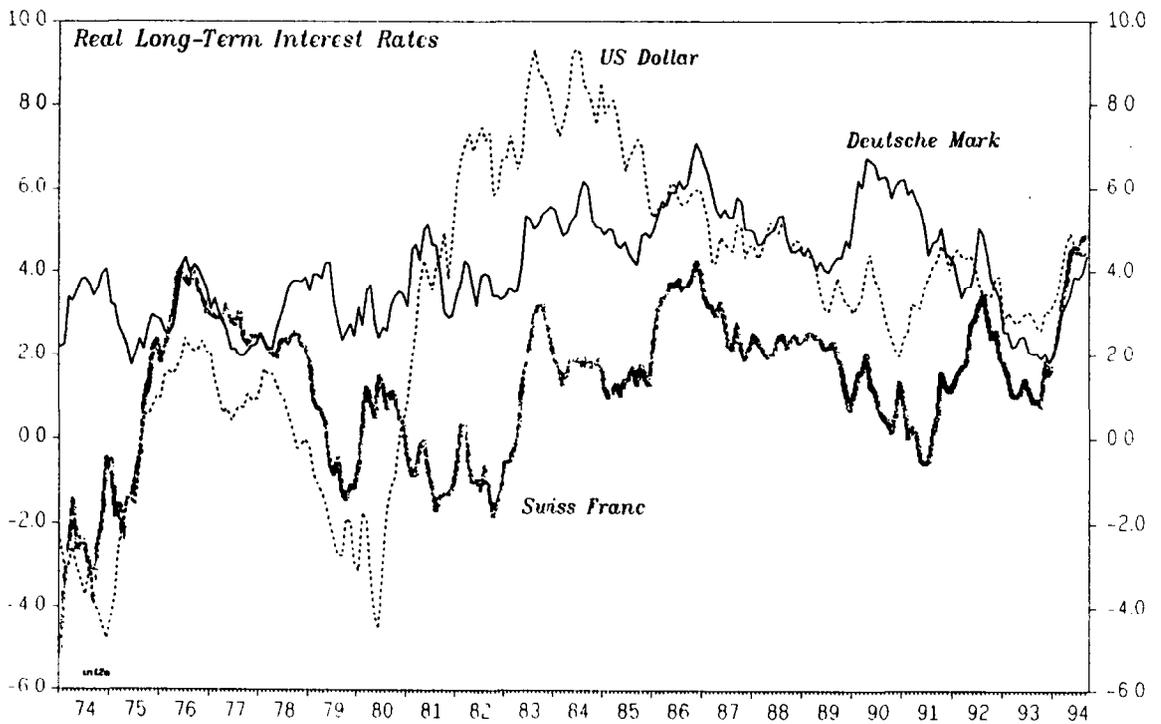
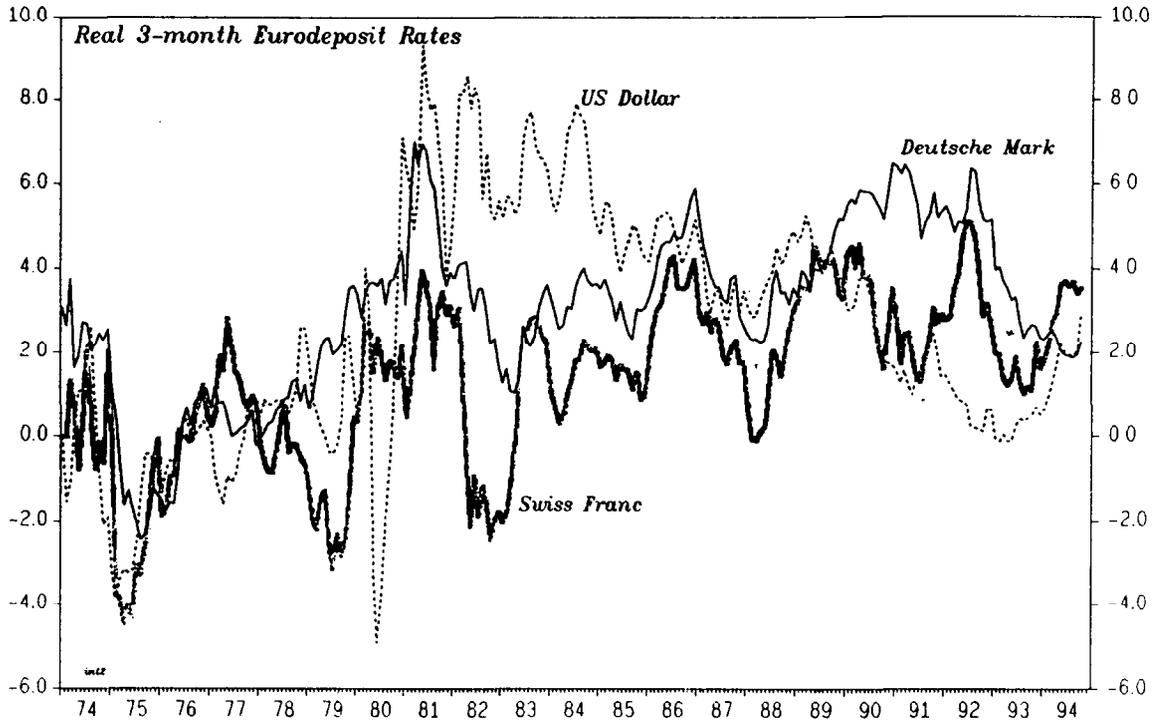
CHART 4  
Switzerland

Nominal Interest Rates



Sources: IMF, International Financial Statistics; and Swiss Institute for Business Cycle Research, data tape.

- 23 -  
CHART 5  
Switzerland  
Real Interest Rates 1/



Sources: IMF, International Financial Statistics; and Swiss Institute for Business Cycle Research, data tape.

1/ Calculated using backward-looking annual rate of CPI inflation.

1. Low interest rates

Both short-run and long-run nominal and real interest rates in Switzerland have been low by international standards. 1/ For example, real 3-month Eurocurrency interest rates have been 1.45 percentage points lower on Swiss franc than on deutsche mark deposits, on average during the period 1974-93. 2/ Although the differential has fluctuated considerably, it has almost always been favorable to Switzerland. Charts 4 and 5 show Swiss, German, and U.S. nominal and real interest rates, respectively, since 1973, and Table 4 shows the 1980-94 averages of nominal and real interest rates, inflation, and the rate of return on capital in the business sector in selected OECD countries. Real interest rates have been lower in Switzerland than in most other industrialized countries. 3/

This paper focuses on real interest differentials, for two reasons. First, low real--rather than nominal--interest rates are what facilitates investment. Second, the nominal interest differential can be split into two components: a real interest, and an expected inflation, differential, and the expected inflation differential can be easily attributed to Switzerland's relatively low and stable inflation performance.

The potential sources of the real interest rate differential from which Switzerland has benefited may be analyzed by means of a widely used decomposition (see, for example, IMF, 1991, and Frankel, 1992). The ex ante real interest rate differential is defined as

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1/ The discussion in this paper concentrates on gross returns, that is, it abstracts from tax considerations. From the point of view of Swiss investors, the differential tax treatment seems to be in the wrong direction to explain the interest differential. Swiss residents benefit from considerable tax advantages on their fiduciary funds, which are largely denominated in foreign currency. Mark (1985) shows that differential taxation treatments do not contribute to explaining (gross) interest differentials. In particular, he points out that taxation treatment of investments relates to their location, rather than to their currency denomination. Meier (1983) argues that Swiss bonds enjoy a tax advantage thanks to Switzerland's low inflation rate. Taxation of income tends to be higher than taxation of capital gains, so that low nominal interest rates would constitute an advantage. However, this argument clearly cannot apply to the differential between Swiss and German rates.

2/ The rate of inflation used is ex post, based on the consumer price index, and drawn from International Financial Statistics.

3/ The standard deviation of nominal and real interest rates in Switzerland has also been low by international standards. On the other hand, the coefficient of variation (that is, the standard deviation divided by the mean) has not been unusual compared with other countries.

$$r^e - r^{e*} = (i - \Delta p^e) - (i^* - \Delta p^{e*}) \quad (3)$$

where  $r$  is the real interest rate,  $i$  is the nominal interest rate,  $p$  is the logarithm of the consumer price index,  $e$  superscript denotes expectations, and  $*$  superscript denotes the foreign variables. As a matter of definition, this can be split into two components:

$$r^e - r^{e*} = (i - i^* - \Delta s^e) + (\Delta s^e - \Delta p^e + \Delta p^{e*}) \quad (4)$$

where  $s$  is the logarithm of the spot exchange rate (defined as the domestic currency price of one unit of foreign currency).

The first term in brackets equals the differential between the nominal returns on Swiss and foreign assets plus the expected appreciation of the Swiss franc. By definition, this term will equal zero if and only if uncovered interest parity holds. 1/ The second term in brackets equals the expected differential between foreign and Swiss inflation plus the expected nominal depreciation of the Swiss franc, that is, it equals the expected real depreciation of the Swiss franc. By definition, this term will equal zero if and only if ex ante relative purchasing power parity holds. Uncovered interest parity (UIP) and ex ante relative purchasing power parity (PPP) are appealing benchmarks, and any proposed explanation for a real interest rate differential may be interpreted in terms of departures from one of these benchmarks. 2/ In what follows, a number of possible reasons for discrepancies from UIP and from PPP are analyzed in turn. Subsequently, the decomposition is applied to data on the differential between real interest rates in Switzerland and a number of other leading industrial economies. It is shown that both components seem to matter in the case of Switzerland.

(a) The rationale for departures from uncovered interest rate parity

A potential reason for departures from uncovered interest rate parity in the direction of lower interest rates in Switzerland than abroad may be suggested in the spirit of the so-called "portfolio balance models." The latter are based on the hypothesis that stocks of wealth are allocated among assets denominated in different currencies, depending on their relative expected returns (see, for example, Bosworth, 1993, Hallwood and

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1/ In other words, uncovered interest parity holds when assets denominated in different currencies yield the same expected return, expressed in a common currency.

2/ Deviations from UIP and PPP do occur in a number of countries, as documented by Cumby and Obstfeld (1984) among others.

MacDonald, 1994). It may be argued that Swiss residents can be induced to hold a net positive stock of assets denominated in foreign currency only if the return on those assets exceeds that implied by UIP (that is, if the expected return on assets denominated in foreign currency is higher than that on assets denominated in Swiss francs), because of the exchange rate risk associated with holding foreign assets. 1/ Covered interest parity (CIP) can be safely assumed to hold, implying that the excess over uncovered interest parity is equivalent to an "exchange rate risk premium." 2/ As Switzerland is a net lender vis-à-vis the rest of the world, it is likely that both the Swiss lenders and the foreign borrowers are bearing an exchange rate risk. 3/ Lower Swiss interest rates than implied by UIP therefore would reflect an exchange rate risk premium required by Swiss residents who lend in foreign currency and foreign residents who borrow in Swiss francs. 4/ This explanation seems to be the most appealing one in accounting for the discrepancy from uncovered interest parity. Deviations from uncovered interest parity cannot be easily arbitrated away, because they involve "risky" arbitrage, and can therefore persist for a long time.

The importance of high savings both by the private and by the public sector then becomes apparent in this context. High national savings have

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1/ Deviations from UIP imply that assets denominated in domestic and foreign currency are imperfect substitutes (for example, because of exchange rate risk), and are compatible with perfect capital mobility.

2/ Covered interest parity states that the return on Swiss bonds, and the return on, e.g., German bonds combined with a forward sale of deutsche mark, will be the same, as neither transaction involves any foreign exchange risk. Discrepancies from CIP would imply the possibility of riskless arbitrage, and are often used as a test of international capital mobility. CIP has been well established in the literature, especially if Eurodeposit interest rates and forward exchange rates are observed on the London Eurocurrency market (Hallwood and MacDonald, 1994, Frenkel and Levich, 1977, 1981). Frankel (1992) decomposes the real interest rate differential as follows:

$$r - r^* = (i - i^* - f_d) + (f_d - \Delta s^e) + (\Delta s^e - \pi + \pi^*)$$

where  $f_d$  is the forward discount on the exchange rate. The first term in brackets is the deviation from covered interest parity, the second is the exchange rate risk premium, and the third is the expected real exchange rate depreciation. Assuming that CIP holds amounts to assuming that  $i - i^* = f_d$ , and this makes it easy to interpret deviations from UIP as the exchange rate risk premium.

3/ In 1987, net foreign assets in foreign currency amounted to a value equivalent to Sw F 176 billion (equivalent to 69 percent of Swiss GDP), while net foreign assets in domestic currency were Sw F 68 billion (27 percent of GDP) (see Schlup, 1988).

4/ The view that exchange rate risk is an important determinant of real interest rate differentials is consistent with the empirical observation that real interest differentials have widened after the move to floating exchange rates (Mishkin, 1984, p.1352; Caramazza et al., 1986, pp. 43-47).

contributed to creating a large stock of net foreign assets. Decreases in national saving would lead to a worsening of the current account balance. Should this occur, the stock of net foreign assets held by Swiss residents would gradually fall. As a consequence, interest rates on assets denominated in Swiss francs would rise, thereby reducing that portion of the real interest differential due to deviations from UIP.

A similar argument, relying on the idea that international capital flows are determined by the relative returns on assets in the various countries is presented in Annex 2, through a simple graphical exposition. According to this alternative view, the desired capital inflow is a positive function of deviations from UIP and therefore, other things being equal, of the domestic interest rate. The lower are interest rates in Switzerland, the lower will be capital flows into Switzerland. According to the identity  $S+CF=I$ , where  $S$  is national saving,  $CF$  is capital inflow, and  $I$  is domestic investment, interest rates are jointly determined by saving, capital inflow, and investment preferences. Therefore, in this flow-based model, high national propensity to save, high desired capital inflows, and low propensity to invest domestically all tend to bring about low interest rates. Again, decreases in national saving would bring about a rise in interest rates, which according to this model would take place immediately.

In the case of Switzerland, national saving is well above investment, so that a capital outflow results. Yet, it might be expected that Switzerland's reputation for being a "safe haven" would imply high propensity to capital inflow, which would in turn contribute to maintaining interest rates low in Switzerland. Following Äberhardt and Zumstein (1990), in this paper the term "safe haven" is taken to apply to the location of the investment, rather than to the currency in which it is made. According to this "safe haven" argument, some investors supply funds to Switzerland at lower interest rates than they would to other countries, because they are willing to pay a premium for holding their assets there. This additional supply of funds would lower the equilibrium interest rate in Switzerland.

One way of evaluating the validity of the "safe haven" argument is to compare the returns on assets having the same characteristics--and, in particular, denominated in the same currency--held in Switzerland and abroad. In September 1994, the deposit rate paid by Swiss commercial banks was 3.75 percent, while the Euromarket rate was 4.18 percent. This discrepancy is not unusually large by international standards and might simply be related to transaction costs. 1/ Therefore, on this basis, there is no evidence of a "safe haven" premium on assets held in Switzerland.

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1/ Frankel and MacArthur (1988) found that local Swiss interbank rates were 0.46 percentage points (standard deviation of the mean: 0.03) higher than Eurodollar rates on the London market converted to Swiss francs using the forward exchange rate, for the period September 1982 to March 1987.

However, observing differences between the returns on similar assets denominated in the same currency but held in different locations is a sufficient, but not a necessary, condition for the "safe haven" argument to be valid. The marginal investor is likely to be an agent--perhaps an investment bank--for whom "safe haven" considerations are irrelevant, and who therefore arbitrages away any "safe haven" premium. There might still be some investors who deposit their funds in Switzerland at a lower rate than they would be able to obtain elsewhere; by raising the overall demand for assets denominated in Swiss currency, their presence might lower the equilibrium interest rate. But two considerations suggest that the empirical relevance of this effect on interest rates may be at best very limited. First, it seems likely that the Swiss banking system can easily absorb the extra supply of funds, without resorting to paying much lower interest rates, because it can reinvest the additional deposits in assets abroad. 1/ Secondly and more importantly, it is important to recall that what requires explanation is the fact that the return on assets denominated in Swiss currency (as opposed to deposited in Switzerland) is relatively low. Investors who are attracted by the Swiss "safe haven" do have the opportunity to hold accounts in Swiss banks in currencies other than the Swiss franc, so the additional supply of funds might be directed to the Swiss banking system, but would by no means be confined to assets denominated in Swiss francs. 2/

A related argument links the phenomenon of relatively low interest rates on assets denominated in Swiss francs to the low degree of political risk in Switzerland. Again it is important to distinguish between the return on assets denominated in Swiss currency and assets held through the Swiss banking system. In addition, it is important to clarify which interest rates the argument applies to. For example, it seems unlikely that political risk considerations should apply to short-term interest rate differentials on the London interbank Eurocurrency markets.

Even as far as the long-term interest rate differential is concerned, it seems implausible that political risk may provide a full explanation. Although there have been no systematic empirical studies of the relationship between interest rates and political risk, the difference in political risk

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1/ As a minor consequence, it might pay slightly lower interest rates as a compensation for foreign exchange rate risk, if these assets are denominated in other currencies.

2/ Indeed, in 1987 (the last year for which published data are available), the proportion of total foreign liabilities of the Swiss banking system which was denominated in foreign currencies was above 40 percent (Schlup, 1988).

between Germany and Switzerland seems to be too small to explain the differential between their interest rates. 1/

There is one special sense, however, in which Switzerland's political stability might cause its interest rates to be lower than implied by UIP. Though this phenomenon has not been studied in a systematic way, popular debate seems to assume that the Swiss franc tends to appreciate in times of unexpected political turmoil in other countries. One might speculate that investors may be willing to accept lower interest rates on assets denominated in Swiss francs, because they expect that--should political crises erupt in other countries--these assets will yield high returns (due to the appreciation of the Swiss franc) exactly at times when the value of their other assets falls.

Overall, it seems that the observed deviation from UIP is to be largely attributed to a foreign exchange rate risk premium compensating Swiss residents who invest in foreign currency and foreign residents who borrow in Swiss francs, while "safe haven" and political risk considerations may at best play only a minor role.

(b) The rationale for departures from purchasing power parity

Real interest rate differentials may in principle be due to imperfect integration of goods markets, which makes departures from PPP possible. Goods arbitrage, which underlies theoretical arguments for why purchasing power parity ought to hold, can only be applied to tradable goods. Switzerland has experienced very high inflation in the nontradables sector relative to inflation in the tradables sector, even by international standards. In particular, this has been the case compared to its main European trading partners, namely Germany, France, and Italy. 2/ Therefore, to the extent that real appreciation of the Swiss franc occurs, it may in part be due to the high relative inflation rate in the nontradables sector. The phenomenon of low real interest rates in Switzerland may thus in part reflect structural inefficiencies.

(c) Empirical decomposition of the real interest rate differential

In what follows, the real interest differential between assets denominated in Swiss francs and other currencies is decomposed into deviations from uncovered interest rate parity and deviations from

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1/ The degree of political risk is difficult to compare across countries. A possible comparison would use subjective indices produced by private country risk assessment services. For example, the Business International "country risk" indices--which are based on questionnaires, on a scale from 0 (worst) to 10 (best)--for 1980 were 9.5 for Switzerland and 8.5 for Germany, with a standard deviation for 70 countries of 1.7.

2/ Evidence on this is reported in Chapter III, SM/95/2.

purchasing power parity. The data are one-month Eurodeposit rates for Switzerland, France, Germany, Italy, Japan, the United Kingdom, and the United States, during the period January 1979 to January 1994.

To obtain an empirical decomposition of the real interest rate differential into deviations from UIP and PPP, a method of estimating expected price inflation and changes in the exchange rate is required. This paper adopts the standard rational expectations approach of using actual (ex post) observations as proxies for the expected (ex ante) variables. 1/ Inflation rates are relatively predictable, so that actual inflation does not prove to be excessively noisy as a proxy for expected inflation. This predictability makes it possible to show that the real interest rate differential from which Switzerland has benefited is statistically significant at the conventional levels vis-à-vis all other countries in the sample. By contrast, the high volatility of exchange rates implies that ex post as a proxy for ex ante appreciation contains substantial measurement error. As a consequence, the average expected return is estimated rather imprecisely, and the ensuing low power of the tests means that it is difficult to reject the hypothesis that it is equal to that implied by any particular theory. 2/ Indeed, even over such a long period, the mean discrepancies from UIP and PPP are not significant at the conventional levels in any of the cases considered here. 3/ As a consequence, the following observations based on the average values of the discrepancies from UIP and PPP should be interpreted as merely suggestive. The results are reported in Table 5.

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1/ According to the condition of weak rationality in expectations, ex ante expected changes are equal to actual changes ex post, subject only to a random, unpredictable error. This amounts to the reasonable assumption that people do not consistently make forecasting errors in the same direction.

2/ The power of a test is the probability that the null hypothesis will be rejected when it is false.

3/ This is the usual finding (see, for example, Frankel and MacArthur, 1988).

Table 5. 1-Month Eurocurrency Rates, Spot Exchange Rates and Inflation, January 1979--January 1994 1/

(Percentage points on a yearly basis; standard deviation of the mean in brackets)

	Real Interest Rate Differential			Excess over Uncovered Interest Parity	Excess over Purchasing Power Parity
	r-r*			i-i* - Δs	Δs - Δp + Δp*
	1979-86	1987-94	1979-94	1979-94	1979-94
Swiss - French	-4.21 (1.01)	-3.63 (0.45)	-3.94 (0.58)	-2.96 (1.53)	-0.99 (1.59)
Swiss - German	-2.68 (0.47)	-1.43 (0.44)	-2.10 <sup>†</sup> (0.33)	-1.06 (1.35)	-1.04 (1.32)
Swiss - Italian	-3.59 (0.95)	-3.60 (0.41)	-3.60 (0.49)	-3.09 (1.96)	-0.04 (1.78)
Swiss - Japanese	-3.00 (0.89)	-0.66 (0.76)	-1.90 <sup>†</sup> (0.60)	-4.03 (3.00)	2.13 (3.01)
Swiss - UK	-3.50 (0.89)	-3.11 (0.74)	-3.32 (0.59)	-3.28 (2.57)	-0.04 (2.64)
Swiss - US	-4.28 (0.57)	0.22 (0.50)	-2.17 <sup>†</sup> (0.42)	-2.58 (3.61)	0.41 (3.56)

Sources: WEFA for interest rates and exchange rates and IFS for consumer price indices; and staff estimates.

<sup>†</sup> Indicates that the mean real interest differential is significantly lower in 1987-94 than in 1979-86 at the 5 percent level.

1/ There are 181 monthly non-overlapping observations for each differential. 25 observations are missing for Italian lira Euro-deposit rates.

Real interest rates have been significantly lower in Switzerland than in all countries considered. For example, the real interest differential vis-à-vis Germany was 2.1 percentage points on average and its standard deviation was 0.33 percentage points, so that the differential is statistically significant at any conventional level. Swiss interest rates have been lower than would be implied by UIP, compared with all countries in the sample. For example, an investment in deutsche mark would have earned on average 1.06 percentage points a year more than an investment in Swiss francs, in common currency terms, over the period 1979-1994. At the same time, the Swiss franc has experienced a real appreciation vis-à-vis the deutsche mark and the French franc, and a real depreciation vis-à-vis the

Japanese yen and--to a lesser extent--the U.S. dollar. 1/ In the case of Germany, Switzerland's main trading partner, real exchange rate appreciation and exchange rate risk premium count in roughly equal measure towards explaining the real interest differential.

Table 5 also reports the average real interest differential between Switzerland and other major industrial countries for two sub-samples, namely 1979-1986 and 1987-1994. 2/ In the later sub-sample, the differential has fallen significantly vis-à-vis Germany, Japan, and the United States (to the point of disappearing in the case of the United States), though not with respect to the other countries considered. Thus there are some indications that the differential may be on a downward trend, and it is tempting to speculate that this development may be linked to the recent change in fiscal behavior in Switzerland; it is too early, however, to reach such conclusions.

Overall, it seems safe to conclude that the real interest differential is due both to failures of UIP and failures of PPP. The exchange rate risk premium may be interpreted as compensating Swiss residents for holding positive net assets denominated in foreign currency. The appreciation of the real exchange rate may be interpreted as being partly the consequence of high relative inflation in the nontradables sector in Switzerland, compared with other countries.

## 2. Decoupling

Though this issue is far from being unambiguously resolved, previous literature has claimed that the covariance of Swiss interest rates with those of other countries and, most notably, those of the U.S. is relatively low. This section provides some evidence on this claim. Charts 4 and 5 show nominal and real interest rates in Switzerland, Germany and the United States since 1973. At high frequencies, Swiss, German and--to a lesser extent--U.S. interest rates vary together to a very high extent. At lower frequencies, the extent to which Swiss interest rates vary together with German rates remains high, while the covariance between U.S. and Swiss rates becomes lower. Thus the month-to-month changes tend to be in the same direction for all three countries, but if one looks at averages over periods of more than one year, the relationship between Swiss and U.S. interest rates becomes weaker. This impression is confirmed by the correlations of

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1/ The real depreciation vis-à-vis the Japanese yen is to be expected, given the fast growth rate of the Japanese economy, and the well-known empirical regularity that inflation tends to be higher in the nontradables sector than in the tradables sector as economic growth takes place (Balassa, 1964).

2/ The cutoff date was chosen a priori as it splits the period into two roughly equal sub-samples and as it broadly coincides with the first signs of a decline in government saving.

nominal and real interest rates for Switzerland and other leading industrial economies (Table 6).

The extent to which Switzerland is "decoupled" from worldwide changes in interest rates can be evaluated in the light of recent developments in bond markets. Since the beginning of 1994, long-term bond yields in industrial countries have risen sharply. The coincident timing of the upturns in bond yields in most countries points to the role of common global factors, and to increases in investment demand and perhaps expected inflation in particular. Yet the extent to which bond yields have risen has varied considerably across countries. Switzerland stands out as the country displaying the smallest increase (1.2 percentage points, compared to an average of 2 percentage points for all industrial economies) in long-term bond yield between January (roughly the recent low point in the long-term bond yield for most industrial countries) and August 1994. <sup>1/</sup> Some commentators have argued that increases in long-term bond yields have tended to be lower in countries with good records of low and stable inflation and low general government deficits. Switzerland is perceived as having a very credible monetary policy, yet it seems that investors were not troubled by its recent relatively high budget deficit. One might speculate that the recent fall in government saving may have been perceived as a temporary departure from the norm.

#### V. Conclusions

This paper has attempted to describe the determinants of the main items in the Swiss balance of payments, and to bring two striking features of the Swiss economy--large current account surpluses and relatively low real interest rates--within a coherent framework. It has argued that high national savings may contribute to explaining both phenomena. In particular, exchange rate risk premia may be interpreted as compensating Swiss residents for holding net positive assets in foreign currency. Since 1988, there has been a decrease in public savings, which has only in part been due to cyclical factors. So far, the current account surplus has not fallen, owing to the increase in household savings and the fall in investment which have coincided with and more than offset the fall in public savings. However, as the recovery continues, investment and consumption may be expected to rise. Therefore, unless the increase in the budget deficit is reversed, it may be expected to lead to a combination of lower current account surpluses and higher interest rates. Another component of the real interest differential, namely the real exchange rate appreciation, might be partly related to the high relative inflation rate in the nontradables sector, and thus to structural inefficiencies in the Swiss economy.

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<sup>1/</sup> The full set of data for all countries is reported in the October 1994 World Economic Outlook.

Table 6. Switzerland: Correlation Matrix of Nominal  
and Real Interest Rates

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	Switzerland	France	Germany	Japan	United Kindgom	United States
Switzerland	1	0.07	0.42	-0.04	0.15	0.16
France	0.03	1	0.15	0.14	0.18	0.11
Germany	0.75	0.21	1	0.14	0.23	0.31
Japan	0.30	0.22	0.45	1	0.38	0.25
United Kingdom	0.30	0.13	0.38	0.71	1	0.17
United States	0.04	0.33	0.34	0.54	0.61	1

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Source: Staff estimates based on WEFA Group data bank and International Financial Statistics, IMF.

1/ The correlations of nominal interest rates are reported below the diagonal and those of real rates above the diagonal.

Excess Sensitivity in Swiss Consumption

This section estimates the extent to which Swiss consumption responds to expected changes in disposable income, as an indication of whether high private saving rates in Switzerland may be partly due to borrowing constraints. It follows the familiar procedures developed in the literature on tests of "excess sensitivity" of consumption. These tests rely on estimating whether the proportion ( $\lambda$ ) of consumers who are liquidity constrained, and hence do not smooth their consumption through borrowing, is significantly above zero. 1/ Consumption in liquidity-constrained households is assumed to be a constant fraction of disposable income, so that it evolves according to:

$$c_{1t}/c_{1t-1} = y_t/y_{t-1} \quad (A1)$$

where  $c_1$  is consumption by the liquidity-constrained households and  $y$  is disposable income. In turn, consumption of unconstrained households,  $c_2$ , accords with the first-order (Euler) condition:

$$c_{2t}/c_{2t-1} = \alpha (1 + r_t) \quad (A2)$$

where  $r$  is the real interest rate,  $\alpha$  is the rate of intertemporal preference, and utility has assumed to be logarithmic for the sake of simplicity. 2/ A linear combination of these subaggregates, with the proportionality factor  $\lambda$ , gives aggregate consumption,  $c$ , which evolves according to:

$$c_t/c_{t-1} = \lambda c_{1t}/c_{1t-1} + (1-\lambda)c_{2t}/c_{2t-1} \quad (A3)$$

Therefore, the following model can be estimated:

$$c_t/c_{t-1} = \lambda y_t/y_{t-1} + \alpha r_t \quad (A4)$$

If  $\lambda$  is found to be positive and significant, then there is evidence of "excess sensitivity". The model is estimated on Swiss quarterly data, using two different techniques: ordinary least squares (OLS) and instrumental variables (IV). 3/ The latter is the appropriate and more usual procedure, since income and the real interest rate in the Euler equation are expected values. The results are reported in Table 7.

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1/ See Campbell and Mankiw (1989).

2/ For simplicity, we follow Campbell and Mankiw (1989) in assuming that the marginal utility of consumption is linear.

3/ The data on consumption, disposable income, and interest rates are from the Swiss Institute for Business Cycle Research.

Table 7. Consumption equations: Sample 1971Q1 - 1993Q4

	Dependent variable: $\Delta(\log c)$	
	OLS	IV <u>1/</u>
Constant	0.002 (6.34)	0.002 (5.59)
$\lambda$	0.439 (18.80)	0.38 (6.42)
$\alpha$	-0.0001 (1.34)	-0.0004 (1.95)
$R^2$	0.806	0.767
DW	1.8	1.59

1/ Instruments were income, consumption, and interest rates lagged three and four quarters, and the consumption/income ratio lagged four quarters.

The parameter  $\lambda$ , which measures the proportion of liquidity-constrained consumers, is positive and significant. Other authors have estimated similar equations for other countries. Jappelli and Pagano (1989) find  $\lambda$  to differ considerably across countries, ranging from 0.12 in Sweden to 0.58 in Italy. 1/ They find that the excess sensitivity of consumption is higher in countries where consumer borrow less. Their result lends support to the interpretation that the degree of excess sensitivity of consumption to current income is an indicator of liquidity constraints. The proportion of total consumption undertaken by liquidity-constrained individuals seems therefore to be higher in Switzerland (0.38, IV estimate from Table 7) than in the United States (0.21) or Sweden (0.12), roughly comparable to that in the United Kingdom (0.40) or in Japan (0.34), and lower than in Italy (0.58), Spain (0.52), or Greece (0.54). Therefore, borrowing constraints seem unlikely to provide much of an explanation for the high private saving rate in Switzerland.

In order to explore whether the moderate process of liberalization of the domestic financial markets has affected  $\lambda$  and, thereby, the private saving rate, over time, the IV model is estimated recursively, for changing

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1/ Campbell and Mankiw (1989) obtain slightly larger estimates for  $\lambda$  in the G-7 countries.

sample periods. 1/ The results are reported in Chart 6. The bold line reports the point estimate of the coefficient  $\lambda$  and the other lines represent the 95 percent confidence bands. The estimate of  $\lambda$  plotted in correspondence of the date  $t$  refers to the sample period between  $t$  and 1993Q4. The estimate of the coefficient  $\lambda$  is fairly stable. Therefore, on the basis of these tests, there is no evidence that financial liberalization has so far altered the proportion of liquidity-constrained households and, thereby, the saving rate.

ANNEX 2

Savings, Investment, Capital Flows, and Interest Rates

This annex presents a graphical exposition of the argument that high savings and high desired capital inflow into Switzerland may contribute to explaining the phenomenon of relatively low Swiss interest rates and--more specifically--the deviation from uncovered interest rate parity. 2/ The following simplifying assumptions are made. First, inflation and expected changes in the exchange rate are exogenous. Second, all foreign assets are denominated in foreign currency and all domestic assets are denominated in domestic currency. Investment,  $I$ , which is usually assumed to be a negative function of the real interest rate, can then be represented as a negative function of the nominal interest rate,  $R$  (Figure 1). The sum of national saving,  $S$ , and desired capital inflow,  $CF$ , can be assumed to be a positive function of the deviation from uncovered interest parity and can then be represented as a positive function of the nominal interest rate in Switzerland. The larger the difference between the expected returns on assets denominated in the domestic currency and on assets denominated in the foreign currency, the larger will be the desired amount of capital inflow. Thus, the nominal interest rate in the home country is jointly determined by saving, investment and capital inflow preferences, as the identity  $S+CF=I$  must hold.

According to this view, then, an increase in national saving--which can be represented as an outward shift in the  $S+CF$  schedule--would lower nominal interest rates in the home country. The same effect would result from an increase in desired capital inflow into the home country. Therefore, the observation that interest rates in Switzerland are lower than implied by UIP could be related to high savings in Switzerland and a high desired capital inflow into Switzerland.

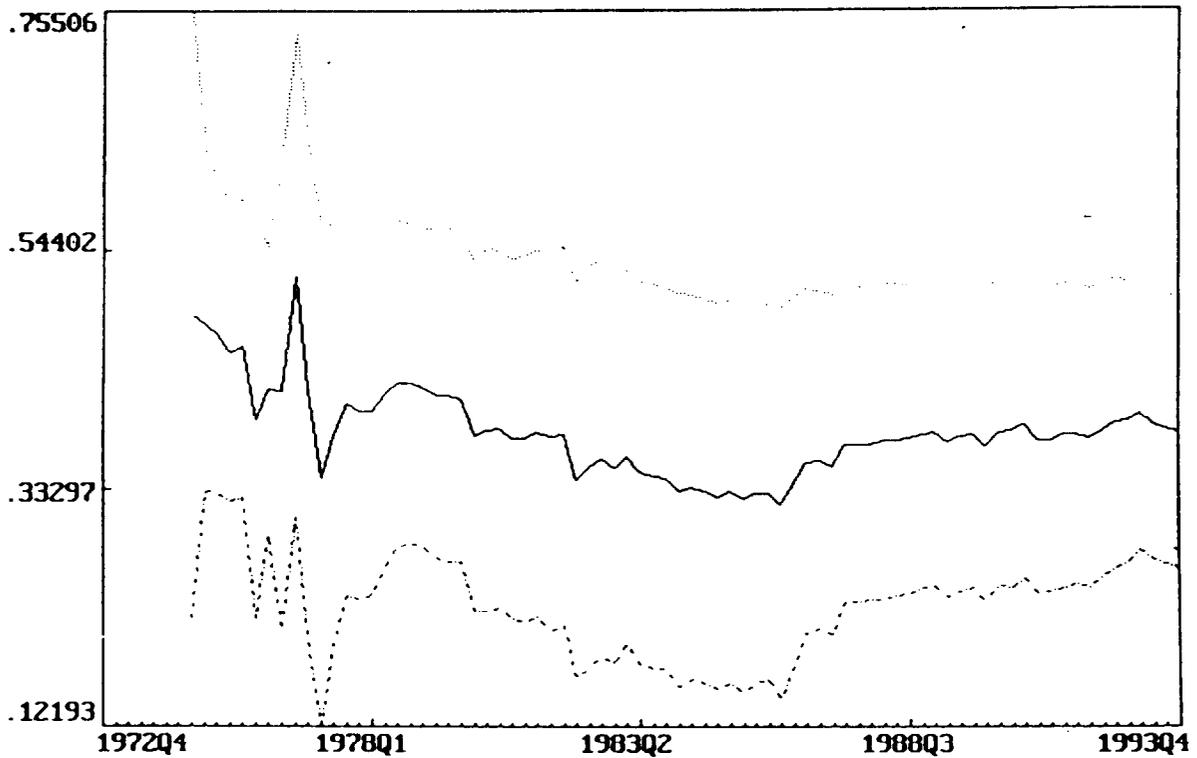
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1/ Typically, tests of whether financial liberalization has affected the proportion of households who are liquidity constrained rely on a slightly different methodology. For example, Bayoumi (1991) estimates the excess sensitivity model allowing  $\lambda$  to interact with a dummy variable which represents hypothesized changes in the financial regime. Since there has not been a clear-cut, pronounced period of financial liberalization in Switzerland, this annex uses the more general method of recursive estimation.

2/ See Mankiw, N. Gregory (1992).

CHART 6  
Switzerland

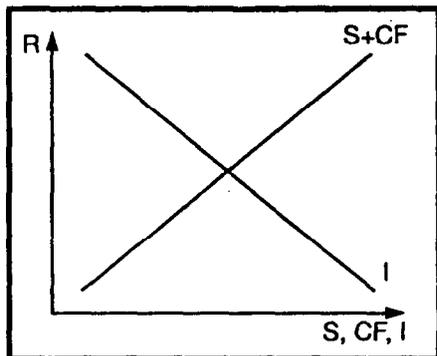
Sensitivity of Consumption to Income 1/



Source: Swiss Institute for Business Cycle Research, data tape; and staff estimates.

1/ Coefficient on income and its two standard error bands based on recursive instrumental variables regressions of consumption on income and interest rates.

Figure 1.



References

IMF sources

Direction of Trade Statistics  
International Financial Statistics

SM/94/4, January 6, 1994 (Switzerland - Economic Developments and Issues)

Swiss sources

Bundesamt für Statistik:  
Séries longues des comptes nationaux de la Suisse, Berne, 1992.

Swiss National Bank:  
Monthly Bulletin  
Quarterly Bulletin  
Annual Report  
The Swiss Banks

Swiss Institute for Business Cycle Research (Konjunkturforschungsstelle (KOF)):  
Economic data tape

Other data sources

OECD, Economic Outlook data bank  
OECD, Monthly Financial Statistics  
OECD, National Accounts data bank  
OECD, Social data bank  
WEFA Group data bank

Other sources

Äberhardt, Werner and Max Zumstein, Zinsinsel Schweiz, Studie Nr. 13,  
Bundesamt für Konjunkturfragen, 1990.

Balassa, Bela, "The Purchasing-Power Parity Doctrine: A Reappraisal,"  
Journal of Political Economy, December 1964.

Bayoumi, Tamim, "Financial Deregulation and Household Behavior," Bank of  
England, mimeo, November 1991.

Bayoumi, Tamim, Peter Clark, Steve Symansky, and Mark Taylor, "Robustness of  
Equilibrium Exchange Rate Calculations to Alternative Assumptions and  
Methodologies," IMF Working Paper 94/17, February 1994.

- Belongia, Michael T. and Werner Hermann, "Swiss Exports and the Real Exchange Rate: An Empirical Analysis," Monnaie et Conjoncture, Swiss National Bank, Zurich, December 1989, 361-369.
- Bosworth, Barry P., Saving and Investment in a Global Economy, The Brookings Institution, Washington D.C., 1993.
- Business International Corporation, Introduction to the Country Assessment Service, New York, January 1984.
- Campbell, John Y. and N. Gregory Mankiw, "Consumption, Income, and Interest Rates: Reinterpreting the Time-Series Evidence," NBER Macroeconomics Annual 1989, ed. O. Blanchard and S. Fischer, MIT Press 1989.
- Capitelli, René and Andreas Schlegel, "Ist die Schweiz eine Zinsinsel?," Schweizerische Zeitschrift für Volkswirtschaft und Statistik, Vol. 127 (3), 647-664, September 1991.
- Caramazza, F., K. Clinton, A. Cote, and D. Longworth, International Capital Mobility and Asset Substitutability, Bank of Canada, Technical Report 44, 1986.
- Carroll, Christopher D., Byung-Kun Rhee, and Changyong Rhee, "Are there cultural effects on saving?," Quarterly Journal of Economics, CIX, 3, 685-699, August 1994.
- Cumby, Robert E. and Maurice Obstfeld, "International Interest Rate and Price Level Linkages under Flexible Exchange Rates," in John F. O. Bilson and Richard C. Marston (ed.), Exchange Rate Theory and Practice, 121-151, The University of Chicago Press, Chicago IL, 1984.
- Cumby, Robert E. and Frederic S. Mishkin, "The International Linkage of Real Interest Rates," Journal of International Money and Finance, 5, 5-23, March 1986.
- Feldstein, Martin, "International Differences in Social Security and Saving," Journal of Public Economics, XII, 225-44, 1980.
- Frankel, Jeffrey A., "Measuring International Capital Mobility: A Review," American Economic Association Papers and Proceedings, 197-201, May 1992.
- Frankel, Jeffrey A. and Alan T. MacArthur, "Political vs. Currency Premia in International Real Interest Differentials," European Economic Review, 32, 1083-1121, 1988.
- Frenkel, Jacob and R. Levich, "Transaction costs and interest arbitrage," Journal of Political Economy 85, 6, 1209-26.

Frenkel, Jacob and R. Levich, "Covered interest arbitrage in the 1970s," Economic Letters, 8, 3, 267-74.

Hallwood, C. Paul and Ronald MacDonald, International Money and Finance, 2nd ed., Blackwell, Oxford, 1994.

Iklé, M., Switzerland: an International Banking and Finance Center, Dowden, Hutchison and Ross, Inc., 1972.

International Monetary Fund, Determinants and Systemic Consequences of International Capital Flows, Occasional Paper 77, Washington DC, March 1991.

Jappelli, Tullio and Marco Pagano, "Consumption and Capital Market Imperfections: An International Comparison," American Economic Review, Vol. 79, No. 5, 1088-1105, December 1989.

Jappelli, Tullio and Marco Pagano, "Saving, Growth and Liquidity Constraints," Quarterly Journal of Economics, CIX, 1, 83-109, February 1994.

Kirchgassner, Gebhard and Jurgen Wolters, "U.S.-European Interest Rate Linkage," Review of Economics and Statistics, 675-684, November 1987.

Mankiw, N. Gregory, Macroeconomics, Worth Publishers, New York, NY, 1992.

Mark, Nelson C., "Some Evidence on the International Inequality of Real Interest Rates," Journal of International Money and Finance, Vol. 4, No. 2, 189-208, June 1985.

Meier, Henry B., Swiss Capital Markets, Euromoney Publications, London, 1983.

Mishkin, Frederic, "Are real interest rates equal across countries?," Journal of Finance, 39, 1345-58, 1984.

Modigliani, Franco, "The Life-Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital," Social Research, 33 (summer), 160-217, 1966.

Modigliani, Franco, "The Life Cycle Hypothesis of Savings and Inter-Country Differences in the Saving Ratio," in Induction, Growth and Trade, Essays in Honor of Sir Roy Harrod, W. Eltis, M. Scott, and J. Wolfe, eds., Oxford, Clarendon Press, 1970.

Munnell, Alicia, "The Impact of Public and Private Pension Schemes on Savings and Capital Formation," in Conjugating Public and Private: The Case of Pensions, ISSA Studies in Research No. 24, Geneva, 1987.

- Organization for Economic Cooperation and Development, Reforming Public Pensions, OECD Social Policy Studies No. 5, Paris, 1988.
- Organization for Economic Cooperation and Development, Economic Survey of Switzerland, 1994 and various other years.
- Picchi, Mauro, "La Suisse, pays exportateur de capitaux," La Vie Economique, 30-35, October 1992.
- Sachs, Jeffrey D., "The Current Account and Macroeconomic Adjustment in the 1970s," Brookings Papers on Economic Activity, 201-268, 1:1981.
- Schlup, Thomas, "Les investissements directs suisse à l'étranger en 1988," Monnaie et Conjoncture, December 1989.
- Schlup, Thomas, "Les avoirs et engagements extérieurs de la Suisse (position extérieure nette)," Monnaie et Conjoncture, December 1988.
- Swiss National Bank, "La balance suisse des paiements en 1993," Supplement to the Monthly Bulletin, August 1994.
- Wechsler, M. and M. Savioz, Soziale Sicherheit nach 2000: Finanzielle Perspektiven und Szenarien für die Schweiz, Verlag Ruediger, Basel, Switzerland, 1993.

