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Possible effects of European Monetary Union on Switzerland

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Abstract

This paper examines the possible effects on Switzerland of asset preference shifts in favor of Swiss franc-denominated assets that could result from European Economic and Monetary Union (EMU). Alternative policy responses to temporary and persistent asset preference shifts and the consequent pressures for exchange rate appreciation are examined. Simulations of a stylized macroeconomic model of the Swiss economy indicate that monetary policy is likely to be the most effective tool for stabilizing output in the short run, but at the cost of a temporary increase in inflationary pressures. The simulations highlight the dilemmas faced by policymakers in an environment with low levels of inflation and nominal interest rates. © 2001 Society for Policy Modeling. Published by Elsevier Science Inc.

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1. Introduction

As the target date for the third stage of European Economic and Monetary Union (EMU) approaches, the effects of EMU are likely to be felt not just on the likely participants but also on countries that, although in some cases not even part of the European Union, have substantial trade and other economic relationships with EMU participants. This paper presents a case study of the possible macroeconomic effects of EMU on one such country, Switzerland. Although the

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analytical framework developed in this paper could, in principle, be applied more broadly to countries in Europe that will not participate in EMU, this focus on the Swiss economy is particularly interesting from an analytical perspective for a number of reasons that are discussed below.

The initial ramifications of EMU on the Swiss economy will depend on a number of factors, including investors' perceptions of the macroeconomic and financial discipline within EMU. Concerns about such discipline could well lead to an increase in investors' preferences for assets denominated in hard currencies outside the new euro area, including the Swiss franc. This paper focuses on the macroeconomic implications of a potential increase in the demand for Swiss franc-denominated assets on the Swiss economy and considers alternative policy responses.

A stylized open economy macroeconomic model of Switzerland is constructed and used to examine a number of scenarios that could help gauge the possible effects of EMU on the Swiss economy. The model is constructed within the broader analytical framework of MULTIMOD, the IMF's global macroeconometric model. Modeling the effects of a shift in investors' preferences toward assets denominated in Swiss francs is complicated for a number of reasons. First, the magnitude and persistence of the preference shift toward Swiss franc-denominated assets is a matter of conjecture. Second, for a small open economy such as Switzerland, the impact of such asset preference shifts on the exchange rate and domestic interest rate is not independent of the policy rules adopted by the authorities. Simulations of the Swiss model are used in this paper to analyze alternative scenarios derived from different assumptions about the magnitude and persistence of the increased demand for Swiss franc-denominated assets that could be stimulated by EMU and to then investigate the effects of various policy responses.

The simulation experiments indicate that monetary policy is likely to be a more effective tool than fiscal policy for stabilizing domestic output in response to portfolio preference shifts in favor of Swiss franc-denominated assets. The magnitude and persistence of such asset preference shifts is difficult to determine in advance but the effectiveness of policy measures in stabilizing output depends on a prompt and commensurate policy response to these shifts.

The simulations also illustrate the additional risks posed by the constraints on monetary policy in responding to external shocks in an environment with low levels of domestic inflation and nominal interest rates. Alternative monetary policy strategies for reducing short-run output losses from upward pressures on the Swiss franc are examined — either increasing the rate of growth of money supply within the monetary targeting framework or explicitly allowing monetary policy to be guided by exchange rate developments. The simulations indicate that stabilizing output in the short run using monetary policy does entail the risk of increasing inflation over the medium term. This highlights the premium placed on timely policy responses to asset preference shifts.

It is worth emphasizing that this paper takes a macro approach and does not address the possible distributional consequences within Switzerland of the types

of "EMU shocks" examined here. In addition, the paper does not examine other aspects of the costs and benefits to Switzerland of remaining outside the European Union.

Section 2 provides a more detailed background for the analysis in this paper. Section 3 describes the construction of the Swiss macroeconomic model and highlights some modeling issues that are of particular relevance to the questions addressed in this paper. Section 4 presents simulation results under alternative assumptions about the nature of the increase in foreign investors' demand for Swiss franc-denominated assets. The effects of alternative policy responses are then analyzed. Section 5 summarizes the main conclusions.

2. Background

This section reviews some salient features of and recent developments in the Swiss economy that provide a context for the analysis in this paper. Over the last three decades, the Swiss have enjoyed relatively low rates of inflation and a trend appreciation in the real effective exchange rate. Households in Switzerland also appear to have a significantly lower rate of time preference compared to other OECD countries. This low rate of time preference is reflected in a domestic saving rate (30% of GDP) and a ratio of net foreign assets to GDP (over 100%) that are the highest among OECD countries. Swiss real interest rates — adjusted for the real exchange rate appreciation — have been markedly lower than real interest rates in other industrialized economies including Germany, although this differential relative to Germany has narrowed during the 1990s. This departure from the standard open interest parity condition has been interpreted as an exchange rate risk discount — indicating a willingness by foreign investors to hold Swiss franc-denominated assets, even though they yield a lower rate of return than assets denominated in other hard currencies.

Since the beginning of the 1990s, economic performance in Switzerland has deteriorated, with an average real GDP growth rate close to 0 and an unemployment rate that has risen to about 5%, well above its historical average. A sharp real appreciation of the Swiss franc from 1993 through 1995 caused a decline in net exports and is widely regarded as having dampened aggregate output growth. Despite a moderate depreciation of the Swiss franc in 1996–1997, net exports have remained weak. In this context, a renewed appreciation of the Swiss franc could significantly worsen prospects for economic recovery and medium-term growth. Hence, an analysis of the channels through which EMU could affect the Swiss economy is of considerable topical interest as well.

Possible responses by monetary and fiscal policy to exchange rate appreciation pressures are, however, constrained by present circumstances in Switzerland. CPI inflation has fallen below 1% per annum. The official discount rate was lowered during 1996 to 1% and overnight market rates have since remained around 1.5%. Such low interest rates limit the scope for further easing of

monetary policy, given the nominal interest rate floor of 0%. In these circumstances, monetary policy can affect the short-term real interest rate only by increasing inflation, rather than through reductions in the short-term nominal interest rate. To highlight the dilemmas facing policy makers in an environment with low levels of inflation and interest rates, the Swiss model in MULTIMOD is extended to incorporate two innovative elements, i.e., nonlinearities in the Phillips curve and money demand relationships.

The effectiveness of fiscal policy at the Confederation (federal) level in Switzerland is, on the other hand, limited by the relative openness of the economy; for example, an expansionary fiscal policy could result in higher imports and would lead, ceteris paribus, to pressures on the currency to appreciate, thereby dampening the direct aggregate demand effects on real GDP. These effects are quantified in the model simulations. In addition, the effectiveness of fiscal policy for short-run demand management in Switzerland has been limited by the relatively small size of the Confederation budget (excluding transfers) and the procyclical behavior of fiscal balances at lower levels of government.

3. Analytical issues in modeling a shift in investor preferences

This section provides a brief overview of the construction of an open economy macroeconomic model for Switzerland within the framework of MULTIMOD and describes the enhancements to the basic model that were necessary for the simulation exercises conducted in this paper.[1]

MULTIMOD is a general equilibrium macroeconometric model developed at the IMF to analyze the transmission of changes in macroeconomic policy within and across countries. The model is well-suited for policy experiments since it incorporates forward-looking expectations and these expectations are imposed in a model-consistent manner. The model derives a consistent path for all endogenous variables in response to exogenous shocks, while respecting stock-flow equilibrium conditions during the transition to the new steady state. MULTIMOD also has an explicit characterization of technology, household preferences, and other structural features, thereby making it possible to calibrate the model to replicate certain stylized facts and thereby gain a better understanding of an economy's dynamic properties.

The model is not intended as a tool for making unconditional forecasts. Rather, MULTIMOD takes the World Economic Outlook (WEO) forecasts made by IMF country specialists as the baseline for simulation scenarios analyzing the effects of policy changes or other exogenous changes in the economic

[1] A detailed description of the basic model can be found in Laxton, Isard, Faruqee, Prasad, and Turtelboom (1998) and Masson, Symansky, and Meredith (1990). See Zurlinden (1992) for an earlier extension of MULTIMOD to the case of Switzerland.

environment. The basic version of MULTIMOD is an annual model that includes each of the G-7 countries plus two country blocks that aggregate the small industrial countries (SIC) and developing countries, respectively. For the purposes of this paper, Switzerland has been modeled separately, while the other SICs remain in a single block.

The proximate determinant of exchange rates in MULTIMOD is an equation for open interest parity across short-term interest rates in different countries; that is, the Swiss short-term interest rate adjusted for the expected appreciation of the Swiss franc relative to any other currency is equal to the short-term interest rate on assets denominated in the latter currency plus a risk premium.[2] More specifically, the open interest parity equation that determines the Swiss franc–DM exchange rate is as follows (Eq. (1)):

$$(1 + \mathrm{SWI}/100)(\mathrm{ER}(t+1)/\mathrm{ER}(t)) = (1 + \mathrm{DMI}/100) + \mathrm{RES\_ER} \qquad (1)$$

where SWI and DMI are the nominal short-term interest rates on assets denominated in Swiss francs and Deutschemarks, respectively; ER is the nominal exchange rate expressed as DM per Swiss franc (i.e., an increase in the exchange rate indicates an appreciation of the Swiss franc); and RES_ER is a residual term. The expected values of both ER and RES_ER are unobservable. Forward-looking expectations of the nominal exchange rate are, however, generated internally by the model and are consistent with forecasted values. The residual term RES_ER reflects deviations from open interest parity and is interpretable as a premium paid for holding Swiss franc-denominated assets. A negative residual indicates that investors are willing, at the margin, to accept a lower nominal rate of return on assets denominated in Swiss francs than in DM (which may be interpreted as an exchange rate risk discount). In simulations of the model, reducing this residual (i.e., making it more negative) is the obvious way of modeling an increase in investors' preferences for assets denominated in Swiss francs.

There is, of course, a real counterpart to the open interest parity equation that was described above in nominal terms. The trend of real appreciation of the Swiss franc in recent years, despite a persistently lower real interest rate in Switzerland than in Germany, indicates that there was also a persistent residual in the interest parity relationship in real terms, which reflects the lower real return that investors appear to be willing to accept for the privilege of holding Swiss franc-denominated assets.[3]

Both real and nominal outcomes are of interest in these simulations. MULTIMOD works with an interest parity equation that is defined in nominal terms but

[2] The level of the exchange rate, particularly in the long run, is of course determined by economic fundamentals.

[3] Mauro (1995) presents evidence showing that the real interest differentials between Switzerland and other countries reflect premia attributable to lower foreign exchange rate risk on Swiss franc-denominated assets rather than premia paid by investors to have deposits located in Switzerland for "safe haven" considerations.

the differential would carry through in real terms. The nominal interest parity equation is crucial because the conduct of monetary policy is through instruments such as the nominal interest rate, and the presence of a floor on nominal interest rates therefore has important implications. To account for the effects of a nominal interest rate floor at 0%, a nonlinear money demand specification was estimated for Switzerland. The estimated elasticities appear quite reasonable (see Appendix A) but there are some important caveats. First, the span of the available time series data is not long and does not cover many periods with low levels of interest rates and inflation. Second, nonlinear models are difficult to estimate with much precision given the span of the data available and, in particular, statistical tests for discriminating among different nonlinear models have limited power. Given the importance of this issue for the operation of monetary policy in an environment with low nominal interest rates, however, the use of a nonlinear specification could not be avoided.[4]

A second dimension in which MULTIMOD is nonlinear is the Phillips curve relationship, which allows for short-run inflation–unemployment trade-offs. Estimating a nonlinear Phillips curve for each country is, unfortunately, fraught with complications, stemming in part from the wide confidence intervals around the parameter estimates. The general strategy that has been employed for MULTIMOD is to estimate a nonlinear Phillips curve using pooled data from the G-7 countries and to impose those common parameters on all industrial countries.[5] Although the data do not reject the use of common parameters among the G-7 countries, using the same parameters for Switzerland raises a number of issues. Switzerland's unemployment history has been different from that of the G-7 countries and it has traditionally had a lower measured unemployment rate than has been observed in G-7 countries. In addition, wage differentiation and nominal wage flexibility appear to be greater in Switzerland than that prevailing on average in most G-7 and European economies (see, for instance, the 1996 *OECD Economic Survey* of the Swiss economy). Both of these considerations, but particularly the latter one, suggest that the short-run trade-off in Switzerland may be better than that for the G-7 countries.

However, in the absence of a well-grounded empirical alternative, the nonlinear Phillips curve specification with parameters based on G-7 data was retained for the MULTIMOD simulations because this specification has important implications for

[4] This approach does not capture the institutional features that could account for the nominal interest rate floor at 0%, but it has the merit of avoiding discontinuities that could complicate the model simulations. See Chadha and Tsiddon (1996) for a theoretical analysis of the consequences of this floor for monetary policy and its effects on output variability.

[5] The functional form, econometric procedure, and estimation results are described in detail in Laxton, Meredith, and Rose (1995). As noted in that paper, single-country estimates of nonlinear Phillips curves are generally very imprecise. This was indeed the case for Switzerland, where we obtained very imprecise estimates for both linear and nonlinear Phillips curves. Debelle and Laxton (1996) argue that, for certain G-7 countries, a nonlinear Phillips curve model fits the data better than linear models.

the conduct of monetary policy. A nonlinear short-run Phillips curve implies, for instance, that prompt actions to offset positive aggregate demand shocks can reduce the need for stronger compensating actions down the road to reduce inflationary pressures. On the other hand, the real costs of reducing inflation to very low levels could be quite substantial. In a world rife with uncertainty, including uncertainty about the levels of potential output and the output gap, the nonlinear Phillips curve places a premium on forward-looking and timely policy actions that could minimize the deleterious effects of exogenous shocks.

Another important issue that arises in adapting MULTIMOD to the Swiss economy concerns the reestimation of certain equations. Previously, all SICs were grouped into one block and parameters were estimated for this block as a whole. In the context of a small open economy, the trade equations are of particular interest and, therefore, these equations were reestimated for Switzerland.[6] The estimated equations and the coefficient estimates are presented in Appendix A. These equations have more explanatory power, as measured by the adjusted R^2, for the Swiss data than the corresponding equations for the SICs. For certain equations such as the oil consumption equation, individual country estimation yielded very imprecise and sometimes implausible estimates. Hence, pooled estimates from the full model have been retained.

It is also necessary, from a theoretical perspective, to impose the small open economy assumption on the model for Switzerland. In practice, this simply means that changes in Swiss variables are constrained not to have an effect on any global variables. This assumption is particularly important when analyzing the effects of changes in the stance of macroeconomic policies in Switzerland. It implies, for instance, that changes in Swiss interest rates do not affect the benchmark "world interest rate."

4. MULTIMOD simulations

This section presents results from a set of MULTIMOD simulations that attempt to model the possible effects of EMU on Switzerland. A possible scenario could run as follows: following the May 1998 announcement of the initial participants in Stage 3 of EMU, the euro is perceived by market participants as likely to be a "soft" currency and the new European Central Bank (ECB) lacks the credibility of the outgoing Bundesbank. Consequently, holders of the new euro prefer to hold assets denominated either in higher-yield currencies (e.g., pound sterling or US dollar) or low-yield currencies (i.e., Swiss franc) outside EMU.

The magnitude and persistence of such portfolio shifts is a matter of conjecture and the share that would be directed toward Swiss franc-denominated assets is

[6] Switzerland is quite open to international trade. Over the period 1975–1995, the average ratio of exports plus imports of goods and services relative to GDP was 0.71 while the ratio of merchandise exports plus imports to GDP was 0.56.

difficult to predict ex ante. In early 1997, Swiss short-term interest rates were about 375 and 400 basis points, respectively, below comparable rates for US dollar and pound sterling-denominated assets. These differentials could make it very expensive to move into Swiss franc assets rather than assets denominated in dollars or sterling. An additional consideration in the simulations is that, reflecting uncertainty, the euro interest rate could rise above the present baseline interest rate for Deutschemark-denominated assets, placing upward pressures on Swiss interest rates. For analytical purposes, in the simulations presented below, these considerations will be examined separately.

As noted earlier, a shift in investor sentiment can be introduced in the model by changing the exogenous residual term in the open interest rate parity equation. A decrease in this residual reflects an exogenous increase in the preference of foreign investors for assets denominated in Swiss francs (i.e., an increase in the exchange rate risk discount). Given the world interest rate, the combination of domestic interest rate declines and exchange rate appreciations that maintain the interest parity condition are then determined by the dynamics of behavioral relationships in the model.

In MULTIMOD, a monetary feedback rule based on money targeting is used to anchor nominal variables over the medium term, although this rule operates somewhat flexibly in the short run. In the short run, nominal money balances are adjusted to be consistent with changes in the price level and output.[7] This feedback rule appears to be a reasonable representation of the regular operation of the Swiss monetary policy framework. The nonlinear specification of the money demand function prevents the interest rate in any of the simulations from falling to 0. The monetary feedback rule is assumed to be credible and known to all agents.

4.1. Temporary portfolio preference shifts

First, consider a scenario in which investors temporarily increase their preferences for Swiss franc-denominated assets due to the uncertainty and possible instability engendered by the formation of EMU. A plausible scenario would be one where shifts in investors' preferences are repeated for a few years and then, as the uncertainties concerning EMU diminish, the preference of international investors for Swiss franc-denominated assets would gradually decline. A key feature of this transitory preference shift is that it does not alter the long-run fundamentals of the Swiss economy.

This scenario is modeled as a temporary change in the exogenized residual of the interest parity equation. The effects that the change in this residual has on

[7] For instance, consider an asset preference shift that would normally result in a change in domestic interest rates. If domestic interest rates were for some reason constrained to remain temporarily unchanged, the nominal money supply would have to adjust to accommodate the change in money demand.

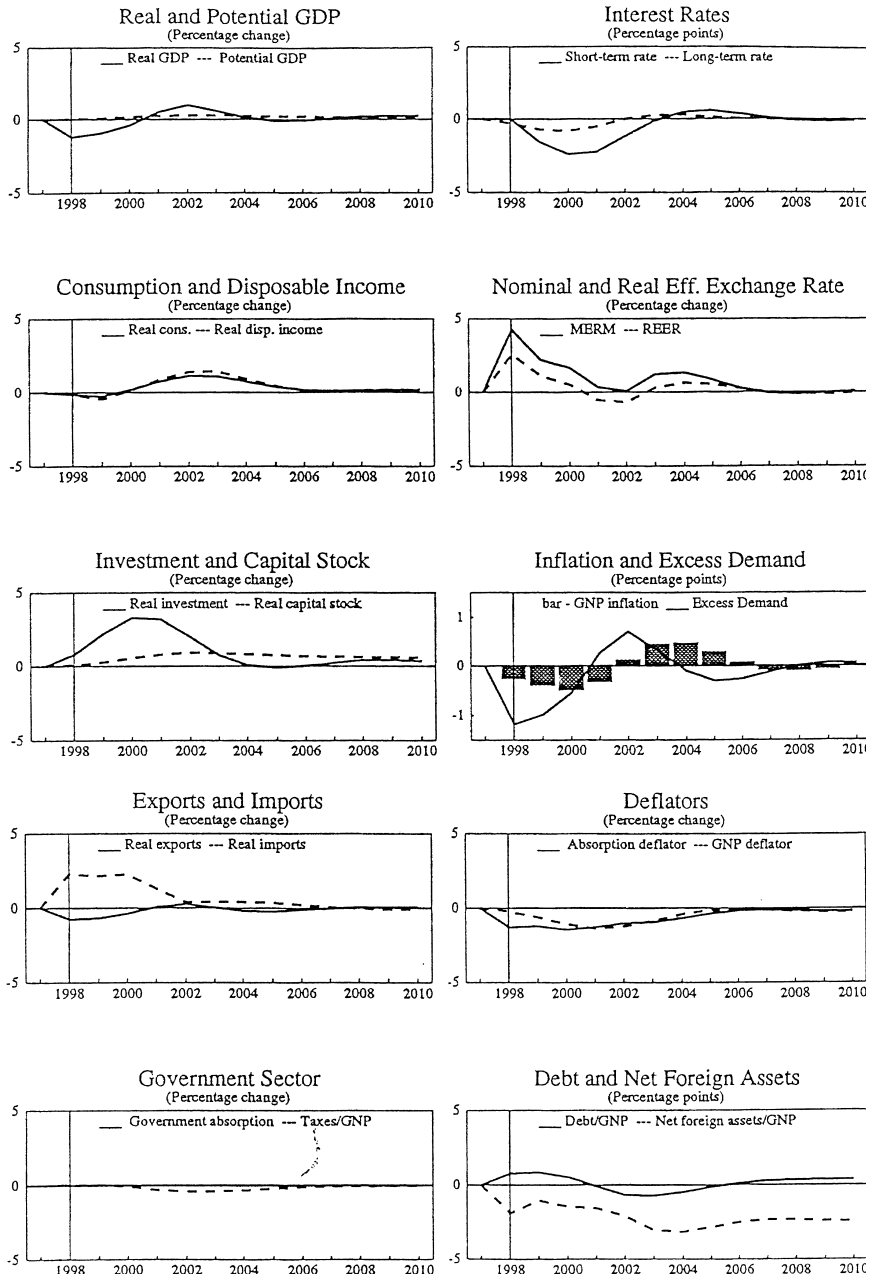

Fig. 1. Switzerland: temporary portfolio preference shift with a delayed monetary reaction.

Table 1
Switzerland: MULTIMOD simulation scenarios

	1998	1999	2000	2001	2002	2003	2004	2005
Output gap								
Scenario 1A	− 1.19	− 1.00	− 0.55	0.26	0.70	0.32	− 0.10	− 0.30
Scenario 1B	− 0.81	− 0.75	− 0.50	0.18	0.59	0.26	− 0.11	− 0.27
Scenario 1C	− 0.72	− 0.65	− 0.44	0.16	0.51	0.21	− 0.11	− 0.24
Scenario 1D	− 1.25	− 1.22	− 0.88	0.16	0.85	0.52	− 0.01	− 0.32
Scenario 1E	− 1.25	− 1.22	0.15	0.61	0.95	0.37	− 0.24	− 0.51
Scenario 1F	− 0.53	− 0.61	− 0.55	0.36	0.97	0.31	− 0.36	− 0.61
Scenario 2A	− 0.40	− 0.28	− 0.10	0.04	0.11	0.10	0.05	0.00
Scenario 2B	− 0.15	− 0.03	0.07	0.07	0.05	0.01	− 0.01	− 0.02
Scenario 3	− 0.20	− 0.13	− 0.04	0.02	0.05	0.05	0.02	− 0.00
GNP inflation								
Scenario 1A	− 0.25	− 0.38	− 0.48	− 0.31	0.12	0.44	0.46	0.27
Scenario 1B	− 0.16	− 0.27	− 0.35	− 0.23	0.12	0.38	9.37	0.20
Scenario 1C	− 0.16	− 0.24	− 0.31	− 0.18	0.12	0.33	0.32	0.16
Scenario 1D	− 0.26	− 0.45	− 0.63	− 0.49	0.02	0.50	0.61	0.43
Scenario 1E	− 0.26	− 0.45	− 0.35	0.06	0.75	1.17	1.11	0.78
Scenario 1F	− 0.10	− 0.18	− 0.25	− 0.02	0.58	0.94	0.80	0.40
Scenario 2A	− 0.12	− 0.21	− 0.26	− 0.25	− 0.19	− 0.12	− 0.07	− 0.05
Scenario 2B	− 0.05	− 0.07	− 0.05	− 0.02	0.02	0.03	0.03	0.02
Scenario 3	− 0.06	− 0.10	− 0.13	− 0.12	− 0.09	− 0.06	− 0.03	− 0.03
Short-term nominal interest rate								
Scenario 1A	0.00	− 1.55	− 2.39	− 2.22	− 1.18	− 0.12	0.50	0.59
Scenario 1B	− 1.03	− 1.83	− 2.33	− 2.06	− 1.06	− 0.09	0.44	0.50
Scenario 1C	− 0.95	− 1.68	− 2.13	− 1.85	− 0.92	− 0.07	0.37	0.40
Scenario 1D	0.00	− 1.20	− 1.60	− 1.95	− 1.44	− 0.35	0.47	0.71
Scenario 1E	0.00	− 1.20	− 1.02	− 1.64	− 0.88	0.36	1.11	1.16
Scenario 1F	− 1.75	− 1.70	− 1.69	− 2.18	− 1.77	0.00	0.92	0.95
Scenario 2A	− 0.56	− 0.97	− 1.21	− 1.32	− 1.29	− 1.19	− 1.08	− 1.00
Scenario 2B	− 0.88	− 1.01	− 1.23	− 1.13	− 1.03	− 0.96	− 0.92	− 0.92
Scenario 3	− 0.28	− 0.48	− 0.61	− 0.66	− 0.64	− 0.59	− 0.54	− 0.50
Nominal effective exchange rate								
Scenario 1A	4.26	2.19	1.64	0.34	0.06	1.21	1.21	0.84
Scenario 1B	3.00	1.96	1.67	0.30	− 0.13	0.88	0.97	0.55
Scenario 1C	3.17	2.19	1.89	0.39	− 0.24	0.64	0.71	0.35
Scenario 1D	4.49	2.86	2.49	0.46	− 0.09	1.30	1.64	1.19
Scenario 1E	4.49	2.86	− 1.04	− 0.35	− 1.19	− 0.36	− 0.70	− 1.74
Scenario 1F	2.14	1.98	1.88	− 0.72	− 1.79	− 0.10	− 0.10	− 0.98
Scenario 2A	1.34	0.91	0.87	1.08	1.39	1.67	1.86	1.93
Scenario 2B	0.52	0.40	0.41	0.62	0.75	0.78	0.74	0.66
Scenario 3	0.65	0.43	0.41	0.51	0.67	0.81	0.89	0.93
Real effective exchange rate								
Scenario 1A	2.56	1.11	0.49	− 0.54	− 0.68	0.29	0.65	0.54
Scenario 1B	1.82	1.06	0.69	− 0.32	− 0.55	0.30	0.60	0.48
Scenario 1C	1.92	1.23	0.88	− 0.17	− 0.53	0.21	0.45	0.34

(*continued on next page*)

Table 1 (*continued*)

	1998	1999	2000	2001	2002	2003	2004	2005
Real effective exchange rate								
Scenario 1D	2.70	1.49	0.90	− 0.69	− 1.08	0.06	0.66	0.66
Scenario 1E	2.70	1.49	− 1.18	− 0.77	− 0.89	0.34	0.83	0.67
Scenario 1F	1.31	1.15	0.97	− 0.68	− 1.06	0.57	1.10	0.82
Scenario 2A	0.79	0.40	0.23	0.20	0.28	0.39	0.48	0.51
Scenario 2B	0.31	0.20	0.17	0.31	0.41	0.46	0.47	0.44
Scenario 3	0.38	0.19	0.10	0.09	0.13	0.19	0.23	0.24

All simulation results represent deviations from the baseline forecast in the IMF's World Economic Outlook. The output gap is expressed as the percentage deviation of actual GDP from potential GDP. The inflation and interest rate responses are in percentage points while the exchange rate responses are in percent.

interest rates and exchange rates is determined by the properties of the model. In order to simulate the effects of a sequence of repeated shocks that diminish in size as the market uncertainties surrounding EMU are resolved, the residual is lowered (i.e., made more negative relative to its baseline level) by 0.05 for 3 years beginning in 1998, by 0.025 in the fourth year, and is set to 0 thereafter.[8] The simulations are presented in Fig. 1, with a few key variables also shown in Table 1 as Scenario A1.[9] This scenario assumes a delayed reaction of monetary policy, i.e., short-run interest rates are kept unchanged in the first year. Consequently, the full impact of the preference shift is on the nominal exchange rate, which appreciates by about 4.3% in the first year, while the real exchange rate appreciates by about 2.6%.[10] Investment increases due to the decline in ex ante real interest rates, even though nominal short-term interest rates do not decline in the first year. On the other hand, given that Switzerland is a very open economy, the trade balance deteriorates sharply in the short run due to the exchange rate appreciation and the high import propensity. The net contractionary impact leads to a fall in disposable income and, hence, in consumption. Overall, real GDP contracts by about 1.2%. The deterioration in the current account balance also implies a decline in the ratio of net foreign assets to GDP.[11]

[8] Reducing this residual by 0.05 would, if interest rates were held unchanged, result in a 5% appreciation of the exchange rate in order to satisfy the interest parity condition.

[9] Note that the simulation results are all expressed as deviations from the baseline staff projections taken from the October 1996 World Economic Outlook.

[10] In MULTIMOD, the real effective exchange rate is calculated as the ratio of the home country's export price to a foreign price that includes weighted averages of foreign GDP deflators and competitors' export prices. An increase in this index represents an appreciation of the real effective exchange rate.

[11] Although it is not apparent from the figure, which shows the simulation results only through the year 2010, the net foreign assets to GDP ratio does return to baseline over the longer term in this and all other simulations below. The desired NFA/GDP ratio in the model is influenced by fundamental determinants such as the rate of time preference, the real interest rate, and the planning horizon of agents in the model.

In the second year, interest rates begin to decline and, over the next 2 years, they fall by more than 2 percentage points relative to the baseline. As the projection for the short-term interest rate in the WEO baseline is over 4% in 1998 and increases gradually thereafter, the interest rate floor is not binding in this scenario.

This simulation illustrates the negative short-run consequences of a temporary increase in the demand for Swiss franc-denominated assets. Aggregate output and, in particular, the traded goods sector are adversely affected by the resulting real exchange rate appreciation. At the same time, the transitory nature of this shift implies that any possible long-run benefits from a lower interest rate are considerably dampened.[12]

We now consider alternative policy responses. It should be emphasized that the aim here is only to illustrate the effects of a range of policy actions, rather than to determine precisely the optimal policy response. The real appreciation in the exchange rate and the fall in output could potentially be offset by a more timely easing of monetary policy — the consequences of a lowering of interest rates in the first year are shown in Scenario A2. The nominal exchange rate takes up less of the burden of adjustment in the first year and, consequently, the real exchange rate appreciation is smaller than in Scenario A1. This policy response has favorable implications for all components of domestic demand and, since the real exchange rate appreciation is smaller, also leads to a smaller deterioration in the trade balance. The output gap is, thus, smaller due to the rapid monetary accommodation in response to the external shock. This is achieved without a substantially different medium-term inflation outcome, indicating the benefits of a timely and appropriate monetary reaction.

Next, in response to the same shock, we consider the effects of fiscal policy. Contractionary fiscal policy could, through standard Mundell–Flemming channels, offset the appreciation of the real exchange rate generated by the shift in asset preferences. However, the direct negative effects on aggregate demand would tend to dominate the effects of resisting the exchange rate appreciation in the short run, exacerbating the short-run weakness in economic activity. Conversely, a fiscal expansion, in isolation, would also tend be of limited effectiveness as the direct expansionary effects on aggregate demand would be diluted by the consequent exchange rate appreciation.[13] Hence, any fiscal expansion aimed at stimulating demand may need to be accompanied by a greater easing of monetary policy.

Scenario A3 shows the effects of a temporary increase of 2 percentage points in the ratio of government expenditure to GDP that is accommodated by a

[12] This is in some respects similar to the "Dutch disease" phenomenon in that the traded goods sector is adversely affected by the exchange rate appreciation but the net welfare effect on the economy could in fact be positive (see, e.g., van Wijnbergen, 1994).

[13] Simulation results showed, for instance, that the external sector leakages resulting from an exchange rate appreciation caused by even a large increase in government expenditure (5 percentage points of GDP), coupled with the crowding out effects caused by an increase in interest rates, yielded a trivial short-run output response.

concomitant lowering of short-term interest rates in response to the portfolio preference shift. The output and inflation effects of this policy mix are similar to those in the previous scenario with the monetary policy reaction. Short-term interest rates decline marginally less and the exchange rate appreciates more in the short run. The principal effect of choosing between a monetary policy reaction and a mix of monetary and fiscal policy is on the composition of aggregate demand. In the latter case, private demand is crowded out to some extent by the increase in government consumption and the traded goods sector is more adversely affected.

In the simulations presented above, it was assumed that the portfolio preference shift would occur in 1998, when the short-term interest rate is projected to be over 4%. If this preference shift was larger than in the previous simulations or if interest rates in 1998 turned out to be significantly lower than the baseline forecast of 4%, the interest rate floor could become a tighter constraint on the interest rate channel for monetary policy. The effects of the preference shift on the domestic economy could then be larger.

This is illustrated in the next simulation (Scenario A4), which repeats the same shock considered in the previous three simulations, but assumes that nominal short-term interest rates are fully constrained by the interest rate floor in the first year and can then fall by a maximum of 200 basis points in the following 3 years. In this case, the exchange rate appreciation is larger and more persistent and, in addition, the smaller decline in interest rates yields a correspondingly smaller positive effect on domestic demand. Consequently, relative to the baseline, the cumulative output loss over the first 3 years is 3.4% of potential output compared to 2.1% in Scenario A2 (without the binding interest rate constraint). The price level falls sharply in the short run, resulting in a decline in inflation that is balanced by a moderate increase of about 0.5 percentage points in medium-term inflation as prices return to their baseline level.

This scenario highlights the real output costs of the constraints imposed on monetary policy in responding to an asset preference shift when the inflation rate and the short-term interest rate are at low levels. In the event that nominal interest rate reductions were constrained, a faster increase in the money supply could be engineered within the existing monetary targeting framework or, alternatively, monetary policy could be guided more explicitly by exchange rate developments. These policy responses are likely to have the effect of limiting the appreciation of the exchange rate and dampening short-term output losses, but at the cost of increasing medium-term inflation. The next two simulations consider the effects of these two strategies.

A simulation of the first type of policy response is shown in Scenario A5 (Fig. 2). This scenario assumes a 5% increase in the money supply target starting in the third year of the simulation. Since nominal interest rates are constrained in the model, the increase in the money supply target has the effect of depreciating the nominal exchange rate sharply after the third year. This gives a boost to the external sector and, consequently, has a positive effect on aggregate output.

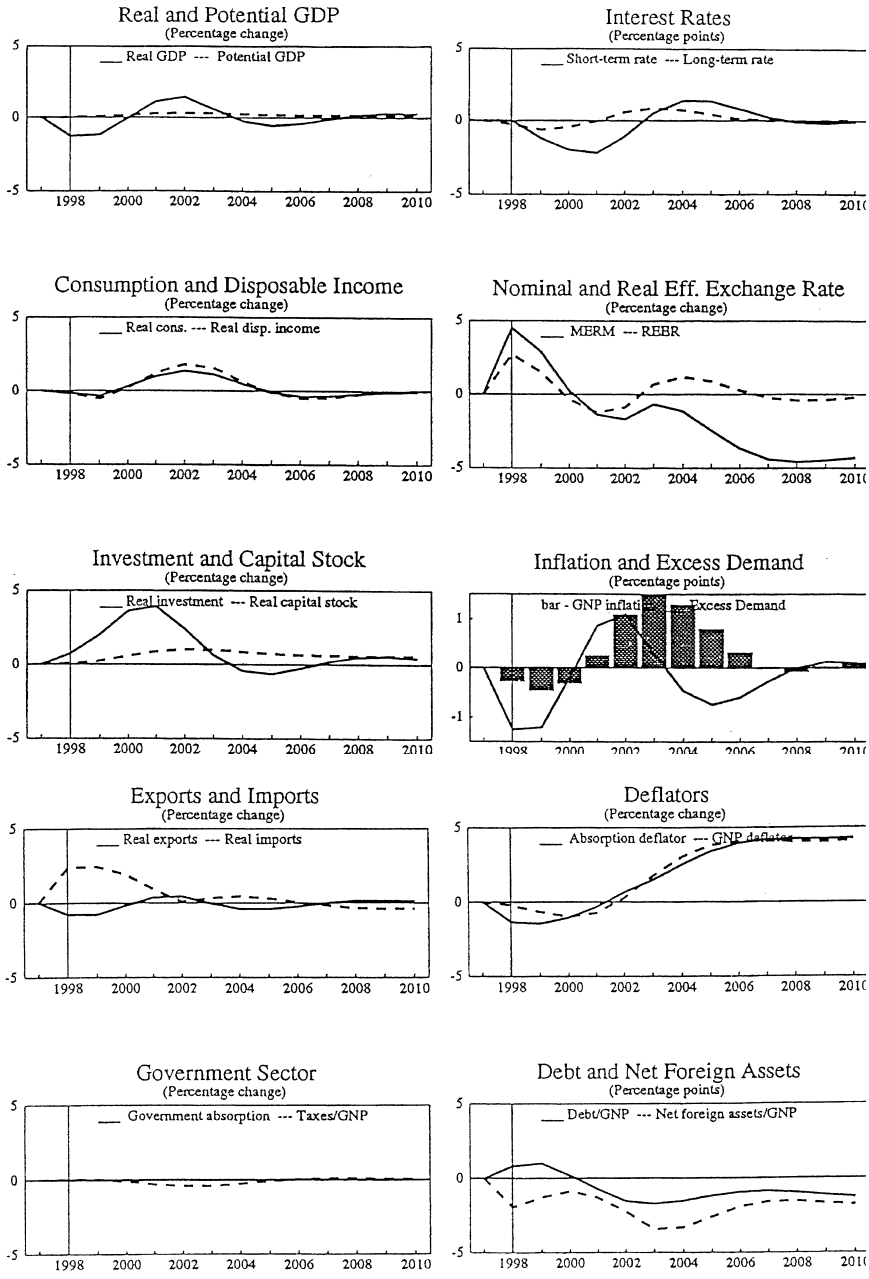

Fig. 2. Switzerland: portfolio preference shift with an interest rate floor and monetary stimulus.

Relative to Scenario A4, this expansionary monetary policy results in a net output gain of 1.6% over a 3-year horizon (2000–2002). The cost of this policy, however, is a marked (although temporary) increase in medium-term inflation relative to the scenarios presented before, with inflation rising by over 1 percentage point above the baseline level by the sixth year of the simulation.[14]

Scenario A6 shows the effects of an implicit (and credible) temporary exchange rate ceiling, where the monetary authority tries to limit the initial nominal exchange rate appreciation to about 2% (relative to baseline) and then counters any further short-term upward pressures on the exchange rate. In this case, the output losses are smaller than in the previous scenario and, in addition, the medium-term inflation outcome is relatively subdued due to the more rapid response of monetary policy. Both these simulations are suggestive of the trade-offs between output and inflation that will have to be faced when using the monetary policy instrument in response to EMU-related shocks.

4.2. Persistent portfolio preference shift

An alternative scenario that we now explore is one where the shift in investors' preferences in favor of assets denominated in Swiss francs is persistent. In this case, since Switzerland is a small open economy, the long-run adjustment effect would be borne entirely by the domestic interest rate, although a nominal interest rate floor could potentially complicate this adjustment process. Through its permanent effect on domestic interest rates and, hence, on capital accumulation, the long-term implications of a permanent asset preference shift are very different from those of a temporary shift. Consider a persistent shift in favor of financial assets denominated in Swiss francs modeled as a permanent reduction (of 0.01) in the residual term of the interest parity equation (Scenario B1).[15] In this scenario, the increased preference for Swiss franc-denominated assets translates into persistently lower domestic interest rates and rates of return on real assets in Switzerland. The real exchange rate appreciates initially and then returns to baseline so that the long-run effect of this shift is transmitted entirely to the domestic interest rate. The persistent decline in the interest rate is accompanied by a reduction in the cost of capital, leading to an investment boom that results in a gradual increase in the capital stock and the rate of growth of potential output.

This simulation suggests that the Swiss economy would benefit from a persistent shift into Swiss franc-denominated assets, particularly productive assets, since a persistent exogenous increase in the preference for Swiss

[14] Since the model incorporates a nonlinear Phillips curve relationship, initial conditions do matter in the sense that the inflation responses are likely to be larger if the baseline output gap were smaller. The baseline forecast assumes an output gap of about 4% of potential GDP in 1996, declining to 0 by the year 2003.

[15] Strictly speaking, this persistent shift is modeled as being long-lived (over 20 years) but not permanent. Hence, the steady state is not affected and potential output returns to its baseline level in the very long run.

franc-denominated assets feeds through into lower domestic interest rates and higher investment and increases potential output growth. But such a shift does have a contractionary effect on output in the short run. The real exchange rate appreciates, which leads to a deterioration in the trade balance and, in addition, private consumption declines temporarily. Inflation declines only marginally in the short run. Nevertheless, since the current inflation rate is around 1%, this scenario does raise the specter of a deflationary economy, which could impose significant real costs in the event of future adverse shocks to the economy.

The short-run adverse consequences on output could be mitigated by an easing of monetary policy, as shown in Scenario B2, where the medium-term money supply target is increased by 1 percentage point relative to its baseline. The real effects in the long run are, of course, similar to those in Scenario B1, but the short-run real differences are striking. The exchange rate appreciation is now substantially smaller in the short run and the effect on exports is considerably smaller. In addition, the decline in the short-term interest rate toward its long-run level is achieved more quickly, slightly sharpening the short-run investment response. The negative short-run effect on aggregate output is now virtually 0 and actual output tracks potential output very closely. Following an initial decline, the price level, as measured by either the GDP deflator or the absorption deflator, returns to its baseline level, unlike in Scenario B1 where the decline in the price level is more persistent. A notable feature of this simulation is that, despite the easing of monetary policy, the business cycle stabilization effects are achieved without a significant increase in inflation, although this relatively benign outcome should be viewed relative to the inflation reduction achieved in Scenario B1.

4.3. A change in the foreign interest rate

Finally, we consider the possibility that the baseline foreign interest rate could increase concurrently with a shift in investors' preferences toward Swiss franc-denominated assets. The appropriate benchmark foreign interest rate is presumably a composite of interest rates in major industrial economies including Germany and the United States. For the purposes of this paper, baseline US interest rates are assumed to be unaffected by the announcement of the participants in Stage 3 of EMU and, thus, the DM interest rate is the key foreign interest rate. However, with the entry of Germany into EMU, the relevant point of comparison will be the euro interest rate. It is plausible that the initial euro interest rate could be higher than the baseline DM interest rate in the WEO forecast since investors may require a higher rate of return on euro assets owing to the initial lack of credibility of the ECB and, more generally, to compensate for the higher risk associated with this new asset.

Although the premium paid by investors for Swiss franc-denominated assets could still increase relative to the baseline, the net impact on Swiss interest rates cannot be determined ex ante. For illustrative purposes, the euro interest rate was

raised permanently by 50 basis points relative to the present baseline German interest rate in the simulation, while the residual in the interest parity equation was also reduced permanently as in the previous scenario. Both changes are assumed to be persistent. The simulation results (Scenario C1) are similar to those for Scenario B1. Although the response profiles are similar, the effects of this composite shock on domestic interest rates, the components of domestic demand, the real exchange rate, and external demand are dampened relative to Scenario B1. For instance, the change in the rate of growth of potential output relative to the baseline is smaller in Scenario C1 than in Scenario B1, and so is the short-run decline in aggregate output. Consequently, the policy implications are also similar, except in terms of the magnitudes of the policy responses needed to offset the adverse short-run effects.

5. Conclusions

EMU is likely to have a significant effect not just on its participants but also on neighboring countries with close economic and financial links to the EMU countries. This paper has examined the possible effects of EMU on one such country, Switzerland. Uncertainties during the initial stages of EMU could lead to a shift in investors' preferences toward assets denominated in hard currencies outside the EMU, including the Swiss franc. Using a stylized open economy macroeconomic model of Switzerland, a number of illustrative scenarios were examined that suggest that the implications of such portfolio preference shifts for the Swiss economy could range from being adverse to being quite beneficial. These simulations indicate that the magnitude and persistence of shifts in portfolio preferences could have an important bearing on the eventual outcome, as would the policy response to such shocks.

Determining the appropriate policy response is a difficult task that is further complicated by the current cyclical weakness of the Swiss economy. The simulation results suggest that monetary policy is a more effective tool for stabilizing output in response to the types of shocks analyzed in this paper, both through its effects on domestic demand and on the exchange rate. Even with expansionary fiscal policy, monetary easing would be required in order to dampen the adverse short-run output effects of these shocks. The simulations showed that the inflationary consequences of a delayed monetary response to an asset preference shift could be larger than if the responses were rapid and sufficiently large. The simulations also illustrated the additional risks posed by the constraints on monetary policy in responding to external shocks in an environment with low levels of domestic inflation and interest rates. Over the next few years, monetary policy in Switzerland is likely to be faced with difficult choices between short-run output losses and temporary but significant increases in medium-term inflation, although this trade-off could be mitigated by timely and forceful policy responses.

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Appendix A. Reestimating the model equations for Switzerland

This appendix briefly describes the results of the reestimation of the money demand equation and the main trade equations in the model for Switzerland. Except for the money demand function, the regression specifications are identical to those used for all other countries in MULTIMOD. All regressions were estimated using annual data from 1971 to 1995 obtained from the OECD Analytical Database.

A.1. The money demand equation

The standard money demand specification is linear in the interest rate. Given Switzerland's current low level of short-term interest rates, it was necessary to constrain the interest rate responses in the simulations from going below the nominal interest rate floor of 0%. Hence, the following simple nonlinear specification was estimated:

$$\log(\mathrm{MB}/\mathrm{PGNPNO}) =$$

$$\underset{(0.806)}{1.687} + \underset{(0.157)}{0.345}\log(\mathrm{GDP}) + \underset{(0.157)}{(1-0.345)}\log(\mathrm{MB}(-1)/\mathrm{PGNPNO}(-1))$$

$$\underset{(0.028)}{-0.051}\log(\mathrm{IR}) - \underset{(0.008)}{0.017}\mathrm{TREND}; \qquad \mathrm{Rbarsq} = 0.313,\ \mathrm{DW} = 2.11$$

where MB is the monetary base, PGNPNO is the non-oil GNP deflator, IR is the annualized 3-month nominal interest rate, and TREND is a time trend. Standard errors are reported in parentheses below the estimated coefficients. The estimated elasticities appear reasonable and when the equation was used in MULTIMOD, yielded acceptable model properties. Using the CPI instead of the output deflator did not change the results very much. However, given the limited span of the available data and the limited number of time periods with low levels of interest rates that could be used to identify nonlinearities, the results of this estimation should be treated with caution.

A.2. The trade equations

The trade equations were estimated using volumes and prices for exports and imports of manufactured goods. The volume equation for imports of manufactures is as follows:

$$\begin{aligned}\mathrm{del}(\log(\mathrm{IM})) = {} & \mathrm{IM0} + \mathrm{IM1} \cdot \mathrm{del}(\mathrm{IM7} \cdot \log(A) + (1 - \mathrm{IM7}) \cdot \log(\mathrm{XM})) \\ & + \mathrm{IM2} \cdot \mathrm{del}(\log(\mathrm{PIMA}/\mathrm{PGNPNO})) + \mathrm{IM3} \\ & \cdot \log(\mathrm{PIMA}(-1)/\mathrm{PGNPNO}(-1)) + \mathrm{IM4} \\ & \cdot (\mathrm{IM7} \cdot \log(A(-1)) + (1 - \mathrm{IM7}) \cdot \log(\mathrm{XM}(-1)) \\ & - \log(\mathrm{IM}(-1))) + \mathrm{IM5}T + \mathrm{IM6} \cdot (T^2)\end{aligned}$$

where the operator del indicates the first difference, IM stands for imports of manufactures, A is real domestic absorption, XM is export volume, PIMA is the import price for manufactures, PGNPNO is the non-oil GNP deflator, T is a time trend, and IM0–IM7 are the parameters to be estimated.

This specification permits a short-run effect of the change in the log of absorption that differs from its long-run effect, which is constrained to have a unit elasticity. The current change in relative prices is included, as well as its lagged ratio. A weighted average of domestic absorption and of exports of manufactures is included to account for the fact that imported inputs are used in producing export goods and that an increase in the latter may, therefore, be associated with higher imports. The estimates are presented in Table A1, with the previous MULTIMOD estimates for the full block of smaller industrial countries (SIC) included for comparison. The results indicate that the import volume equation for Switzerland differs in some respects from the SIC estimates. For instance, the short-run effect of activity on imports is smaller than the SIC average. The estimates are generally quite plausible, with price and activity elasticities having the correct signs.

Next, we turn to the export volume equation. This equation incorporates an error-correction specification, uses weighted foreign absorption as an explanatory variable, and the price variable takes into account the price of exports relative to prices in the importer's home market, as well as competition in third markets. The equation also allows for lagged real exchange rate effects and is written as follows:

$$\begin{aligned}\mathrm{del}(\log(\mathrm{XM})) = {} & \mathrm{XM0} + \mathrm{XM1} \cdot \mathrm{del}(\mathrm{REER}) + \mathrm{XM2} \cdot \mathrm{del}(\log(\mathrm{FA})) \\ & + \mathrm{XM3} \cdot \log(\mathrm{XM}(-1)/\mathrm{FA}(-1)) + \mathrm{XM4} \cdot \mathrm{REER}(-1) \\ & + \mathrm{XM5} \cdot T + \mathrm{XM6} \cdot (T^2)\end{aligned}$$

Table A1
Estimates of trade equations for Switzerland

Import volume equation			Export volume equation			Export price equation		
Coefficient	Switzerland	SIC	Coefficient	Switzerland	SIC	Coefficient	Switzerland	SIC
IM0	− 0.757 (4.5)	− 0.790 (2.7)	XM0	− 2.861 (4.1)	− 1.243 (6.5)	PXM0	0.001 (0.2)	− 0.016 (2.0)
IM1	1.977 (18.1)	2.104 (4.6)	XM1	− 0.299 (2.9)	− 0.242 (1.1)	PXM1	0.645 (12.5)	0.626 (3.5)
IM2	− 0.225 (2.8)	− 0.670 (3.8)	XM2	1.795 (6.2)	2.003 (10.4)	PXM2	0.077	0.077 (2.5)
IM3	− 0.260 (3.0)	− 0.597 (2.9)	XM3	0.772 (3.9)	− 0.633 (8.8)			
IM4	0.483 (6.2)	0.511 (2.7)	XM4	− 0.369 (3.7)	− 0.447 (7.3)			
IM5	0.022 (4.1)	0.008 (1.6)	XM5	0.022 (3.4)	2.696 (2.0)			
IM6	0.000 (5.5)	0.000 (0.0)	XM6	0.000 (2.8)	− 0.050 (1.4)			
IM7	0.760 (15.7)	0.770						
Rbarsq.	0.950	0.761	Rbarsq.	0.797	0.611	Rbarsq.	0.871	0.614
SER	0.015	0.035	SER	0.019	0.036	SER	0.018	0.036
DW	2.705	2.07	DW	2.030	1.94	DW	1.33	

Figures in parentheses are absolute *t* ratios. The trade equations for Switzerland were estimated using annual data over the period 1971–1995. The SIC equations were estimated using annual data over the period 1966–1987 and represent pooled estimates across SIC and G-7 countries, with certain coefficients restricted to be the same across all countries. The regression diagnostics are from these pooled equations. The pooled coefficient estimate of 0.077 for PXM2 was used for Switzerland.

where XM stands for the volume of exports of manufactures, REER is the real effective exchange rate, FA is the weighted average of foreign absorption, T is a time trend, and XM0–XM6 are parameters to be estimated. The estimation results (Table A1) indicate that the short-run elasticity of imports with respect to foreign absorption is 1.8, compared with a long-run elasticity that is imposed to be unity. The short-run price elasticity of exports is smaller than the long-run elasticity and all coefficients have reasonable signs.

Finally, the export price equation was also reestimated using Swiss data. The rate of change of export prices is assumed to be a linear combination of the rates of change of domestic and foreign non-oil export and output prices. In addition, the specification includes a lagged difference between domestic and export prices, thereby forcing export prices to rise one for one with domestic output prices in the long run:

$$\begin{aligned}\mathrm{del}(\log(\mathrm{PXM})) = {} & \mathrm{PXM0} + \mathrm{PXM1} \cdot \mathrm{del}(\log(\mathrm{PGNPNO})) + (1 - \mathrm{PXM1}) \\ & \cdot \mathrm{del}(\log(\mathrm{PFM})) + \mathrm{PXM2} \\ & \cdot \log(\mathrm{PGNPNO}(-1)/\mathrm{PXM}(-1))\end{aligned}$$

where PXM is the export price for manufactures, PGNPNO is the domestic non-oil output deflator, PFM is a weighted average of competitors' prices in foreign markets, and PXM0–PXM2 are parameters to be estimated. The coefficient estimates are presented in Table A1, along with the estimates for the full SIC block.

References

Chadha, B., & Tsiddon, D. (1996). *Inflation, nominal interest rates, and the variability of output* (IMF Working Paper 96/109). Washington, DC: International Monetary Fund.

Debelle, G., & Laxton, D. (1996). *Is the Phillips curve really a curve? Some evidence for Canada, the United Kingdom, and the United States* (IMF Working Paper 96/111). Washington, DC: International Monetary Fund.

Laxton, D., Isard, P., Faruqee, H., Prasad, E., Turtelboom, B. (1998). *Multimod: Mark III.* (IMF Occasional Paper No. 164). Washington, DC: International Monetary Fund.

Laxton, D., Meredith, G., & David, R. (1995). Asymmetric effects of economic activity on inflation. In: *Staff papers, vol. 42* (pp. 344–374). Washington, DC: International Monetary Fund.

Masson, P., Symansky, S., & Meredith, G. (1990). MULTIMOD Mark II: a revised and extended model. In: *IMF Occasional Paper, vol. 71.* Washington, DC: International Monetary Fund.

Mauro, P. (1995). *Current account surpluses and the interest rate island in Switzerland* (IMF Working Paper 95/24). Washington, DC: International Monetary Fund.

van Wijnbergen, S. J. G. (1994). The "Dutch disease": a disease after all? *Economic Journal*, *94*, 45–55.

Zurlinden, M. (1992). Stabilitätspolitik in einem Mehrländermodell: simulationsergebnisse für die Schweiz. In: *Geld, währung und konjunktur*, (No. 3, pp. 269–288). Zürich: Swiss National Bank.