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Switzerland: Selected Issues

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SWITZERLAND

Selected Issues

Prepared by Kornélia Kranjyák and Stephan Danninger (EU1)

Approved by the European I Department

April 24, 2001

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Switzerland: Basic Data

Area and population	
Total area	41,293 square kilometers
Total population (end-2000)	7.2 million
GDP per capita (2000)	$ 33,626
GNP per capita (2000)	$ 36,933

	1997	1998	1999	2000 1/	2001 1/
	(Percentage changes at 1990 prices)				
Demand and supply					
Private consumption	1.4	2.2	2.2	2.0	1.4
Public consumption	0.0	0.7	-0.4	0.1	0.2
Gross fixed investment	1.5	4.5	1.8	6.5	5.7
Construction	-1.5	0.4	-5.3	2.1	1.3
Machinery and equipment	4.9	8.9	8.8	10.3	9.2
Final domestic demand	1.2	2.6	1.7	2.9	2.4
Inventory accumulation 2/	0.1	1.7	-0.2	0.1	-0.3
Total domestic demand	1.3	4.3	1.4	2.9	2.0
Exports of goods and nonfactor services	8.6	5.0	5.9	9.5	4.5
Imports of goods and nonfactor services	7.6	9.6	5.5	8.3	4.5
GDP	1.7	2.3	1.5	3.4	2.0
GNP	3.7	2.5	2.3	4.9	0.5
	(In billions of Sw F, at current prices)				
GDP	371.4	380.9	389.0	408.8	422.6
	(In millions, unless otherwise indicated)				
Employment and unemployment					
Employment	3,806	3,848	3,873	3,916	3,941
(Percent change)	-0.3	1.1	0.6	1.1	0.6
Unemployed (registered)	0.19	0.14	0.10	0.07	0.07
Unemployment rate (in percent)	5.2	3.9	2.7	1.9	1.9
	(Percentage changes, unless otherwise indicated)				
Prices and incomes					
GDP deflator	-0.2	0.2	0.6	1.6	1.4
Consumer price index	0.5	0.0	0.8	1.6	1.4
Nominal wage growth 3/	0.5	0.7	0.3	1.4	2.5
Unit labor costs (total economy)	0.5	-0.4	-0.6	-0.9	1.2
Real disposable income	3.0	0.9	2.1	3.9	0.8
Personal savings ratio (in percent)	10.1	8.9	8.8	10.5	10.0
	(In percent of GDP)				
Public finances					
Central government financial balance 4/	-1.5	0.0	-0.8	0.9	-0.2
Gross debt	25.1	27.6	25.3	23.8	23.2
General government					
Financial balance 4/	-2.4	-0.4	-0.4	1.8	0.3
Structural balance	-0.8	-1.0	0.5	0.7	0.4
Gross debt	51.5	54.4	51.3	48.6	46.8
Expenditure	39.4	39.1	38.6	37.7	37.4

1/ Staff estimates and projections unless otherwise noted.
2/ Change as percent of previous year's GDP.
3/ Nominal wage growth per employee.
4/ Including railway loans as expenditure.

Switzerland: Basic Data (concluded)

	1997	1998	1999	2000 1/	2001 1/
	(In billions of Sw F, unless otherwise indicated)				
Balance of payments					
Trade balance	-0.5	-2.3	-0.4	-4.8	-5.2
Service balance	18.9	19.6	19.8	22.6	24.6
Balance on goods and non-factor services	18.5	17.2	19.4	17.8	19.4
Factor income balance	23.4	25.5	31.9	40.2	35.0
Net private transfers	-3.0	-3.0	-3.9	-3.6	-3.7
Net official transfers	-1.9	-2.3	-2.3	-2.0	-2.1
Current account	37.0	37.5	45.0	52.4	48.7
(In percent of GDP)	10.0	9.8	11.6	12.8	11.5
Foreign direct investment	-16.1	-13.7	-36.9	-51.1	-15.0
Outward	-25.7	-24.1	-54.0	-66.9	-30.0
Inward	9.6	10.4	17.1	15.8	15.0
Portfolio investment	-15.5	-6.7	-61.5	-12.9	-28.5
Outward	-28.6	-21.6	-70.4	-37.7	-35.0
Inward	13.1	14.9	8.9	24.8	6.5
Banking sector, net	-1.2	-16.7	27.2	11.0	-10.0
Memorandum items:					
Net investment income	30.0	32.0	38.4	47.2	41.5
(In percent of GDP)	8.1	8.4	9.9	11.5	9.8
Net external assets	449.1	493.7	555.8	605.8	654.3
(In percent of GDP)	120.9	129.6	142.9	148.2	154.8
Official reserves (billions of US$, end period) 2	39.0	41.2	36.3	32.3	31.2
Reserve cover (months of imports of GNFS) 2/	5.2	4.9	4.6	3.9	2.5
	(Percentage changes in annual averages)				
Monetary and credit data					
Monetary base	4.8	3.0	2.4	1.1	...
Money (M1)	10.1	8.0	8.6	-1.9	...
Broad money (M3)	5.1	1.2	1.0	-1.6	...
Domestic credit	1.7	0.8	2.3	3.8	...
	(Period averages in percent)				
Interest rates 3/					
Three-month rate	1.5	1.6	1.4	3.5	3.4
Yield on government bonds	3.5	2.9	2.9	3.9	3.4
	(Levels)				
Exchange rates					
Sw F per US$ (end of period) 3/	1.46	1.38	1.60	1.63	1.73
Sw F per US$ (annual average) 3/	1.45	1.45	1.50	1.69	1.67
Sw F per euro (annual average) 3/	1.64	1.61	1.60	1.56	1.54
Nominal effective rate (1990=100) 3/	104.3	107.0	105.1	103.1	106.2
Real effective rate (1990=100) 3/ 4/	100.9	102.2	100.2	97.8	99.5

Sources: IMF, World Economic Outlook database; Swiss National Bank; and Swiss Institute for Business Cycle Research.

1/ Staff estimates and projections unless otherwise noted.

2/ Data for 2001 refer to February.

3/ Data for 2001 refer to March.

4/ Based on consumer prices.

I. Switzerland's Debt Brake[1]

A. Introduction

1. Switzerland has a long tradition of sound public policies, though the onset in 1991 of a prolonged economic slowdown led to a series of large deficits and a rapidly rising debt-to-GDP ratio. The reaction has been to enshrine in the Constitution a balanced budget rule at the federal government level. Proposed amendments, already approved by the Council of States, although approval by the National Council and a referendum are required before they can be implemented, seek to inject a degree of cyclical flexibility into the balanced budget rule—deficits would be allowed in recessions, surpluses in periods of overheating. This way, the long-term "debt brake" of a balanced budget would be retained but procyclical tendencies inherent in a year-by-year application of the rule would be reduced.

2. This paper examines the effectiveness of the proposed fiscal policy framework in meeting Switzerland's fiscal challenges. It attempts to shed light on both whether the medium- and long-term target of fiscal policy—budget balance—is appropriate in view of the strains on public expenditure arising from population aging, and whether the proposed amendments to the budget rule adequately address short-term cyclical inconsistencies in fiscal policy.

B. Trends in Public Debt and the Proposed Fiscal Rules for Switzerland

3. From an international perspective Switzerland's debt-to-GDP ratio is not excessive but its rate of growth in the 1990s stands out. In 1990 Switzerland had a substantially smaller debt burden in terms of GDP than many other European countries. Between 1990 and 1998, the gross debt-to-GDP ratio increased from 31 to 54 percent of GDP. The strongest increase was experienced at the federal level where debt more than doubled from 12 to 28 percent of GDP (Figure I-1). By contrast, many European countries undertook over the same period a concerted effort to consolidate their budgets and to reduce their debt ratios.[2] Ireland (quite dramatically), Portugal, Belgium, Netherlands, and Denmark all reduced their debt-to-GDP ratios. By 1998 the Swiss debt ratio had moved into the mid-range of ratios in the euro area of around 50–60 percent of GDP (Figure I-2).

4. The Swiss economy's protracted period of stagnation was the main contributory factor to the steep rise in debt. Between 1990 and 1999, average annual growth of real GDP dropped to 0.5 percent compared to 1.8 percent between 1990 and 1999. While the decline was partly cyclical, it also reflected low underlying productivity growth (SM/98/40). As a consequence, budget financing was persistently constrained by low revenues, which could

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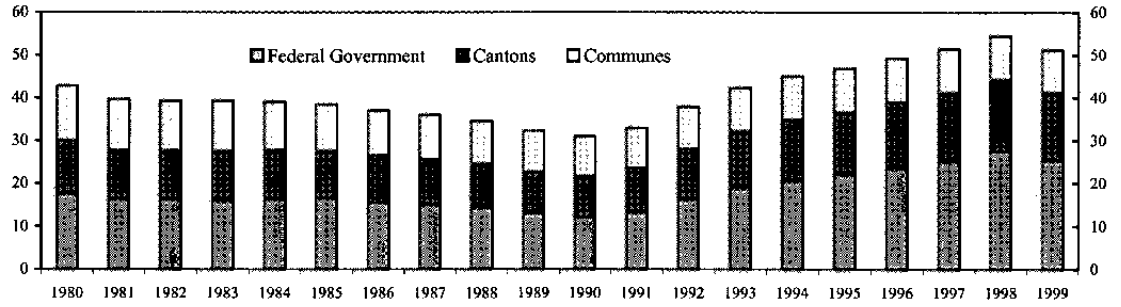
[1] Prepared by Stephan Danninger.

[2] The Maastricht Treaty introduced a euro area membership requirement of a maximum deficit of 3 percent of GDP and a 60 percent debt-to-GDP ratio.

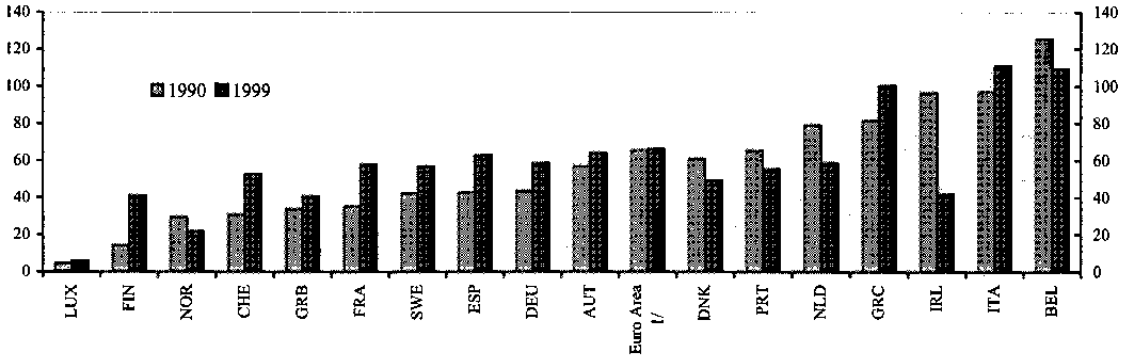
not meet growing expenditures, especially for health insurance and invalidity pensions. High unemployment (by Swiss standards) also led to substantial deficits in the unemployment insurance program which required financing through the federal budget.[3]

Figure I-1. Switzerland: Debt-to-GDP Ratio of the Federal Government, Cantons and Communes, 1980-1999



Source: Eidgenössische Finanzverwaltung, Switzerland, 2000.

Figure I-2. Switzerland: International Comparison of General Government Debt Ratio (In percent of GDP)



Source: IMF, World Economic Outlook.
1/ Euro area without Luxembourg.

[3] Between 1993 and 1997 the federal government paid a net SwF 4.3 billion (1.1 percent of GDP) into the unemployment insurance fund. A similar amount was provided by the cantons.

5. More recently the authorities have taken steps to strengthen the fiscal framework and arrest the growth in debt. Based on a constitutional amendment in 1998, the government set out to eliminate the structural deficit by 2001(Stabilisierungsprogramm). The main relief for the budget is coming from large cuts in military spending and reductions in the railroad budget together with higher welfare contributions of the cantons at a combined annual saving of 1.1 percent of GDP. A marked turnaround in unemployment in 1999 and 2000 and a pick-up of economic growth greatly facilitated the achievement of the goal. On top of this, one-time revenue gains of about 1½ percent of GDP pushed the federal budget into surplus in 2000, a year ahead of the target for achieving budget balance. As a result, the debt-to-GDP ratio has already been falling sharply. With improvements in the finances of the lower levels of government (the cantons and communes also ran surpluses last year), general government debt declined from over 54 percent of GDP at end-1998 to under 49 percent of GDP at end-2000. Government efforts are now concentrated on gaining referendum approval for a constitutionally binding expenditure rule that will retain a balanced federal budget on average but allow some variation in the fiscal position over the economic cycle.

Characteristics of the proposed Swiss fiscal rule

6. The proposed rule specifies a one-year ahead ceiling on central government expenditures equal to predicted revenues adjusted by a factor reflecting the cyclical position of the economy. The cyclical factor is determined as the ratio of trend real GDP to expected real GDP. Thus under the new rule it would be possible to run a deficit in a recession and a surplus in a boom, but over the whole cycle deficits and surpluses would have to cancel out. The intention is for expenditures to remain relatively independent of cyclical variations, while taxes act as automatic stabilizers.

7. Revenue and real GDP forecasts are based on forecasts from the current budget planning process. According to the proposal, trend GDP would be calculated as an extrapolation of a Hodrick Prescott-filtered (HP) historical output time series.[4] The spending ceiling for the budget year $t+1$ can be expressed as:

$$G^{c}_{t+1} = E_t(R_{t+1}) \cdot E_t(C_{t+1}) + A_{t+1}$$

where G^{c}_{t+1} is the spending ceiling for period $t+1$. The two components, $E_t(R_{t+1})$ and $E_t(C_{t+1})$, denote expectations at time t of revenue and the cyclical position at time $t+1$. The term A_{t+1} is an adjustment factor correcting for past differences between budget targets and outcomes. These differences may arise from revenue forecast errors or breaches of the spending limit. A

[4] The HP-filter is a widely used method for decomposing time series data into a trend and a cyclical component. It has the advantage of providing a transparent and objective measure of potential output. However, the authorities are open to alternative approaches if a superior method for calculating the output gap can be found.

full record of these deviations is kept in a fictional account which is debited in case of an unanticipated deficit (over-spending or under-collecting) and credited in case of an unanticipated surplus (under-spending or over-collecting).[5] The fiscal rule requires that the government must eliminate any *negative* balance on this account, but no time horizon is specified. Only if the negative balance exceeds 6 percent of expenditures (0.6 percent of GDP) must the government bring it below 6 percent within three years.

8. The legal text specifies the computation of the expenditure ceiling and also includes a definition of its main component variables—revenue and the cyclical factor. The correction for past errors, A_t, is not regulated so long as the accumulated overspending amounts to less than 6 percent of expenditures. No reporting requirements are specified for revenue and growth forecasts.

9. The expenditure ceiling is binding for both the budgetary planning and execution stage. In accordance with the constitution, the government would be required to present a budget subject to the expenditure rule to parliament. Parliament would then be permitted to make changes to both the level and composition of expenditures. If this amended budget still satisfies the rule, then it is adopted as law. If not, the budget can only be enacted with a qualified majority in parliament.[6] If this majority cannot be achieved, the original government's budget is adopted by default.

10. Sanctions are judicial by nature. The federal budget must satisfy the expenditure rule and the spending ceiling cannot be overturned throughout the year by budget amendments. Only under exceptional circumstances can the spending ceiling be broken by a qualified majority in parliament. The law does not specify these conditions and allows considerable room for interpretation. Simulations by the authorities indicate that the expenditure ceiling would have been breached on exceptional grounds at various times in the 1990s (*Botschaft zur Schuldenbremse*), but the overall amount would have been less than 2 percent of GDP distributed over several years.

C. An International Comparison of the Swiss Rule

11. In recent years fiscal rules have become a popular vehicle for imposing fiscal discipline. The response has been driven by the perception that political and institutional factors such as the short time horizon of governments, a bias to overestimating returns to

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[5] The balance of the fictional account is determined as the accumulated difference between revenue and expenditures deviations minus discrete adjustments A_t at any prior year. The overall balance is given as: $\Sigma_j^t (E_{j-1}(R_j) - R_j) - \Sigma_j^t (G^e_j - G_j) - \Sigma_j^t A_j$ where j ranges from the start of the rule to the current period t.

[6] The qualified majority requirement is waived if the proposed expenditures exceed the ceiling by less than 0.5 percent.

public expenditures, and lax procedures for spending amendments, lie at the root of the problem (Hemming and Kell, 2001).

12. Fiscal rules are commonly defined as constraints on fiscal policy with a time-bound character. In their most common form they set a numerical target or define specific rules for the budget process. The underlying objectives of fiscal rules are various (Kopits and Symansky, 1998) and depend on the particular economic situation of a country. They include: achieving lower interest rates and debt through reputational effects (New Zealand, Sweden); reducing the size of government, as measured by tax-to-GDP ratio (Finland, Netherlands); restraining demand in an overheating economy (Ireland, Portugal); and tackling future ageing-related spending needs (Austria, Belgium, Denmark).

Types of fiscal rules

13. A number of diverse rules have been developed. The two most common types are (i) deficit and debt rules[7] and (ii) expenditure rules (Table I-1). These are not exclusive categories, but rather tend to highlight different *degrees of specificity*. Deficit and debt rules define only levels of final fiscal objectives and are usually vague about how to attain them. On the other hand, expenditure rules concentrate on the steps to achieve fiscal targets and put heightened emphasis on implementation issues. The distinction between these two categories of rules is, however, by no means clear cut.

14. A typical example of a deficit rule in conjunction with a debt goal is the "close to balance" requirement for general government budgets under the EU's Growth and Stability Pact.[8] Countries are required to meet the criterion unless exceptional circumstances can be claimed, but although ECOFIN reviews a member country's stability program, no instructions are provided on how to achieve these goals. Other examples are the fiscal rules in United Kingdom and Germany that specify limited deficit targets to allow debt finance of investment as a means to pursue a growth-enhancing policy (golden rule). Debt targets—defined by the debt-to-GDP ratio—are commonly used as supplementary goals specifying an upper limit, since some debt-variability is in general considered desirable (Barro 1979). Examples are a maximum debt-to-GDP ratio of 60 percent defined in the Maastricht criteria and a maximum 40 percent debt-to-GDP ratio in the UK.

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[7] Deficit and debt objectives are unequivocally linked through the flow-stock identity that fiscal deficits are equal to changes in the debt level.

[8] The Stability and Growth Pact was adopted in 1997 and is geared towards fiscal discipline among the member countries of the European Monetary Union.

Table I-1. Switzerland: Comparison of Fiscal Policies in Selected Countries

	Objective	**Planning horizon**	**Operating variables**
Switzerland	Debt control through permanently balanced budget	Permanent rule applied each year	Expenditure ceiling while allowing cyclical budget variation
European Union Growth and Stability Pact	Sound budgetary positions close to balance or in surplus	Permanent rule, exceptions possible	Countries have to provide multiyear stability programs
Austria	Balanced budget	Four year stability program	Revenue and expenditure side measures
Australia	Sound fiscal policy through public scrutiny: budget balance over the cycle	Three year fiscal strategy statements; also sustainability assessment for next 40 years	Annually specified in budget strategy program which includes short term fiscal measures.
Belgium	Deficit and debt targets of Maastricht	Four year stability program	Target ceilings for social expenditure growth
Canada	Balanced budget with supplementary growth enhancing measures	Two year budget plan under prudent planning	Restraints in program spending
Denmark	Budget surplus and debt reduction	Four year stability program	Tax reform and expenditure restraints
Finland	Deficit reduction and in future tax cuts	Four years on an annually rolling basis	Expenditure ceilings
France	Balanced budget	Three year stability program	Tax reduction and expenditure growth target
Germany	Deficit and debt targets of Maastricht	Five year target plan for budget	Expenditure restraint and tax reform
Ireland	Budget surplus to curb inflation	Two year stability program	Tax reform and expenditure control
Italy	Balanced Budget	Three year stability program	Tax and primary expenditure cuts
Netherlands	Deficit reduction and tax cuts	Four years set at beginning of coalition period	Expenditure ceilings for government and social security
New Zealand	Operational surplus; decline of debt-to-GDP ratio; improved credibility	Long-run goals set forth in budget policy statement; no specific time horizon	Expenditure restraints, and revenue measures
Portugal	Eliminating deficit by 2002	Five year medium-term outlook	Expenditure control
Spain	Deficit targets for each level of government	Four year stability program	Expenditure control
Sweden	Debt reduction through budget surplus of 2 percent	Three years based on macro forecasts	Expenditure ceiling on categories
U.K.	Balanced budget over cycle holding debt to GDP ratio at prudent level (40 percent)	Three years on a two year rolling basis	Expenditure restraint while allowing cyclical budget variation
United States	Balanced budget as defined in Budget Enforcement Act 1997	Four year reform program ends in 2002	Expenditure ceiling for each fiscal year, expenditure changes tied to revenue measures

15. Expenditure rules on the other hand focus on the steps to achieve a fiscal target. While expenditure restraint is only one approach to fiscal improvement, it has proven to be the most effective one (Alesina and Perotti,1997). The country-specific setup of expenditure rules reflects diverse political systems and budget procedures. Some expenditure rules pursue explicit deficit targets (Sweden, Switzerland), while others allow policy makers to change the objectives over time (Netherlands, Finland).

16. A main factor in choosing one type of rule over another is the trade-off between the commitment to achieve long-run fiscal goals—which requires more detailed rules—at the cost of insufficient short-run fiscal flexibility. Relatively rigid rules, such as the requirement to restrict expenditures to a pre-determined value, are more likely to achieve a given fiscal goal, but can create an undesired fiscal policy stance in the short run. In contrast, rules with fewer regulations or less specific goals—e.g., a budget "close to balance"—allow more flexibility in the short run, but suffer from weaker enforcement discipline. More complex rules with conditional clauses could improve the trade-off, but have not found much application in practice due to difficulties in communicating policy intentions to the public.

17. Transparency is an important adjunct to fiscal rules. Transparency involves being open to the public about the structure and functions of government and its policy intentions and projections (Kopits and Craig, 1998). The reputational effects associated with transparency lead to more accountability of policy decisions and facilitate performance judgments against fiscal objectives. Some countries have explicitly emphasized this approach to fiscal policy, with New Zealand pioneering this approach through its Fiscal Responsibility Act of 1994. More recently, Australia (1998) and the United Kingdom (1997) have adopted some of these aspects.

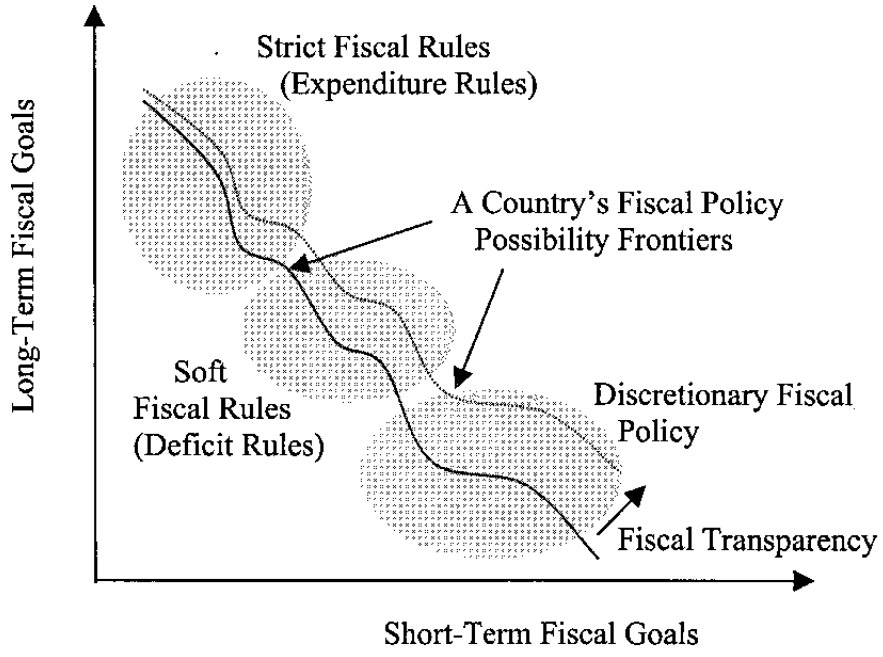
18. Assuming transparency has a disciplining effect, policy makers can exploit credibility gains and implement fiscal policy more flexibly. A schematic representation of the fiscal policy trade-off is shown in Figure I-3. The axes on the graph denote desired short-run policy goals (e.g., counter-cyclical policy) and long-term policy goals (e.g., debt reduction). The solid downward sloping curve represents the set of feasible fiscal policies. The disciplining effect of fiscal transparency leads to a less severe policy trade-off (dotted line). The "north-west" region of the graph is characterized by the adoption of binding fiscal rules. The expenditure rules of Switzerland, Netherlands, Sweden, and Finland would fall into this area. The "center area" depicts soft rules with some built-in some flexibility for short-term discretion. The fiscal policies of most of the EU member countries under the Growth and Stability Pact would fall into this region. Finally the "south-east" represents discretionary policies where policies are conducted without formal rules.

Expenditure rules in comparison

19. An important feature of all expenditure rules is their aim to solve a time-inconsistency problem inherent to many political systems. Political decisions are often driven by short-run spending pressures leading to a lax fiscal policy during upswings and persistent overspending during downturns with the results of a gradual build-up of public debt

(Hemming and Kell, 2001). Fiscal rules tackle the problem of expenditure overruns by constraining policy decisions via tailored institutional regulations.

Figure I-3. Fiscal Rules: Trade-Off Between Long-Term and Short-Term Policy Goals



20. Given the differences in political systems and budget processes, expenditure rules vary substantially across countries. The expenditure rules in the Netherlands and Sweden aim at strengthening the role of the finance minister within the government, while in Switzerland the new fiscal rule attempts to limit the influence of parliament on expenditures (Table I-2). The Swiss rule also relies on a one-year planning horizon compared to the multi-year budget plans in the Netherlands and Sweden.

Table I-2. Switzerland: Comparison of Expenditures Rules

	Switzerland	Netherlands	Sweden
Effective date	Proposed for 2003	Since 1998 coalition agreement	Since State Budget Act 1996
Fiscal Objective	Balance structural budget over cycle	Control expenditure growth and allow cyclical budget variations	Achieve long-run budget surplus of 2 percent
Level of Rule	Central government expenditures including public investments; no grouped spending ceilings	Central government expenditures less non-tax revenue and infrastructure fund; ceilings for social security, health care and general government	Central government expenditures less interest payments; ceilings for 27 spending categories with built-in safety margin.
Expenditure Ceiling	Annual nominal expenditure ceiling equal to one-year revenue forecasts adjusted for cyclical position of economy	Four year real expenditure ceilings based on cautious growth and revenue forecasts	Three year nominal expenditure ceiling based on macro and revenue forecasts
Deviations from rule	Anticipated exceptional overruns require a qualified majority in parliament; For unanticipated overruns a fictional account is kept; if deficits larger than 6 percent of expenditures then cuts are required	Unanticipated deficit or surplus: rule assigns excess funds or financing needs to revenue changes and budget imbalances; special provision for public wage overruns	Unanticipated budget overruns are financed through expenditure reallocation or new revenues
Sanctions	Judicial	Reputational	Reputational

Sources: Botschaft zur Schuldenbremse, Schweizer Bundesrat, July 2000; Netherlands: Staff Report for the 1999 and 2000 Article IV Consultations; and Sweden: Staff Report for the 1999 and 2000 Article IV Consultations.

21. The expenditure rule in the Netherlands is based on three pillars: (i) a rolling four-year cautious macroeconomic scenario; (ii) four-year real net expenditure ceilings tied to a trend forecast; and (iii) a formula for dividing up budget shortfalls or gains. With the cautious forecasting approach, the Dutch rule implicitly targets a budget surplus without committing to a specific value. Budget surpluses are divided into debt- reduction and tax cuts depending on the size of the surplus, while deficits are partly corrected through expenditure adjustments and partly through debt financing. The rolling planning horizon introduces

inertia into expenditure growth and has significantly altered the political power constellation within the government. The influence of the finance minister on budget outcomes is improved through the heightened emphasis of the rule on the planning process. On the other hand, the decision making power of individual ministries over current expenditures has been reduced and emphasis has shifted to adjustments of the time-path of expenditures. First experiences show a significant improvement of the budget balance, although the rule has so far mainly been tested against a backdrop of favorable macroeconomic conditions.

22. The Swedish expenditure rule is also based on a multi-year framework, but specifies an explicit target of a 2 percent of GDP budget surplus. In a top-down approach, the finance minister has the responsibility to draw up and update the multi-year macroeconomic forecast and to produce revenue forecasts. In a cabinet meeting, the ministers decide on individual expenditures bound by these forecasts. In effect this shifts political negotiations away from individual spending limits to the allocation of funds over expenditure categories. A built-in budget margin ensures that small spending overruns do not violate the overall expenditure goal. First assessments indicate that the tighter system of expenditure control has significantly contributed to recent favorable budgetary developments. A potential limitation is the rigidity of binding spending categories, which include cyclically sensitive categories.

23. In Switzerland institutionalized expenditure restraints via budget rules have been in use for some time at the cantonal level and for various city budgets. The effectiveness of these fiscal frameworks on budget targets are well documented (Feld and Kirchgässner, 2001). Under the proposed rule for the federal government, spending limits are set by the government while the parliament is primarily allowed to make only compositional changes in expenditure. Level changes require a qualified majority in parliament. With these requirements, the Swiss government aims to shift the political debate away from spending ceilings towards a debate about long-term spending trends. In comparison to the rules adopted in the Netherlands and Sweden, the Swiss rule does not rely on medium-term macro-economic and revenue projections. Information about the future status of the economy is embodied in a mechanical estimate of next year's cyclical position of the economy. The choice of this approach has been justified by its heightened transparency and objectivity.

24. While the main objective of the expenditure rules in these three countries of imposing fiscal discipline in the political decision making process is similar, the chosen means differ substantially. In comparison, the Swiss rule appears the most stringent by relying on a one-year planning horizon, by constitutionally fixing its deficit and debt goal, and by tightly defining escape clauses from the expenditure ceiling.

D. Is a Balanced Budget an Appropriate Long-Term Target?

25. The new fiscal rule implicitly fixes federal debt, on average over the business cycle, at its current level. This translates into a long-term path for the debt-to-GDP ratio, which declines in line with the nominal growth rate of the economy. While a reduction of the debt ratio appears warranted, it is unclear by how much and how rapidly it should fall.

Theoretical results and international experiences

26. Theoretical analyses of an optimal debt level do not provide much practical guidance. The main considerations with respect to optimal debt policy are either based on efficiency losses from distortionary taxation or are related to the impact of debt reduction on national savings.[9] The implications of these approaches differ vastly across models. For instance, if taxation is distortionary, then government activities should be financed through earnings on assets implying a *negative* government debt target. On the other hand, if frequent changes in the tax code cause distortions, then an optimal policy would require tax smoothing over time implying an oscillating positive long-run debt level. Finally, models concentrating on the effect of debt on national savings highlight the positive effects of debt reduction on investment. The actual debt target level remains unclear and depends on parameters such as the time rate of preference, long-run growth rates, and population dynamics.

27. International experiences show that debt reduction is motivated to a large extent by a heightened awareness of future aging-related spending needs, a desire for inter-generational equity (stressed in popular debate in the USA), and more generally with a desire to provide more future room for maneuver for fiscal policy.[10] For example:

- New Zealand's fiscal management rules in the Fiscal Responsibility Act of 1994 state that public debt should be reduced to "prudent levels" in order to provide a "buffer against future adverse effects". The prudent level is defined by the government consistent with future financing needs and a desired revenue-to-GDP ratio. The initial target debt-to-GDP ratio of 30 percent was achieved in 1996. The government currently targets a debt-to-GDP ratio of 15 percent.

- In Denmark, current policy aims to gradually eliminate public debt through budget surpluses. The purpose is to free up resources for projected increases in pension expenditures through lower interest payments.

- A more flexible long-run debt policy is practiced by the UK. The government can borrow for public investments as long as net debt-to-GDP is held below a stable and prudent level, currently defined as 40 percent of GDP. By allowing new borrowing for investment projects, the budget excludes a sizeable part of expenditures from its balanced budget constraint and slows down or temporarily reverses the growth induced decline of the debt-to-GDP ratio.

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[9] For example, see Becker (1979) and Aiyagari and McGrattan (1998).

[10] The debt ceiling for European Monetary Union was set at 60 percent of GDP. While this level serves as a reference value for a sustainable fiscal position with a steady state budget deficit of 3 percent and a nominal GDP growth rate of 5 percent, the EU has never officially referred to the 60 percent ceiling as an optimal level of public debt.

28. Compared to these countries, the implied speed of decline of the debt-to-GDP ratio in Switzerland is in the middle range. With a balanced budget the federal debt-to-GDP ratio would be halved in about 24 years assuming a nominal growth rate of GDP of 3 percent a year. A golden rule approach with a deficit of one percent of GDP would stabilize the debt to GDP ratio in the long-run, but not reduce it. On the other hand, a targeted federal budget surplus of 1 percent would speed up the debt-reduction process and cut the current debt ratio in half in 10 years. Thus small variations in the budget target introduce considerable variation in reduction times for the debt-to GDP ratio.

Long-run challenges for the federal budget

29. Switzerland faces the challenges from an aging population sooner than most other countries. The old-age dependency ratio (fraction of people over age 60 to working age population) rises steeply after 2015, reaching a peak in 2030. While the social security system is better prepared than in many other countries—Switzerland's pension system rests on three pillars, only one of which depends on public contributions—Switzerland also has one of the highest life expectancy rates. Between now and 2045 life expectancy is projected to rise from 79.5 to 83.3 years. This compares to an average increase in the Euro area from 78.1 to 82.4 years. The two main expenditure categories affected by this transition are health care and pension payments.

30. The public retirement insurance (AHV) system represents the base pillar of the Swiss pension system and provides means tested benefits paying 20–40 percent of average life-time earnings. The pension fund is financed as a pay-as-you-go system with public sector subsidies amounting to 20 percent of expenditures of which 17 percentage points come from the federal government—1.7 percent of GDP in 1999—and the rest from the cantons. The health care system centers on compulsory insurance with limited competition among health care providers. Health care expenditures as a fraction of GDP are small compared to other countries, but have risen strongly over the last decade. Federal contributions have been stable at around 12 percent of total expenditures or 1.7 percent of GDP.

31. IMF staff projections show that both AHV pension and health care expenditures will put considerable pressure on the federal budget. The combined annual net financing need is 1.4 percent of GDP by 2015 and increases to over 3 percent of GDP in 2025 (Table I-3). The main source for the financing gap is accelerating AHV pension payments (from 6.9 percent of GDP to 9.0 percent of GDP in 2025) and growing health care expenditures (from 4.9 percent of GDP to 6.5 percent of GDP). Moreover, a shrinking labor force reduces the real growth rate of the economy and thereby lowers contribution payments. The full weight of changes in the population age-composition are projected to bear down on the social welfare system after 2015.

Table I-3. Switzerland: Projected Long-Run Finances of AHV Pension and Health Care

	2000	2005	2010	2015	2020	2025
AHV pension expenditure as share of GDP 1/	6.9	6.9	7.4	8.0	8.4	9.0
Health care expenditure as share of GDP 1/	4.9	5.1	5.5	5.9	6.2	6.5
AHV pensions: projected annual financing need as share of GDP 2/	-0.4	-0.5	0.0	0.7	1.5	2.6
Health care: projected annual financing need as a share of GDP 3/	0.0	0.7	0.7	0.8	0.8	0.8
Debt service: projected annual savings as a share of GDP	-0.3	0.3	0.1	0.1	0.1	0.1
Projected net financing need as a share of GDP	-0.1	-0.1	0.6	1.4	2.2	3.3
Memorandum items: (five-year averages)						
Real growth rate	...	1.3	1.0	0.9	0.8	0.7
Inflation rate	...	1.75	1.75	1.75	1.75	1.75

Sources: Swiss authorities; and IMF staff estimates.

1/ Expenditures determined by nominal growth plus 0.5 percent health care cost inflation and change in population composition.

2/ Projected federal subsidy in excess of nominal growth rate of GDP. Projcected revenue comprises receipts from 0.5 percent premium increase and from 1.5 percent earmarked VAT.

3/ Projected federal subsidy in excess of nominal growth rate of GDP. Based on the assumption of a balanced fund and unchanged subsidy rates of federal and cantonal government.

32. The projections are sensitive to assumptions about economic growth, although the broad conclusions are not significantly affected. Staff projections are in this regard slightly less conservative than those of the authorities: the staff assumes the annual real growth rate

will average 1.5 percent for 2000–2010 and 0.9 percent for 2010–2025, compared to 1.3 percent and 0.7 percent in government scenarios for the corresponding periods.[11] Higher labor force participation rates, more immigration, and a pick-up of the investment rate could bolster growth rates, but probably only to a small degree as Switzerland's participation rate is one of the highest by international standards and political pressure is mounting to limit immigration. Nonetheless, a 0.5 percentage point higher growth rate from 2010 onwards would reduce the estimated financing needs by one fifth. On the other hand, there is a risk that expenditure growth could be higher than assumed. Projections for AHV pension payments assume only small real increases and estimated revenue already includes receipts from a planned increase of contribution rates of 0.3 percentage point and from additional earmarked VAT revenue of 1.5 percent of GDP. Likewise, projected health care expenditures may understate accelerating costs for those over 75 years old.

33. A more ambitious fiscal policy goal would mean a stronger burden sharing of fiscal adjustment by the baby-boomer generation that will be placing the strains on social spending in the next few decades. Taxing the current working generation more, or making it forgo public goods, will free up interest savings that could then unburden the next generational cohort. For example, if a surplus of 1 percent of GDP were targeted, debt would be eliminated around 2020. The additional interest savings relative to a budget balance scenario would grow to a maximum of 0.7 percent of GDP—enough to cover about one third of projected financing needs. However, the more ambitious the fiscal goal the greater would be the risk of it proving to be politically unsustainable as it could create undue pressures to cut discretionary expenditures or temptations to expropriate the surpluses. In sum, fiscal surpluses might not be time consistent. There are also no compelling macroeconomic reasons to pursue a stricter budget target: the national savings rate is one of the highest by international standards and Switzerland has a large external current account surplus.

34. With or without additional discipline from a tougher fiscal rule, long-term fiscal sustainability will require direct reforms of the social welfare system through perhaps a combination of cost cutting measures, benefit reductions, and alternative financing options. Some tentative first steps are being taken in this regard: a proposed reforms of the AHV pension in 2005 would lower annual financing needs by about 0.5 percent of GDP; and first steps towards a long-term health care reform have been undertaken. However, there remains room for further cost-cutting measures in the health sector as well as a review of the generosity of health and pension benefits. With relatively low VAT (currently 7.5 percent) and social security contribution rates (8.4 percent of earnings in 2000) by international standards, Switzerland has also more room than many other countries to finance some of the rising costs through higher taxation.

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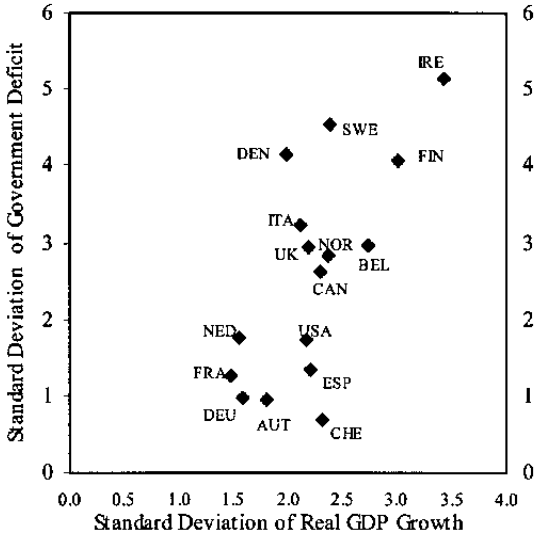
[11] The authorities project AHV expenditures to increase from 7.3 percent of GDP in 2010 to 9.4 percent of GDP in 2025 and health care expenditures from 4.0 percent of GDP to 5.9 percent of GDP.

35. In sum, the objective of a balanced budget appears to be reasonable for Switzerland. By gradually reducing the debt ratio it will provide some room for future fiscal maneuver whilst not placing unrealistic—and hence perhaps self-defeating—pressures on the authorities. It is also an easy and transparent objective to communicate to the public. But it does not obviate the need for additional measures to address rising strains on the pension and the health care system.

E. Cyclical Responsiveness of the Expenditure Rule

36. A secondary goal of the new rule is to establish an effective counter-cyclical fiscal policy. Over the last 30 years the variability of Switzerland's federal government balance has been remarkably low by the standards of industrial countries (Figure I-4). Several European countries, notably Austria, France, Germany, and Netherlands, have had larger variations in their budget balance while experiencing less real output variations. In addition, whatever fiscal variability that occurred often resulted in procyclical outcomes. Several different factors have contributed to this:

Figure I-4. Switzerland: Standard Deviation of Real GDP Growth versus Federal Budget Balance as a Ratio of GDP, 1970-1999

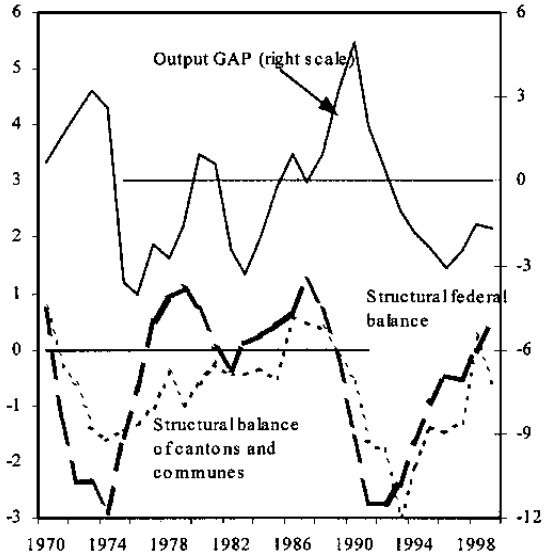


Source: IMF, World Economic Outlook.

- A main impediment in the past was an undisciplined discretionary fiscal policy. In the early 1970s, both the federal government and the cantons and communes ran sizeable deficits while the economy went through a phase of high economic growth (Figure I-5). Likewise, at the end of the 1980s, all tiers of government ran small deficits while the economy was overheating. As fiscal positions subsequently deteriorated with the onset of prolonged slow growth in the 1990s, public concern

about rising debt prompted the federal government to curb its growing deficits producing a negative fiscal impulse while the economy was still far below capacity.

Figure I-5. Switzerland: Output Gap and Structural Budget Balance, 1970-1988



Sources: Eidgenössische Finanzverwaltung; and staff calculations.

- The automatic stabilizers have been hampered by long income tax collection lags. Up to 2001, most cantons and the federal government based income tax calculations on the average taxable income of the previous two years—the only exceptions were the cantons of Basel City, Geneva, Neuchatel, and Solothurn with combined tax revenue of 25 percent of all cantonal income tax. Beginning in 2001, the federal government as well as all but three cantons will assess income tax calculations on previous year income.

- Inadequate financing of the unemployment insurance system also fostered procyclical fiscal policy. The reserve funds of the unemployment insurance fund were limited to six times the previous year's benefit payments and triggered a cut in contribution rates if this level was exceeded. In the late 1980s, when unemployment was extremely low, this requirement led to a decline of both reserves and contribution rates. In the following recession the available reserves were insufficient to meet growing benefit payments triggering a procyclical adjustment of contribution rates. Additional loans from the public sector were also needed. These were not anticipated by the federal government and prompted a tightening of the budget thereby offsetting the stabilizing effects of the unemployment insurance system.

- Finally, the high degree of decentralization in Switzerland impeded effective counter-cyclical fiscal policy. The federal government amounts to about one third of the public sector. The cantons and communes draw up their own budgets and issue their own debt. Currently, there is little fiscal coordination between the three levels of government despite a constitutional mandate requiring all levels of government to consider the business cycle when establishing their budgets.

Stabilizing elements of the new expenditure rule

37. Given the procyclicality of fiscal policy in the past, a less discretionary policy approach is entirely understandable. The proposed rule-based framework seeks to facilitate a more cyclically sensitive fiscal policy through (i) unrestricted operation of the unemployment insurance and (ii) an explicit mechanism to vary the budget balance over the cycle.

38. As regards (i), the new rule stipulates that the unemployment insurance fund is financed outside the federal government budget. Legislation is currently crafted to set up a fund for extraordinary loans to the unemployment insurance system which would not fall under the spending ceiling of the expenditure rule. Moreover a gradual build-up of the unemployment insurance fund's reserves is planned to preempt the need for both procyclical rate adjustments and public transfers to the fund during recessions. The new law also redefines how contribution rate are adjusted to avoid procyclical responses as in the past.

39. As to (ii), the new budget rule builds in budget fluctuations that are designed to mimic the stabilizing effects of cyclical revenue variations.[12] Using the simplest formulation of the expenditure rule (abstracting from the adjustment factor A_t), the actually prescribed balance at a fiscal position C can be written as:

$$GDR = \frac{G^c - R}{Y} = \frac{R}{Y} \cdot (C - 1)$$

where GDR denotes the government deficit ratio to GDP and $G^c = R\ C$. Given that the tax to GDP ratio (R/Y) of the Swiss federal government is about 10 percent, and the maximum output gap from HP-filtered GDP time series data is about 5 percent, the feasible range for the government balance is then: [13]

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[12] The rule assumes that the output-gap elasticity of revenue is equal to one which roughly corresponds to the actually observed revenue response to changes in the real growth rate.

[13] The maximum output gap of 5 percent is based on annual real GDP data covering the period 1970-1999 using a standard smoothness parameter (λ=100). As discussed in the following section variations in the smoothness parameter can increase or decrease the

(continued...)

$$GDR \in [-0.5, 0.5] \text{ percent of GDP}$$

A strict application of the expenditure rule in Switzerland would therefore only permit a deviation of expenditures from revenue by about 5 percent or a maximum cyclical deficit of about 0.5 percent of GDP.

40. Under an unanticipated severe recession, the permissible range for the GDR could perhaps reach a one-time maximum deficit of 1.5 percent of GDP. However this calculation assumes a serious prediction error for revenue—a 10 percent over-prediction of revenues—and a favorable overestimate of the output gap. The large forecast error would permit the substantially higher deficit, but at the same time would trigger the requirement to lower the deficit in the following years (see Appendix for details).

41. A strict application of the fiscal rule in the period 1987-99 would have further reduced the variability of the federal budget deficit—although compared to the procyclical nature of actual fiscal policy, this would at least in some periods have been an improvement. Only in the upswing period 1986-1990 would the federal budget have been within the 0.5 percent of GDP band (Figure I-6). But in that period, budget surpluses were not large enough to prevent the economy from overheating and left the fiscal accounts in an insufficiently strong position when the subsequent downturn began. The prescribed expenditure restraint under the rule might have improved the situation somewhat, but would have fallen short of an effective counter-cyclical policy. Likewise the permitted fiscal deficits during the recession of the 1990s would have been significantly smaller than the actual deficits implying that the fiscal stance would have been much tighter under the proposed rule—even assuming the rule would have permitted a maximum short-run deficit of 1.5 percent of GDP.

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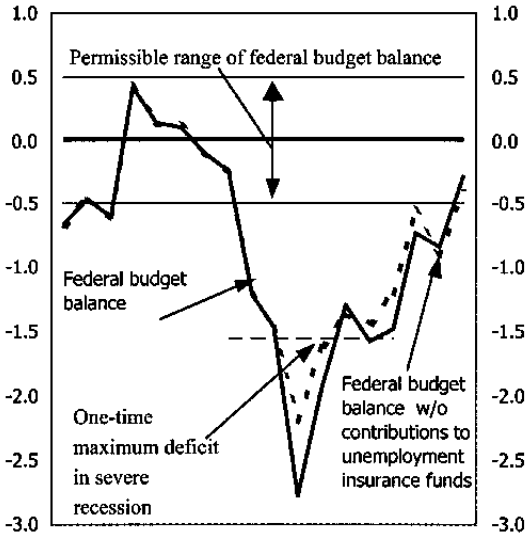
measured output gap. Production function estimates of potential output give a somewhat wider range of output gaps over the same period.

Figure I-6. Switzerland: Federal Budget Balance and Limits Based on Rule
(In percent of GDP)



Sources: IMF, World Economic Outlook; and staff calculations.

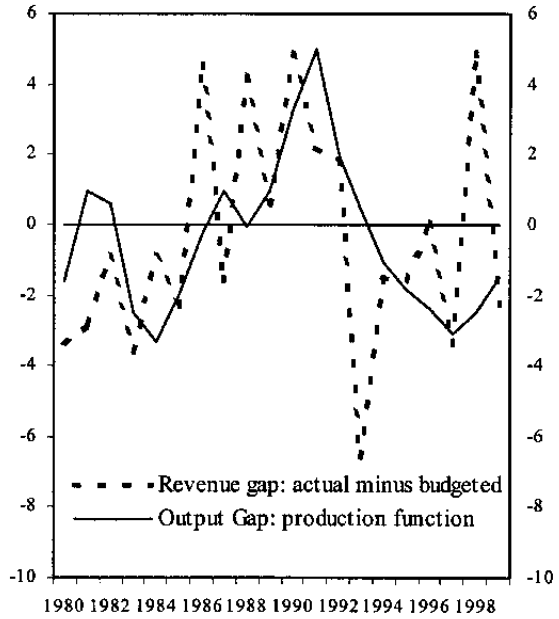
42. The historical analysis leaves the impression that the small permitted budget variations under the proposed rule would have led to a rather tight fiscal policy during the prolonged recession of the 1990s. It is, however, difficult to gauge the actual effects of a strict application of the expenditure rule to this period, since GDP is endogenous. For example, if the rule had been in place before 1991, and larger surpluses would have been run, the economy might have experienced a smaller positive output gap and, subsequently, a less severe downturn than actually occurred. It should also be stressed that the burden of countercyclical policy is not borne by the federal government alone. Reductions of income tax collection lags on the cantonal level have strengthened the stabilizing effect of income taxation. Also, during the depth of the last downturn, the unemployment insurance fund recorded a deficit of about 0.7 percent of GDP, significantly augmenting the degree of budget variability on a consolidated government basis. Were the unemployment insurance fund to operate as an unimpeded stabilizer throughout the full business cycle, the low variability of the federal budget balance under the proposed rule would be a less pressing issue.

43. Rules based on longer-run planning horizons, as in some other countries, could generate more short-term variability in the budget balance than allowed under the proposed rule. In this vein, an analogous rewriting of the rule would be to base the expenditure ceiling on trend revenue rather than the one-step-ahead forecast of revenue. Since trend revenue tends to exceed actual revenue in a downturn, and trail behind it in an upturn (Figure I-7), the range of possible budget variation could rise to ±1.3 percent of GDP. This follows from a rewriting the rule as follows:

$$GBR_{\max} = \max \frac{R}{Y}(C\frac{RT}{R} - 1) = 1.3$$

where RT is trend revenue and, based on HP-filter estimates, the maximum for C and RT/R are 1.05 and 1.08 respectively. An additional advantage of using trend revenue would be that it avoids significant revenue forecasting errors. Ex-post adjustments via A_t due to prediction errors would be eliminated and potential procyclical effects through the built-in correction mechanism (discussed below) could be minimized. However, a downside to the approach would be the need to establish a transparent and reliable estimation method for trend revenue, especially when some revenue categories are highly variable.[14]

Figure I-7. Switzerland: Output-Gap and Revenue Deviations from Trend, 1980-1999



Sources: IMF, World Economic Outlook; and staff calculations.

F. Implementation Issues

44. While on average the balanced budget rule can be expected to generate an improved fiscal policy, there are circumstances in which it could produce some unintended results.

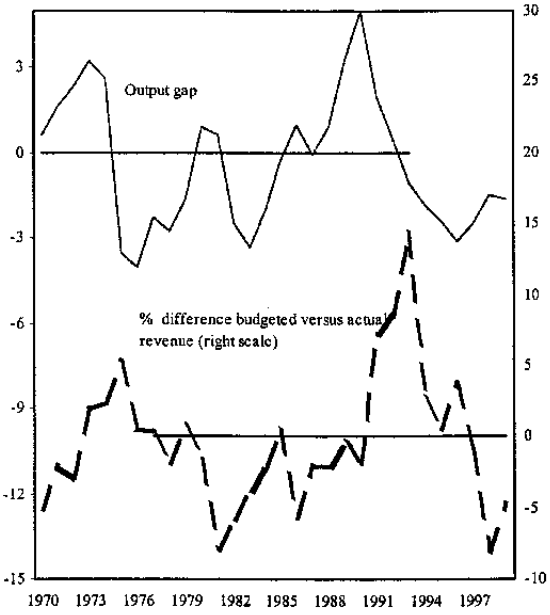
[14] For example, much of the volatility of revenues in Figure I-7 stems from a high variability of receipts from the stamp duty and the withholding tax.

Protracted recessions and unanticipated surpluses

45. In order to avoid systematic revenue forecast errors or deliberate overspending the new rule imposes an error correction mechanism which requires an ex-post spending adjustment for failed targets. Past spending overruns need to be reduced via expenditure restraint to avoid a gradual build-up of debt. More specifically, if past spending overruns amount to more than 6 percent of revenue then the excessive balance on the fictional account must be brought back below this threshold within three years. In a protracted recession when overspending is likely due to overly optimistic revenue forecasts, this mechanism can have a perverse effect. It could claw back expenditures at a time when the economy is still underutilized.

46. Historical data show that there is a systematic tendency to over-predict revenue in downswings and under-predict it in upswings. Revenue prediction errors are particularly large at the beginning of a new cycle (Figure I-8).[15] Several episodes of large prediction errors can be identified. For example, budgeted revenue exceeded actual (ex post) by 7 to 10 percent at the height of the recession. The recorded spending overflows would therefore soon have reached the 6 percent threshold level and induced pro-cyclical expenditure restraint via the correction mechanism in the following years. A wider permitted deficit band or a loosened adjustment requirement for A_t could avoid such an outcome.

Figure I-8. Switzerland: Output-Gap and Revenue Prediction Error, 1970-1997



Sources: IMF, World Economic Outlook; and staff calculations.

47. Another potential weakness of the new rule is the lack of provision to save unanticipated revenue gains. Contrary to the requirement to reduce a negative balance in the fictional account from past overspending there is no equivalent constraint in the case of an unforeseen surplus. This surplus would produce a positive entry in the fictional account and could be used for spending purposes in the following year even though the output gap could still be positive. Past experience show that such a scenario is not unlikely. For example in 2000, revenues from stamp duty and the withholding tax were significantly higher than expected. The procyclical use of unanticipated revenues could be avoided through a modification of the expenditure rule by requiring that accumulated surpluses only be eliminated during periods when the economy has a declining or negative output gap.

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[15] Revenue forecast errors are approximated by the percentage difference between the budgeted and actual revenue receipts in a given year. Average percentage deviations of the budgeted from actual revenue were 2.8 percent of revenue in the period 1970-1999.

The HP-filter and estimates of the cyclical position

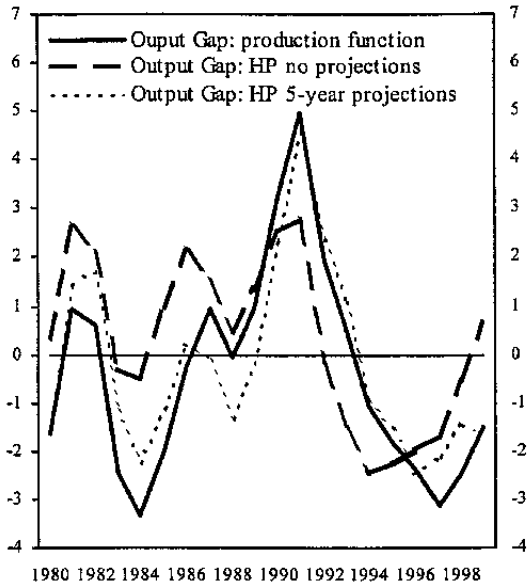
48. The method of measuring the cyclical position of the economy can also yield perverse results in some circumstances. While the proposed use of an HP-filter possesses some advantages—ease of calculation, transparency, and symmetric estimates of output gaps that would imply that budget surpluses and deficits cancel out over time—it also has drawbacks:

- The size of the output gap depends on the choice of an arbitrary smoothness parameter. A low smoothness factor leads to a more responsive trend component and therefore to smaller output gaps. A high smoothness parameter generates an unresponsive trend component and relatively large output gaps. Theoretical arguments that suggest the smoothness parameter should be based on the length of the business cycle are difficult to apply in Switzerland's case given the considerable variation in the length and amplitude of the business cycle.

- Predictions for the trend component of GDP are biased in the direction of recent output developments. As a result, trend and actual output move together and the cyclical factor C_t tends to lag behind the actual output gap and be less pronounced. In turn, this reduces the counter-cyclical effect of fiscal policy.

- Estimates of the output gap do not respond well to changes in the duration of the business cycle. During long periods of low growth, the HP-filter automatically downgrades the trend growth rate and predicts a smaller output gap. While this would be fine if trend growth rate actually had fallen, it could trigger a procyclical fiscal response in a protracted recession. For example, compared to production function estimate of the output gap, the HP-filter interpreted the very long economic downturn in the 1990s as a permanent downward shift in trend growth.

Figure I-9. Switzerland: Output Gap, Production Function Estimate and HP Filtered Estimates



Sources: Eidgenössische Finanzverwaltung; and staff calculations.

49. Some of these drawbacks can in principle be lessened by including forward-looking information on GDP growth when running the HP-filter. This can make trend output less sensitive to recent observations, as shown in the dotted line in Figure I-9.[16]

[16] Each estimate of the output gap is based on historical data plus data for the next five years.

However, for the current output gap, any improvement is only as good as the quality of GDP projections.

50. Better estimates of output gaps could be obtained with a production function or structural model approach. Compared to the HP-filter, structural approaches use information on internal and external demand developments, respond to expected changes in factor supplies (labor and capital), and can also be adjusted for structural policy changes. The main drawback would be that such methods are less transparent and straightforward than mechanical filters.

G. Concluding Remarks

51. A number of conclusions follow from an analysis of the proposed fiscal framework:

- The proposed constitutional amendment to the balanced budget rule provides a transparent framework for shrinking the debt/GDP ratio and reducing procyclical tendencies in fiscal policy.

- A more ambitious fiscal target might arguably be more inter-generationally equitable and free up interest savings to pay for some of the budget costs after 2015 of an aging population. But it may not be time consistent—governments would be tempted to expropriate the surpluses along the way. There are also no compelling macroeconomic reasons to run a tighter fiscal policy than a balanced budget.

- As the rule alone does not provide much additional cyclical flexibility, it will be important to follow through with other measures. In particular, the finances of the unemployment insurance fund should be strengthened so that procyclical movements in contribution rates can be avoided. Better coordination of fiscal policy across the levels of government would also help.

- Some aspects of the fiscal rule could be strengthened—or at least will require careful discretion during implementation. In particular, the feedback rule to eliminate unintended deficits should not be allowed to provide procyclical budget cuts in a prolonged recession. Stronger safeguards should be put in place to ensure that unintended surpluses are saved. And, as a technical matter, mechanical methods to estimate the cyclical position of the economy should be avoided or supplemented with other information on the degree of capacity utilization.

The Range of the Federal Budget Balance Under the Expenditure Rule

52. Rearranging the expenditure rule to solve for the implied government deficit ratio (GDR) gives:

$$GDR = \frac{E_t(R_{t+1}) \cdot E_t(C_{t+1}) + A_{t+1} - R_{t+1}}{Y_{t+1}}$$

53. The most basic scenario assumes that revenues and the cyclical factor are predicted without

errors ($E_t(R_{t+1}) = R_{t+1}; E_t(C_{t+1}) = C_{t+1}$) and that no adjustments are necessary ($A_{t+1} = 0$). The permitted range of the budget balance as discussed in the main text defines a range within 0.5 percent of GDP.

54. However, estimates of $E_t(R_{t+1}), E_t(C_{t+1})$ are not necessarily accurate or unbiased, and revenue forecasts can differ substantially from actual revenue collection. Large short-run tax elasticities and frequent changes in the tax code impair the ability of accurate forecasts. A rough estimate of the prediction error, π, can be derived from past federal budget data. These data show an average percentage difference between budgeted and actual revenue of 3 percent of budgeted revenue. The largest differences in budgeted revenue were observed at the onset of the severe 1991 recession where revenues were over-budgeted by about 7 to 10 percent of overall revenue. Assuming the worst case scenario of a counter-cyclical revenue forecast error of 10 percentage points ($\pi_{max} = 0.1$) the actual GDR can be calculated as

$$GDR = \frac{R_{t+1}}{Y_{t+1}}((1+\pi_{\max})C_{t+1} - 1) + \frac{A_{t+1}}{Y_{t+1}}$$

55. Abstracting from the annual adjustment payments, the maximum permissible deficit in a severe and unforeseen downswing would be 1.55 percent of GDP. The error correction mechanism of the expenditure rule stipulates that large forecast errors must be corrected in particular if the accumulated overspending amounts to more than 6 percent of expenditures. A forecast error of 10 percent would likely lead to an immediate violation of the deficit limit and require an adjustment of the spending ceiling via a negative A_{t+1}. The size of the adjustment depends on the level of accumulated spending overruns in the past. Historically underestimation of revenues during growth periods has been comparably low at around 2 percent of revenue. Therefore only a small reserve can be expected in the fictional account to offset negative revenue prediction errors and therefore substantial expenditure cut backs are likely in recession years. In sum revenue forecast errors can in extreme cases allow a deficit of 1.55 percent of GDP, but based on the expenditure rule would immediately met by counteracting adjustment requirements pushing the deficit down to substantially lower levels.

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II. Monetary Policy Transmission and the New Policy Framework[17]

A. Introduction and Summary

56. After a quarter century of monetary targeting, the Swiss National Bank (SNB) adopted a new monetary policy framework in January 2000. The new framework defines an explicit inflation objective; specifies that monetary policy decisions should be based on the medium-term inflation forecast; and designates a short-term interest rate as the operating target. Although the framework differs substantially from monetary targeting, its adoption could be considered the culmination of a gradual, decade-long shift in emphasis from quantity indicators to other variables in the pursuit of price stability.

57. The eminent role of the medium-term inflation forecast in monetary policy decisions in the new framework focuses attention on two basic questions: how does monetary policy influence prices, and what are the output costs attached over the forecast horizon—in other words, how does monetary transmission operate over the medium term in Switzerland? To shed some light on these questions, this chapter examines the relationship between monetary policy (summarized by interest rates) and economic developments (captured by the behavior of output, inflation, exchange rate, and price) in Switzerland in the 1983-99 period. It offers three main findings:

- Monetary policy influences the economy with long lags and large uncertainties.
- Both the exchange rate and the credit channel are important ingredients of the transmission mechanism, in line with the fact that Switzerland is a small open economy with a sophisticated financial sector.
- Monetary policy appears to have been successful in anchoring inflation expectations.

58. The first finding confirms conventional wisdom, and suggests that a three-year horizon for the inflation forecast is broadly appropriate. The second finding indicates that a synthetic indicator of the monetary policy stance could benefit from including information on interest rates, exchange rates, and credit market developments. The third finding provides some support that increased transparency might generate benefits for the efficiency of monetary policy in controlling inflation.

59. After a brief review of the main features of the monetary policy framework in Section B, Section C presents results of the empirical analysis, while Section D offers some policy conclusions.

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[17] Prepared by Kornélia Krajnyák.

B. The New Monetary Policy Framework in an International Perspective

60. The Swiss economy has been operating under a floating exchange rate regime since the collapse of the Bretton Woods system in 1973, with an independent monetary policy that has been geared towards the objective of price stability. However, the SNB repeatedly emphasized that it retained the option to offset undesirable exchange rate developments, should it become necessary.[18] Correspondingly, foreign exchange market developments temporarily became the driving force of monetary policy on several occasions, namely, during 1978-79 (appreciation of the franc), in 1981-82, in 1987 (at the time of the U.S. stock market crash), in 1992-93, in 1996, and in 1998 (during the Asian crisis).

61. Until January 2000, the SNB conducted its monetary policy in the framework of a monetary aggregate target.[19] Prior to 1990, annual target growth rates were set, first for M1, then from 1979 for base money. Beginning in 1990, annual targets were replaced by a medium-term (5-year) growth rate objective. The shift to a medium-term target was triggered by a series of velocity shifts beginning in 1988, and the perception that the relationship between the targeted monetary aggregate (monetary base) and prices had become unstable. During the 1990s, various other quantity indicators (e.g., M3) were also considered as supplementary indicators. Although the rhetoric of monetary targeting was retained, the prominence of indicators other than monetary aggregates (e.g., interest rates) appears to have increased steadily in the formulation of monetary policy.[20]

62. The 2000 monetary framework abandoned monetary targeting and set in place a regime that most resembles inflation targeting. However, contrary to some other countries that adopted similar monetary policy frameworks (e.g., New Zealand, Sweden, or the U.K.), the change in the monetary policy regime is not a result of poor performance or an outright failure by the previous framework. In this respect, the new framework represents evolution rather than revolution. Further, there has been no abrupt shift in policy objectives, and no particular reason to believe that the policy reaction function has changed substantively,

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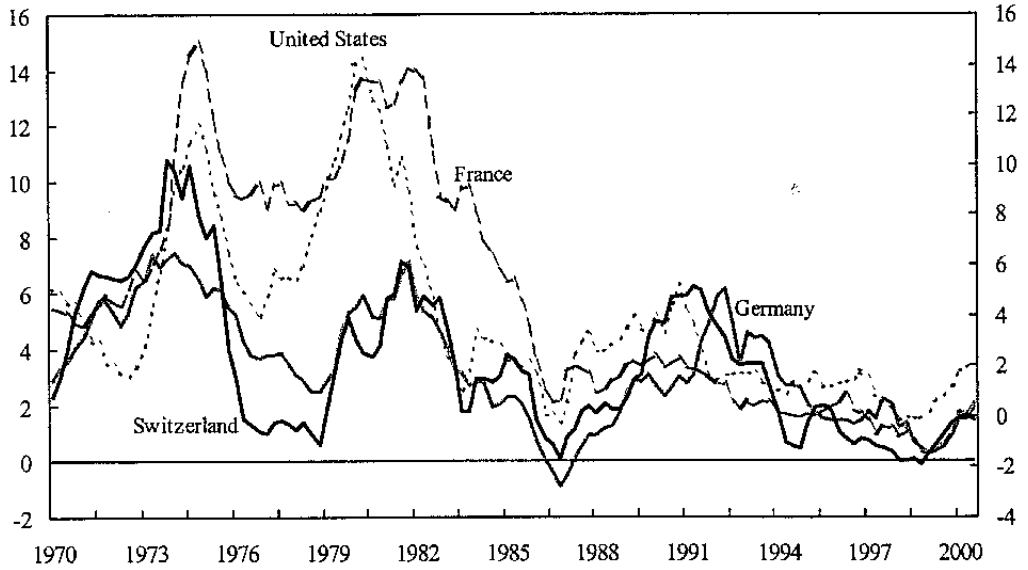
[18] "The Bank will react appropriately to any unexpected developments, which would prove detrimental to the Swiss economy without losing sight of the goal of price stability", Quarterly Bulletin 1997/2, p.166. Also, the SNB "[retains] the option of deviating from its monetary course in the event of serious disruptions in the financial markets", Quarterly Bulletin 1996/4, p.295.

[19] Rich (1989) and Rich (1996) provide more detailed discussions.

[20] Topics of the studies published in the SNB Quarterly Bulletin are probably an indicator of this process. Between 1990 and 1996, all but one volume contained at least one article on a topic closely related to monetary targeting (e.g., money demand, monetary aggregates, etc.). However, other topics also begin to surface (transparency in 1993, inflation targeting in 1994, etc.), and by 1997, none of the articles are closely related to monetary targeting.

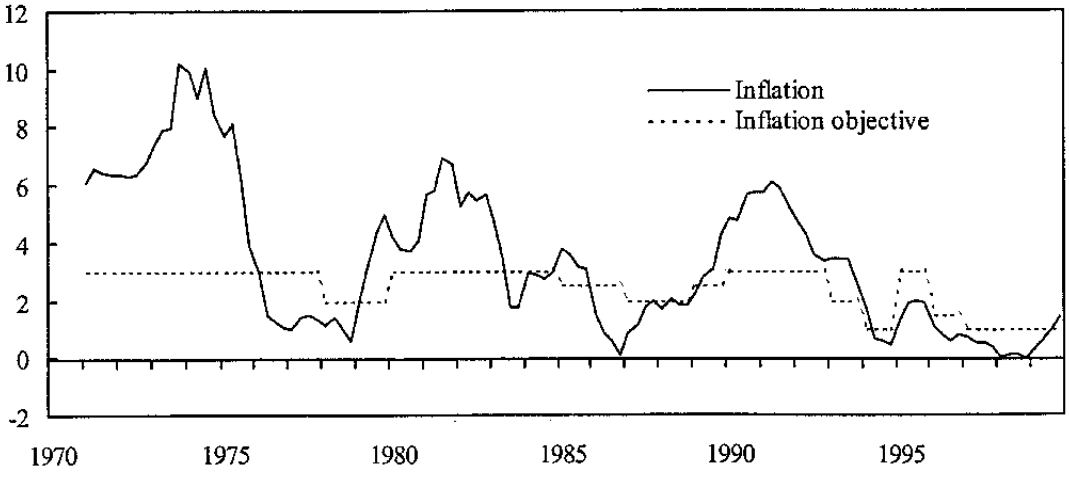
Rich (2000). In addition, given the SNB's long and relatively successful track record of independent monetary policy (Figures II-1 and II-2), Swiss policymakers adopted the new regime equipped with a considerable stock of credibility.

Figure II-1. Switzerland: Inflation Rate in Selected Countries



Sources: OECD Analytical Database; and IMF, World Economic Outlook.

Figure II-2. Switzerland: Actual Inflation and Medium-Term Inflation Goal



Sources: IFS; and staff calculations.

63. The SNB describes the main features of the new framework as (i) an explicit definition of the price stability objective; (ii) a central role for medium-term inflation forecasts in monetary policy decisions; and (iii) an operational target range for the three-month Swiss franc interest rate.[21] As Table II-1 illustrates, some of these features are shared with the monetary framework of the ECB, and with countries that practice inflation targeting. In particular, all the comparator countries have an explicitly defined inflation objective and publish inflation forecasts. In the pursuit of their objective, all countries use a short-term interest rate as an operating target. However, details vary substantially across the different frameworks – for instance, New Zealand and the UK do not target headline CPI, but a price index excluding the direct effect of interest rates; several comparators have a point rather than a range objective for inflation; and different interest rates serve as operating targets in different countries.

64. A further and more substantial difference between Switzerland and the ECB on one hand, and the inflation targeter comparators on the other hand, lies in the area of transparency and accountability.[22] In particular, formal mechanisms to ensure transparency of monetary policy decisions, and enhance the accountability of policymakers are in place and are being spelled out in ever-increasing detail in the inflation targeting countries. This is not by accident, as the mechanisms that secure transparency and accountability are viewed by some analysts as an integral part of the framework.[23] The corresponding mechanisms remain largely informal in the case of Switzerland and the ECB.

65. Transparency can yield economic benefits by strengthening the central bank's credibility and helping to build up or preserve its reputation. As a transparent central bank can be held accountable more easily, transparency could also contribute to correcting the "democratic deficit" that arises from delegating monetary policy to an independent agency.[24]

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[21] Swiss National Bank (2001).

[22] "Transparency" of monetary policy making is defined as *open, clear, and honest* communication of (i) policy objectives (goal transparency); (ii) economic information such as the central bank's assessment of the current economic situation and its forecasts complete with the appropriate data, models, and methods (economic transparency); (iii) procedures; (iv) policy decisions; and (v) operations. Similar interpretations are used by Winkler (2000), Gersbach-Hahn (2001), and Geraats (2001). "Accountability" is understood to be as the monitoring and ex post evaluation (complete with possible penalties) of the central bank's policymaking activity.

[23] See for instance Svensson (1998a).

[24] Briault et al (1996).

Table II-1. Switzerland: Monetary Policy Frameworks in Selected Countries

	Switzerland	Canada	ECB	New Zealand	Sweden	United Kingdom
Inflation targeter	no	yes	no	yes	yes	yes
Objective	price stability	price stability	price stability	price stability	price stability	price stability
Institutional commitment	no	yes	"first pillar"	yes	yes	yes
Inflation rate	headline CPI	core inflation	headline HICP	CPIX	headline CPI	RPIX
Inflation level	<2%, but positive	2% with tolerance of ± 1%	<2%, but positive	0-3%	2% with tolerance of ± 1%	2.5%
Horizon	medium term	2 years	medium term	1½ to 2 years	2 years	2 years
Inflation report						
Frequency	4x per year	2x per year	2x per year staff forecast	4x per year	3x per year	4x per year
Detail	little	detailed	little	detailed	detailed	detailed
Operating target	3-mo SwF LIBOR; 100 bp. range	overnight rate; level	3-mo repo rate; level	official cash rate; level	1-week repo rate; level	2-week repo rate; level
Operating procedures	repo	repo	repo	repo	repo	repo
Decision maker	Gov. Board	Gov. Board	Executive Board	Governor	Gov. Board	MPC
Accountability	Central bank accountable to Federal Government	Accountable to Federal Government	Accountable to European Parl., Council of Min, Commission	Governor personally accountable	Central bank accountable to Parliament; "Open letter"	"Open letter"

Source: Blejer et al (2000); and websites of the respective central banks.

However, transparency is not a free lunch, nor is more information necessarily better. First, producing, processing, packaging and transmitting information is costly. Second, bogus transparency in the form of redundant or confusing information can be counterproductive.[25] For these reasons, practices vary across countries.

66. While all central banks in Table II-1 are transparent regarding their objectives, there are substantial differences with respect to other aspects of transparency. Regarding economic transparency, the divide is between the SNB and the ECB on one hand and inflation targeting countries on the other. The latter publish detailed inflation reports, compared with a very compact few pages for Switzerland, and none (until recently) for the ECB. Procedural transparency is mainly influenced by the institutional setup. Sweden and the U.K publish minutes of meetings of their monetary policy decision making bodies, complete with voting records of members. This would be unnecessary in New Zealand, where the responsibility rests with the Governor. Decisions in the other three countries are consensus based, hence publishing minutes is perceived to have little value added. In contrast, policy transparency is present in all six countries, as policy decisions and likely future actions are communicated to the public. Similarly, operating targets and procedures are well-defined. However, information provided on details of monetary policy implementation (such as market intervention) varies across countries.

67. With respect to accountability, the central banks in Table II-1 are in some form responsible to their respective governments or parliaments. In addition, monetary policy in the U.K. and Sweden is subject to the open letter system, whereby the governor of the central bank is required to explain the reasons in an open letter to the chancellor whenever inflation deviates by more than 1 percent from the target. In New Zealand, the governor of the central bank is directly responsible for monetary policy outcomes.

C. The Monetary Transmission Mechanism in Switzerland

68. In an attempt to quantify broad policy tradeoffs, this section examines the effects of monetary policy on output and inflation. Although the empirical analysis does not yield particularly sharp or surprising insights, the following tentative conclusions can be offered:

- The empirical relationships linking main macroeconomic variables do not appear stable over the past 25 years. However, they display somewhat more stability in the more recent period.
- Lags in the transmission mechanism are relatively long and variable, but comparable to those found for other countries.
- The exchange rate plays a significant role in the transmission of interest rate shocks.

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[25] An example is publishing the voting records of uninformed central bankers in Gersbach and Hahn (2001).

- The relative importance of domestic real interest rates and the rate of real appreciation for real GDP growth is probably 2:1 to 3:1.
- Monetary policy inflation targets appear to have been fairly credible and successful in anchoring inflation expectations.

Lags and channels—an unrestricted VAR approach

69. To obtain a broad picture of the monetary transmission mechanism in Switzerland, in particular, to gauge the length of lags from policy shocks to output and inflation and to get a sense of the relative importance of various transmission channels, a small unrestricted vector autoregression (VAR) model is estimated. The model links five variables, and summarizes the economy's observed responses to various shocks.

70. The VAR model includes the output gap, the deviation of inflation from its longer run target[26], the credit to potential GDP ratio, the short-term interest rate, and the nominal effective appreciation rate. Data sources and the construction of the variables are discussed in detail in the Appendix. The methodology and the choice of variables are fairly standard in the empirical literature on monetary transmission: similar specifications were estimated e.g., by Leeper et al (1996) and Bagliano and Favero (1998) for the U.S., by Ramaswamy and Sløk (1997) and Clements et al (2000) for EU countries, and by Morsink and Bayoumi (1999) for Japan.

71. In this reduced form model, short-term interest rates (three-month Swiss franc LIBOR) are assumed to represent monetary policy. The rationale for this choice is that the SNB's current monetary framework employs this interest rate as an operating target, therefore it should be included in the empirical analysis if relevant lessons are to be learned.

72. Shocks to short-term interest rates are transmitted to output and inflation via three channels: (i) directly; (ii) through their effect on the availability of credit; and (iii) through the exchange rate. The domestic financial sector can magnify or dampen the effects of a policy impulse on output and inflation, as financing constraints in the economy become more or less binding. The existence of this channel can be justified by the presence of liquidity constrained agents or by balance sheet effects (for example, Bolton-Freixas (2000) or Gertler et al (2000)). The exchange rate channel is an obviously important ingredient of monetary transmission in a small, open economy like Switzerland.

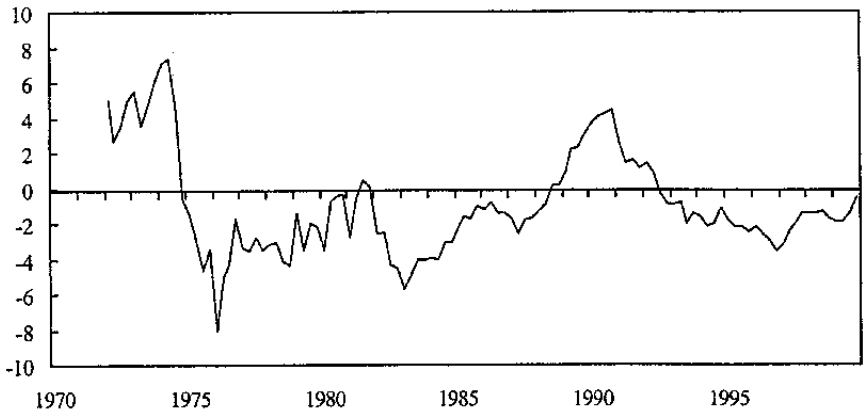
73. The quarterly VAR model is estimated with two lags over the 1983-99 period, and includes changes in oil prices, German short-term interest rates, and two dummies as

[26] By construction, the inflation objective variable incorporates features of both the inflation goal and the inflation forecast.

exogenous variables.[27] The dummies are as follows: a quarter dummy for 1988Q1; and a shift variable for the 1989-90 cyclical peak. The first dummy coincides with a large drop in interest rates following the introduction if the Swiss Interbank Clearing System. A possible rationale for including the second dummy—a shift variable for the cyclical peak—is the relatively short sample period that includes only one peak. Empirically, the peak dummy improves the description of output dynamics. In principle, all variables should be stationary, and neither casual observation of the series nor formal unit root tests indicate otherwise. Errors are orthogonalized using the Choleski decomposition, with the variables ordered as listed above. The ordering corresponds to the assumed reaction speed of the variables to shocks—the output gap is assumed to be the most sluggish, while the exchange rate reacts the quickest.

74. The sample period is chosen to begin in 1983 for several reasons. First, studies (for instance, Belongia (1988), Peytrignet and Fischer (1991)) have found that structural changes took place in the money demand relationship in Switzerland at the beginning of the 1980s. It is likely that these changes lead to modifications in the monetary transmission mechanism as well. Second, eyeballing the data reveals that the output gap series was considerably more volatile prior to this period (Figure II-3), indicating a change either in measurement or in economic structure (including the nature of shocks). The results are broadly invariant to extending or shortening the sample period, but become unstable when the sample is extended to include the 1970s, and completely fall apart when the estimation is carried out excluding the 1990s.

Figure II-3. Switzerland: Output Gap, 1970-99



Sources: OECD Analytical Database; and staff calculations.

[27] The Akaike and Schwarz information criteria do not indicate that longer lag length is warranted, and the results remain broadly stable when the system is reestimated with longer lag length. The Appendix discusses the specification issues in more detail.

75. The impulse responses of the endogeneous variables to a "typical" (one standard deviation) short-term interest rate shock are fairly intuitive (Figure II-4).[28] As the first panel indicates, an increase in the short-term interest rate has an initial perverse effect on output, and starts to have a contractionary effect on the output gap only about 1 year later.[29] The output response bottoms out after 2 years. Inflation responds faster (the effect reaches a trough within one year), but then the effect of an interest rate shock becomes positive. This counterintuitive response of inflation to interest rate shocks has often been found in the literature and has been dubbed the "price puzzle". Although the price puzzle might partially be explained by the presence of interest related items in the inflation variable, such as rents[30], usual explanations include imperfect identification of policy induced interest rate shocks, and incomplete specification of the policymaker's information set in the model.[31] Higher interest rates also reduce credit and appreciate the exchange rate. Credit is scarcest after about 1½ years. The exchange rate appreciates nearly 1:1 instantaneously, but the maximum effect on the appreciation rate is not reached until after 1½ years.

76. Other impulse responses are also fairly intuitive:

- Financing shock[32] (Figure II-5) is expansionary, with long-lasting effects on output, but also leads to higher inflation with a short lag. Interest rates rise, but effects on the rate of exchange rate appreciation are not significant.

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[28] The full set of impulse responses is reported in the Appendix, Figure A2.

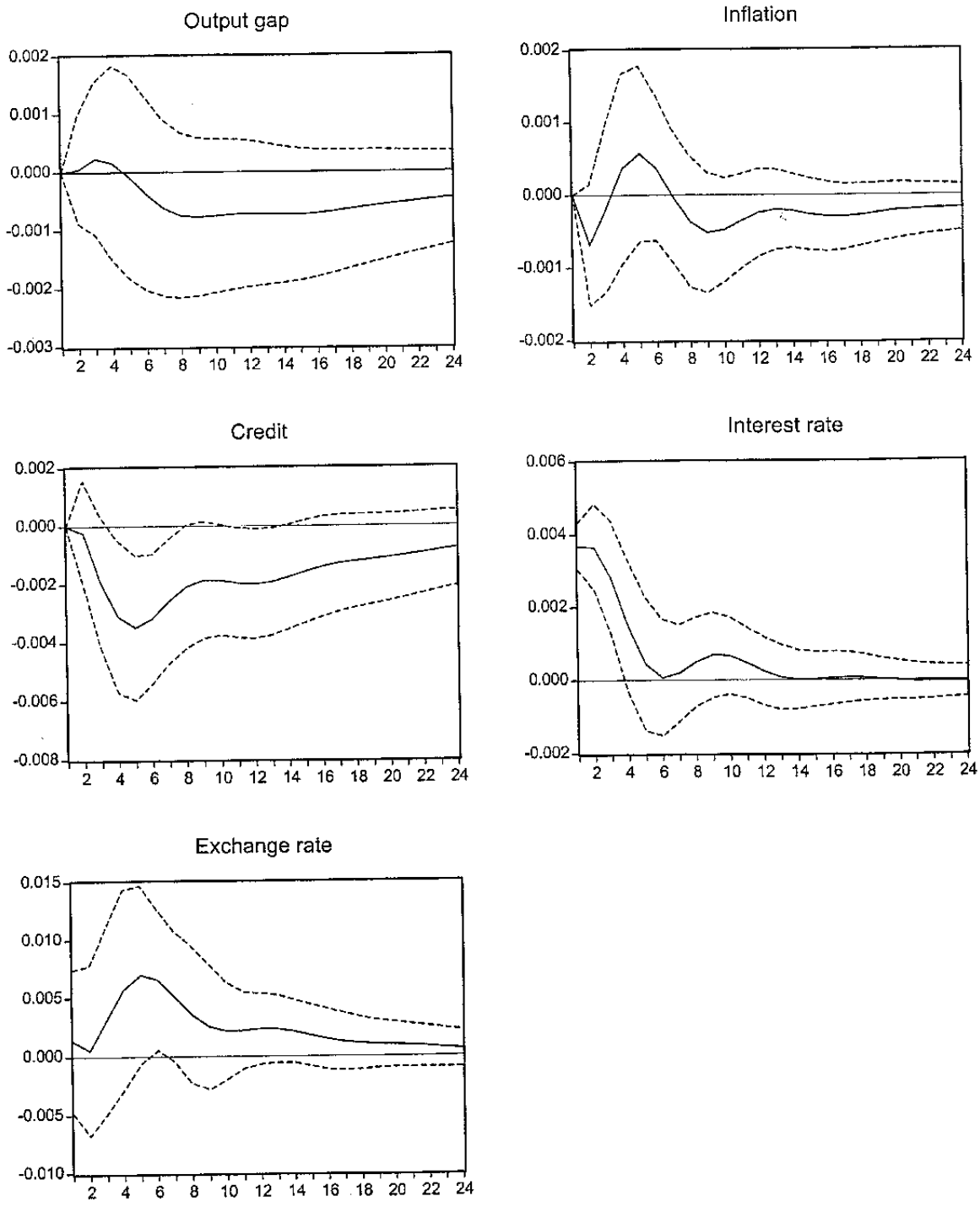
[29] The effect on the growth rate turns negative earlier, with a lag of 3 quarters (at the point when the output gap starts declining).

[30] Rents, which comprise over just 20 percent of the Swiss consumption basket, are indexed to interest rates. Although excluding interest rate induced variation in rents from the CPI would be desirable, excluding rents altogether is more problematic, as it skews CPI inflation towards non-domestic components. In the event, it turns out that the impulse functions are not greatly changed if rents are excluded from the CPI.

[31] See for instance Sims (1986) and Leeper et al (1996). In the first case (improper identification), the impulse response could trace the reaction of prices to velocity shocks. In the second case (incomplete specification), information about future inflation available to the policymaker when making her monetary policy decision, but not included in the model, would produce the mirage of inflationary effects of a contractionary monetary policy shock.

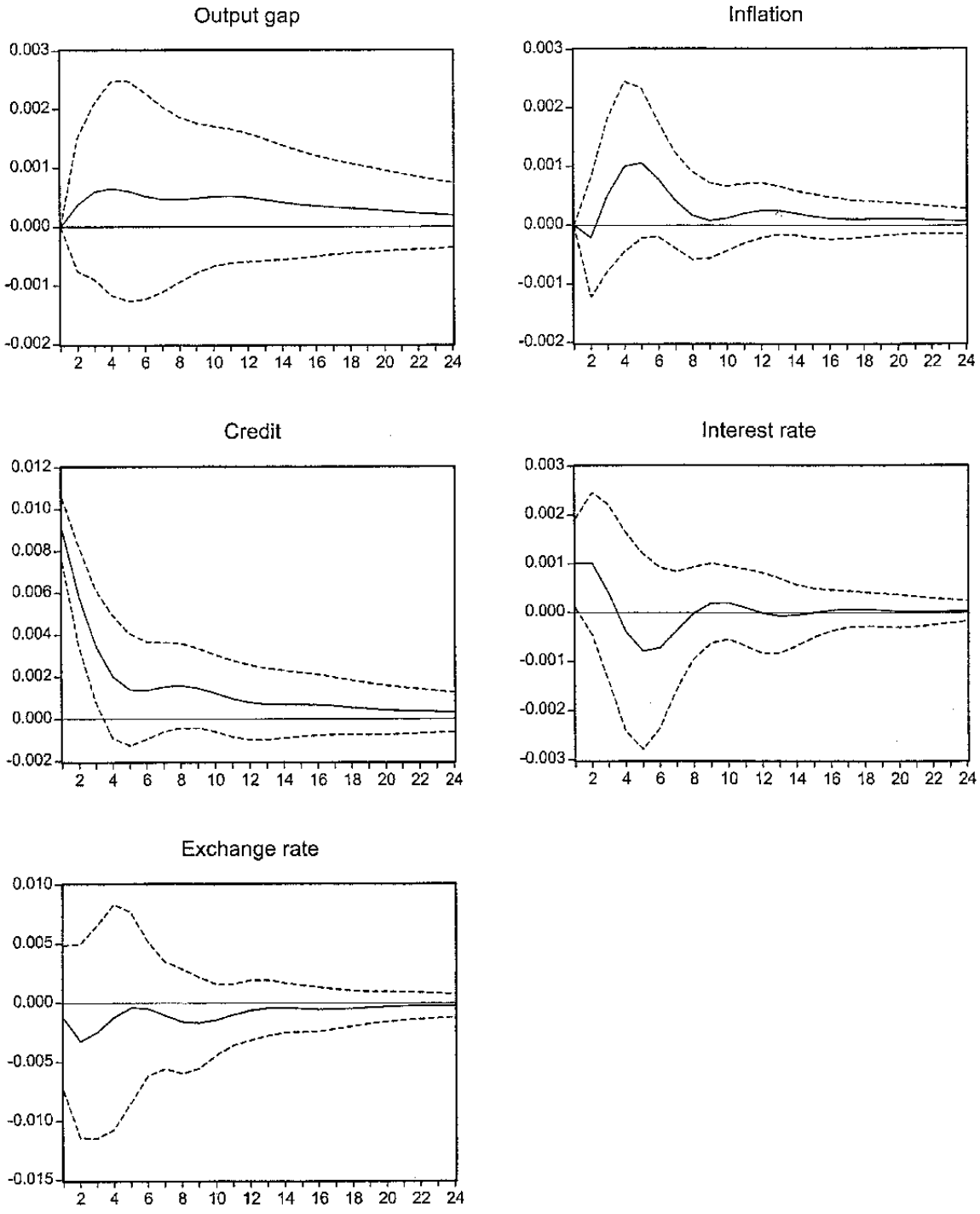
[32] An example of such a shock is a financial innovation which facilitates monitoring of borrowers. This is likely to ease credit constraints immediately but feed through to (measured) potential output with a delay. Another example is a shock to real estate prices, which decreases collateral and tightens financing constraints.

Figure II-4. Switzerland: Impulse Responses to an Interest Rate Shock



Source: IMF staff calculations.

Figure II-5. Switzerland: Impulse Responses to a Financing Shock



Source: IMF staff calculations.

- A shock to the appreciation rate feeds through to lower output and lower inflation relatively fast, with the effect at maximum after 1½ years in both cases (Figure II-6). In response, interest rates decline and credit supply contracts.

77. The impulse responses of the short-term interest rate to the various shocks are consistent with countercyclical changes in the monetary policy stance (Figure II-7). While the short-term interest rate increases in response to output, inflation, and financing shocks, an exchange rate shock (higher nominal appreciation rate) triggers a decline in interest rates. Further, interest rate shocks are persistent in international comparison.

78. The estimated effects of an interest rate shock are quite sensitive to the sample period (Figure II-8). The output response bottoms out after 1½ to 2½ years, with faster reactions obtained for the more recent sample periods. Although the transmission lags are longer than for instance in the U.S. (where the output response is usually estimated to bottom out within 1½ years), they are not out of line with lag lengths found for some small European economies. The size of the estimated effects, however, is small in international comparison.[33] The inflation response obtained from data for the more recent period shows a decline in inflation due to higher interest rates.

79. "Shutting down" either the exchange rate or the credit channel of transmission dampens the impulse response of both output and inflation (Figure II-9).[34] In particular, when the exchange rate channel is eliminated, no significant output response to an interest rate shock is detected. This may indicate the presence of an "expenditure switching" effect, with foreign demand making up for weaker domestic demand when domestic interest rates rise but the exchange rate does not change. Similarly, closing the credit channel leads to a less pronounced and less speedy transmission from interest rate shocks to output.

80. The VAR's estimated impulse responses give some indication as to what weight to assign to domestic interest rates, the exchange rate, and credit developments when describing the degree of tightness in monetary conditions. Figure II-10 shows the output effects of 1 percentage point contractionary shocks to these three factors. After about 6 quarters, the effects of an interest rate shock are about twice as large as the effects of an exchange rate shock. Over this horizon, a (negative) financing shock has an output effect comparable to an

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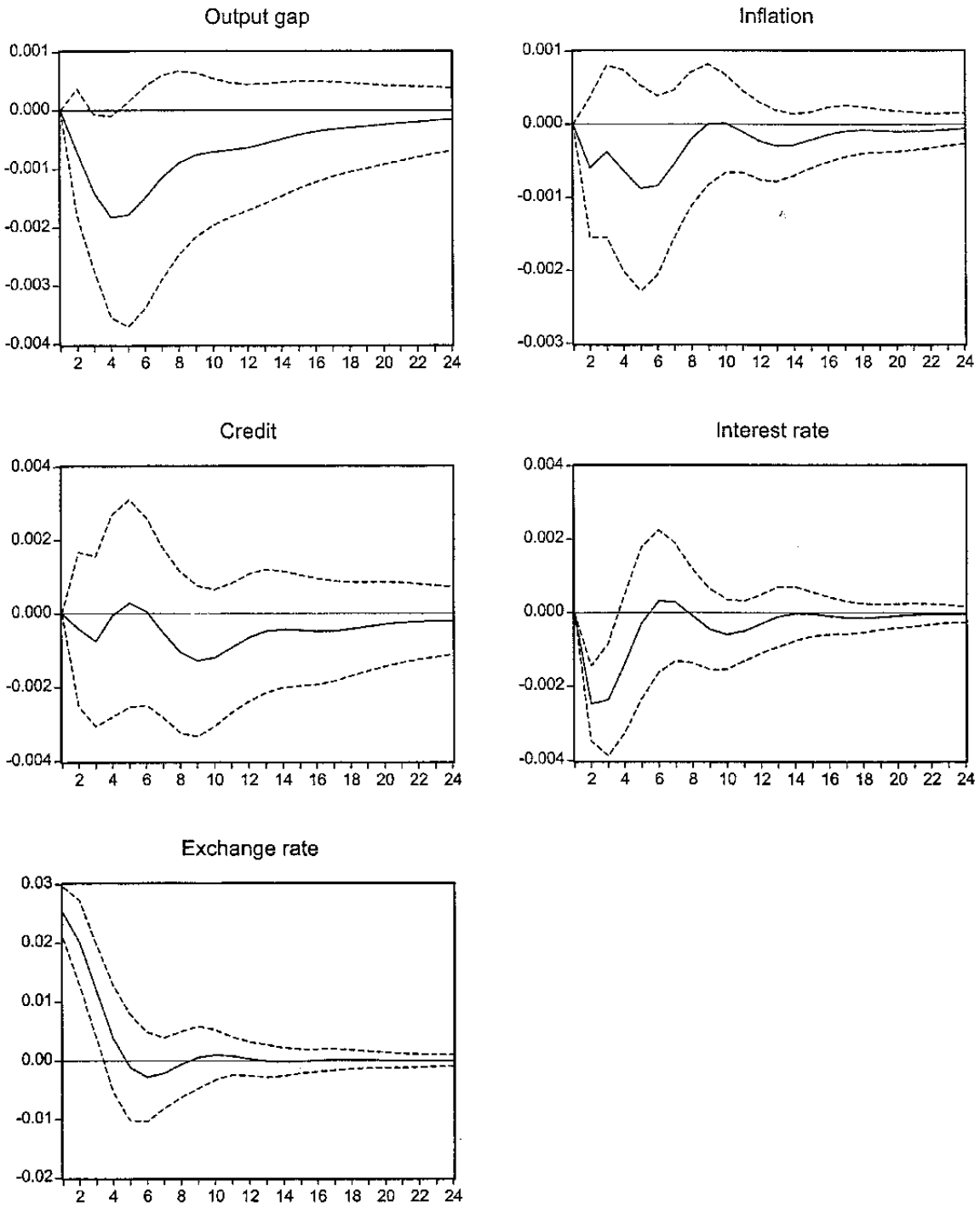
[33] For instance Ramaswamy and Sløk (1997), and Clements, Kontolemis and Levy (2000) find that maximum output response occurs after 1½–2½ quarters for European countries. Real output response ranges between 0.4–1 percent, which is larger than for Switzerland. However, these estimates are based on different (level) specifications of the VAR model.

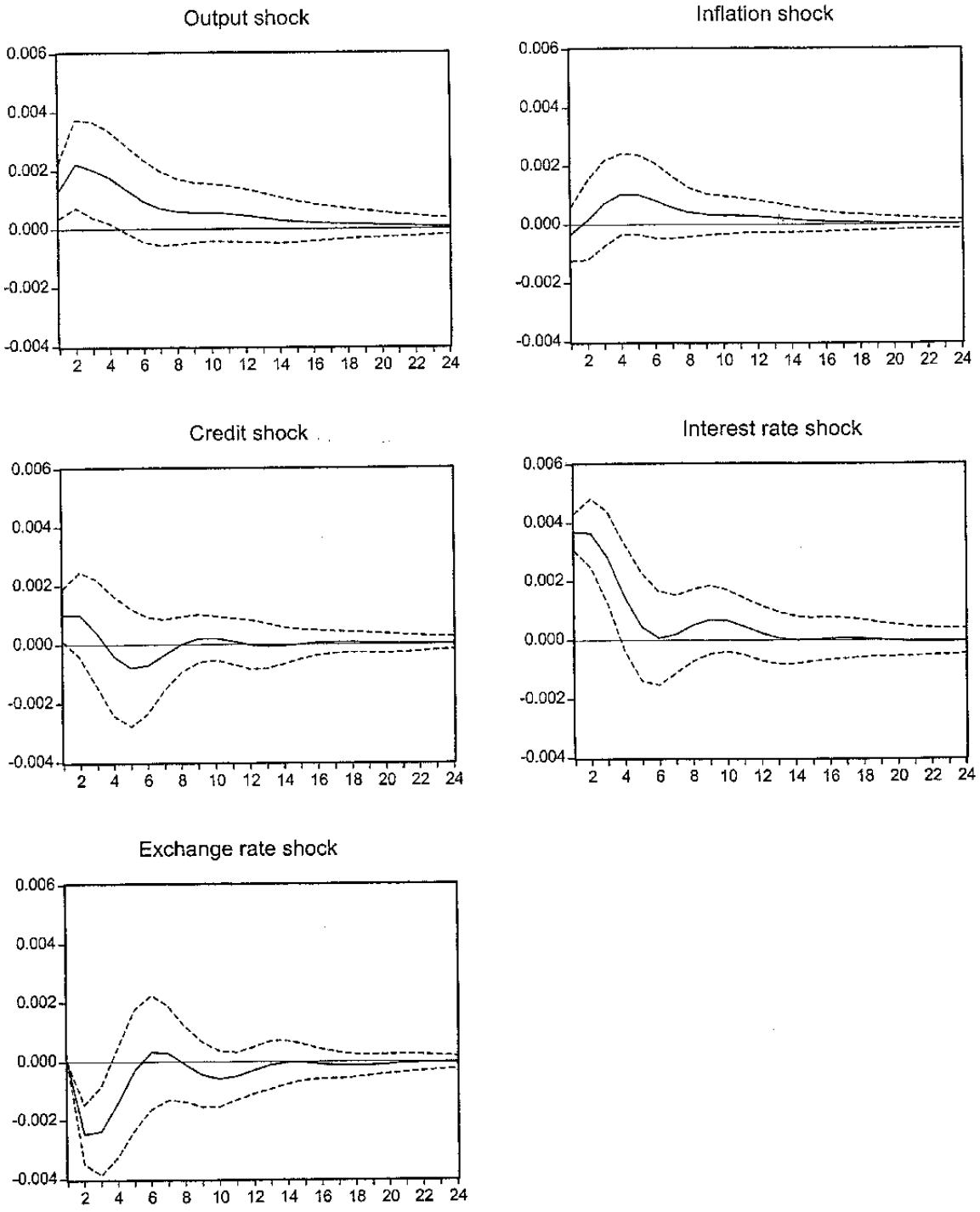
[34] This experiment involves recalculating the impulse responses after excluding the variable in question from among the endogeneous variables and including its lagged values among the exogenous variables.

Figure II-6. Switzerland: Impulse Responses to an Exchange Rate Shock



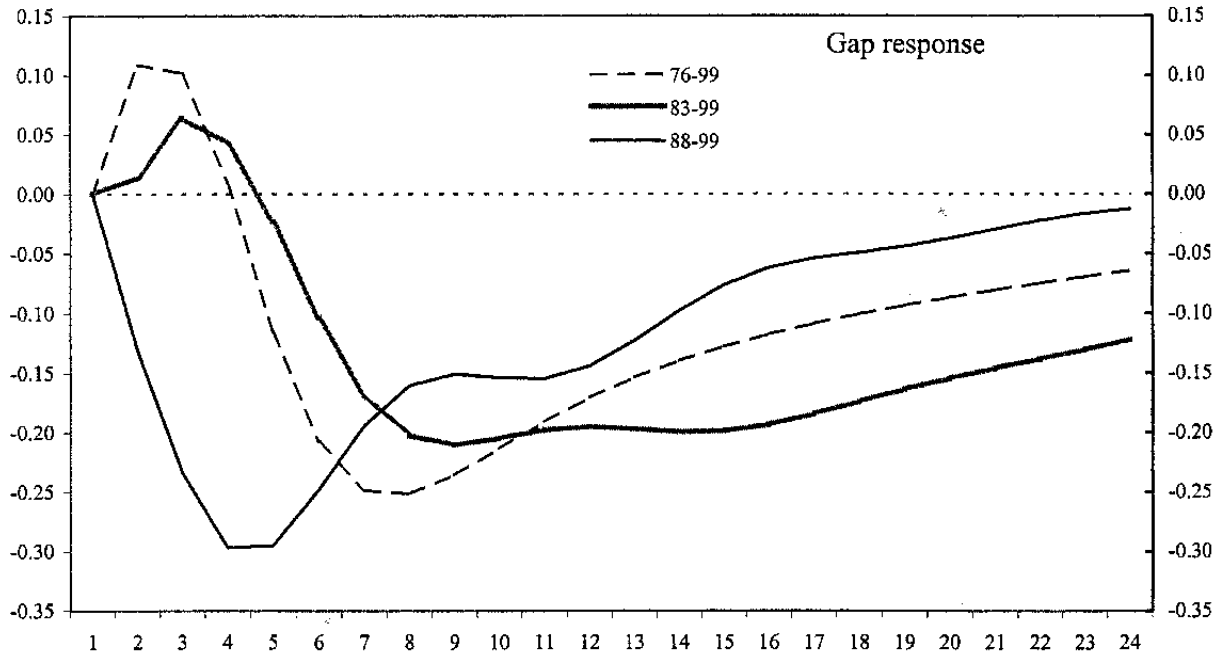
Source: IMF staff calculations.

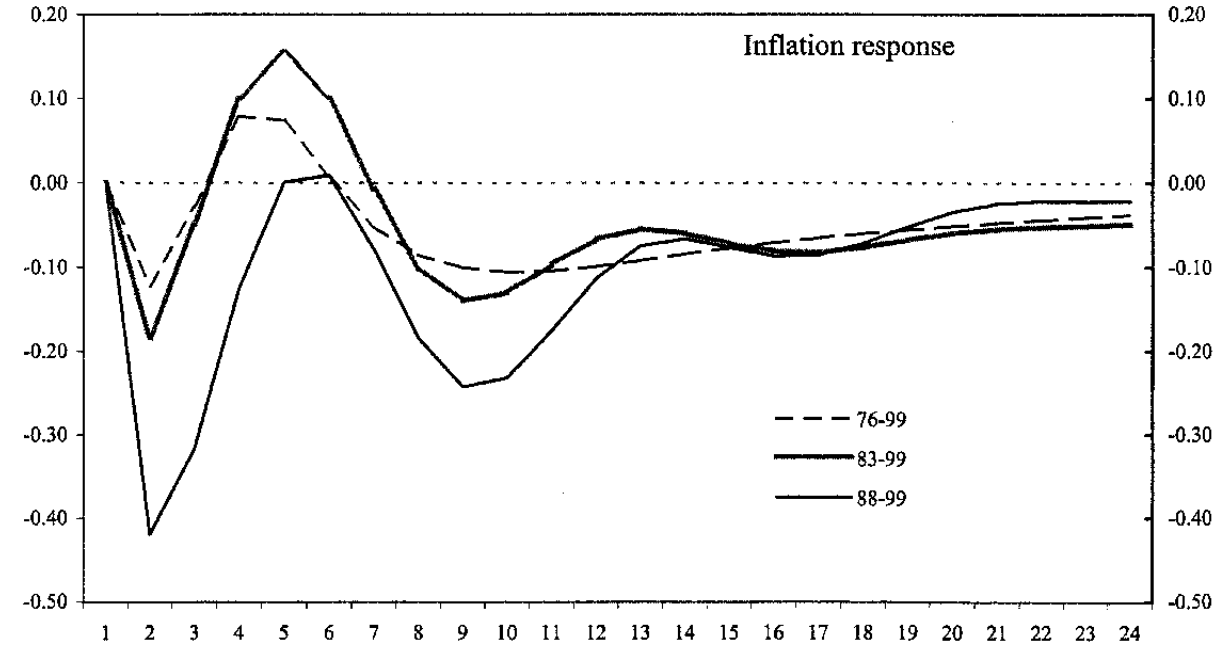
Figure II-7. Switzerland: Response of Interest Rates to Shocks



Source: IMF staff calculations.

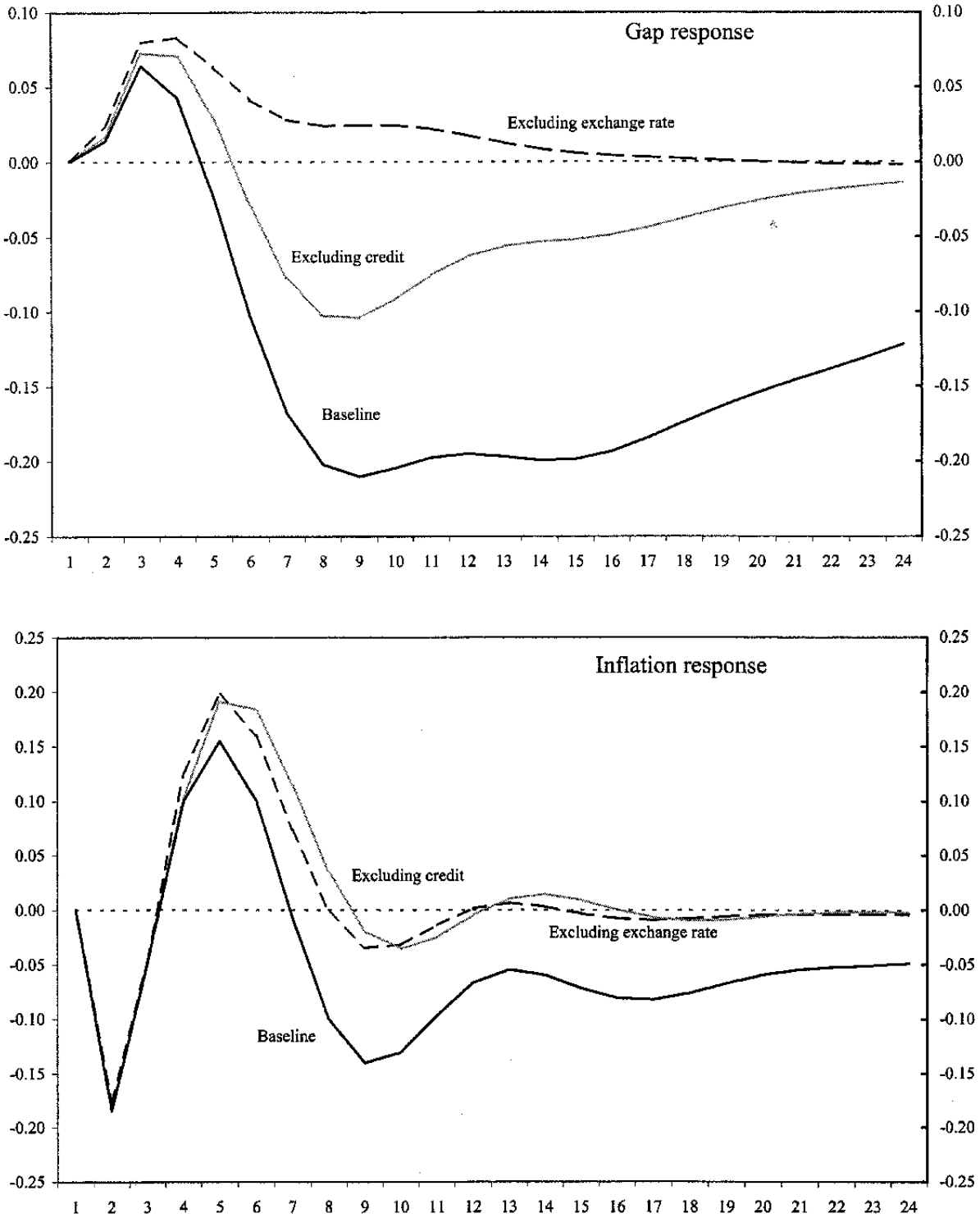
Figure II-8. Switzerland: Effects of a Unit Shock to Interest Rates on Output Gap and Inflation





Source: Fund staff calculations.

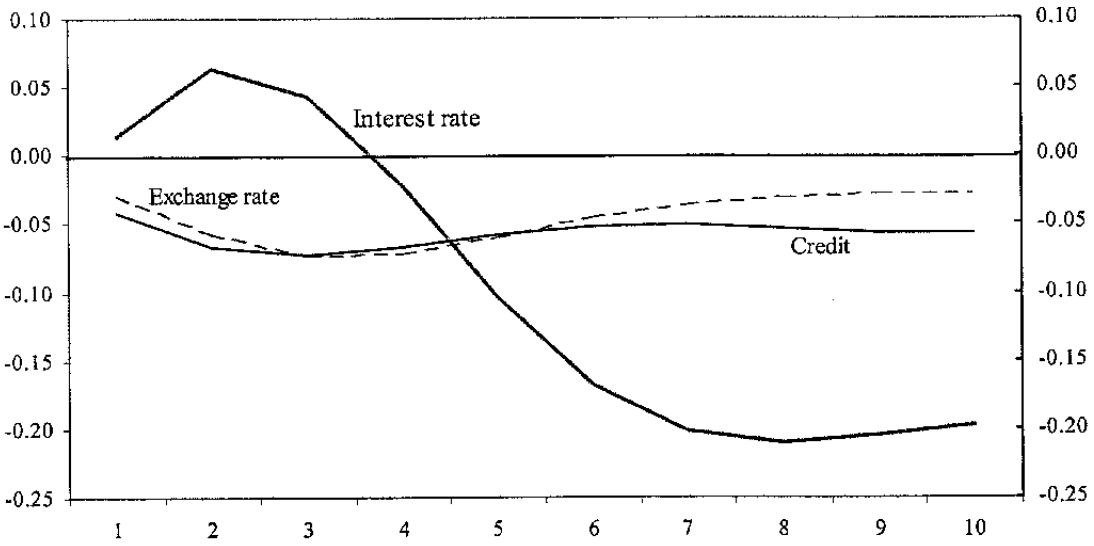
Figure II-9. Switzerland: Effects of a Unit Shock to Interest Rates
With and Without the Exchange Rate and Credit Channels



Source: Fund staff calculations.

exchange rate shock. This would suggest giving interest rates, exchange rates, and credit the respective weights 2:1:1 when constructing an indicator of monetary conditions.[35] However, identifying shocks is not feasible in practice, and monetary condition indices usually rely on the total change in interest and exchange rates. Weighting these two factors 2:1 to 3:1 would appear to be broadly consistent with the findings. Augmenting such an MCI with an indicator of credit developments would in general amplify measured changes in monetary conditions. For example, an MCI based only on interest and exchange rates would show an increase of about 4 percent between 1993 and late 1996, while an "augmented" MCI would register an increase of about 8 percent.

Figure II-10. Switzerland: Output Effects of 1 Percent Contractionary Shocks



Source: Fund staff calculations.

A more structured look at output, inflation, and monetary policy

81. The impulse responses obtained in the previous subsection motivate imposing some restrictions on the links between key macroeconomic variables. In particular, the VAR results point to a simple policy feedback rule connecting interest rates to output, inflation, and the exchange rate. This, along with more parsimonious equations that can be given behavioral interpretations—an output process (an aggregate demand relationship) and an inflation process (an aggregate supply relationship)—complete a small system that helps shed further light on the monetary transmission process.

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[35] Strictly speaking, the weight of interest rate shocks should be based on the impulse response excluding the exchange rate channel.

82. The output process links output growth (measured as quarterly change in log GDP) to lags of the output gap, external market growth, real appreciation, and real interest rates. In addition to these variables, two dummies are included: a dummy for 1991Q1 (coincident with the German unification), and a dummy variable spanning the 1989–90 cyclical peak. Table II-2 presents the regression results. The coefficients have the expected sign, and the negative effect of the real interest rates on growth is significant at the 10 percent level (with p-value 0.06). On the other hand, the negative effect of real appreciation is not statistically significant (p-value = 0.19). The magnitude of the estimated effects is consistent with the findings based on a VAR—a unit increase in the real interest rate has about twice the effect of a unit real appreciation on output after 5 quarters.

83. The inflation process models four-quarter inflation as a function of the economy's cyclical position, the inflation objective, nominal appreciation, oil price increases, and its own lags.[36] As Table II-3 shows, all variables have the expected sign. The null hypothesis that the long-term coefficient on the inflation objective variable is equal to one cannot be rejected at conventional significance levels. Furthermore, leads and lags of the inflation goal are insignificant. Coefficient estimates remain similar when the sample is extended back to 1976; the major difference appears to be in the estimated greater persistence of inflation in the longer sample.[37]

84. The unit long-run coefficient on the inflation objective could be interpreted as evidence that monetary policy was highly credible and successfully anchored inflationary expectations in the sample period. An alternative representation of this idea is provided by Table II-4. This table presents estimates of an error correction like specification for the change in inflation. The change in inflation was regressed on the lagged deviation of inflation from the objective, the change in the objective, lagged changes in the output gap, appreciation rate and oil price inflation, and its own lags.[38] When monetary policy is credible, the inflation objective is expected to act as an attractor (the coefficient on the deviation from the objective is negative), and a change in the inflation objective produces an "announcement effect" (the coefficient on the change in the objective is positive). As Table II-4 shows, neither of these hypothesis are falsified by the data.

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[36] Including quarterly dummies made no difference to the estimates.

[37] This is consistent with Ricketts and Rose (1995).

[38] Change in inflation is measured as d pi = pi-pi(-1)=(p - p(-4))-(p(-1)-p(-5)), where p denotes log CPI. Results from a similar specification using pi-pi(-4) as the dependent variable and appropriately defined RHS variables are qualitatively similar, but errors in that regression are serially correlated. Including quarterly dummies makes no difference in either case.

Table II-2. Switzerland: Regression Results: GDP Growth

Dependent variable: Real GDP growth
Method: OLS
Sample: 1983:1 1999:4
Included observations: 68

Variable 1/	Coefficient	Std. Error	t-statistic	p-value
Output gap (-1)	-0.09	0.05	-1.78	0.08
Market growth (-1)	0.06	0.04	1.33	0.19
Change in exchange rate (-2)	-0.04	0.02	-1.55	0.13
Change in exchange rate (-3)	-0.01	0.02	-0.33	0.74
Change in exchange rate (-4)	-0.01	0.02	-0.52	0.61
Real interest rate (-2)	-0.27	0.09	-3.09	0.00
Real interest rate (-3)	0.35	0.11	3.26	0.00
Real interest rate (-4)	-0.21	0.08	-2.78	0.01
Constant	0.00	0.00	1.62	0.11
91 Q1 dummy	-0.02	0.01	-2.94	0.00
Peak dummy	0.01	0.00	4.32	0.00
R-squared	0.50	Mean dependent var		0.00
Adjusted R-squared	0.41	S.D. dependent var		0.01
S.E. of regression	0.00	Akaike info criterion		-7.63
Sum squared resid	0.00	Schwarz criterion		-7.27
Log likelihood	270.54	F-statistic		5.67
Durbin-Watson stat	1.83	Prob(F-statistic)		0.00

Source: Fund staff calculations.

Table II-3. Switzerland: Regression Results: Inflation

Dependent variable: Inflation
Method: OLS

	Sample: 1983:1 1999:4 Included observations: 68				Sample: 1983:1 1999:4 Included observations: 68				Sample: 1976:1 1999:4 Included observations: 96			
Variable A23	Coefficient	Std. error	t-statistic	p-value	Coefficient	Std. error	t-statistic	p-value	Coefficient	Std. error	t-statistic	p-value
Output gap(-1)	0.11	0.03	3.98	0.00	0.11	0.02	4.47	0.00	0.09	0.03	3.40	0.00
Inflation target	0.35	0.10	3.66	0.00	0.36	0.06	5.84	0.00	0.26	0.06	4.27	0.00
Inflation target (-4)	0.05	0.10	0.49	0.62								
Inflation target (4)	0.04	0.08	0.57	0.57								
Change in exchange rate (-1)	-0.03	0.02	-1.53	0.13	-0.03	0.02	-1.59	0.12	-0.03	0.02	-1.86	0.07
Change in exchange rate (-2)	0.00	0.02	0.20	0.84	0.00	0.02	0.20	0.84	0.01	0.02	0.59	0.56
Change in exchane rate (-3)	-0.04	0.02	-1.90	0.06	-0.04	0.02	-1.95	0.06	-0.02	0.02	-0.99	0.33
Change in exchange rate (-4)	0.00	0.02	0.16	0.87	0.00	0.02	0.27	0.79	0.02	0.02	1.01	0.32
Inflation (-1)	0.93	0.12	7.92	0.00	0.93	0.11	8.21	0.00	1.02	0.10	10.08	0.00
Inflation (-2)	-0.23	0.17	-1.39	0.17	-0.23	0.16	-1.42	0.16	-0.12	0.15	-0.81	0.42
Inflation (-3)	0.02	0.16	0.15	0.88	0.03	0.16	0.20	0.84	-0.10	0.15	-0.71	0.48
Inflation (-4)	-0.02	0.10	-0.18	0.86	-0.01	0.10	-0.10	0.92	0.02	0.09	0.28	0.78
Oil price inflation	0.01	0.00	4.02	0.00	0.01	0.00	4.23	0.00	0.01	0.00	4.22	0.00
Constant	0.00	0.00	-0.64	0.52								
R-squared	0.96				0.96				0.94			
Adjusted R-squared	0.95				0.95				0.93			
S.E. of regression	0.00				0.00				0.00			
Sum squared resid	0.00				0.00				0.00			
Log likelihood	287.86				287.47				379.72			
Durbin-Watson stat	1.91				1.90				1.86			
F-statistic	92.96				126.06				127.62			
Prob(F-statistic)	0.00				0.00				0.00			

Source: Fund staff calculations.

Table II-4. Switzerland: Regression Results: Dynamics of Inflation

Dependent variable: Change in inflation
Method: OLS

	Sample: 1983:1 1999:4 Included observations: 68				Sample: 1976:1 1999:4 Included observations: 96			
Variable	Coefficient	Std. error	t-statistic	Prob.	Coefficient	Std. error	t-statistic	Prob.
Deviation of inflation from target (-1)	-0.08	0.04	-1.85	0.07	-0.06	0.04	-1.70	0.09
Change in target (-4)	0.10	0.08	1.37	0.18	0.15	0.08	1.94	0.06
Change in output gap (-1)	-0.04	0.09	-0.46	0.65	0.06	0.05	1.11	0.27
Change in output gap (-2)	0.24	0.09	2.78	0.01	0.01	0.05	0.21	0.84
Change in nominal effective appreciation rate (-1)	-0.02	0.02	-1.21	0.23	-0.01	0.01	-1.18	0.24
Change in nominal effective appreciation rate (-2)	0.00	0.02	0.29	0.77	0.00	0.01	0.30	0.77
Change in inflation (-1)	0.44	0.10	4.55	0.00	0.40	0.08	4.95	0.00
Change in oil price inflation	0.01	0.00	3.41	0.00	0.01	0.00	4.68	0.00
R-squared	0.50				0.42			
Adjusted R-squared	0.44				0.37			
S.E. of regression	0.00				0.01			
Sum squared resid	0.00				0.00			
Log likelihood	278.19				375.55			
Durbin-Watson stat	1.94				2.10			
F-statistic	8.53				9.02			
Prob(F-statistic)	0.00				0.00			

Source: Fund staff calculations.

85. Regression results in Table II-5 characterize a simple policy feedback rule. In line with the previous discussion, short-term interest rates are taken to represent monetary policy, and a Taylor-rule like relationship[39] is estimated, linking the interest rate to the current output gap, the future deviation of inflation from the objective, and the deviation of the nominal exchange rate from trend.[40] In addition, a constant and a dummy for 1988Q1 are also included. All stochastic right hand side variables are clearly endogenous, so the equation is estimated using their lags as instruments. Coefficient estimates indicate a positive correlation with future inflation; a negative correlation with the exchange rate; and no correlation with the output gap. The first two findings are consistent with Cuche (2000), who also finds a strong feedback from the output gap to indicators of monetary policy.

86. However, this open economy Taylor rule is likely to be an overly simplistic description of Swiss monetary policy. As discussed in Section B, the SNB actively managed the exchange rate in certain periods. Correspondingly, Dueker and Fischer (1996) argue that the conduct of monetary policy in Switzerland can be well characterized by a switching rule, whereby policy responsiveness to domestic variables and to the exchange rate varies, depending on whether the central bank is in "manager" or "floater" mode. To obtain a valid picture of how output, inflation, and exchange rate expectations are linked to the interest rate, a policy feedback rule could be estimated along these lines.

D. Lessons for Monetary Policy

87. The empirical findings of Section C provide some basis for offering two lessons for monetary policy. First, in light of the relatively long and uncertain lags in the monetary transmission mechanism, the current *3-year horizon* for monetary policy appears appropriate.[41] Second, enhanced *transparency* would appear useful for two reasons. On the one hand, communicating the SNB's inflation forecast to the public in a more effective manner would help maintain the SNB's credibility, and there could be an added benefit from

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[39] In recent years, estimating Taylor rules has developed into a minor industry. Some examples are Clarida, Galí, and Gertler (1995) for the G-3; Nelson (2000) for the U.K; and Cuche (2000) for Switzerland.

[40] The nominal exchange rate trend is derived using an HP filter. In this equation, the level, rather than the change of the exchange rate is included, reflecting the evidence that periodically, monetary policy reacted to the level of the exchange rate.

[41] Policy implications of uncertainties associated with the transmission mechanism are not clear-cut, cf. for instance Orphanides et al (1999) and Tetlow et al (2000). Intuitively, when the source of uncertainty is mismeasurement, then observed macroeconomic variables contain limited information for the policymaker and thus trigger relatively weak policy response. In contrast, when there is uncertainty regarding the model, more aggressive policy response might be called for.

Table II-5. Switzerland: Regression Results: Policy Rule

Dependent Variable: Short term interest rate
Method: IV
Sample(adjusted): 1983:1 1998:4
Included observations: 64 after adjusting endpoints

Variable 1/	Coefficient	Std. error	t-statistic	Prob.
Nominal interest rate (-1)	0.76	0.07	11.27	0.00
Output gap	-0.06	0.08	-0.75	0.46
Deviation of inflation from target (+4)	0.64	0.21	2.99	0.00
Deviation of inflation from trend	-0.09	0.04	-2.42	0.02
Constant	0.01	0.00	2.79	0.01
1988Q1 dummy	-0.02	0.01	-2.25	0.03
R-squared	0.92			
Adjusted R-squared	0.91			
S.E. of regression	0.01			
Durbin-Watson stat	1.29			
F-statistic	133.89			
Prob(F-statistic)	0.00			

Source: Fund staff calculations.

1/ Instruments include two lags of interest rates, gap, and nominal effective exchange rate; four lags of the deviation of inflation from the objective; the inflation objective; a dummy for 1988Q1; and a constant.

anchoring inflation expectations more tightly.[42] In this regard, more detailed discussion of inflation forecasts could be useful, and—in keeping with the SNB's practice so far—publication of point forecasts complete with the discussion of risks, rather than range forecasts, would be preferable. On the other hand, large uncertainties associated with the short-term workings of the monetary transmission machine would call for careful ex ante explanation and ex post evaluation of policy decisions. This could also contribute to a learning process gradually reducing the uncertainties.

88. The SNB, similar to other central banks, uses an eclectic approach when deriving its policy decisions: a range of indicators and models as well as non-model-based aids are combined to analyze the current economic situation and choose the appropriate monetary policy action. As simple empirical models have limited chances to fully capture the interactions between macroeconomic variables and policy instruments (as illustrated by the lack of sharp conclusions in this chapter), this approach remains fully justified.

[42] As the inflation objective variable used in Section C shares features with both the inflation goal and the inflation forecast (see Appendix), the empirical results can be interpreted in favor of both goal and economic transparency.

DATA SOURCES DEFINITIONS AND SPECIFICATION ISSUES

A. Sources and Definitions

Output gap

89. Quarterly data on real GDP were obtained from the OECD Analytical Database. The quarterly output gap was constructed by using the Hodrick-Prescott filter (Figure A1).

Inflation objective

90. Target inflation for the post-1984 period was compiled based on information from the SNB's Quarterly Bulletin. The Bulletin is available from 1984, and the medium-term inflation rate can be inferred for most years. Together with the monetary target, the inflation rate consistent with the monetary target over the medium run is usually reported. In the years when the medium-term inflation rate target was reported as a range, the midpoint of the range was chosen. When "target inflation" was not available from the Bulletin, Figure 2 in Dueker and Fischer (1996), p.99 was used to fill in the gap. This latter source was used to generate the series for the pre-1984 period.

91. The SNB's data are indicative of policy intentions, and are based on information available to the policymaker prior to the year for which the target is set. Thus, they are clearly exogenous. In contrast, data from Dueker and Fischer (1996) are estimated policy parameters and hence might not be exogenous. As a result, estimates for the 1976-99 period should be treated with caution.

92. The inflation objective series is based on annual information, and changes in a lumpy fashion in the first quarter of the year by construction. This might introduce spurious correlations when seasonal effects are present. However, inclusion of quarterly dummies made no difference to any of the results presented in the paper.

Inflation deviation

93. The CPI series was obtained from the IFS (line 64). The series for inflation deviations was defined as the difference between actual inflation (4-quarter change in log CPI) and the longer run inflation target. The series for seasonally adjusted inflation deviation and for inflation deviation excluding rents are similarly defined, based on the corresponding CPI series from the Federal Statistical Office.

Credit

94. The credit variable is based on domestic credit outstanding to the private sector from the IFS (line 32d). As the credit-to-GDP ratio was strongly trending in the sample period (see Figure A1), a detrended (with a broken linear trend) version was used in the empirical work.

Short-term interest rates

95. Short-term interest rates are 3-month LIBOR rates and 3-month Swiss franc euro rates from the IFS (lines 60a and 60b). The two series are nearly identical, but LIBOR rates are not available prior to 1978.

Effective exchange rates

96. The nominal effective exchange rate series was constructed based on IFS and DOTS data (CPI and nominal exchange rate information; and trade weights, respectively). The nominal effective exchange rate is defined as a trade-weighted average (with smoothed moving weights) of the bilateral exchange rates (normalized to 1995 Q1 = 100) vis-à-vis OECD countries. The effective exchange rate is expressed in effective currency/Swiss franc, s.t. an increase indicates appreciation. The appreciation rate is defined as the 4-quarter log change in the nominal effective exchange rate. The corresponding real effective exchange rate and the real effective appreciation rate series are based on relative CPIs.

Oil prices, German and Swedish variables

97. Oil prices are expressed in U.S. dollars and are taken from the IFS (line 76a). German and Swedish short-term interest rates as well as Swedish CPI, exchange rate, and domestic credit are also from the IFS, while the source of the Swedish real GDP data is the OECD Analytical Database.

B. Specification Issues

Specification of the baseline VAR.

98. The baseline VAR model contains five endogenous and five exogenous variables.

Endogenous variables:

- output gap
- deviation of 4-quarter inflation from medium-term target
- credit to potential GDP ratio (detrended)
- short-term interest rate
- change in nominal effective exchange rate

Exogenous variables:

- German short-term interest rates
- 4-quarter change in oil prices
- dummy for 1988 Q1 (takes the value 1 in 1988 Q1, zero otherwise)
- dummy for the 1989-90 cyclical peak (takes the value 1 from 1989 Q1 through 1990 Q4, zero otherwise)

99. Of the endogenous variables, the output gap captures developments in the real economy, inflation deviation—trivially—captures price developments, the third variable is a

summary statistic for financial sector developments, the forth variable characterizes monetary policy, and the last one describes effects from foreign exchange markets.

100. Including German short-term interest rates as an exogenous variable is justified on the grounds that Switzerland is a small, open economy, which has operated under a floating exchange rate regime under the conditions of international capital mobility during the period examined. Under these circumstances, world interest rates (captured by German interest rates here) are bound to influence domestic rates. Oil prices are included to control for work-wide supply shocks. The 1988 Q1 dummy coincides with a large drop in interest rates following the introduction if the Swiss Interbank Clearing System. The cyclical peak dummy is included to improve the description of output dynamics.

101. All variables are measured in logs, except for interest rates which are expressed as fractions. Inflation deviation and the change in the nominal effective exchange rate are defined as 4-quarter log changes.

102. The ordering of the endogenous variables is as listed. Assuming that output and prices react the most sluggishly follows conventional wisdom. Ordering the exchange rate last assumes that international financial markets react to shocks to all other variables within the same quarter. Considering that exchange rates are forward-looking asset prices, this assumption is also relatively uncontroversial. The relative ordering of credit and interest rates is more debatable, as these two variables are related to quantities and prices on the same market. Credit is ordered higher in the baseline specification for three reasons. First, interest rates are given a policy interpretation and it is assumed that monetary policy reacts to financial market developments within the same quarter. Second, credit outstanding is a stock variable and hence is assumed to react relatively slowly to interest rate shocks. Third, previous research[43] has found some evidence of a non-zero reaction time.

103. The above system was estimated for the 1983Q1-1999Q4 period including 2 lags of the endogenous variables.[44] The choice of lag length is not invalidated by the Akaike and Schwarz criteria, and is in line with the empirical literature. Figure A2 traces out the estimated impulse responses. Changing the ordering of the credit and the interest rate variable produces impulse responses which do not differ substantially from the baseline.

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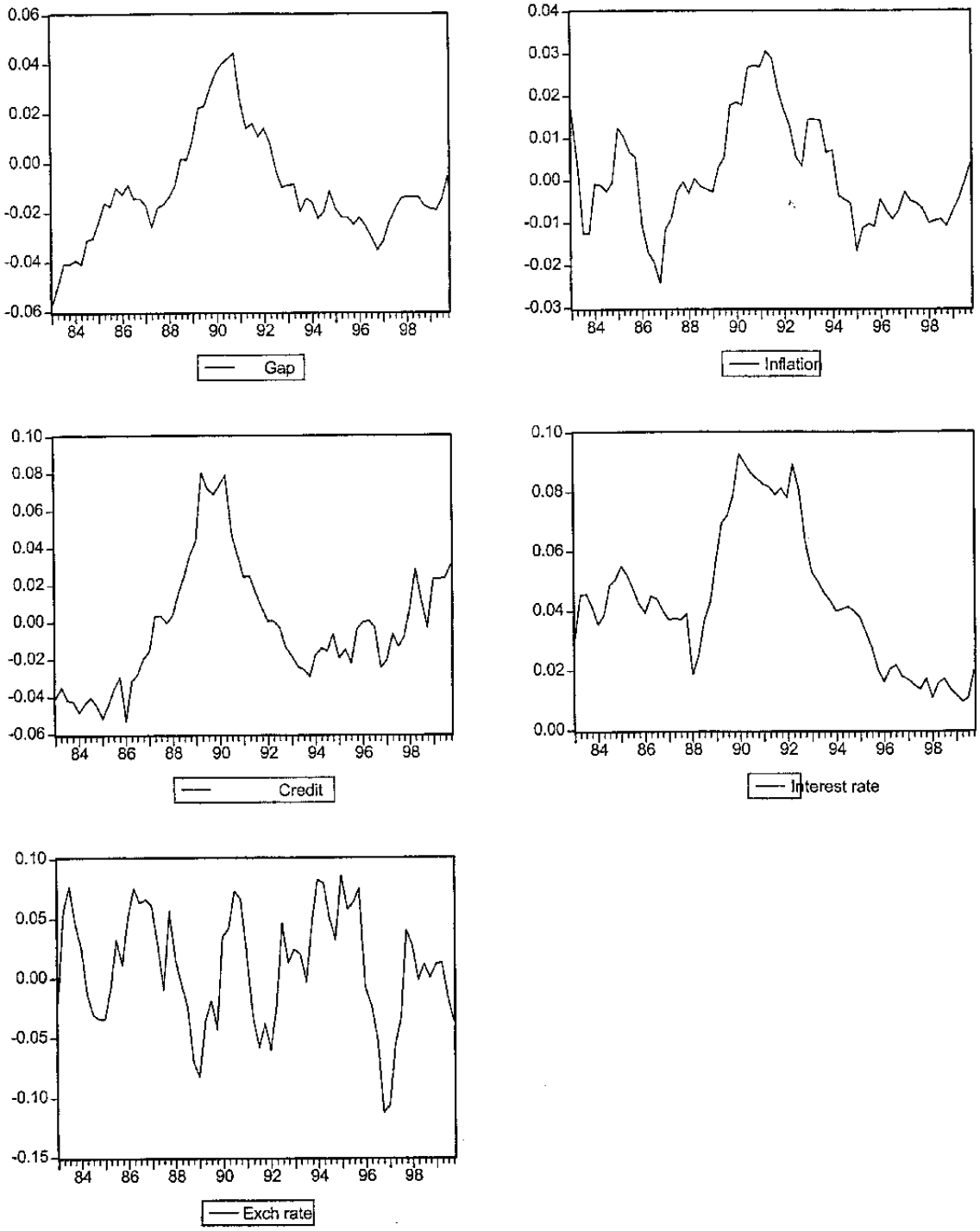
[43] Ettlin (1994) and Ettlin (1995).

[44] Some of the literature estimates similar specifications as a vector error correction mechanism for the *level* of output, prices, exchange rates etc (Dhar et al (2000) represents a recent example). This route was not followed here because estimating cointegrating relationships over a time period little longer than 15 years requires a considerable stretch of imagination.

Robustness

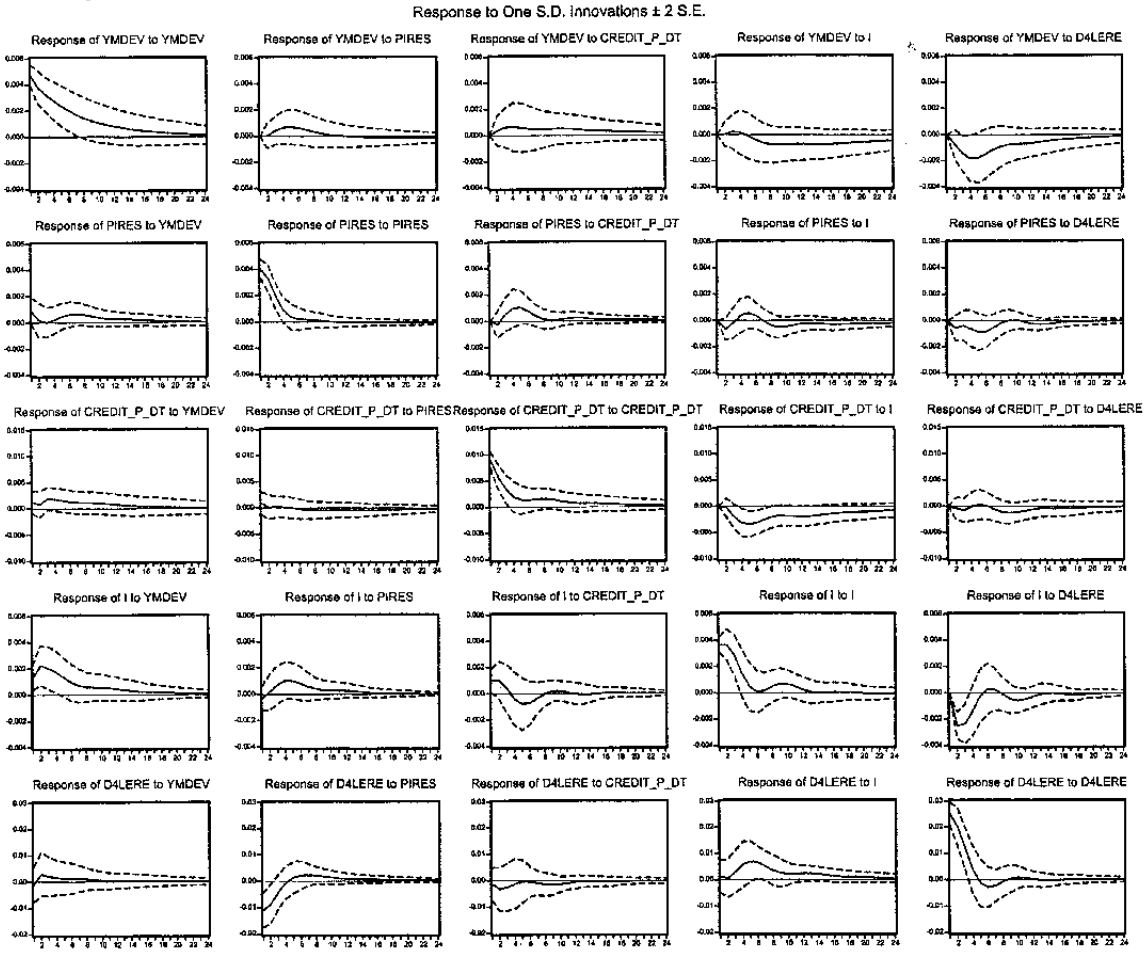
104. The estimates and impulse responses are also fairly robust to changes in the definitions of inflation and the exchange rate. For example, the baseline specification measures inflation deviation based on "raw" CPI for reasons of comparability with the studies by Ramaswamy and Sløk (1997) and Clements et al (2000). As inflation is defined as 4-quarter change in the log CPI, the lack of seasonal adjustment might not present a serious problem. However, using seasonally adjusted CPI data makes little change to the results. Nor were the impulse responses very different if the VAR was reestimated using an inflation measure that excludes rents (which represent over 20 percent of the CPI and are indexed to interest rates). Finally, the results were broadly similar when the VAR was reestimated using the bilateral Swiss franc/ Deutsche Mark instead of the effective exchange rate.

Figure A1. Switzerland: Output Gap, Inflation, Credit, Interest Rate, and Nominal Appreciation



Source: IMF staff calculations.

Figure A2. Switzerland: Impulse Responses from the Baseline Specification



Source: IMF staff calculations.

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