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## Growth in Switzerland: Can Better Performance Be Sustained?

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**IMF Working Paper**

European I Department

**Growth in Switzerland:  
Can Better Growth Be Sustained?**

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**Abstract**

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Swiss growth performance in the past quarter century has been mediocre. The paper finds that conditional income convergence contributes significantly to slow growth and the poor performance of the domestically oriented sectors has been a drag on growth. However, slow growth is not inescapable. Faster growth would require raising total factor productivity growth, which remains low by international standards, and the investment rate. Further progress in structural reform could sustain the underlying growth rate at about 2 percent in the next few years.

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Contents	Page
I. Introduction and Conclusions .....	3
II. Is Slow Growth Inescapable? .....	5
III. By How Much Could Growth Be Raised? .....	10
IV. Have There Been Gains From Industrial Restructuring? .....	15
V. Will the Recent Improved Growth be Sustained?.....	23
Appendix I .....	24
Text Boxes	
1. The Determinants of Growth: Cross-Country and Fixed-Effects Estimates.....	6
2. Relation Between Aggregate and Sectoral Productivity Growth.....	21
Text Tables	
1. Growth Determinants in Switzerland and in the Euro Area .....	7
2. Growth Determinants in Switzerland and in the Euro Area .....	8
3. Switzerland's International Competitiveness Ranking .....	8
4. Determinants of the Swiss-Euro Area Growth Differential.....	10
5. Switzerland: Factors Affecting GDP Growth .....	12
6. Switzerland: Investment Rate .....	12
7. Switzerland: Productivity, Employment and Value Added .....	16
8. Switzerland: Value Added, Employment and Productivity by Branch, 1990-96 .....	18
9. Switzerland: Value Added, Employment and Productivity by Branch, 1997-99 .....	19
10. Switzerland: Value Added Per Employee in Selected Industrial Countries, 1997 .....	22
11. Switzerland: Factors Affecting GDP Growth .....	23
Figures	
1. Real Output Growth in Selected Countries.....	4
2. Product Market Regulation in OECD Countries, 1978-98 .....	9
3. Investment Rate.....	13
4. Impact of a 3 Percentage Point Increase in the Investment Rate on the Growth Rate ....	14
5. Change in Employment and Value Added, 1990-98 .....	17
6. Percent Changes in Relative Prices and Productivity, 1997-99.....	20
References.....	25

## I. INTRODUCTION AND CONCLUSIONS

**Swiss growth performance in the past quarter century has been mediocre.** Annual real GDP growth averaged 1½ percent, or ¾ percentage points below the European Union average and 1½ percentage points lower than in industrial countries.<sup>2</sup> Growth firmed to 2 percent in 1997–2001, but this is slow for an economy emerging from stagnation and extensive enterprise restructuring. In per capita terms, growth has averaged 1 percent, knocking Switzerland from first to fourth place in terms of per capita GNP. Nonetheless, per capita GNP is still significantly above the EU average in purchasing power terms (Figure 1).

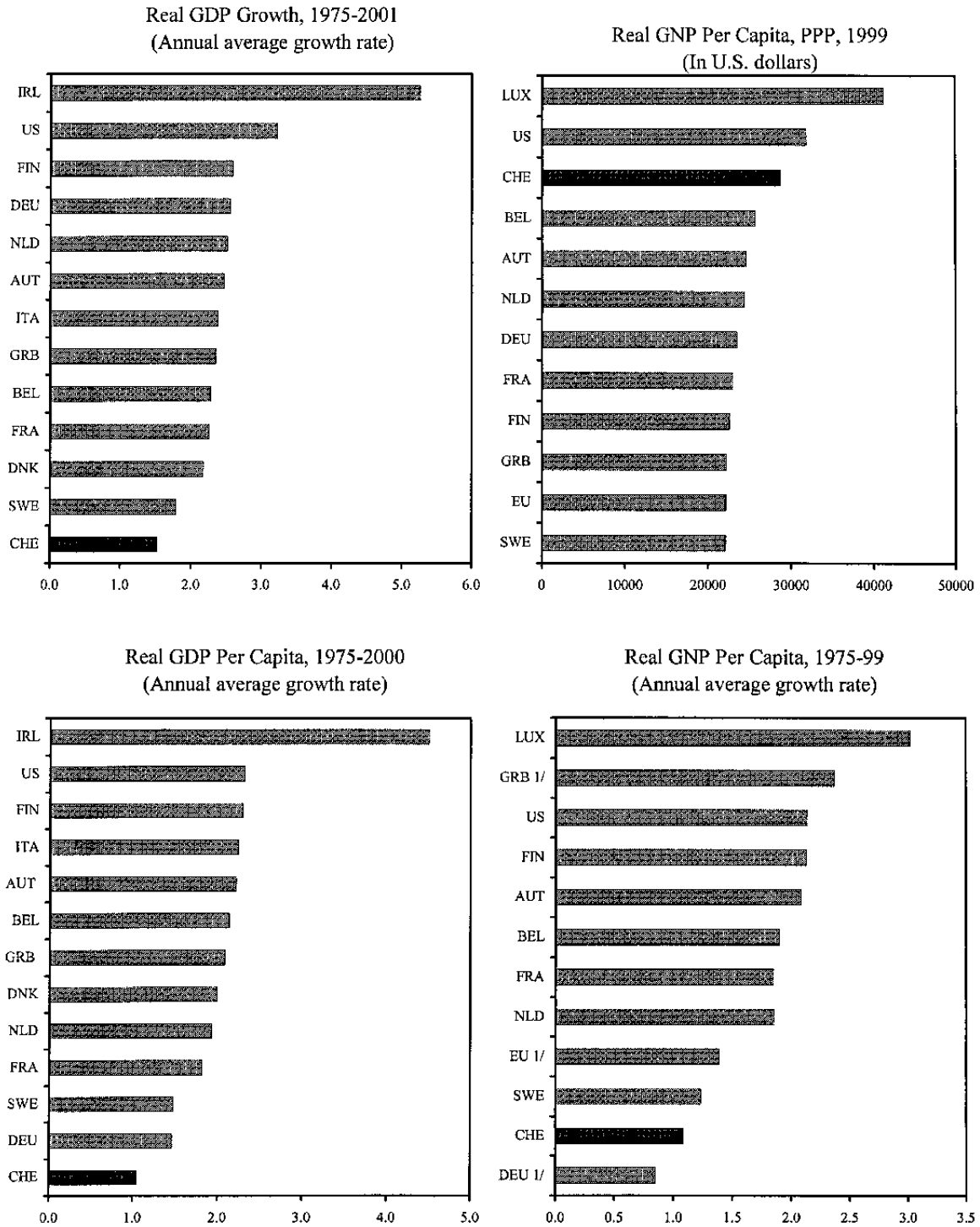
**This paper attempts to address several important questions.** Is slow growth inescapable for Switzerland? By how much could policies raise growth? Has enterprise restructuring in the 1990s laid the ground for stronger future performance? The main conclusions can be summarized as follows:

- **Income convergence across countries contributes significantly to slow relative growth in Switzerland, but experience in several advanced industrial countries reinforces the view that slow growth is not inescapable.** In fact, Switzerland already takes advantage of several positive institutional features such as openness, small government, a good educational system, and a high degree of economic freedom. However, failure to keep up with the pace of structural reforms in other countries has been eroding such institutional advantages.
- **Higher growth will require raising total factor productivity (TFP) growth, which remains low by international standards, and to a lesser extent, raising the investment rate.** This in turn requires redressing skill shortages, opening up sheltered sectors, and invigorating domestic competition. With the right policies, annual growth could potentially be raised by about ½ to 1 percent over the medium term.
- **A review of restructuring efforts in the 1990s pinpoints the performance of the domestically oriented sectors of the economy as the main drag on growth.** Labor productivity increased fastest in manufacturing, which is exposed to international competition and has to cope with trend real exchange rate appreciation. But in more sheltered sectors—for example, services, construction, and agriculture—productivity grew by less and in some instances it even fell.

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<sup>2</sup> Current measurement practices tend to understate Swiss growth, but this is not the dominant reason for weaker relative performance. See the Appendix.

Figure 1. Real Output Growth in Selected Countries



Source: World Bank; OECD, Analytical Database.  
1/ Average growth rate in 1991-99.

- **Looking forward, it is reasonable to expect an underlying growth rate of about 2 percent in the next few years, but further progress in structural reform would be needed to sustain this rate.** Slow growth of the working age population will provide a restraint on growth and, in the longer run, population aging is likely to shift resources to relatively slow growth sectors. In this environment, it will be important to maximize productivity growth through reforms to product markets and policies to improve the attractiveness of Switzerland as a business location.

## II. IS SLOW GROWTH INESCAPABLE?

**The consensus from the empirical growth literature is that convergence of per capita incomes and national policies significantly affect relative growth performance.** A vast literature employing cross-country growth regressions finds strong evidence of conditional convergence; that is, contingent on the level of human capital, market openness, and other determinants of growth, rich countries tend to grow more slowly than poor ones.<sup>3</sup> Such convergence is consistent with the standard neoclassical model, according to which a country's per capita growth rate is inversely related to its starting level of per capita GDP. Convergence is also related to technology diffusion and the tendency in advanced industrial economies to shift resources to services, which are generally characterized by below-average productivity growth. The literature finds that indicators of national policy are correlated with growth. However, there is disagreement as to the relative significance of individual policies and transmission mechanisms. Authors emphasize to varying degrees openness to international trade, macroeconomic policies, financial developments, and structural policies.

**Estimates suggest that conditional income convergence has a strong negative effect on Switzerland's relative growth performance.** Estimates derived from recent models suggest that Switzerland's much higher per capita income might have been expected, in isolation, to have pushed growth some 2 to 3 percentage points below the euro area average in 1980-99. The high end of this range is based on parameter values estimated by including a wide range of countries—developed and developing—into a fixed effects panel regression (Box 1).<sup>4</sup> The lower bound is based on estimates that only include a panel of industrial countries.<sup>5</sup> It thereby provides some control for the possibility that the higher estimate exaggerates technological catch-up effects. The results compare with an estimate in Bassanini and others (2001) of 1.7 percentage points for the convergence difference between growth in Switzerland and

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<sup>3</sup> See Barro and Sala-i-Martin (1995), Sala-i-Martin (1997), Fisher (1993), Levine and Renelt (1992), and Easterly and Levine (2001).

<sup>4</sup> The high end of the range is estimated as the product of the conditional convergence coefficient in the fixed effects regression (-4.43) in Box 1 and the Swiss-euro area differential in log per capita GDP (log 2.028) in Table 1.

<sup>5</sup> The analysis follows Arora and Vamvakidis (2001).

### Box 1. The Determinants of Growth: Cross-Country and Fixed-Effects Estimates

The growth regressions below, obtained from Vamvakidis and Zanforlin (2002), relate per capita GDP growth to the initial level of real per capita GDP to control for convergence; the share of investment in GDP; secondary school enrollment as an indicator of the human capital; population growth, to capture demographics; and growth in trading partners, to capture the international economic environment. The regressions include also five policy indicators: inflation and the ratio of government consumption to GDP as indicators of macroeconomic stability; the external trade as a percent of GDP to capture the degree of openness of the economy; and the index economic freedom to capture the extent to which production and allocation are governed by markets.

Dependent Variable: Real Per Capita GDP Growth (t-values in parentheses)		
	Fixed Effects	Cross-Section
Constant		-5.39 (-2.20)
GDP (constant 1995 US\$)		0.33 (3.00)
GDP per capita (constant 1995 US\$)	-4.43 (-5.22)	-0.8 (-3.31)
Gross capital formation (in percent of GDP)	0.07 (1.83)	0.15 (4.47)
Consumer price inflation (in percent)	0.00 (-1.36)	0.00 (-5.60)
Government consumption (in percent of GDP)	-0.25 (-4.29)	0.03 (0.81)
Population growth (in percent)	0.11 (0.32)	-0.79 (-3.53)
Secondary school enrollment ratio (in percent)	0.01 (0.65)	0.01 (1.02)
Trade (in percent of GDP)	0.02 (1.93)	0.01 (1.64)
Growth in main trading partners (in percent)	1.11 (5.21)	0.78 (1.77)
Economic freedom index	0.42 (3.63)	0.13 (1.35)
R-squared	0.42	0.68
Standard error	1.61	1.16

The estimates are based on a sample of 91 countries for which data are available for the period 1980–99. All data are from the World Bank's World Development Indicators, except for the index of economic freedom, which comes from Gwartney, Lawson, and Samida (2000). The fixed effects regression, which allows for country-specific factors other than those captured by the explanatory variables, is more suitable for quantifying the impact of policies on per capita growth. The cross-country regression, on the other hand, is useful for estimating potential growth.

Results are in line with the consensus in empirical growth literature (Levine and Renelt, 1992; Sala-i-Martin, 1997). Fixed effects matter, that is, there are differences in performance across countries even after controlling for the effects of convergence and the other determinants of growth. There is strong evidence of convergence. Measures of spending do not appear to affect growth in a significant way; inflation and openness do not matter much, but their presence improves the fit of the regression.

other OECD countries. It should be stressed that the precision of estimates of the convergence effect is quite low. Nonetheless, its sign and significance suggest that it is an important explanation of Switzerland's poor relative growth performance.

**The analysis also suggests that many positive institutional features in Switzerland tend to offset the convergence effect.** Relative to the euro area, Switzerland has a smaller public sector, lower tax rates, greater reliance on markets, lower inflation, greater openness to external trade, a highly qualified labor force, amicable labor relations, and a higher rate of capital accumulation. According to the regressions described in Box 1, these factors tend to boost growth. Smaller government and greater economic freedom had the strongest offsetting effects followed by openness and capital accumulation (Table 1). The policy implication is that slow growth is not inevitable in the presence of strong income convergence.

Table 1. Growth Determinants in Switzerland and in the Euro Area, 1980–99

	Euro area	Switzerland	Differential (Swiss-EA) 1/	Impact on Growth Differential
Real per capita GDP growth	1.7	0.9	-0.8	0.08
Due to:				
GDP per capita (constant 1995 US\$)	21.1	42.8	102.8	-3.12
Gross capital formation (in percent of GDP)	21.6	24.0	2.3	0.16
Consumer price inflation (in percent)	4.5	2.8	-1.7	0.01
Government consumption (in percent of GDP)	20.4	13.7	-6.7	1.67
Population growth (in percent)	0.3	0.6	0.3	0.03
Secondary school enrollment ratio	99.5	98.2	-1.3	-0.01
Openness (trade as percent of GDP)	57.2	70.7	13.6	0.27
Growth in main trading partners (in percent)	1.8	1.6	-0.2	-0.18
Economic freedom index	4.2	7.2	3.0	1.26

Sources: Box 1; and IMF staff estimates.

1/ Difference in percentage points, except for per capita GDP, which is expressed as percentage difference.

**Nonetheless, Switzerland's institutional advantages have been narrowing over time (Table 2).** In the increasingly interconnected global environment, convergence is not confined to per capita incomes. There is also technological convergence and convergence in economic policies and the regulatory environment. Lower inflation in Europe, fiscal consolidation in the run up to EMU, and Switzerland's failure to keep up with the pace of liberalization internationally have been eroding Switzerland's relative attractiveness as a business location and worsening her relative growth performance. This is confirmed by several competitiveness reports—for example, Schwab et al (2002) and IMD (2001)—which show Switzerland's relative growth capacity has been eroding since the early 1990s largely owing to a failure to keep pace with the other industrial countries in opening up product



markets, promoting competition, and streamlining regulation (Table 3).<sup>6</sup> In the same vein, Nicoletti et al (2000) present evidence that the pace of product market reform in Switzerland in the past thirty years has been the slowest among OECD member countries (Figure 2).

Table 2. Growth Determinants in Switzerland and in the Euro Area

	Switzerland				Euro Area			
	1980-84	1985-89	1990-94	1995-99	1980-84	1985-89	1990-94	1995-99
Real GDP per capita growth	1.4	2.0	-0.4	0.8	1.1	2.7	1.1	1.9
GDP per capita (constant 1995 US\$) 1/	39,841	41,719	45,951	43,639	17,880	19,017	21,916	25,761
Gross capital formation (in percent of GDP)	25.6	26.1	23.5	20.8	22.3	21.3	22.1	20.9
Consumer price inflation (in percent)	4.4	2.1	4.0	0.8	9.1	3.4	3.9	1.8
Government consumption (in percent of GDP)	12.9	13.3	14.4	14.2	20.5	20.3	20.5	20.3
Population growth (in percent)	0.3	0.6	1.0	0.4	0.2	0.3	0.5	0.2
Secondary school enrollment ratio	95.2	97.1	100.4	100.2	90.2	95.1	104.0	108.7
Trade (in percent of GDP)	70.7	72.4	68.4	71.4	58.2	56.7	53.9	59.9
Growth in main trading partners (in percent)	1.2	2.1	1.1	2.0	1.3	2.4	1.1	2.2
Economic freedom index 1/	7.2	7.2	7.4	7.1	3.7	3.3	4.7	5.3

Sources: IMF, *International Financial Statistics* and WEO; World Bank, WDI databases; and IMF staff estimates.

1/ The initial observation for each five-year period.

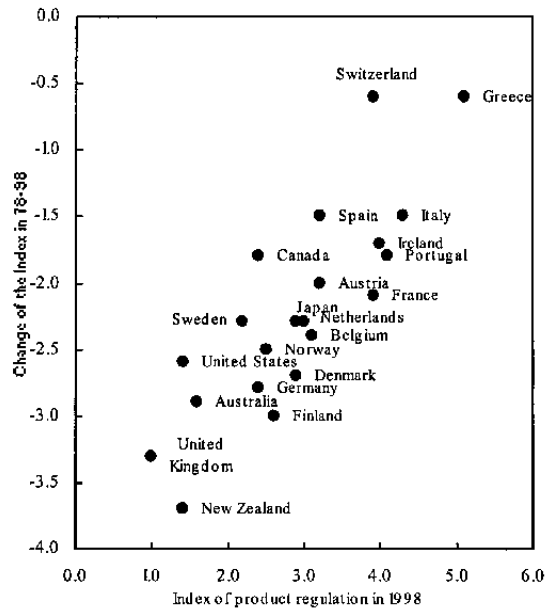
Table 3. Switzerland's International Competitiveness Ranking

	1988	1990	1995	1996	1997	1998	1999	2000	2001
World Economic Forum									
Growth competitiveness				6	6	6	6	9	15
Current competitiveness							5	5	5
IMD Lausanne									
Competitiveness Scoreboard	2	2	5	9	12	9	7	7	10

Sources: Schwab and others (2002); and IMD (2001).

<sup>6</sup> See also Hviding (1998), and OECD (2002).

Figure 2. Product Market Regulation in OECD Countries, 1978-98



Source: Nicoletti (2000).

**The erosion of Switzerland’s relative institutional advantages has been outstripping the weakening of the convergence effect.** According to the fixed effects model in Box 1, the shrinking per capita income differential between Switzerland and the euro area reduced the convergence effect from 3.5 percentage points in the 1980s to 2.8 percentage points in the 1990s. Between the same periods, the offsetting effects of Switzerland’s relative advantages declined by more (Table 4). The decline was particularly pronounced in the case of size of government (proxied by the government consumption ratio) and economic freedom.<sup>7</sup> The latter, which captures the extent to which production and allocation are governed by markets, remained virtually unchanged (albeit at a high level) in Switzerland, but improved considerably in the euro area, knocking Switzerland from 4th to 14th place, shaving 0.7 percentage points from the Swiss-euro area growth differential. The important policy implication is that both actions and inaction have a bearing on relative performance. Had Switzerland pursued structural reforms more vigorously and maintained its rank in terms of reliance on markets, average growth might have been ½ percentage point faster.

<sup>7</sup> The index of economic freedom, which ranks countries on the 0–10 scale, is a weighted average of 23 factors designed to measure how consistent institutional arrangements and policies are with economic freedom, see Gwartney et al (2000).

Table 4. Determinants of the Swiss-Euro Area Growth Differential  
(In percentage points)

	1980–89	1990–99
Real GDP per capita growth differential	-0.2	-1.3
Due to:		
GDP per capita	-3.5	-2.8
Institutional factors	3.7	2.5
Gross capital formation	0.3	0.0
Consumer price inflation	0.0	0.0
Government consumption	1.8	1.5
Population growth	0.0	0.0
Secondary school enrollment ratio	0.0	-0.1
Trade	0.3	0.3
Growth in main trading partners	-0.3	-0.1
Economic freedom index 1/	1.6	0.9
Residual, including fixed effects.	-0.5	-1.1

Sources: Table 2; Box 1; and IMF staff estimates.

**Although the regression analysis appears to capture important determinants of growth in Switzerland, it abstracts from several important aspects and the estimates are subject to considerable uncertainty.** In particular, it does not take into account the effects of the unusually long recession in the 1990s or of Switzerland's nonparticipation in the European Economic Area. And it abstracts from supply-side constraints to growth (e.g., skill shortages that might have prevented Swiss enterprises from entering decisively certain high-technology sectors). More importantly, there is no one-to-one correspondence between policies and the regressors used (which are proxies for several policies). This makes it impossible to address the more interesting question as to how specific policies affect growth.

### III. BY HOW MUCH COULD GROWTH BE RAISED?

**Faster underlying growth requires either raising the growth of factor inputs or increasing the efficiency of their employment—that is, raising productivity growth.** A growth accounting exercise shows that TFP has accounted for a substantial part of GDP growth in the last 20 years (Table 5).<sup>8</sup> TFP growth doubled 1997–2001. But at 0.9 percent, it

<sup>8</sup> TFP growth is calculated as a residual after a weighted average of the growth of capital and labor have been subtracted from actual growth. The weight on capital is set at 0.35. This is consistent with econometric estimates of the elasticity of output with respect to capital. It is

remained low by international standards, especially for a country emerging from a deep recession, as occurred in Switzerland in the first half of the 1990s.

**Slow and decelerating population growth and a trend decline in working hours have kept the contribution of employment to growth low.** Switzerland's population, including naturalizations, has increased at an average annual rate of 0.3 percent in the past 20 years whereas the growth of foreign workers has decelerated from an average annual rate of almost 2 percent in the 1980s to 0.8 percent in 1997–2001. The already high, by international standards, participation rate and share of foreign workers (currently, one-fifth of the population), as well as low unemployment, cap further the potential contribution of employment to growth.

**The contribution of capital accumulation to growth has declined despite a high investment rate.** The investment rate, at constant prices, is high by international standards and has risen slightly over the past 20 years (Table 6), although there have been significant gyrations in its components (Figure 3). The latter include the real-estate bubble in the late 1980s and its subsequent correction, the global recession of 1992–93, the monetary and fiscal tightening in the first half of the 1990s, and the strong growth in machinery and equipment investment in the late 1990s. The effect of the high investment rate on capital accumulation has been dented by the high (and rising) capital/output ratio.<sup>9</sup> During the 1991–96 recession, a negative contribution of capital also reflected a decline in capacity utilization and increased scrapping associated with enterprise restructuring (see Table 5). Likewise, the contribution of capital accumulation during the 1997–2001 upswing was limited by a shortening of the average lives of newer machinery and equipment.

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slightly lower than the share of capital in GDP (around 40 percent), but in the presence of monopolistic competition the share of capital tends to overstate the elasticity of output with respect to capital (Nishimura and Shirai, 2001). Ideally, TFP growth should reflect the increase in the efficiency in production. In practice, because it is calculated as a residual, it also incorporates the impact of omitted variables (such as the quality of labor and capital, and capacity utilization); measurement errors (especially as regards capital stock, see Appendix); changes in the composition of production; and misspecification of the production function. In principle, the residual could be “cleaned” with a combination of mechanical adjustments and control variables but the available statistical information in Switzerland is inadequate for this purpose.

<sup>9</sup> The pace of capital growth reflects the interaction between the investment rate, depreciation, and capital intensity and is summarized by  $\Delta K/K_t = (I+\gamma) \cdot (I/Y) \cdot (Y/K)_t - \delta$  where  $(I/Y)$  stands for the investment rate at constant prices,  $(K/Y)$  the capital-output ratio, and  $\gamma$  and  $\delta$  denote, respectively, GDP growth and the depreciation rate.

Table 5. Switzerland: Factors Affecting GDP Growth  
(In percent)

	1981-90	1991-96	1997-2001
GDP growth	2.1	0.0	2.0
Contribution of:			
Effective employment	0.6	-0.3	0.2
Average hours	-0.6	-0.3	-0.2
Employment	1.2	0.0	0.4
Population	0.4	0.5	0.2
Activity rate	0.2	-0.1	0.0
Participation rate	0.7	0.0	-0.2
Unemployment rate	0.0	-0.4	0.3
Capital	1.0	-0.2	0.9
Capital stock	0.9	0.3	0.8
Capacity utilization	0.1	-0.4	0.2
Total factor productivity growth (residual)	0.5	0.5	0.9
Average labor productivity growth	1.1	0.5	1.7
Contribution of:			
Total factor productivity	0.5	0.5	0.9
Capital deepening	0.6	0.0	0.8

Sources: Federal Statistical Office; SECO; and IMF staff estimates.

Table 6. Switzerland: Investment Rate

(In percent of GDP)

	1981-90	1991-96	1997-2001
	(In constant prices)		
Gross investment	24.8	25.4	26.1
Construction	13.9	14.3	12.4
Machinery and equipment	10.8	11.1	13.7
	(In current prices)		
Gross investment	25.3	22.3	20.4
Construction	13.9	12.4	10.0
Machinery and equipment	11.5	9.9	10.4

Sources: Federal Statistical Office; and IMF staff estimates.

**From the perspective of factor inputs, there would appear to be limited scope to raise the contribution from labor, but perhaps room to increase the investment rate.** The tumbling of the investment deflator in the 1990s (Figure 3c) has led to a 5 percentage point decline in the investment rate at current prices and a corresponding widening of the savings-

Figure 3. Switzerland: Investment Rate  
(In percent of GDP)

Figure 3a. Investment Rate at Constant  
and Current Prices

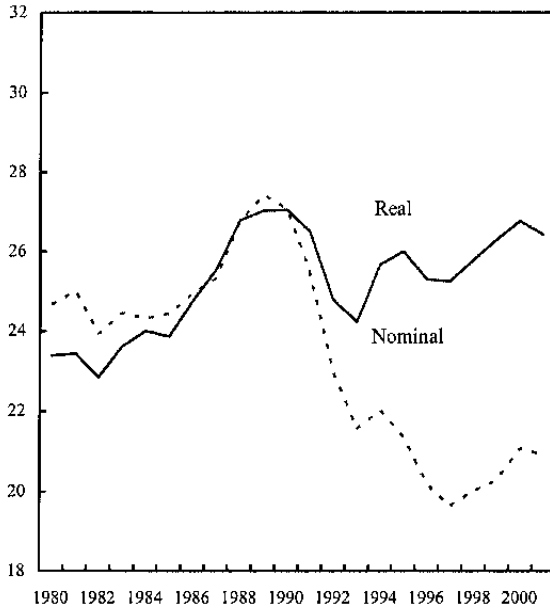


Figure 3b. Investment Rate at Current  
Prices

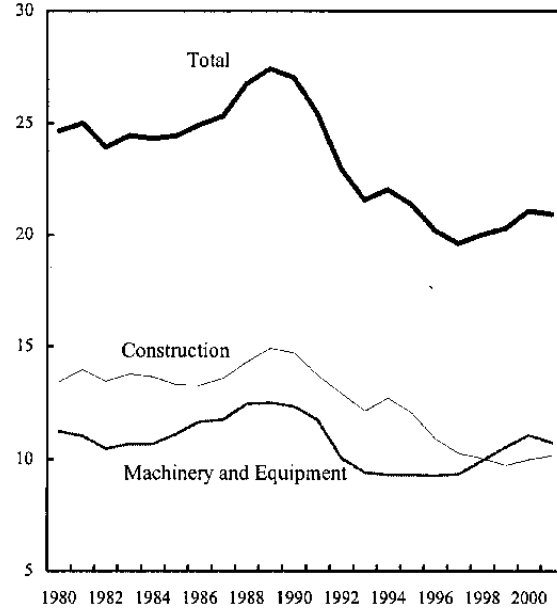


Figure 3c. Relative Investment  
Deflators 1/

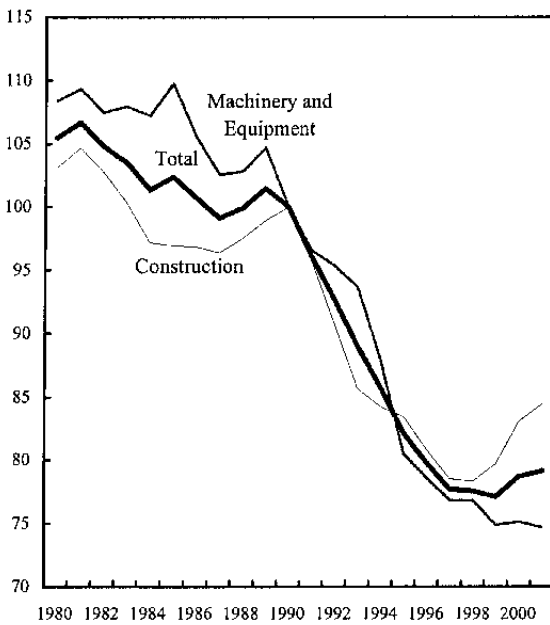
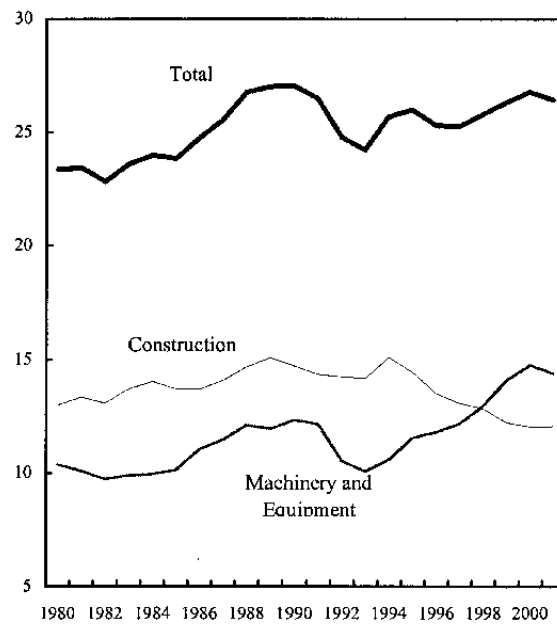


Figure 3d. Investment Rate at Constant  
Prices

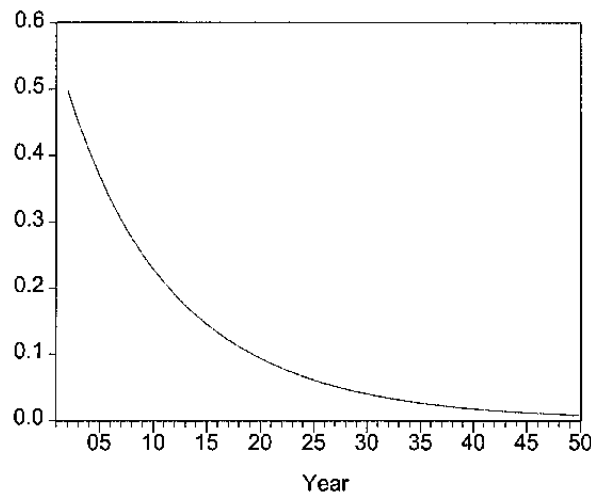


Sources: Federal Statistical Office; SECO; and IMF staff estimates.  
1/ 1990=100.

investment imbalance.<sup>10</sup> But it also reduced the user cost of capital. This should have boosted the investment rate if it had not been for a number of factors that may have reduced Switzerland's attractiveness as a business location. These include the non-ratification of EEA, which perhaps prompted enterprises to relocate activities to the EU, and intensified globalization, which increased investment opportunities abroad and induced a rebalancing of portfolios in favor of foreign investment. A slower pace of structural reform relative to other industrial countries probably also diminished Switzerland's locational competitiveness.

**If reforms were to succeed in raising the non-residential investment rate from its current 22 percent to 25 percent of GDP, per capita GDP growth could be boosted temporarily by about 0.5 percentage points a year.** However, a higher investment rate would provide only a temporary boost to growth as, over time, diminishing returns from a rising capital/output ratio, and rising depreciation would set in. The growth effect, for example, declines to 0.2 percentage points after 10 years and disappears altogether in the long run (Figure 4). The precise channels through which the investment rate might be influenced are hard to pin down and a constellation of policies would probably be needed to improve the attractiveness of Switzerland as a business location. The emphasis should be on raising profitability, which should help attract a larger portion of savings to domestic investment. With the savings rate high by international standards, there is no *prima facie* need to stimulate savings.

Figure 4. Impact of a 3 Percentage Point Increase  
in the Investment Rate on the Growth Rate  
(In percent)



Source: IMF staff estimates.

<sup>10</sup> Adjusting for exchange rate effects, the decline is on the same order of magnitude as experienced in the United States (where the investment deflator is also adjusted for quality) and almost double the declines in neighboring Germany and Austria (respectively, 10 percent and 13 percent).

**By contrast, reforms that raised productivity growth would translate into a permanent, one-for-one increase in longer-term growth.** Such reforms should focus on removing inefficiencies and fostering innovation. However, some reforms and other phenomena, such as new economy effects and technological catch-up, might only be associated with a one-time increase in the level of productivity.

**Product market reforms appear to present a promising means of raising TFP growth.** Whereas Switzerland scores highly in many structural areas, high domestic prices point to inefficiencies in domestic markets and support the studies cited earlier about Switzerland's relative weakness in product markets. Based on cross-country estimates in Salgado (2002), long-run productivity growth might be raised by 0.1–0.3 percentage points if the price markup in Switzerland were reduced to the OECD average. Based on productivity and price comparisons, OECD (2002) estimates an even stronger effect from the opening up of the health, agriculture, electricity and gas sectors—a cumulative increase of 4–7 percent of GDP over a 10-year period. The main, and lasting, benefit of product market reforms relate to the strengthening of competition and the pressure that this creates for continuous innovation. Product (and factor) market reforms would help to weed out inefficient firms; remove bottlenecks, inefficiencies and distortions; accelerate the reallocation of resources from low to high productivity activities; and foster innovation. Other reforms, for example the liberalization of shopping or working hours, could also raise capacity utilization.

**In sum, reforms could perhaps add ½ to 1 percentage points to the Swiss medium-term growth rate.** By improving Switzerland's attractiveness as a business location, reforms would encourage inward FDI and the channeling of a larger portion of savings to domestic investment. Product market reform in particular would reduce prices in sheltered sectors, which is equivalent to a positive productivity shock. Sustaining an improved growth performance over the longer term will, however, prove difficult: labor force constraints to growth will become more binding as the population ages and reforms that raise the investment rate will not have a permanent impact on the growth rate.

#### **IV. HAVE THERE BEEN GAINS FROM INDUSTRIAL RESTRUCTURING?**

**The 1991–96 recession and appreciation of the Swiss franc catalyzed extensive enterprise restructuring and raised labor productivity.** Restructuring was manifested in labor shedding, shedding of noncore activities that had previously diluted the focus of management, outsourcing of support activities, mergers to exploit synergies and economies of scale, and the redeployment of production lines to low-cost sites abroad. Moreover, outward FDI skyrocketed, mainly due to one-off portfolio adjustment as globalization deepened, the integration of the internal EU market strengthened, and Switzerland's lead in innovation started to erode. Firms also tried to strengthen their profit margins by focusing more on quality and on price-inelastic niche markets that allowed improvements in the terms of trade.



Table 7. Switzerland: Productivity, Employment, and Value Added  
(Annual average rates of change, in percent)

	Labor productivity		Employment		GDP	
	1991-96	1997-99	1991-96	1997-99	1991-96	1997-99
Total	1.2	1.2	-1.1	0.6	0.0	1.8
Agriculture	-1.2	2.0	0.4	1.7	-0.7	3.8
Manufacturing sector	4.2	2.0	-3.2	-0.7	0.8	1.3
Electricity, gas, and water	7.3	-2.1	-3.2	0.7	3.9	-1.4
Construction	-1.4	1.6	-3.0	-0.8	-4.4	0.8
Services	0.3	0.9	-0.2	1.2	0.1	2.1

Sources: Federal Statistical Office; and IMF staff estimates.

**The greatest productivity gains have been in sectors exposed to competition.**

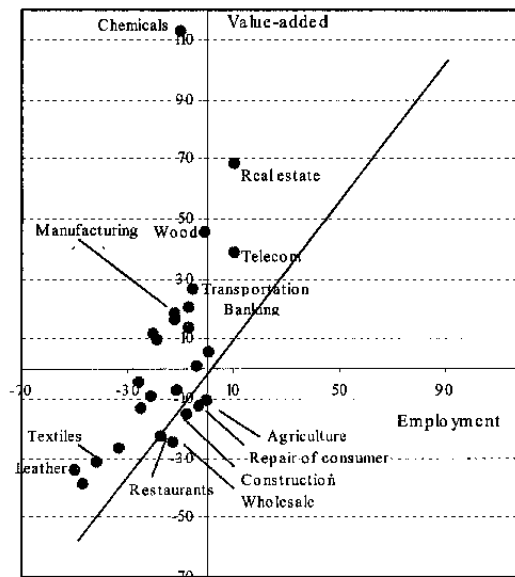
Manufacturing productivity, measured as value-added per full-time-equivalent employment, has increased consistently at above-average rates. The increase was particularly pronounced during the 1991-96 recession (Table 7).<sup>11</sup> Meanwhile, services and construction have registered consistently below-average productivity growth. This difference in performance is consistent with the greater exposure of manufacturing to international competition, including adjustment pressures stemming from the appreciation of the franc in the mid-1990s. By contrast, services and construction have been sheltered from competition by an intricate regulatory system, which has reduced the pressure for reform. The negative correlation between the extent of restructuring and the degree of sheltering from competition is evident from the detailed productivity data (Tables 8 and 9):

- **In manufacturing**, almost all branches registered significant productivity gains, with average growth approximately at par with that in U.S. manufacturing firms (Council of Economic Advisers, 2001). In all instances, the gains were accompanied by massive labor shedding; and in more than half of the branches output declined, accelerating a trend that had already been in place. Star performers have been chemical and pharmaceutical firms (Figure 5).

<sup>11</sup> There are breaks in the series owing to the introduction of a new classification in 1997 and a new employment survey in 1991. Employment is measured in full-time equivalents whereas the earlier growth accounting calculations are based on staff estimates of work hours.

- In **construction**, productivity declined at 1.4 percent annually during the recession as employment declines fell short of the plummeting of activity in the aftermath of the bursting real estate bubble. High compartmentalization of the market due to cantonal restrictions in public procurement biddings is likely to have slowed the restructuring process.
- In **services**, the picture is more differentiated: productivity increased in branches that became more open to competition (e.g., productivity growth in telecommunications and financial services was at par to that in the U.S.) but declined in more sheltered branches (e.g. in wholesale and trade productivity growth fell significantly short of the rates registered in the United States). Telecommunications are notable because the large productivity increase was accompanied by significant employment gains following the opening up of the sector.

Figure 5. Switzerland: Change in Employment and Value Added, 1990-98



Source: IMF staff estimates.

Table 8. Switzerland: Value Added, Employment, and Productivity by Branch, 1990-96

(Annual average change, in percent)

	Gross Value Added 1/	Employment 2/	Labor Productivity
Total	0.0	-1.1	1.2
Agriculture	-0.7	0.4	-1.2
Electricity, gas, steam, and distribution of water	3.9	-3.2	7.3
Extraction	-3.5	-4.7	1.2
Food, beverages, and tobacco	2.0	-1.5	3.5
Manufacturing of textiles	-5.8	-8.5	2.9
Manufacturing of clothes, wearing apparel	-5.7	-6.0	0.3
Wood and furniture industry	0.1	-3.1	3.3
Paper industry	0.3	-1.8	2.2
Graphic arts	-2.4	-2.9	0.5
Leather and shoe manufacturing	-4.1	-6.5	2.5
Chemicals	9.8	-2.7	12.8
Plastic and rubber industry	-0.7	-3.1	2.5
Nonmetallic mineral products industry	-5.3	-3.7	-1.6
Metallurgy	-0.5	-2.8	2.4
Manufacturing of machines and vehicles	-1.9	-4.0	2.2
Manufacturing of electronic/electronic equipment	-2.0	-3.4	1.5
Manufacturing of watches and jewellery	3.6	-1.4	5.1
Other manufacturing industries	4.3	-1.5	6.0
Construction sector	-4.4	-3.0	-1.4
Wholesale and commission trade	-3.6	-1.5	-2.2
Retail trade	-0.9	-0.8	-0.1
Restaurants and hotels	-4.2	-2.3	-2.0
Repair of consumer goods and vehicles	-3.5	-1.9	-1.6
Transportation	4.5	-1.6	6.2
Communication	3.8	1.6	2.2
Real estate activities	7.4	1.1	6.3
Renting of machinery and equipment	-10.7	-2.4	-8.5
Consulting activities	0.4	0.6	-0.1
Personal services activities	-3.8	0.3	-4.1
Education	-0.5	-0.1	-0.5
Research and development	0.3	-2.1	2.4
Health services	1.6	1.6	0.0
Sewage and refuse disposal	-4.6	-4.0	-0.7
Social accommodation activities	-2.8	1.9	-4.7
Employers association	-0.4	4.1	-4.3
Recreation, cultural and sports activities	-13.8	0.2	-14.0
Banking and financial services	1.0	-0.9	2.0
Insurance (without social insurance)	2.2	0.4	1.8
Other sectors and adjustments (residual)	0.7	1.4	-0.7

Sources: Swiss Federal Statistical Office; and IMF staff estimates.

1/ At constant prices.

2/ In full-time equivalents.

Table 9. Switzerland: Value Added, Employment and Productivity by Branch, 1997-99

(Annual average change, in percent)

	Gross value added 1/	Employment 2/	Labor productivity
Total	1.8	0.6	1.2
Agriculture	3.8	1.7	2.0
Extraction	1.6	-2.2	3.9
Food, beverages, and tobacco	0.0	0.0	-0.1
Textiles	-4.2	-4.1	-0.1
Apparel	-11.0	-12.1	1.2
Leather and shoe manufacturing	-18.5	-12.0	-7.5
Wood and furniture	-1.4	-2.1	0.7
Paper industry	2.9	-1.3	4.2
Graphic arts	2.5	-4.3	7.1
Chemicals	2.9	-0.4	3.3
Plastic and rubber industry	2.4	1.9	0.5
Nonmetallic mineral products	1.2	-2.5	3.8
Metallurgy	1.9	1.5	0.4
Metal products	1.5	-0.3	1.9
Manufacturing of machines	-1.0	-1.0	0.0
Manufacturing of electronic equipment	2.5	-5.2	8.2
Manufacturing of telecommunications equipment	7.4	4.6	2.7
Manufacturing of instruments	2.1	2.3	-0.2
Automotive industry	-0.1	-1.0	0.9
Manufacturing of other vehicles	-1.6	13.2	-13.0
Other manufacturing industries	1.7	-0.5	2.2
Electricity, gas, steam, and distribution	-1.4	0.7	-2.1
Construction	0.8	-0.8	1.6
Automobile dealers	3.3	-0.3	3.6
Wholesale and commission trade	1.6	1.7	-0.1
Retail trade	1.7	-0.1	1.9
Restaurants and hotels	3.2	1.3	1.8
Transportation	0.5	-1.5	2.0
Transportation-related services	-5.1	1.3	-6.3
Post and telecommunications	9.4	3.0	6.2
Financial intermediation	3.3	-0.9	4.2
Insurance	1.9	2.9	-1.0
Real estate activities	8.4	6.0	2.3
Renting of machinery and equipment	1.1	2.1	-0.9
Computer services	12.1	15.2	-2.6
Research and development	3.2	4.4	-1.1
Public administration	0.2	0.3	-0.1
Education	0.6	1.0	-0.3
Health and social services	0.6	1.0	-0.5
Sewage and refuse disposal	0.7	1.4	-0.7
Recreational, cultural, and sports activities	2.3	2.7	-0.4
Personal and domestic services	0.7	-2.9	3.7

Sources: Swiss Federal Statistical Office; and IMF staff estimates.

1/ At constant prices.

2/ In full-time equivalents.

**In general, labor shedding was significantly lower in sheltered sectors during the recession.** Labor shedding was greatest in declining manufacturing sectors such as textiles (-41 percent), leather (-33 percent), and clothing (-31 percent). But it was also pronounced in dynamic industries such as chemicals (-15 percent) and electronic equipment (-19 percent). By contrast, in sheltered sectors, layoffs have been more moderate: employment dropped by only 5 percent in banking (despite serious financial problems, which led to the disappearance of one-third of the banks and closure of 17 percent of their branches) and by 5 percent in retail trade (despite intensifying competition from large retail chains). Labor shedding was more extensive in large manufacturing firms (i.e., firms with more than 250 employees). This could be related to their greater international orientation, which may have made it easier for them to transfer production to lower cost sites abroad.

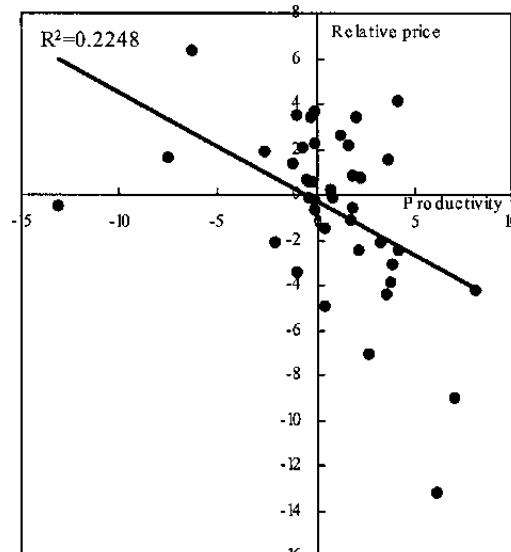
**A negative correlation between productivity gains and relative price improvements is consistent with the view that competitive focus has spurred restructuring (Figure 6).**

However, the relationship between relative price changes and productivity is bi-directional. While on the one hand, lower prices put pressure on firms to raise productivity, on the other hand, productivity gains in a competitive environment tend to depress prices. In general, price declines and productivity increases have been higher in sectors open to competition, such as manufacturing, and less so in services where geography and regulation provided some degree of protection.

**With the birth of many new start-ups, enterprise restructuring has not just been a shakeout of labor and inefficient firms.**

Enterprise statistics indicate that almost one-third of SMEs in operation in 1995 were created in the period 1991-95, compared to only 5 percent in large firms. The branches with the highest (almost 60 percent) share of “young” SME firms were telecommunications, informatics, and financial services. However, since 1996, shortages of skilled labor have likely contained productivity gains. Direct estimates of the effect of shortages are not available. In a study on the effects of bilateral agreements with the EU (Bärlocher and others, 1999) estimated that the bulk of the benefits would most likely come from the alleviation of labor shortages and would raise GDP by a cumulative 2 percent, over a period of ten years.

Figure 6. Switzerland: Percent changes in Relative Prices and Productivity, 1997-99



Source: IMF staff estimates.

**Resource reallocation also contributed ¼ percentage point to average productivity growth during the recession but had no perceptible net impact in the first three years (1997–99) of the upswing (Box 2).** The positive contribution stems from employment reductions in sectors such as construction, hotels and restaurants, and clothing where productivity is one-half the national average. On the other hand, agriculture, where productivity is also one-half the national average, failed to register a reduction in employment.

### Box 2: Relation Between Aggregate and Sectoral Productivity Growth

Aggregate productivity growth can be raised by *raising productivity* in individual sectors and/or by *reallocating resources* from low- to high-productivity sectors. The relative significance of these two channels can be examined by expressing aggregate productivity as a weighted average of sectoral productivities:

$$P = \sum P_i \cdot E_i$$

where  $P_i = V_i/L_i$  stands for sectoral productivity measured as value added over employment and  $E_i = L_i/L$  denotes sector's  $i$  share in total employment. First differencing of the above identity, dividing both sides by  $P$ , and rearranging terms yields in the following expression for the rate of change in economy-wide productivity:

$$p = \sum (V_i/V) \cdot p_i + \sum [(P_i - P)/P] \cdot \Delta E_i + \sum (V_i/V) \cdot p_i \cdot \Delta E_i$$

where lower case symbols stand for percent changes, i.e.,  $p_i = \Delta P_i / P_i$ . The first term shows that the contribution of a sector to aggregate productivity growth is positively related to its share in GDP. The second terms captures the reallocation effect: a shift of labor to above-average productivity sectors,  $P_i > P$ , raises economy-wide productivity. The aggregate reallocation effect is pronounced when (i) the correlation between  $(P_i - P)/P$  and  $\Delta E_i$  is strong (the second term in the above expression is equal to the covariance between  $(P_i - P)/P$  and  $\Delta E_i$ ) and (ii) the differences among sectoral productivities are large (convergence factor); however, the effect dissipates as the economy approaches the steady state. Only the first channel can be a source of lasting productivity growth. Finally, the third term captures the interaction between productivity growth and resource reallocation and is, numerically, of second order of significance.

**The overall level of productivity in Switzerland remains high by international standards although it lags in some sectors.** Expressed as gross value added in euros per employee (Table 10), labor productivity in industry is slightly higher than in neighboring Germany and Austria as well as in Denmark. By contrast, labor productivity is very low in agriculture, where protection is far above EU levels. In financial services, productivity is 2–3 times higher than the corresponding figure in these countries; this could reflect a combination of higher productivity and monopolistic rents. The high level of labor productivity in Switzerland suggests that capacity to innovate is key to faster growth. However, shifting resources from low (e.g., agriculture) to high productivity sectors would also give productivity growth a temporary boost.

Table 10. Selected Industrial Countries: Value Added Per Employee, 1997

(In thousands of euros)

	Switzerland	Austria	Denmark	Germany
Total	58.4	45.5	48.8	46.1
Agriculture	20.1	...	39.8	23.3
Industry	59.5	46.6	49.7	49.1
Manufacturing of food products	69.9	39.2	...	37.1
Manufacturing of textiles	42.7	40.5	...	37.1
Manufacturing of clothes and wearing apparel	31.2	25.3	...	31.1
Leather and footwear	31.2	31.8	...	31.6
Wood	40.2	37.6	...	42.2
Pulp and paper	59.5	75.8	...	54.5
Publishing and printing	52.8	55.5	...	46.6
Coke and chemical industry	101.8	73.5	...	75.0
Rubber and plastic products	57.7	49.3	...	48.9
Nonmetallic mineral products	52.5	60.2	...	51.9
Basic metals	55.0	42.2	...	52.8
Fabricated metal products	51.6	42.2	...	42.5
Machinery and equipment	59.2	47.0	...	50.2
Office, electrical machinery, and computers	52.6	46.4	...	54.0
Communications equipment	57.8	58.6	...	51.0
Medical and optical instruments, watches	64.7	40.2	...	39.5
Motor vehicles	48.9	61.6	...	60.7
Other transport equipment	55.0	53.1	...	51.2
Furniture	41.1	31.2	...	36.9
Electricity, gas, steam, and distribution of water	254.4	127.0	192.4	120.1
Construction	40.0	41.4	38.9	35.4
Trade	47.3	36.0	40.0	31.9
Sale, maintenance, and repair of vehicles	41.6	...	...	32.7
Wholesale trade	71.0	...	...	48.4
Retail trade	35.2	...	...	23.2
Hotels and restaurants	27.8	20.7	30.3	15.0
Transport and communications	58.6	45.4	60.1	50.2
Financial intermediation	162.4	89.9	82.1	70.7
Banks	184.7	104.3	...	69.4
Insurance and pension funds	113.1	61.1	...	76.4
Real estate and business services	62.3	51.3	111.0	121.4
Real estate	110.4	106.4	...	624.4
Other business activities	56.9	44.4	...	65.1
Informatics	77.4	51.8	...	82.7
Research and development	48.5	43.3	...	44.9

Sources: Swiss Federal Statistical Office; Austrian Central Statistical Service; Danish Statistical Office; German Federal Statistical Office; and IMF staff estimates.

**V. WILL THE RECENT IMPROVED GROWTH BE SUSTAINED?**

**Underlying growth in Switzerland could be maintained at 2 percent in the next few years (Table 11).** Although part of the pick-up in productivity growth has been of a cyclical nature, it is reasonable to expect that the surge of investment in new technologies during the past upswing will bring about lagged productivity increases as enterprises gain experience with the new technologies. The ongoing effects of recent product market reforms—for example the liberalization of the telecommunications sector, and the removal of agricultural price supports—could also help. And productivity growth is expected to be boosted by the implementation of the bilateral agreements with the EU which, among other things, should help mitigate skill shortages that in the past few years prevented enterprises from utilizing fully the opportunities offered by ITC technologies. Overall, total factor productivity growth is expected to be maintained at just under 1 percent. At the same time, the contribution of investment is expected to remain significant, supported by a continuing decline in the user cost of capital. However, the contribution of employment to growth is expected to stay limited.

**In the longer run, growth is likely to ease unless reforms succeed in raising productivity growth.** The contribution of capital accumulation to growth is expected to peter off as the rising capital deepening will raise demands for replacement investment. Thus, maintaining the growth rate over the longer run would require an ever-rising investment rate or offsetting increases in productivity growth. Labor contribution is likely to decline as the population ages and the prospects for absorbing even more foreign workers diminishes.

Table 11. Switzerland: Factors Affecting GDP Growth  
(In percent)

	1981–90	1991–96	1997–01	Proj. 2002–06
GDP growth	2.1	0.0	2.0	2.0
Contribution of:				
Effective employment	0.6	-0.3	0.2	0.3
Capital	1.0	-0.2	0.9	0.8
Total factor productivity growth (residual)	0.5	0.5	0.9	0.9
Average labor productivity growth	1.1	0.5	1.7	1.5
Contribution of:				
Total factor productivity	0.5	0.5	0.9	0.9
Capital deepening	0.6	0.0	0.8	0.7

Sources: Federal Statistical Office; SECO; and IMF staff estimates and projections.



### Statistical Problems in Measuring GDP Growth in Switzerland

Several factors may understate growth in Switzerland, but since such factors are present also in other countries' statistics, the impact on relative growth comparisons is not clear:

- **Excluded items.** GDP estimates—based on ESA79—do not include business expenditure on software (which are treated as intermediate production rather than investment) and revenue from patents (which are treated as factor income), and account only partially for financial intermediation services (revenue from intermediation services to nonresidents are captured in the current account but intermediation services to residents are not reflected in the domestic demand components of GDP). At this stage, there are no estimates of the size of expenditure on software. However, to the extent that a significant portion of software is imported, the impact on GDP growth would be small. Net revenue from patents amounted until recently to ½ percent of GDP but fell in 1999-2000 as a result of mergers and acquisitions. The inclusion of imputed financial intermediation services in GDP could add ¼ percentage point to GDP growth.
- **Failure to fully account for “quality”.** Quality improvement has been particularly pronounced in the financial sector (where productivity is notoriously hard to measure) and branches of industry characterized by rapid technological progress. The effect of quality improvement has been exacerbated in recent years as enterprises have been intensifying their focus on niche, high profit margin sectors. Hedonic price indices or other forms of adjusting for quality changes are not used in Switzerland.
- **The trend improvement in the terms of trade.** This reflects a combination of quality improvements and changes in relative commodity prices. Abstracting from the former, Kohli (2002) estimates that the trend terms-of-trade improvement, which has been more pronounced in Switzerland than in other industrial countries, could underestimate real growth by as much as 0.6 percent of GDP, compared to 0.4 percent in Germany and 0.5 percent in France.

In addition, the lack of direct estimates of the capital stock may distort measurement of TFP. The capital stock series used in the calculations is derived from an initial estimate for 1969—based on Lüsser and Ruoss (1996)—and the cumulation of investment assuming depreciation rates of 4 percent for nonresidential structures and 20 percent for machinery and equipment but allowing also for higher depreciation in periods of enterprise restructuring as well as for ITC investments. This potentially leaves a large margin of error from not properly taking into account depreciation in connection with enterprise restructuring or changes in the quality of capital. An underestimation in capital accumulation could overstate productivity growth thereby distorting the assessment about the relative significance of capital accumulation and productivity for growth.

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