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Sweden: Selected Issues

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INTERNATIONAL MONETARY FUND

SWEDEN

Selected Issues

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Approved by Approved by European I Department

August 10, 1999

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Sweden: Basic Data

Area	449,964 square kilometers
Population (March 1998)	8.85 million
Labor force (1997 average)	4.26 million
GDP per capita (1997)	SDR 19,518
Exchange rate (February 1999)	SKr 7.95 per US$1

Social and Demographic Indicators (1990)

Life expectancy at birth	
Male: 74	
Female: 80	
Infant mortality (aged under 1) in percent of live births:	0.07
Population per physician:	398
Population per hospital bed (1989):	84.9

	1993	1994	1995	1996	1997	1998
Economic Data						
	(Annual percentage change)					
Demand and Supply (at constant prices)						
GDP	-2.2	3.3	3.9	0.9	2.2	2.9
Total domestic demand	-5.2	2.6	2.5	-0.3	0.9	3.9
Private consumption	-3.1	1.8	0.8	1.3	2.0	2.6
Public consumption	0.2	-0.7	-1.0	-1.7	-0.4	1.9
Gross fixed investment	-17.2	2.0	12.4	3.7	-4.8	9.6
Business	-13.0	18.6	27.7	4.7	-0.1	10.2
Public	6.8	11.1	-5.7	-8.0	-9.4	6.4
Housing	-32.8	-35.9	-23.5	13.1	-25.7	8.8
Imports of goods and nonfactor services	-2.5	13.2	10.2	3.7	11.7	11.0
Exports of goods and nonfactor services	7.6	14.0	12.9	6.1	12.8	7.3
Selected domestic indicators						
Unemployment rate (in percent of labor force)	8.2	8.0	7.7	8.0	8.0	6.5
Hourly labour costs (industry)	0.1	3.3	6.2	6.7	4.4	3.3
Productivity (industry) 1/	6.6	9.2	5.8	2.5	6.5	2.2
GDP deflator	2.6	2.4	3.7	1.0	1.2	0.8
Consumer prices (average)	4.6	2.2	2.5	0.5	0.5	-0.1
Broad money (M3)	4.0	0.3	2.7	11.4	1.3	2.1
Three-month interbank rate	8.5	7.6	8.8	6.0	4.4	4.4
Ten-year government bond yield	8.5	9.4	10.2	8.0	6.7	5.0

Sources: Data provided by the Swedish autorities; and staff calculations.

1/ National income data.

Sweden: Basic Data (Continued)
(In percent of GDP, unless otherwise noted)

	1993	1994	1995	1996	1997	1998	
Gross saving	11.3	14.5	17.6	17.0	17.6	18.9	
Public sector	-7.6	-7.2	-5.0	-0.1	1.2	2.8	
Private sector	18.9	21.7	22.6	17.0	16.3	16.1	
Gross investment	14.2	13.7	14.6	14.8	13.7	14.4	
Public sector	2.4	2.5	2.2	2.0	1.8	1.8	
Private sector	11.8	11.2	12.4	12.8	11.9	12.7	
Household saving rate (in percent of disposable income)	8.3	8.0	6.3	4.4	1.1	1.2	
General Government							
Financial balance	-12.3	-10.3	-7.8	-2.1	-0.7	2.2	
Local authorities	0.7	-0.2	-0.1	0.2	-0.4	-0.1	
			(Annual percentage change)				
Selected External Indicators							
Real effective exchange rate (relative normalized ULC)	-23.9	-2.9	-1.7	10.4	-5.3	-3.0	
Export volume (merchandise)	8.7	15.6	8.1	5.5	10.9	6.7	
Import volume (merchandise)	1.4	14.1	8.4	1.0	8.9	8.9	
Terms of trade (f.o.b./c.i.f.)	-3.3	0.4	4.6	-1.4	-1.0	0.5	
			(In billions of Swedish kronor)				
Balance of Payments							
Trade balance	53.3	67.1	109.1	119.1	133.1	130.9	
Exports, f.o.b.	385.9	464.6	573.5	572.0	636.4	675.9	
Imports, c.i.f.	332.6	397.6	464.5	453.0	503.4	544.9	
Invisible balance	-82.8	-61.3	-69.8	-75.5	-82.4	-92.9	
Current balance	-29.5	5.8	39.3	43.6	50.7	38.0	
(in percent of GDP)	-2.0	0.4	2.4	2.6	2.9	2.1	
Financial account	...	...	...	...	-34.9	32.5	3/
Official reserves 4/							
SDR billion	14.1	16.1	16.3	13.5	8.2	10.2	
In weeks of imports	25.0	22.9	18.3	15.4	9.0	11.2	
Net foreign assets 1/ (in percent of GDP) 4/	...	...	...	...	44.4	37.9	3/

1/ Excluding capital transfers.

2/ Change in ratio of real effective exchange rate based on manufacturing export unit values to real effective exchange rate based on unit labor costs.

3/ New definitions were adopted in October 1997 and consistent data are available only for 1997 and 1998.

4/ The decline in external reserves in 1997-98, notwithstanding current account surpluses, reflect the winding down of the Riksbank's forward contracts which had been used to boost reserves in previous years.

EXECUTIVE SUMMARY

This document presents four papers prepared by the staff for the 1999 Article IV consultations with Sweden, to provide background information on a few key issues discussed in the Staff Report.

Chapter I describes a variety of methodologies for estimating a country's potential output level and presents empirical estimates for Sweden. The paper explains why these methods produce a variety of results, some of which are more plausible than others. Excluding the less realistic estimates, it finds that the "output gap" for Sweden—actual output minus potential—appears to have been between –½ and –4½ percent of potential output in 1998. The point estimate used in the Staff Report (-2.2 percent) is close to the middle of this range.

Chapter II looks more closely at one aspect of growth in potential output: how has it been affected by the structural policy improvements of the past several years? The paper examines the pattern of output and unemployment over time to separate permanent from cyclical and other temporary changes and estimates relationships between the structural component and economic policies. It concludes that the fiscal consolidation program of the 1990s, by reducing the ratio of government spending to GDP, has temporarily raised the rate of potential output growth by an estimated 0.3 percent per annum to 2.2 percent per annum. Once the economy settles at a level in which the ratio of government expenditure to GDP is constant, and the working age population remains stable, potential output growth is projected to fall to about 1.7 percent.

Chapter III presents long-run estimates of the effects of demographic change on the projected costs of pension, disability, and medical spending through 2050. It shows that, with no change in public policy, the cost of the disability pension scheme will decline as a percentage of GDP by an estimated 1 percentage point, while the cost of public health insurance will rise by 4 percentage points. Over the same period, the reforms now being implemented in the old-age pension program are expected to ensure that the costs of that program will be covered by contributions and a limited and temporary program of transfers from the state budget. The study highlights the importance of developing contingency arrangements to deal with possible shortfalls.

Chapter IV provides background information on several aspects of recent and ongoing reforms in monetary policy and financial sector oversight. It begins by reviewing how inflation targeting works in Sweden, how monetary policy might be affected by a decision to join the European Monetary Union, and how the recent legislative changes in the Riksbank Act are expected to enhance the central bank's independence to pursue its policy strategy. It then reviews recent trends in the financial sector, focusing particularly on the steps that have been taken and are being developed to strengthen the sector and to prevent a recurrence of the early-nineties banking crisis.

I. Potential Output and the Output Gap in Sweden[1]

A. Introduction

1. This chapter presents estimates of potential output and the output gap for Sweden, in order to help identify the scope for sustainable noninflationary growth and allow an assessment of the current stance of macroeconomic policies.[2] The level of actual output relative to the potential level of output determines whether economic policy should be directed toward raising aggregate demand or whether structural issues should be given more prominence.

2. The staff's current estimate of the output gap is based on the upper end of the range of estimates developed in previous consultations in which the staff documented an output gap in the range of -½ percent to -2 percent of GDP in 1998 (this gap is consistent with a range for the long-term open unemployment rate between 5 and 7 percent, see SM/98/213 and SM/97/205). The staff has emphasized the upper end of the output gap range in this consultation in light of a companion study which reveals that the strong improvement in public finances since the early 1990s has added about 0.3 percentage points per annum to pre-existing estimates of potential output growth (Chapter II).

3. The authorities do not publish a time series of estimates for the output gap or the natural rate of unemployment, but current estimates are implicit in their projections for the unemployment rate over time and with assertions about the magnitude of remaining slack in the economy. In the spring budget, the Ministry of Finance indicated that the unemployment rate is projected to decline to about 5 percent in 2002, consistent with eliminating the output gap. Similarly, the most recent inflation report issued by the Riksbank indicated that the unemployment rate is judged to be under 5 percent in 2001 when unutilized resources in the economy would be gradually eliminated. The base medium-term scenario of the National Institute of Economic Research also presents an unemployment rate of about 5 percent.

4. Aside from the official assumptions, very little prior research has been done on Sweden's output gap. Exceptions are papers by Apel, Hanssen, and Lindberg (1996) and Apel and Jansson (1997) which estimated output gaps for Sweden through 1996. The former use an HP filter, production function, and unobserved components approach and find output gaps ranging from about -½ percent to -2½ percent in 1996. The latter use a system unobserved components approach and find output gaps ranging from roughly -3 to -8 in 1996 depending on the measure of inflation and the equation specification used in the estimation. (These methodologies are described below.) In addition to these in-country analyses, a recent

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[1]Prepared by Valerie Cerra and Sweta Saxena.

[2] The output gap is defined as actual output minus potential output relative to potential output, $(y-y^*)/y^*$, in percent.

issued paper by the European Commission (May 1999) compares output gaps for European countries through 1998 using an HP filter and other trend estimation methods (band pass filter, linear time trend, and production function). Results from these trend estimation methods indicate that the output gap in Sweden was nearly closed in 1998, except that the production function method shows an output gap of about -1 percent (+1 percent when including a trend break).

5. The definition and estimation of the trend and cyclical components of output raise a number of theoretical and empirical questions, which reflect the ongoing controversy over the origins of economic fluctuations. As potential output is an unobserved variable, a number of statistical and economic approaches have been developed to estimate it and the corresponding output gap. Since such measures are known to be fairly uncertain, this chapter presents estimates derived from different techniques, highlighting the sensitivity of the results to alternative methodologies.

6. The chapter is organized as follows. Section B briefly describes alternative methods for estimating potential output and the output gap and related determinants of potential output, such as the non-accelerating inflation rate of unemployment (NAIRU). Section C presents the estimates obtained for Sweden. Section D summarizes the main findings.

B. Approaches to Estimating Potential Output and the Output Gap

7. There are two basic methodologies for estimating potential output: statistical detrending and estimation of structural relationships. The former attempt to separate a time series into permanent and cyclical components; the latter attempt to isolate the effects of structural and cyclical influences on output, using economic theory. The set of statistical methods discussed here include the HP filter, Beveridge-Nelson, and various unobserved components methods (univariate, bivariate, and common permanent and cyclical components). Methods that use economic theory to identify the output gap include the structural VAR, production function, demand-side model, and multivariate system models.

The Hodrick-Prescott filter

8. The Hodrick-Prescott (HP) filter is a simple smoothing procedure that has become increasingly popular because of its flexibility in tracking the characteristics of the fluctuations in trend output. Trend output (denoted by y^*) derived using the HP filter is obtained by minimizing a combination of the gap between actual output (y) and trend output and the rate of change in trend output for the whole sample of observations (T):

$$\text{Min} \sum_{t=0}^{T}(y_t - y_t^*)^2 + \lambda \sum_{t=2}^{T-1}\left[(y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*)\right]^2, \qquad (1)$$

where λ determines the degree of smoothness of the trend.

9. The properties and shortcomings of the HP filter have been well documented (Harvey and Jaeger, 1993). A major drawback comes from the difficulty in identifying the appropriate detrending parameter λ—which is generally overlooked by using arbitrary values popularized by the real business cycle literature. Mechanical detrending based on the HP filter can lead to spurious cyclicality with integrated or nearly integrated time series and an excessive smoothing of structural breaks. A second important flaw of the HP filter arises from its high end-sample biases, which reflect the symmetric trending objective of the method across the whole sample and the different constraints that apply within the sample and at its edges. This flaw is particularly severe when the focus of attention is directed at the most recent observations in the sample in an effort to draw conclusions for policy implementation and make projections for the immediate future.

The unobserved components methods

10. The unobserved components method is an approach to estimating unobserved variables such as potential output and the NAIRU using information from observed variables. This approach has the advantage that explicit relationships can be specified between output, unemployment, and inflation. The unobserved series are then estimated through an iterative process (the Kalman filter) that uses guesses for the unobserved variables to create predictions for the observed variables and then updates the guesses based on the prediction errors.[3] The approach has the disadvantage of requiring considerable programming. In addition, results are often sensitive to the initial guesses for the parameters.

Beveridge-Nelson decomposition

11. A Beveridge-Nelson decomposition is a detrending method using unobserved components. Output is assumed to contain unobserved permanent and temporary components consisting of a random walk with drift and a stationary autoregressive process, respectively.

12. Consider an ARMA(p,q) model for the changes in output:

$$\phi(L)\Delta y_t = c + \theta(L)\varepsilon_t, \quad \varepsilon_t \sim iid(0,\sigma^2), \text{ where} \tag{2}$$

$$\phi(L) = 1 - \phi_1 L - \phi_2 L^2 - \ldots - \phi_p L^p \tag{3}$$

$$\theta(L) = 1 + \theta_1 L + \theta_2 L^2 + \ldots + \theta_p L^p \tag{4}$$

[3] Refer to Kim and Nelson (1998) for the technical details of the Kalman filter.

and where $|\varphi| < 1$ and $|\theta| < 1$. The ARMA model can be written in its moving average representation (Wold form) as:

$$\Delta y_t = \mu + \Psi(L)\varepsilon_t \quad \text{where} \quad \Psi(L) = \phi(L)^{-1}\theta(L) = \sum_{j=0}^{\infty} \psi_j L^j . \tag{5}$$

13. The Beveridge-Nelson decomposition is given by:

$$y_t = y_0 + \delta t + \Psi(1)\sum_{j=1}^{t} \varepsilon_j + \tilde{\varepsilon}_t \tag{6}$$

where $\tilde{\varepsilon}_t = \Psi(L)\varepsilon_t, \quad \Psi(L) = \sum_{k=0}^{\infty} \psi_k L^k, \quad \psi_k = -\sum_{j=k+1}^{\infty} \psi_j .$

where $TD_t = y_0 + \delta t$ = deterministic trend

$$TS_t = \sum_{j=1}^{t} \varepsilon_j = \text{stochastic trend} \tag{7}$$

$$C_t = \tilde{\varepsilon}_t = \text{temporary or cyclical component} \tag{8}$$

14. To proceed with the decomposition, an ARMA(p,q) is estimated on the changes in output. Various ARMA models are estimated up to an ARMA (2,2) and the Schwarz criterion is used to select the best model. Then the series is decomposed into stationary and trend components using the BN decomposition technique described above.

Univariate unobserved components model

15. Unlike the Beveridge-Nelson decomposition, the UC model decomposes the series y_t into two independent components: a stochastic trend component, y_{1t} and a cyclical component, y_{2t}. That is, whereas shocks to the two components are perfectly correlated in the BN decomposition, the shocks are uncorrelated in the univariate unobserved model.

$$y_t = y_{1t} + y_{2t} \tag{9}$$

$$y_{1t} = \delta + y_{1,t-1} + e_{1t} \tag{10}$$

$$y_{2t} = \phi_1 y_{2,t-1} + \phi_2 y_{2,t-2} + e_{2t} \tag{11}$$

$e_{it} \sim i.i.d.N(0,\sigma_i^2), \; i = 1,2, \; E[e_{1t}e_{2t}] = 0$ *for all t and s*

where the roots of $(1-\phi_1 L-\phi_2 L^2)=0$ lie outside the unit circle. Taking both y_{1t} and y_{2t} as unobserved state variables, this model could be written in the state-space form as follows:

$$y_t = [1 \;\; 1 \;\; 0]\begin{bmatrix} y_{1t} \\ y_{2t} \\ y_{2,t-1} \end{bmatrix} \tag{12}$$

$$\begin{bmatrix} y_{1t} \\ y_{2t} \\ y_{2,t-1} \end{bmatrix} = \begin{bmatrix} \delta \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 \\ 0 & \phi_1 & \phi_2 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \\ y_{2,t-2} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2,t} \\ 0 \end{bmatrix} \tag{13}$$

Once a dynamic time series model is written in a state-space form, the unobserved state vector can be estimated using a Kalman filter.

Bivariate unobserved components model

16. Through a bivariate unobserved components model, definitions of potential output, the NAIRU, and the inflation rate can be explicitly incorporated in the decomposition and can be simultaneously estimated. Following Clarke (1989), the cyclical movement in output is measured using a bivariate unobserved components model, where output and unemployment (or alternatively inflation) each have their own trend components, but the cyclical component is common to the two series. Assume that output, y_t, contains a stochastic trend, n_t, and a stationary cyclical component, x_t. The unemployment rate, z_t, has a trend component, L_t and a stationary component, C_t. The model is:

$$y_t = n_t + x_t \tag{14}$$

$$n_t = \delta + n_{t-1} + v_t, \quad v_t \sim i.i.d.N(0,\sigma_v^2) \tag{15}$$

$$x_t = \phi_1 x_{t-1} + \phi_2 x_{t-2} + e_t, \quad e_t \sim i.i.d.N(0,\sigma_e^2) \tag{16}$$

$$z_t = L_t + C_t \tag{17}$$

$$L_t = L_{t-1} + v_{lt}, \quad v_{lt} \sim i.i.d.N.(0,\sigma_{vl}^2) \tag{18}$$

$$C_t = \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + e_{ct}, \quad e_{ct} \sim i.i.d.N(0,\sigma_{ec}^2) \tag{19}$$

17. All errors are white noise. The cyclical component of unemployment, C_t, is assumed to be a function of the current and past transitory components of output.

18. Treating all the variables in the above model as unobserved, the model could be represented in the state-space form as follows:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & \alpha_0 & \alpha_1 & \alpha_2 & 1 \end{bmatrix} \begin{bmatrix} n_t \\ x_t \\ x_{t-1} \\ x_{t-2} \\ L_t \end{bmatrix} + \begin{bmatrix} 0 \\ e_{ct} \end{bmatrix} \tag{20}$$

$$\begin{bmatrix} n_t \\ x_t \\ x_{t-1} \\ x_{t-2} \\ L_t \end{bmatrix} = \begin{bmatrix} \delta \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & \phi_1 & \phi_2 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} n_{t-1} \\ x_{t-1} \\ x_{t-2} \\ x_{t-3} \\ L_{t-1} \end{bmatrix} + \begin{bmatrix} v_t \\ e_t \\ 0 \\ 0 \\ v_{lt} \end{bmatrix} \tag{21}$$

19. This model is then estimated using a Kalman filter.

20. One advantage of using the inflation rate is the closer linkage of the constructed output gap to its definition based on stable inflation. Cyclically high rates of inflation would be correlated with the cyclical component of output through the component x_t.

Common permanent and temporary components

21. The idea that economic times series have common components dates back to the landmark study of Burns and Mitchell (1946) which found that the business cycle is characterized by simultaneous comovement in many economic activities. A generalization of the above bivariate unobserved (cyclical) component model would include both common permanent and common cyclical factors. Examples of specifications using common permanent factors abound in the business cycle literature following the econometric formalization of the idea by Stock and Watson (1989, 1991, 1993). The focus on permanent components of output followed from the strand of empirical literature which provided evidence that output follows a stochastic trend. Such evidence implies that shocks to growth persist and therefore a recession permanently reduces output. An additional implication of the stochastic trend view is that since there is no temporary component to recessions and expansions, the output gap cannot be defined. However, a series of recent papers challenges the view that changes in output are permanent (Wynne and Balke (1992), Beaudry and Koop (1993), and Sichel (1994)). This recent evidence points to a strong recovery phase following a recession, an idea explicit in Friedman's (1964, 1993) "plucking" model of the business cycle, whereby output is plucked down from its trend growth during recessions (as in the path of a string attached to the underside of a board) and then springs back to the upper limit set by resource constraints. This section takes an agnostic approach to the debate by permitting both temporary and permanent factors.

22. Formally, each individual time series Y_{it} (in logs), for i=1,..., N, consists of a deterministic time trend DT_{it}, a stochastic permanent component with a unit root P_{it}, and a transitory component T_{it}. Each series can be written as:

$$Y_{it} = DT_{it} + P_{it} + T_{it} \tag{22}$$

$$DT_{it} = a_i + D_i t \tag{23}$$

$$P_{it} = \gamma_i C_t + \zeta_{it} \tag{24}$$

$$T_{it} = \lambda_i x_t + \omega_{it} \tag{25}$$

where C_t and x_t are the common permanent and common transitory components, respectively; ζ_{it} and ω_{it} are the idiosyncratic permanent and transitory components, respectively. The γ_i terms are permanent factor loadings, and indicate the extent to which each series is affected by the common permanent component, C_t. Similarly, the transitory factor loadings, λ_i, indicate the extent to which each series is affected by the common transitory component, x_t.

23. Taking first differences, the model can be written in deviations from means:

$$\Delta y_{it} = \gamma_i \Delta c_t + \lambda_i \Delta x_t + z_{it} \tag{26}$$

where $\Delta y_{it} = \Delta Y_{it} - \Delta \overline{Y}_i$, $\Delta c_t = \Delta C_t - \phi(1)^{-1}\delta$, and $z_{it} = \Delta\zeta_{it} + \Delta\omega_{it}$.

$$\phi(L)\Delta c_t = v_t, v_t \sim iid\ N(0,1) \tag{27}$$

$$\phi^*(L)x_t = u_t, u_t \sim iid\ N(0,1) \tag{28}$$

Equations (27) and (28) describe the dynamics of the permanent and transitory components, respectively.

Common permanent and temporary components with asymmetric growth rates

24. The other regularity of the business cycle documented by Mitchell (1927) is asymmetry—the idea that expansions are fundamentally different from recessions in their duration and in the abruptness of changes in growth: "Business contraction seems to be a briefer and more violent process than business expansion." Therefore, an extension of the model above permits asymmetry in the growth rates. Asymmetry is obtained by specifying regime switching in the common permanent component, as proposed by Hamilton (1989), or

regime switching in the common temporary component, as advocated by Kim and Nelson (1999).

25. Formally, the above model can be altered as follows.

$$\phi(L)\Delta c_t = \mu_{S_{1t}} + v_t \,,\; v_t \sim iid\; N(0,1) \tag{29}$$

$$\mu_{S_{1t}} = \mu_0 + \mu_1 S_{1t} \,,\; S_{1t} = \{0,1\} \tag{30}$$

$$\Pr[S_{1t} = 0 \mid S_{1,t-1} = 0] = q_1, \;\; \Pr[S_{1t} = 1 \mid S_{1,t-1} = 1] = p_1 . \tag{31}$$

26. S_{1t} is a latent Markov-switching state variable that switches between 0 and 1 with transition probabilities given by equation (31). The common permanent component, c_t, grows at rate $\phi(1)^{-1}(\mu_0)$ when $S_{1t} = 0$, and at rate $\phi(1)^{-1}(\mu_0 + \mu_1)$ when $S_{1t} = 1$.

$$\phi^*(L)x_t = \tau_{S_{2t}} + u_t \,,\; \mathrm{u}_t \sim iid\; N(0,1) \tag{32}$$

$$\tau_{S_{2t}} = \tau S_{2t} \,,\; S_{2t} = \{0,1\} \tag{33}$$

$$\Pr[S_{2t} = 0 \mid S_{2,t-1} = 0] = q_2, \;\; \Pr[S_{2t} = 1 \mid S_{2,t-1} = 1] = p_2 . \tag{34}$$

27. S_{2t} is a latent Markov-switching state variable, independent of S_{1t}, whose transitions are governed by the probabilities in equation (34). The term, τ, is the size of the 'pluck'. If $\tau < 0$, then the transitory component is plucked down during a recession. Following the pluck then there is a tendency for output to revert to its previous peak.

28. The idiosyncratic components of each series have the following autoregressive structure:

$$\psi_i(L)z_{it} = e_{it} \,,\; e_{it} \sim iid\; N(0,\sigma_i^2) . \tag{35}$$

29. The innovation variances of the common components have been normalized to unity to identify the model; all innovations are assumed to be mutually and serially uncorrelated at all leads and lags; and the roots of $\phi(L) = 0$, $\phi^*(L) = 0$, and $\psi_i(L) = 0$ lie outside the unit circle.

30. The common growth component, Δc_t, and the common transitory component, x_t, can be governed by one state variable S_{1t} or two different state variables, S_{1t} and S_{2t}. The latter relaxes the assumption that all recessions are alike by permitting different episodes to be based on temporary or permanent causes.

The structural VAR approach by Blanchard and Quah (1989)

31. This method stems from the traditional Keynesian and neoclassical synthesis, which identifies potential output with the aggregate supply capacity of the economy and cyclical fluctuations with changes in aggregate demand. Based on a vector autoregression (VAR) for output growth and unemployment, Blanchard and Quah (1989) identify structural supply and demand disturbances by assuming that the former have a permanent impact on output, while the latter can have only temporary effects on it.[4] The analysis can be extended to include temporary nominal shocks by including a price variable that is affected by nominal shocks in the short and long runs. A similar approach has been used by Clarida and Gali (1994) to estimate the effects of supply, demand, and nominal shocks on relative output, the real exchange rate, and the price level of the home country relative to its trading partners.

32. Formally, the method, as applied to the Clarida and Gali model, expresses the log of relative output, the log of the real exchange rate and the log of relative CPIs as a vector in first differences (assuming that both variables are difference stationary):

$$\Delta x_t = [\Delta y_t - \Delta y_t^*, \Delta RER_t, \Delta p_t - \Delta p_t^*] \qquad (36)$$

The vector has a moving-average structural representation given by:

$$\Delta X_t = C(L)\,\varepsilon_t \qquad (37)$$

where L is the lag operator and $\varepsilon_t = [\varepsilon_s, \varepsilon_d, \varepsilon_n]$ is a vector of exogenous, unobserved structural shocks; ε_s is the aggregate supply shock, ε_d is the aggregate demand shock and ε_n is the aggregate nominal shock. The errors are serially uncorrelated and have a variance-covariance matrix normalized to the identity matrix. Since the vector of structural shocks is not observed directly, the trick is to recover ε_t by estimating an unrestricted VAR, which can be inverted to yield the moving-average representation:

$$\Delta X_t = A(L)\,u_t \qquad (38)$$

The first matrix in the polynomial A(L) is the identity matrix and u_t is a vector of reduced form residuals with the covariance matrix Σ.

33. Equations 37 and 38 imply a linear relationship between the reduced form residuals and the shocks of the structural model:

$$u_t = C_0\,\varepsilon_t \qquad (39)$$

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[4]Extensions of the method and other types of identification can be found in King et al. (1991) and Bayoumi and Eichengreen (1992).

34. It is necessary to identify the 3x3 matrix C_0 to be able to recover the vector of structural shocks ε_t from the estimated disturbance vector u_t. The symmetric matrix $\Sigma = C_0C_0'$ imposes six of the nine restrictions that are required, and therefore we need only three more identifying restrictions. Blanchard and Quah (1989) suggest that we can use economic theory to impose these restrictions. Economic theory has a number of implications regarding the long-run behavior of variables in response to shocks and therefore imposing these long-run restrictions allows us to properly identify the shocks.

35. The long-run representation of equation (37) can be written as

$$\begin{bmatrix} \Delta Y \\ \Delta RER \\ \Delta CPI \end{bmatrix} = \begin{bmatrix} C_{11}(1) & C_{12}(1) & C_{13}(1) \\ C_{21}(1) & C_{22}(1) & C_{23}(1) \\ C_{31}(1) & C_{32}(1) & C_{33}(1) \end{bmatrix} \begin{bmatrix} \varepsilon_s \\ \varepsilon_d \\ \varepsilon_n \end{bmatrix} \tag{40}$$

where $C(1) = C_0 + C_1 + \ldots$ is the long-run effect of ε_t on ΔX.

36. Using Clarida and Gali's (1994) identifying assumptions, the long-run restrictions imposed on the model are $C_{12}=0$, $C_{13}=0$, and $C_{23}=0$. These restrictions make the matrix C(1) upper triangular and we can use this fact to recover C_0. The restrictions imply that in the long-run, output is affected only by supply shocks. The nominal shock can be distinguished from demand shocks by the fact that only the latter impacts the real exchange rate in the long run. Nominal shocks have permanent effects only on the price level.

37. The residuals from the unrestricted VAR and the estimated parameters of C_0 can be used to construct the vector of exogenous structural shocks. Since potential output corresponds to the permanent component of output in the system, the equation for the change in potential output can be derived using the vector of supply shocks:

$$\Delta Y_t = \mu_y + C_{11}(L)\varepsilon_s \tag{41}$$

where μ_y is the (previously ignored) linear trend in output.

38. Compared with other multivariate detrending techniques, this method relies on clear theoretical foundations and does not impose undue restrictions on the short-run dynamics of the permanent component of output. In particular, the estimated potential output is allowed to differ from a strict random walk (Dupasquier et al., 1997).[5] In addition, the output gap estimates derived by this method are not subject to any end-sample biases. One obvious drawback of this approach is that the identification chosen may not be appropriate in all

[5] Potential output can be described as following a random walk if production inputs evolve as a stochastic trend, for example, if productivity growth depends on the stochastic arrival of new technologies.

circumstances. This is true when changes in the real exchange rate (in the Clarida and Gali model) or the unemployment rate (in the Blanchard-Quah model) do not provide good indications of cyclical developments in output. Standard deviations of the output gap estimates also suggest that these measures are particularly uncertain.[6]

39. This approach is also limited by its ability to identify at most only as many types of shocks as there are variables. Moreover, the model of Clarida and Gali assumes that the orthogonally constructed exogenous innovations correspond to pure uncorrelated supply, demand and nominal shocks. However, economic theory could identify many types of shocks with varying supply, demand or nominal characteristics. For example, a technological advancement identified as a supply shock may simultaneously increase demand owing to wealth or demonstration effects. An increase in government spending on productive infrastructure is associated with a demand shock, but would likely also have long-run supply-side effects. As a consequence, it is often difficult to relate the composite pure shocks to specific economic variables. Economic theory can also have divergent implications for the effects of shocks on economic variables. The theoretical foundation for the identification of shocks in the Clarida Gali analysis stems from the Mundell-Fleming model. According to this model, a positive demand shock leads to an appreciated exchange rate in the long run. However, in models with traded and nontraded sectors, the long-run effect of a demand shock (from say higher government spending) on the real exchange rate depends on which sector spending is directed toward. As a result of these identification problems, the structural VAR may not produce results that appropriately correspond to the assumptions.

The production function approach

40. In its simplest form, this approach postulates a simple two-factor Cobb-Douglas production function for the business sector (Giorno et al., 1995):

$$Ln(Y) = c + \alpha Ln(L) + (1-\alpha)Ln(K) + tfp + e \qquad (42)$$

where Y, L, and K are the value added, employment, and capital stock of the business sector, respectively; *tfp*, the trend total factor productivity (in log form); c, a constant; and e, the residual.

41. With parameter α approximated by labor's share in value added, the contributions of labor and capital to output can be computed and subtracted from the value added of the business sector (in log form). The trend total factor productivity is then derived by smoothing the residuals of the equation.

42. Potential output for the business sector is then computed as:

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[6]See Staiger et al. (1997) for a discussion of estimates of the NAIRU.

$$\text{Ln}(Y^*) = c + \alpha\,\text{Ln}(L^*) + (1-\alpha)\,\text{Ln}(K) + tfp, \quad (43)$$

where L^* is the trend labor input of the business sector calculated as:

$$L^* = P_{wa}\ \ Part^*(1 - NAIRU) - EG, \quad (44)$$

with the trend labor force constructed as the product of P_{wa} (the working age population) and $Part^*$ (the trend participation rate). EG is employment in the government sector. Potential output for the whole economy is then computed by assuming that output of the government sector—measured by the government wage bill—is always at its potential.

43. Compared with other methods, the production function approach can provide useful information on the determinants of potential growth. This approach relies, however, on an overly simplistic representation of the production technology, and the estimates of potential output and the output gap are crucially dependent on the NAIRU estimates and sensitive to the detrending techniques used for smoothing the components of the factor inputs. Problems of trend elimination for GDP is shifted to the trend estimates of the inputs. For example, the estimates from the production function approach share the end-sample biases that affect the underlying detrending techniques that are used for labor, capital, and productivity. These estimates may also be affected by measurement errors in factor inputs, particularly in the capital stock.

Demand-side model

44. Bayoumi (1999) proposes estimating the output gap directly from measures of slack in the economy such as the unemployment rate, the ratio of job seekers to job offers, and capacity utilization. The output gap is the fitted value from these measures in a regression that includes a polynomial time trend. This construction assumes that these measures of slack are contemporaneous with the cycle. However, since unemployment, for example, consists of both structural and cyclical components, this method overestimates the output gap unless the structural components of the slack variables are first removed from the totals.

System estimates of potential output and the NAIRU

45. System methods specify relationships between output, unemployment, and inflation on the basis of economic relationships suggested by theory. Adams and Coe (1990) jointly estimate potential output and the natural rate of unemployment based on a system of simultaneous equations for output, unemployment, inflation, and wages. They first estimate single equation preliminary specifications. Later the system is estimated using three-stage least squares where trend output and productivity used in the preliminary equations are replaced by potential output and productivity derived from a production function. The natural rate of unemployment is incorporated in the wage equation and is consistent with the measure of potential output.

46. An alternative approach is to use an unobserved components model which simultaneously constructs the unobserved variables of potential output and the NAIRU. The estimated levels of these variables can be explicitly linked to their definitions of the level of output and the level of unemployment in which inflation is stable. The unobserved components models described above are examples of this approach with output, unemployment, and inflation having a common cycle and/or common stochastic trend. Kuttner (1994) specifies a bivariate model with output and inflation similar to that above linking output and inflation through a Phillips curve. The deviation of output from its potential is related to inflation through a common cycle. Apel and Jansson (1997) specify a more general model that jointly estimates potential output and the NAIRU using the Phillips curve relationship and Okun's Law, and also includes exogenous determinants of inflation. The system can be represented by the measurement equation linking output, unemployment, and changes in inflation to potential output, NAIRU, and a cycle and other exogenous variables:

$$\begin{bmatrix} y_t \\ u_t \\ \Delta\pi_t \end{bmatrix} = \begin{bmatrix} 1 & 0 & \phi & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & \eta & 0 \end{bmatrix} \begin{bmatrix} y_t^P \\ u_t^N \\ u_t - u_t^N \\ u_{t-1} - u_{t-1}^N \end{bmatrix} + \mathrm{A}\,\mathrm{Z}_t + \begin{bmatrix} e_t^{ol} \\ 0 \\ e_t^{pc} \end{bmatrix} \tag{45}$$

47. The first equation in the system represents Okun's Law. Actual GDP consists of potential GDP and a cyclical component that depends on the deviation of unemployment from the natural rate. Viewed in terms of a production function approach, this assumes that labor participation, productivity and the capital stock are at their trend levels. The third equation is the Phillips curve. Changes in inflation depend on the demand-side determinants that affect the deviation of unemployment from NAIRU and supply-side shocks (Z). The unobserved series evolve according to the transition equation:

$$\begin{bmatrix} y_t^P \\ u_t^N \\ u_t - u_t^N \\ u_{t-1} - u_{t-1}^N \end{bmatrix} = \begin{bmatrix} \delta \\ 0 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \lambda_1 & \lambda_2 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} y_{t-1}^P \\ u_{t-1}^N \\ u_{t-1} - u_{t-1}^N \\ u_{t-2} - u_{t-2}^N \end{bmatrix} + \begin{bmatrix} e_t^{yp} \\ e_t^n \\ e_t^c \\ 0 \end{bmatrix} \tag{46}$$

48. Potential output and the NAIRU follow random walks, while the cycle is modeled as a second order autoregressive process.

C. Empirical Estimates of Potential Output and the Output Gap

49. The estimations, except for the HP filter and the production function approach, use seasonally adjusted quarterly data on GDP and other variables as required, including inflation and unemployment. The sources for data are the International Financial Statistics, OECD, and the national authorities. The HP filter was implemented on a series of annual

observations in order to enlarge the sample with medium-term staff projections from the World Economic Outlook (WEO), so that end-point biases for the most recent years would be minimized. The production function approach also used annual data to maintain consistency with the estimations of Chapter II.

HP filter

50. WEO projections assume growth rates of 2.8 percent in 1999, 2.9 percent in 2000, 3 percent in 2001, 2.5 percent in 2002, leveling off to 2.2 percent in 2003–4. Using the standard value of the smoothing parameter for annual observations, 100, the output gap was estimated at –0.6 percent in 1998 (Table 1). Potential output grew by 2.1 percent from 1997 to 1998 and is projected to grow by 2.3 percent in 1999. However, as Figure 1 illustrates, estimates of the output gap vary depending on the choice of the smoothing parameter, λ. Higher values of λ attach greater weight to smoothing rates of change in the trend and therefore produce smaller (larger) fluctuations in estimates of potential growth (output gaps). This happens because the HP filter retains cycles above a certain frequency and eliminates those below that frequency (European Commission 1999). Accordingly, at lower values of λ, the cycles in potential growth for Sweden are implausibly volatile, implying a change in potential growth from around 1.2 percent in 1992 to 2.5 by the end of the projection period in 2004.

Simple unobserved components methods

51. The Beveridge-Nelson (BN) decomposition resulted in estimates for potential output which tracked actual movements in output very closely.[7] This result implies that nearly all of output movements can be interpreted as permanent, structural changes. The reason for this result may stem from the long swing in output over the 1990s. Since several years passed before the depressed growth rates of output reversed, the estimated autoregressive coefficients may not be able to capture the long lag structure in output cycles over this estimation period. Moreover, as Park (1996) points out in the comparison of different detrending methods, trends from an HP filter are smoother (and cycles more volatile) than from the BN filter, which includes a unit-root component. Indeed, it has been shown that the HP filter creates artificial cycles if the actual data contains a near unit root. Moreover, a series of BN decompositions shown in Park produce trend components which are similarly close to the actual data.

52. A comparable result was obtained using the univariate unobserved component method and the bivariate unobserved component method with inflation as the second series. However, the bivariate unobserved component method with unemployment generated a much smoother series for potential GDP (Figure 2). Accordingly to the latter method, the output gap—at a sample low in 1993—was closed in 1998.

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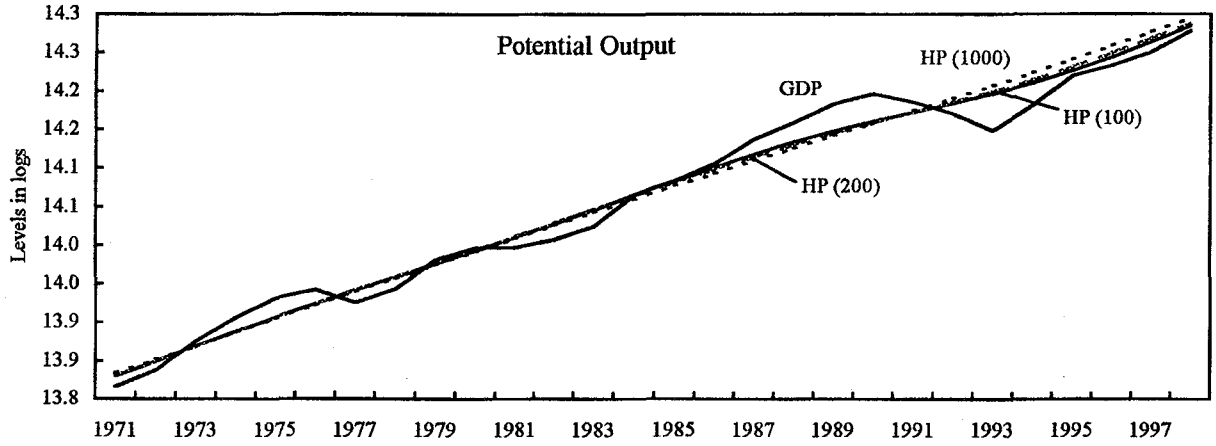
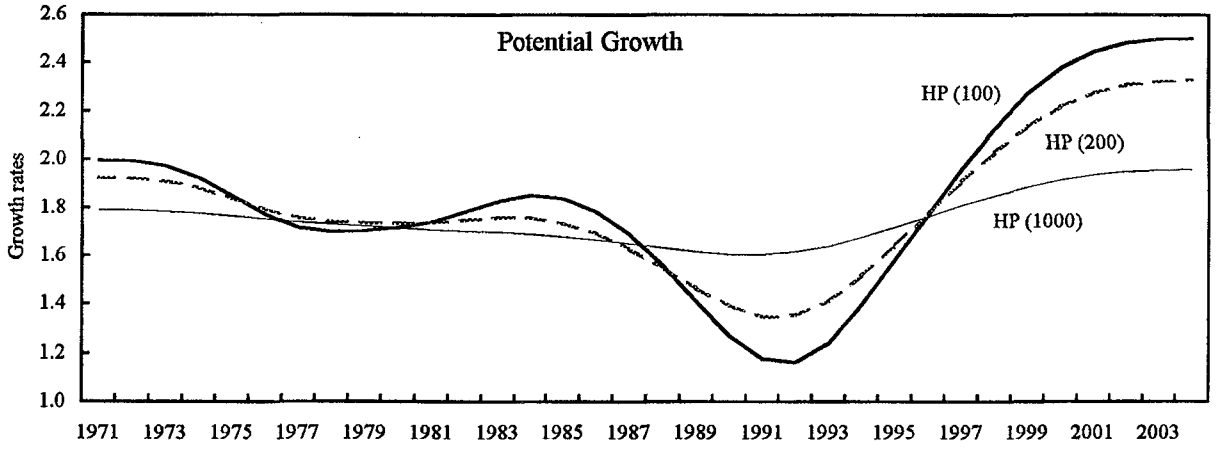
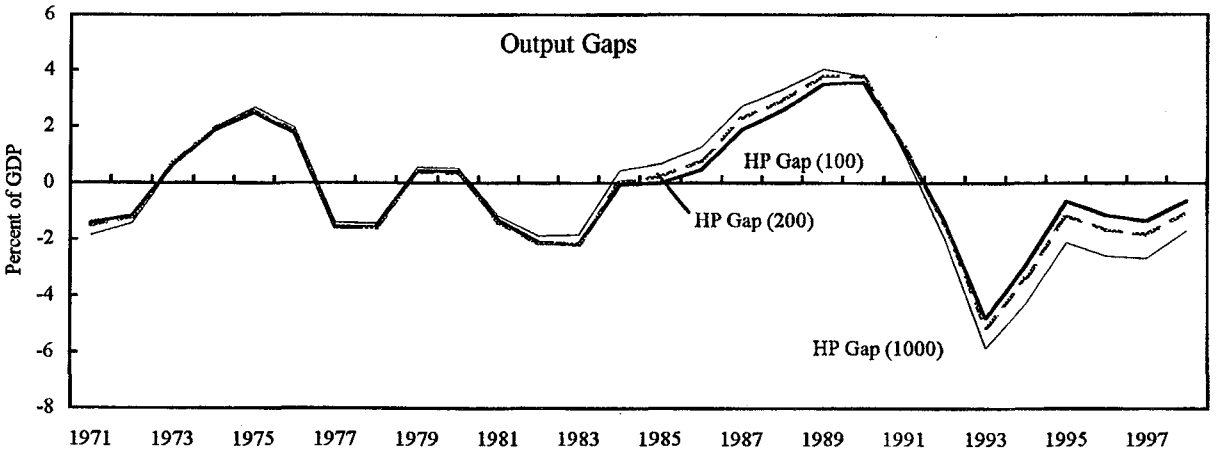
[7] An ARMA(2,2) was found to be the best model based on the Schwarz criterion.

Figure I-1. Sweden: Potential Output, Growth, and Output Gaps
HP Filter with Smoothing Parameters 100, 200, and 1000

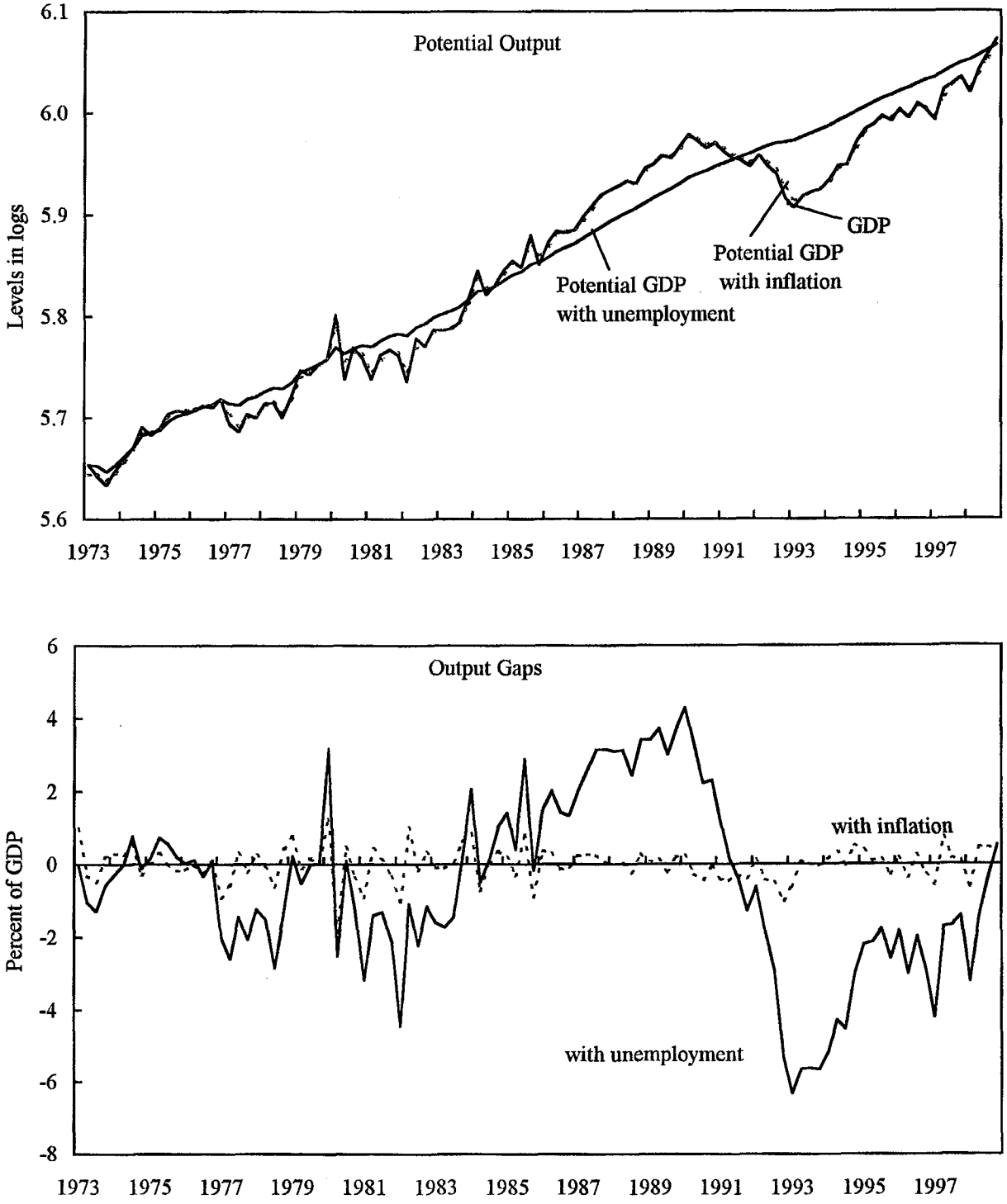






Source: Staff estimates.

Figure I-2. Sweden: Potential Output and Output Gaps
Bivariate Unobserved Components Models with Unemployment or Inflation



Source: Staff estimates.

Common permanent and cyclical components with asymmetric growth rates

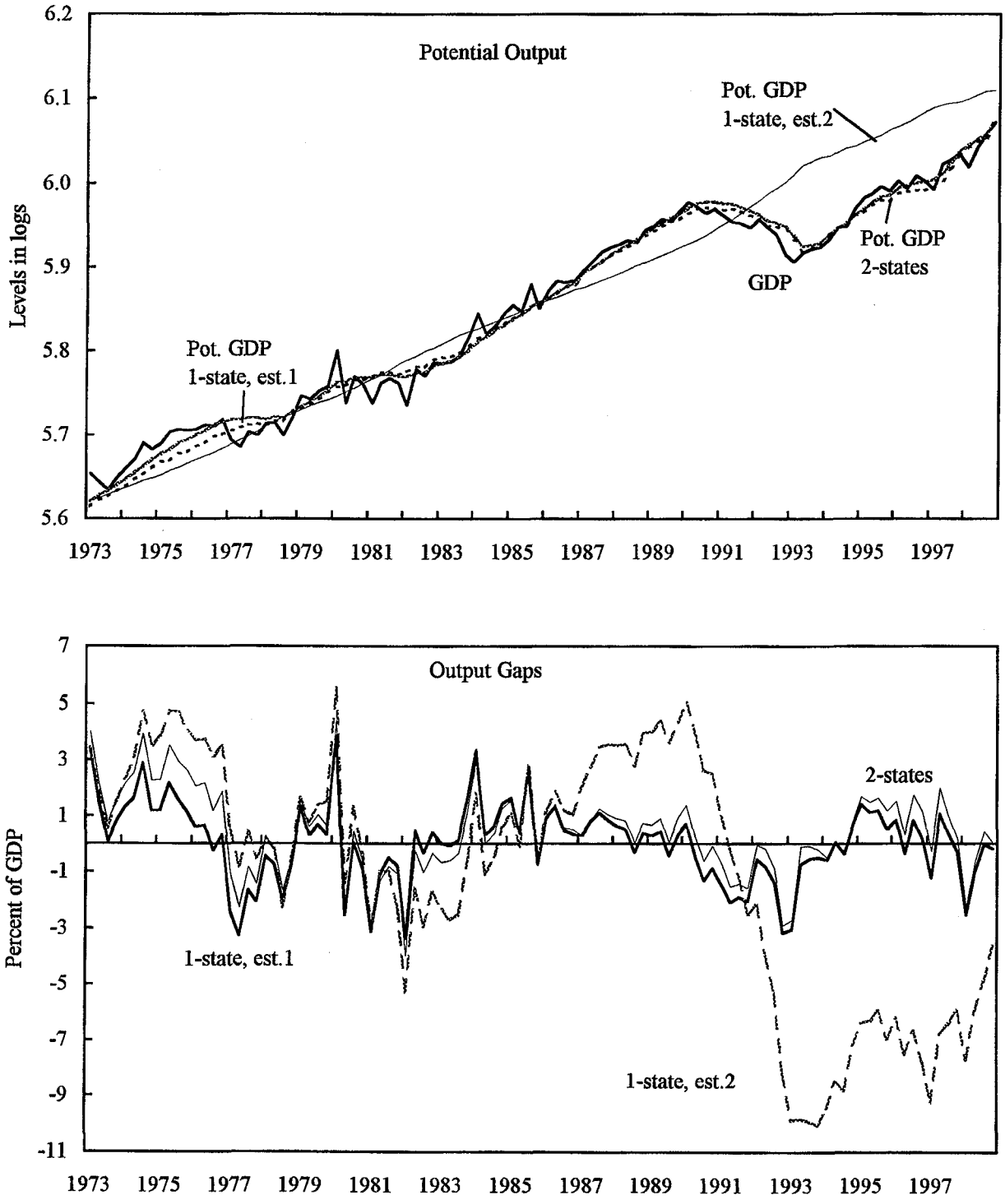
53. Most results from the unobserved components models with common permanent and transitory factors are similar to the univariate case. Deviations of potential output from actual are small. However, the result is sensitive to the initial guesses provided for the parameters (Figure 3). For the model using common permanent and temporary components with asymmetry governed by a single unobserved state variable, two local maxima were produced with close likelihood ratios. The resulting series from one set of parameter estimates was nearly a linear trend, while the other series tracked actual output. These results underscore the uncertainty in the estimates of potential output. The model with two unobserved states, each controlling a different component, led to an estimated output gap of -0.6 percent.

54. The latter model relies on separate permanent and temporary state dependent switching in the average growth rate of output. This two-state model permits a characterization of historical recessions as leading to permanent versus temporary output losses. According to results from this model, recessions prior to 1993 could be attributed to a reduction in the temporary component of output growth, implying a reversion to trend (Figure 4). On the other hand, the results indicate that the output loss due to the recession in 1993 was mainly permanent. This lends support to the view that structural changes occurred in the early 1990s (Chapter II). There is also clear evidence that the business cycle is asymmetric—expansions are more persistent than recessions. According to the estimates, the temporary component of output expands for about 10½ quarters on average but contracts for only 1¼ quarter. Likewise, the permanent component of output expands for about 23 years on average, but contracts for about 2¼ years.

Structural VAR

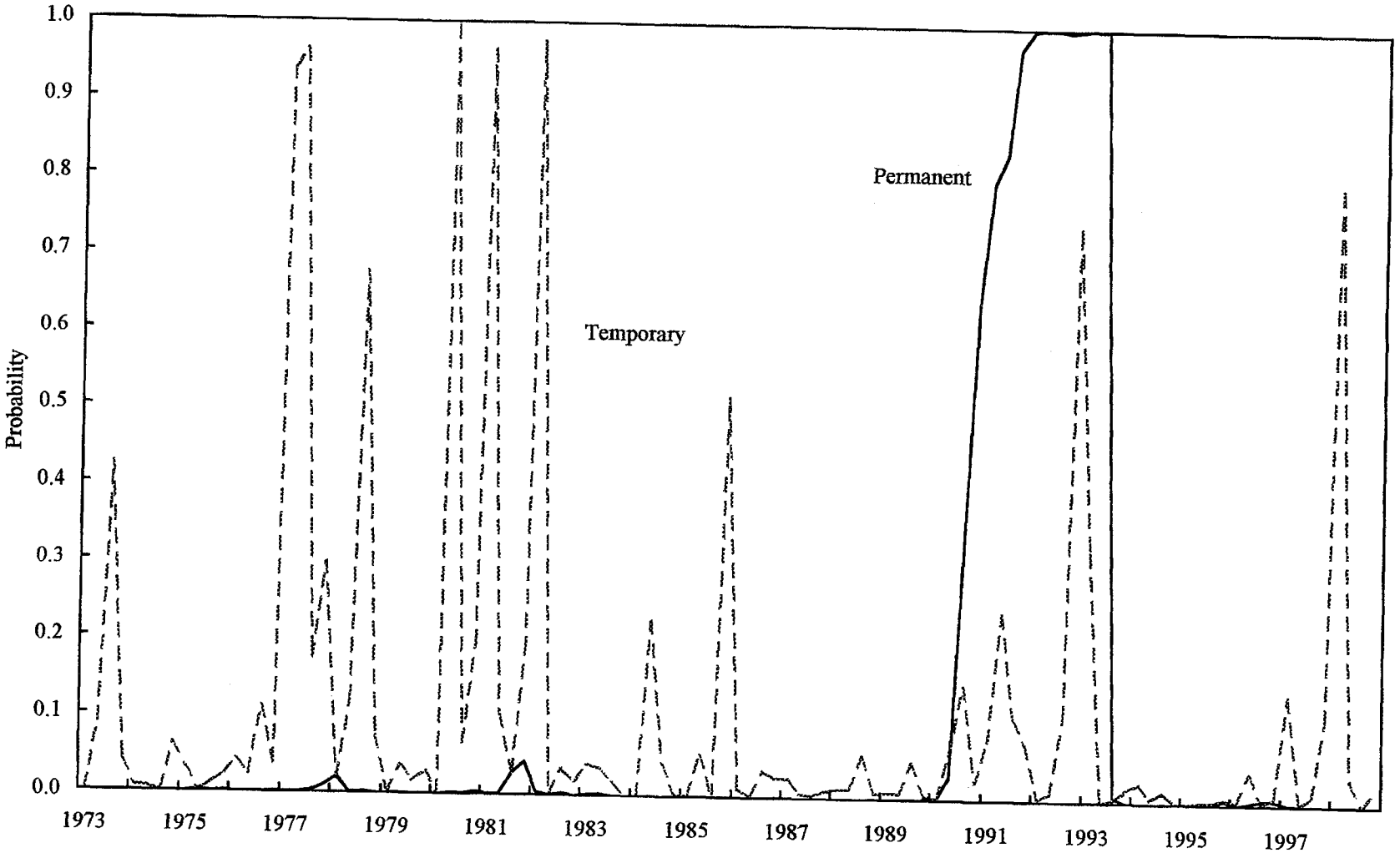
55. The Blanchard and Quah decomposition of output was obtained from two separate trivariate VAR models including changes in real GDP. First, the model proposed by Clarida and Gali that includes relative output, the real exchange rate and the relative price level was estimated except that Swedish output was substituted for the relative measure in order to prevent the estimation of Sweden's potential growth from being entangled with changes in the potential output of its trading partners. Second, a trivariate system was estimated that includes unemployment, similar to the Blanchard and Quah model except for the additional use of domestic prices. Impulse response functions from the first system of variables are similar to those presented in SM/97/205. In accordance with the theory, supply shocks lead to positive long-run effects on output, while demand and nominal shocks have only small positive short-run effects. Correspondingly, most of the forecast variance in output stems from supply shocks. The first decomposition produces an output gap of -3.6 percent in 1998 and a growth of potential output of 2.7 percent from 1997 to 1998 (Figure 5). On the other hand, the Blanchard-Quah decomposition with output, unemployment, and inflation leads to an estimate of -0.6 percent for the 1998 output gap, and a higher potential growth rate of 3.0 percent (Figure 6). Results from this latter set of variables seem implausible, however, as the output gap is positive over much of the sample, including the early 1990s.

Figure I-3. Sweden: Potential Output and Output Gaps
Common Permanent and Cyclical Components



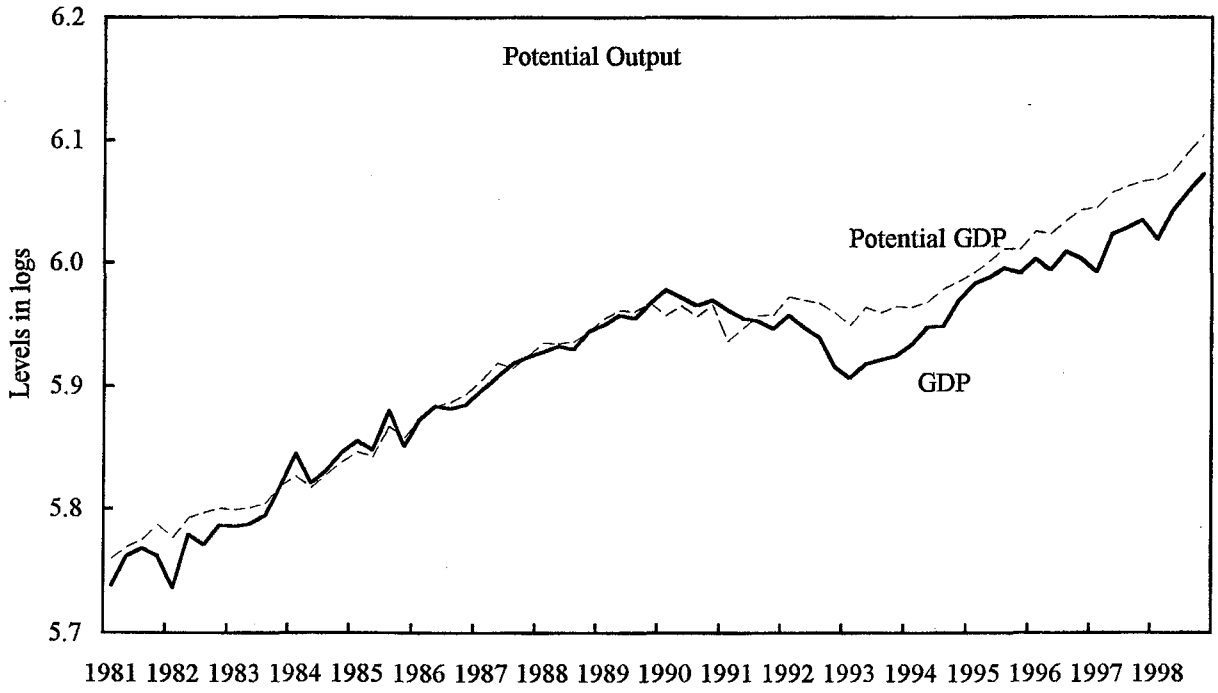
Source: Staff estimates.

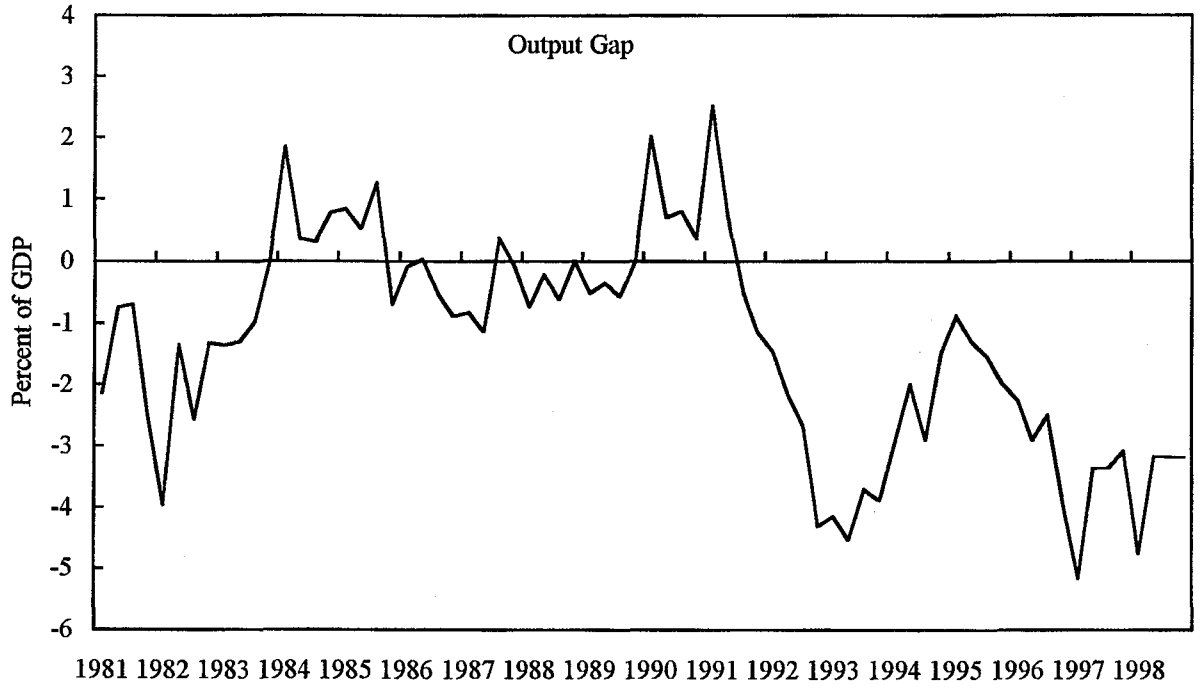
Figure I-4. Sweden: Probabilities of Permanent and Temporary Output Losses



Source: Staff estimates.

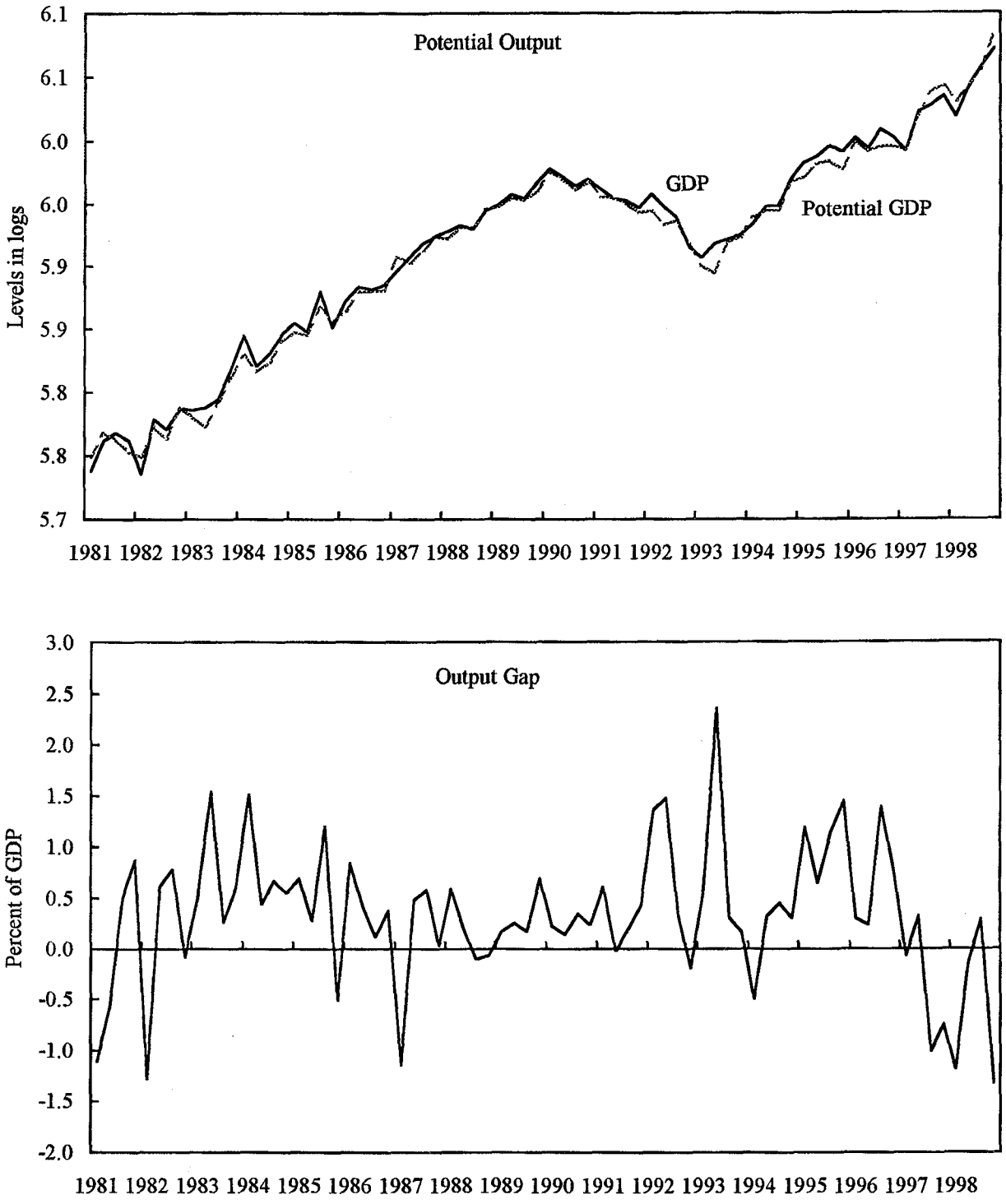
Figure I-5. Sweden: Potential Output and Output Gap
Structural VAR with Output, the Real Exchange Rate, and Relative Prices





Source: Staff estimates.

Figure I-6. Sweden: Potential Output and Output Gap
Structural VAR with Output, Unemployment, and Inflation



Source: Staff estimates.

Production function

56. The production function approach was modeled consistent with the data and estimation of Chapter II. Annual private and public output, and the private capital stock series are the same as discussed in the chapter. However the trend labor input was estimated using various methods as opposed to using the actual data on private hours worked which are likely to be cyclical. An OECD data series on the labor force is assumed to be at its trend level each year. Public employment was also taken from OECD.[8] Labor's share in output was assumed to be 65 percent. Total factor productivity was constructed as the residual of output less the capital and labor inputs. Trend productivity was constructed based on the fitted values of a regression (from the specification outlined in Chapter II) which includes changes in the ratio of government expenditure to GDP and changes in the real capital stock of the public sector and controls for the cyclical component of productivity by including an adjusted unemployment rate and the interest rate spread.

57. Several methods were investigated in order to provide a measure of the nonaccelerating-inflation rate of unemployment (NAIRU). However, the divergence of resulting estimates attested to the uncertainty in measuring the NAIRU. First, an alternative measure of labor market slack, the NAWRU (nonaccelerating wage rate of unemployment) was estimated based on the approach proposed by Elmeskov (1993). This method assumes that changes in wage inflation are proportional to the gaps between actual unemployment and the NAWRU:

$$\Delta^2 \mathrm{Ln}(W) = -a\,(U - NAWRU)$$

With the additional assumption that the NAWRU does not change significantly from one year to another, the NAWRU can be approximated by:

$$NAWRU = U - (\Delta U / \Delta^3 \mathrm{Ln}(W))\,\Delta^2 \mathrm{Ln}(W)$$

and the resulting series are then smoothed using a HP filter to eliminate erratic movements. However, since the variance of wage growth has been small, the NAWRU tracks actual unemployment fairly closely. Hence, this method did not add to an immediate application of the HP filter. Moreover, the assumption that the NAWRU does not change significantly from one year to another is inconsistent with the result and seems to negate the value of the approach.

58. Second, as motivated by the discussion in Chapter II, time dummies for 1991, 1992, and 1993 were used to net out the sharp rise in the aggregate unemployment rate. However, this transformation removed all of the increase in unemployment, including a portion that

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[8] Missing data for 1996-1998 were extrapolated based on changes in the ratio of public hours worked to total hours worked.

could arguably be related to the cyclical position of the economy in those years. Finally, an HP filter was employed. In order to minimize the end-point problems with the HP filter previously discussed, the sample period was extended through 2005 using staff WEO projections and the structural level of unemployment was capped at 5 percent in accordance with estimates provided by the national authorities.

On the basis of this approach, the output gap in 1998 was estimated at -0.8 percent and potential output grew by 2.4 percent over the previous year (Figure 7). Figure 8 shows the contribution to the level of potential output of the labor input and total factor productivity (the capital stock is assumed to be equal to its trend level). Both inputs to production contributed to the sharp output gap around 1993. However, while productivity returned to and eventually eclipsed (slightly) its trend level, actual labor continues to be below its potential level. This reflects an unemployment rate which is higher than estimates of NAIRU.

Systems unobserved components

59. The system unobserved components approach updates estimations presented in Apel and Jansson (1997) using output, unemployment, and changes in inflation. An import price series is used as an exogenous variable in the equation for inflation. The estimated output gaps are broadly similar to the previous work, falling to around -7 percent in 1993 and recovering by a few percentage points in the mid-1990s (Figure 9). The results also indicate that the output gap averaged around -6 percent in 1997 and -4.6 percent in 1998, but narrowed to -3.5 percent by the last quarter 1998. Potential output grew by 1.5 percent in 1998.

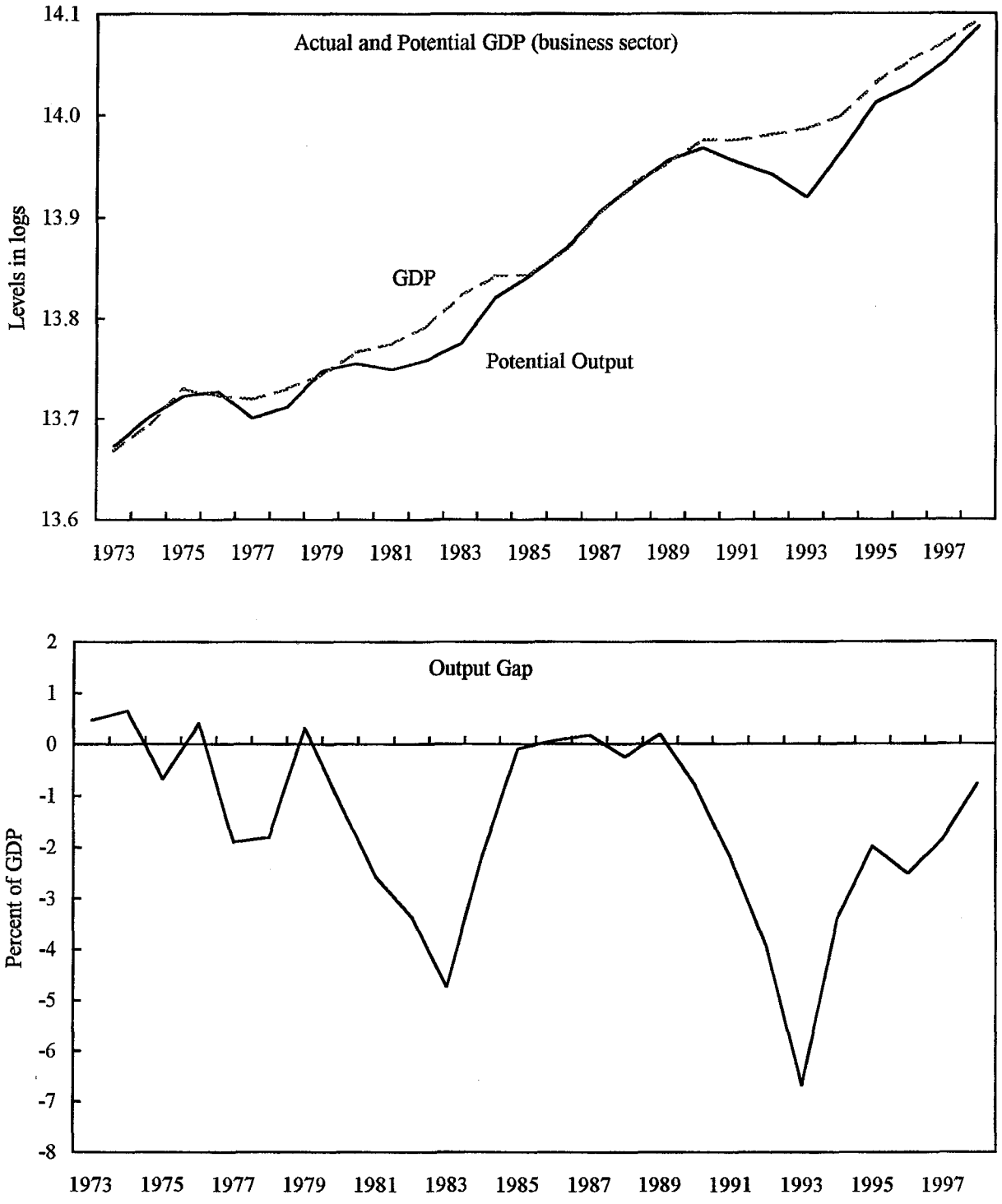
60. This method also leads to estimates for the NAIRU. The bottom panel of Figure 9 illustrates that the NAIRU increased after 1993 to a level close to 5 percent, although it declined slightly since 1997. According to the parameter estimate on the unemployment gap (significant at the 1 percent confidence level), an actual unemployment rate that is 1 percentage point higher than the NAIRU is associated with a 1.8 percent shortfall of output from its potential level. In addition, the results indicate that import prices are important determinants of Sweden's domestic inflation rate. The parameter estimate of 0.37 on import prices is significant at the 1 percent level and import prices appear to explain nearly half of the variation in domestic prices.

D. Conclusions

61. This chapter has presented new estimates of trend output and the output gap for Sweden according to different methods. The estimates are shown in Table 1. Based on the present calculations, the output gap was between -5.5 and 0.2 percent in 1998, while potential growth ranged from 0.9 percent to 4.2 percent from 1997 to 1998.

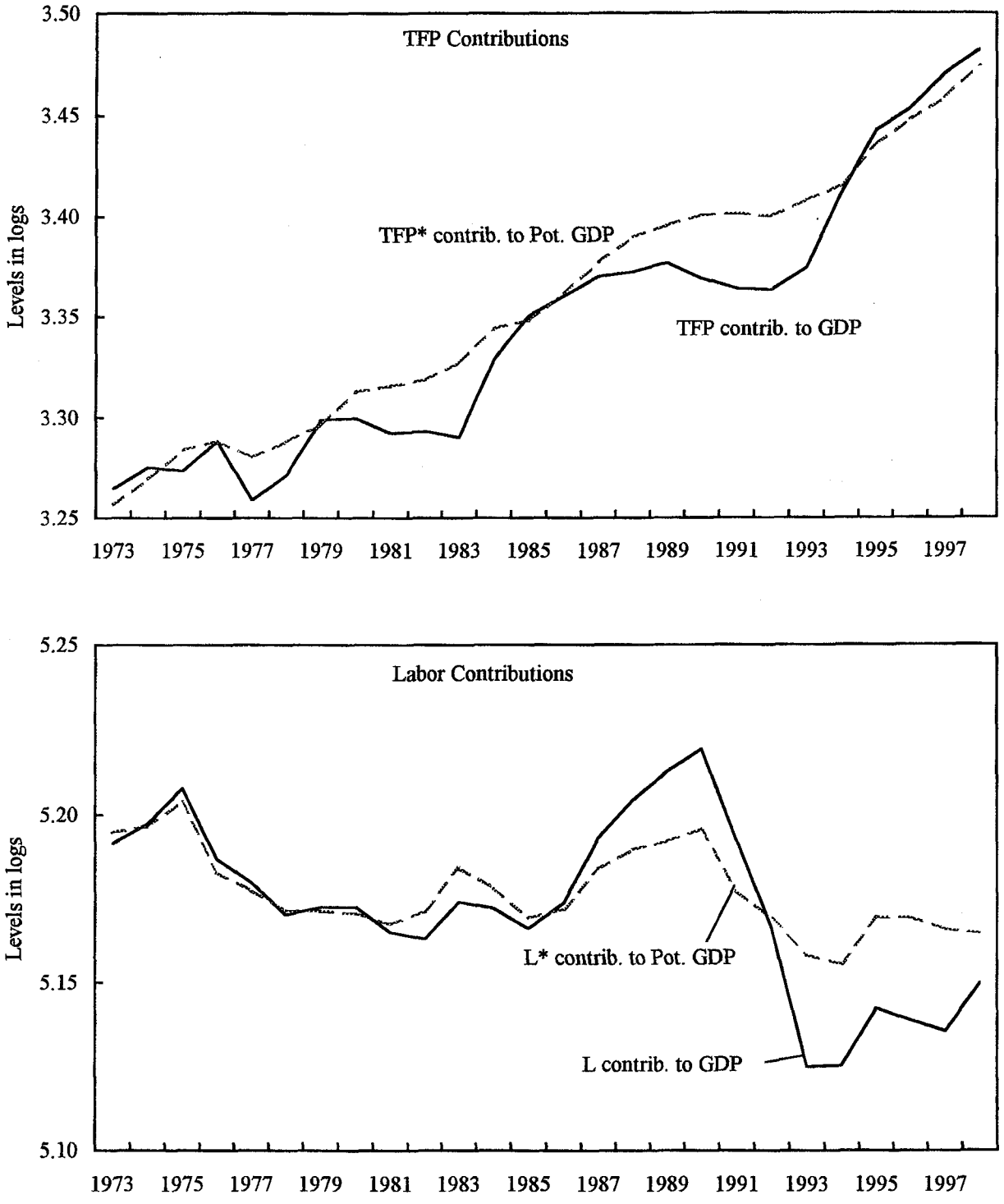
62. Each method has advantages and disadvantages as discussed in Section B. The main disadvantage of the statistical detrending techniques is that they are mechanistic. The latter methods rely on economic theory linking potential output to other developments in the

Figure I-7. Sweden: Potential Output and Output Gap
Production Function Approach



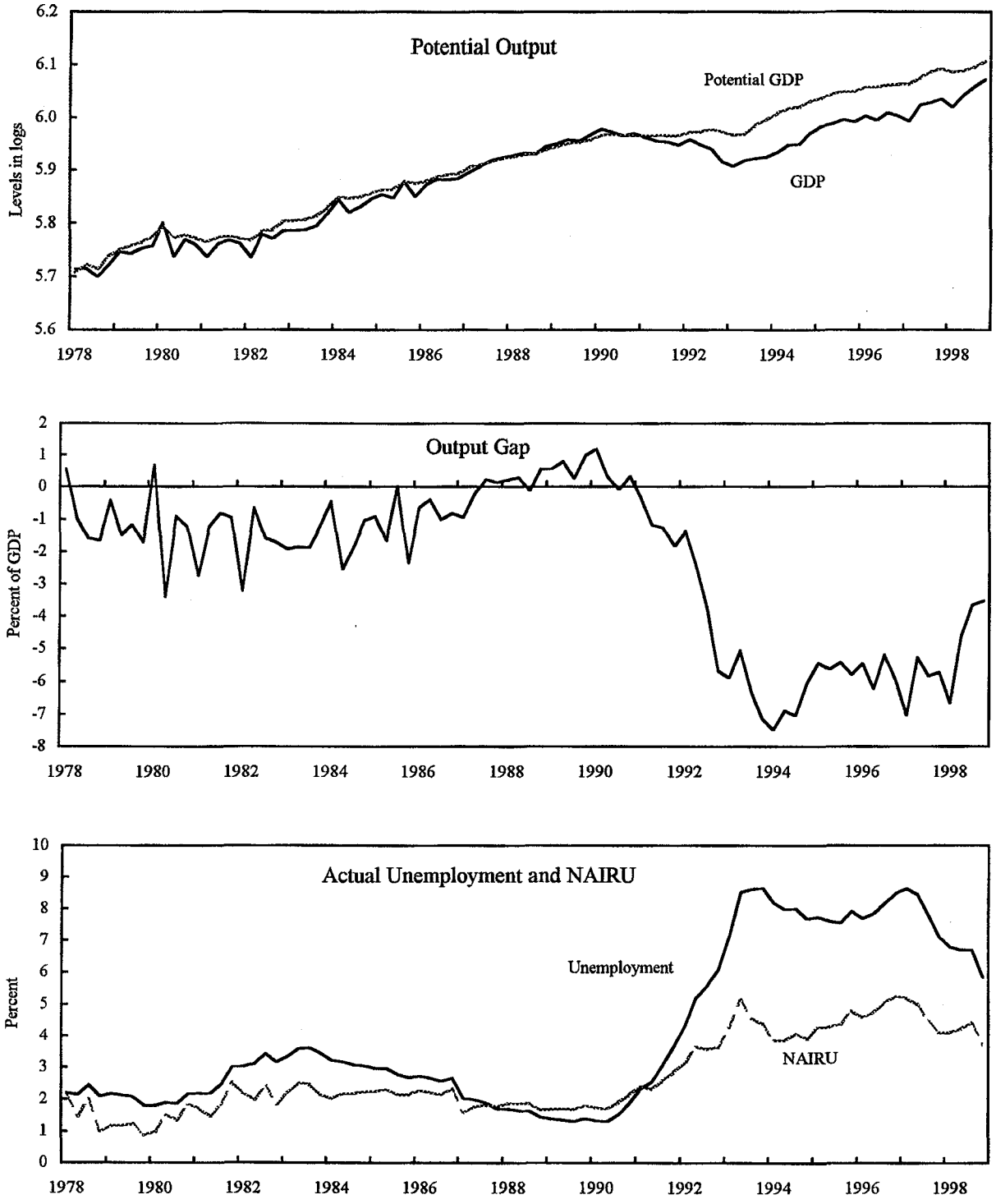
Source: Staff estimates.

Figure I-8. Sweden: TFP and Labor Contributions to the Levels of GDP and Potential GDP
Production Function Approach



Source: Staff estimates.

Figure I-9. Sweden: Potential Output, Output Gap, and NAIRU
System Unobserved Components Method



Source: Staff estimates.

Table I-1. Sweden: Output Gaps and Potential Growth Rates in 1998
Calculated From Different Estimation Methods

Estimation Method	Output Gap	Potential Growth
Hodrick-Prescott Filter		
100	-0.6	2.1
200	-1.0	2.0
1000	-1.7	1.9
Beveridge-Nelson	-1.7	3.0
Unobserved Components		
Univariate	0.2	2.8
Bivariate		
with inflation	0.2	2.8
with unemployment	-1.1	1.7
Common Permanent and Transitory Components		
One State		
estimate 1	-0.9	3.7
estimate 2	-5.5	0.9
Two States	-0.6	4.2
Structural VAR		
with the real exchange rate	-3.6	2.7
with unemployment	-0.6	3.0
Production Function	-0.8	2.4
Systems Unobserved Components	-4.6	1.5

Source: Staff estimates.

economy. If there is confidence in the potential levels of the underlying inputs, the production function approach would likely be a preferred method since potential output would be determined on the basis of the constraints of the production factors. Attempts to produce more output than capacity would generate production bottlenecks and also lead to cost push inflation through wage pressures. However, in the case of Sweden, the estimate for the potential labor force is very uncertain due to difficulty in determining the NAIRU. Confidence in this approach is thereby weakened as the measure of the NAIRU would in turn rely on either ad hoc assumptions or atheoretical detrending methods. In this case, the system unobserved component method simultaneously generates potential output and the NAIRU with an explicit link to inflation performance. Moreover, the approach allows exogenous factors to influence inflation, although it can be argued that it is difficult to determine the complete set of contributing factors.

63. Although the various methods produce a range of results for the output gap, the overall evidence suggests that the large negative output gap—most pronounced in 1993—has either closed in 1998 or will close in the next 1-2 years if current trends continue. However, the evidence also suggests that at least part of the large jump in unemployment occurring in conjunction with this recent recession has become permanent. A future upswing in the business cycle may not be sufficient to restore unemployment to earlier levels; instead, structural policies to encourage a flexible and well-functioning labor market will likely be required.

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II. PRODUCTIVITY GROWTH IN SWEDEN: HAS THERE BEEN A RECENT STRUCTURAL CHANGE? [9]

A. Introduction

1. In recent years there has been considerable debate on whether productivity growth in Sweden has begun to return to the levels experienced before the 1970s. Over the 1970–93 period, Swedish labor productivity growth (1.37 percent per annum) was considerably below the average among OECD countries (1.73 percent), and this led to a fall in rank from third place to seventeenth among the richest OECD countries in terms of PPP adjusted GDP per capita.[10] While a number of research papers have charted the steady decline in Swedish performance over this period, disagreement remains about the nature of the underlying factors behind the decline. In particular, although many argue that the rapid rise in the government sector and the attendant increase in taxes were the major culprits in the relative decline in total factor productivity, small changes to other controlling factors can have significant effects on the results (see in particular Agell, 1998).

2. Rather than entering into this debate directly, the objective of this paper is more modest in considering whether a structural shift has occurred to productivity growth in Sweden in the 1990s in response to the improved government finances, increased central bank independence, and EU accession. The main focus of the paper is, therefore, to identify proper cyclical variables that can eliminate cyclical movements in productivity and allow proper inference on whether the long-term productivity performance of Sweden has improved. Section B of the paper discusses the standard measure of total factor productivity (TFP) in a Swedish context, section C presents a discussion of the variables chosen to control for cyclical movements in TFP, section D tests whether a structural change has occurred to Swedish TFP during the 1990s and section E presents an estimate of potential output growth based on the TFP estimates obtained in this paper.

B. Estimates of Total Factor Productivity

3. The standard way of measuring total factor productivity is to assume two factor inputs, labor and capital, and constant returns to scale technology. Under these conditions TFP growth is represented as follows:

$$\Delta TFP = \Delta Y - \alpha.\Delta H - (1-\alpha).\Delta K \qquad (1)$$

where Y is real GDP, H is total hours worked, K is the gross real capital stock and the coefficient α is the average labor share over a particular historical period.

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[9] Prepared by Alun Thomas.

[10] See Henrekson (1997).

4. In this analysis, we propose using government expenditure variables as determinants of changes in total factor productivity in line with the current literature in this area (see below). In order to minimize potential endogeneity problems between TFP growth and government expenditure, we shall focus on TFP growth in the private sector in this paper. Total TFP growth will be determined as the weighted sum of the private and public components. In Sweden, total factor productivity growth in the public sector has averaged about zero over the period 1971–1998, although it has picked up over the recent period (Figure 1, Chart 1). The working assumption in this paper is that future TFP growth in the public sector will be zero.[11]

5. TFP growth in the private sector is defined according to equation (1) with Y representing real GDP in the private sector measured in 1991 prices, H is total hours worked in the private sector, K is the gross real capital stock in the private sector and the coefficient α is the average labor share over the 1970–98 period. Since data on the real capital stock are currently available only through 1995, estimates through 1998 were obtained using the following formula and assuming that depreciation was constant in relation to the capital stock at the average level over the 1991–94 period.

$$K_t = K_{(t-1)} + I_t - \lambda K_{t-1}$$

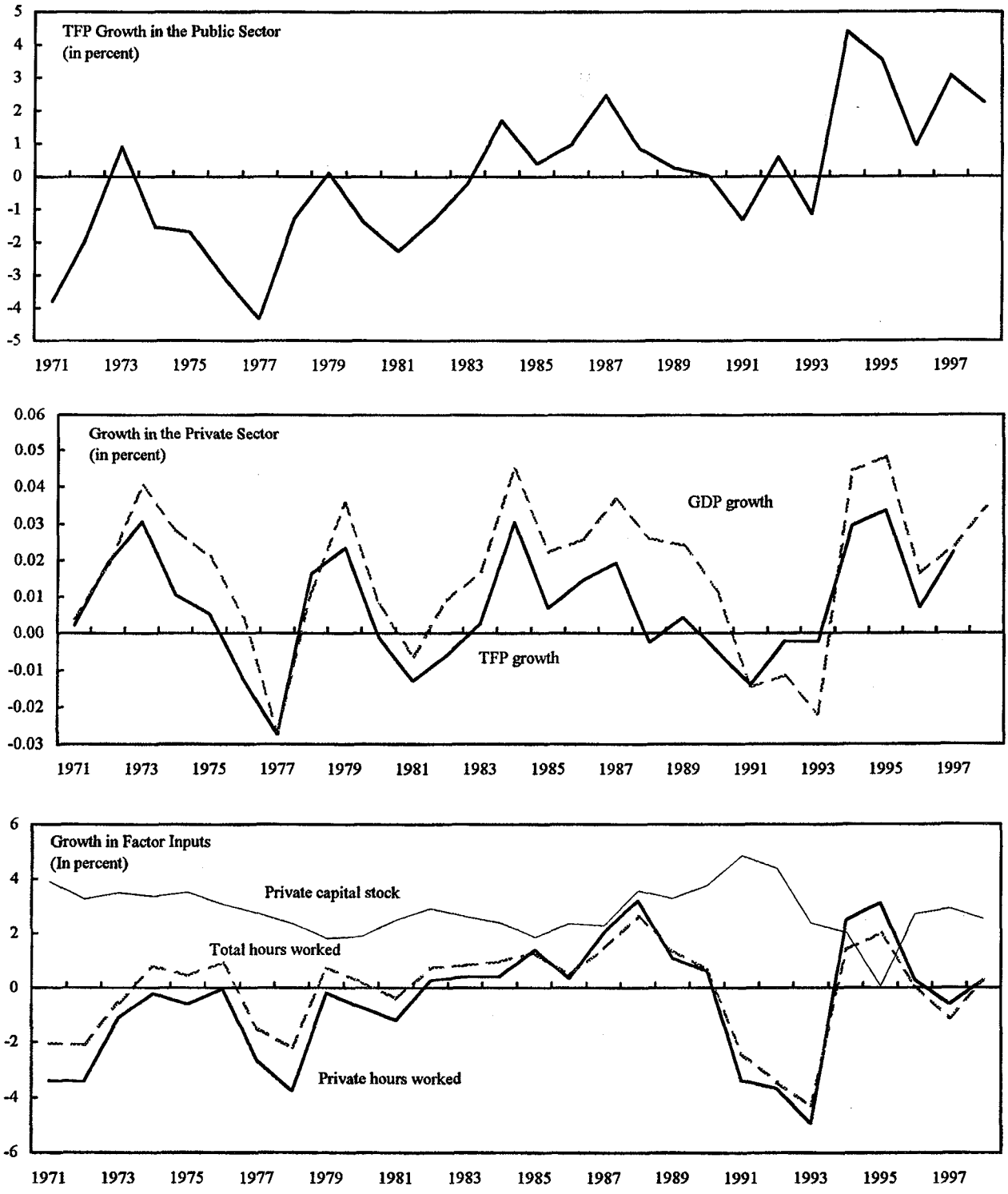
where I is gross investment in period t and lambda is the average depreciation rate over the 1991–94 period.

6. Figure 1, Chart 2 presents the calculated TFP growth rate in the private sector and the aggregate GDP growth rate over the 1970–98 period. This chart reveals the large cycles in TFP growth with peaks in 1973, 1979, 1984 and 1995, all coinciding with peaks in output growth. Until the mid–1980s, labor and capital were not very sensitive to the cycle, and movements in TFP growth over this period can generally be explained by the pattern of output growth (Figure 1, Chart 3). However, since the mid–1980s, working hours in the private sector have become much more responsive to the cycle, rising rapidly in the late 1980s in response to the boom in domestic demand and falling during the severe recession of the early 1990s.

7. To explain the movements in TFP growth, particularly over the 1970–85 period, it is useful to briefly describe the movements in real GDP. The peak in productivity growth in 1973 was associated with the strong competitive position of firms with moderate wage increases during the early 1970s facilitating strong investment and production. However, in the mid-1970s, significant wage increases were triggered by imported price increases in connection with world-wide inflation and by increases in payroll taxes. As a result, the growth of product real wages far outpaced the growth of labor productivity leading to a loss

[11] The public sector includes both general government and parastatal enterprises. Because most government output has no measurable market value, output is valued conventionally by the cost of inputs. The variation in public-sector TFP, therefore, primarily reflects changes in composition and in parastatal productivity.

Figure II-1. Sweden: Total Factor Productivity Growth and Growth in Factor Inputs



Source: Statistics Sweden; and staff estimates.

of competitiveness and export market shares. A number of discretionary exchange rate devaluations were undertaken to restore competitiveness (1976, 1977, 1981, 1982), and nominal wage increases returned to levels experienced prior to the mid–1970s. Following the 1982 devaluation, the government obtained a tacit understanding from the labor unions that they would accept the pending real wage losses without claiming compensation. This agreement improved the business environment leading to sizeable production and productivity increases in the mid-1980s.

8. In the late 1980s, the terms of trade improved considerably for Sweden as a result of the oil price decline and the surge in world market prices for paper and pulp, and this improvement led to strong net export growth which spilled over into domestic demand. This stimulus was amplified by easier access to credit following the financial deregulation of the mid–1980s and by rising wealth attributable to higher asset prices. However, the tightening of monetary policy and the extensive tax reform during 1990–91 raised real after tax lending rates to historically high levels and contributed to the sharp drop in property and bank share prices. In response, households began to consolidate their financial positions by cutting back on consumption, and businesses became less favorable toward new investment. These events led to the sharp recession of 1991–93. Since then, output has recovered strongly, associated with the positive effects on net exports of the large exchange rate depreciation of 1992 and more recently, the improving sentiment in the household sector.

9. Since 1993, Sweden's total productivity growth has averaged about 2 percent per annum. However, this is not an appropriate estimate of structural productivity because productivity is usually very strong during the early stages of an upturn with firms reluctant to rehire until clear evidence of the upswing is visible. Therefore in order to properly evaluate whether a structural improvement has taken place in recent years, it is necessary to control for the cycle.

C. Cyclical Controls

10. Macroeconomists have struggled with the issue of separating trend from cycle for a long time and still have not developed a clear consensus on the issue. A popular way of constructing the trend is by fitting a piecewise linear spline through the logarithm of GDP in years with similar levels of unemployment. The rapid increase in unemployment since the late 1980s precludes adopting this method for Sweden. An alternative view of output movements is that all fluctuations are the results of the dynamic effects of permanent shocks, so that actual and trend outputs are equivalent. In this case, movements in GDP result from the accumulation of shocks, each of which is on average positive, and has large permanent effects on output. Under these conditions, there is no sense in which recessions or expansions are temporary, or that cyclical fluctuations can be defined.

11. This paper assumes that cycles occur in economic activity and tries to find variables that are sensitive to the cycle and are projected to have only temporary effects on productivity. In identifying such variables the paper takes its cue from the literature on leading indicators, that identifies stock prices, the money supply, and the term structure of

interest rates as variables that lead the cycle (see "Lahiri and Moore , 1991" and "Estrella, 1998" for a detailed discussion of these variables). This paper also considers coincident variables such as the unemployment rate because it is less interested in leading indicators than in variables that comove with output. However, it is recognized that including contemporaneous variables makes the analysis subject to problems of simultaneity.

12. In terms of the hypothesized effects of the cyclically-sensitive variables on TFP growth, an increase in the spread between the long-term and short-term interest rates would be expected to put upward pressure on the economy leading to an increase in output and TFP growth.[12] However, as output responds, the interest rate spread would also be expected to decline. Increases in the money supply and in the stock price index would normally imply future increases in output and productivity. Finally, because output adjustment is more rapid than the adjustment of labor input early and late in the cycle, an increase in the unemployment rate would tend to be negatively correlated with total factor productivity growth. However, this effect comes from the unemployment rate responding to changes in TFP growth so that the assumption of exogenous regressors is questionable in this case: there appears to be causality both ways between the unemployment rate and TFP growth.

13. During the recession of the early 1990s, total hours worked in the private sector fell by a cumulative 12 percent. Moreover, in contrast to the experience during a similar recession in the early 1970s, hours worked in the public sector did not adjust to compensate for the significant reduction in hours worked in the private sector. As a result, the aggregate unemployment rate shot up dramatically, leading a number of commentators to argue that a structural shift had taken place in the unemployment rate (Figure 2, Chart 2). This paper does not address the magnitude of this structural shift, but rather nets out contemporaneous effects by regressing the unemployment rate on time dummies for the period 1991–93 and constructs a variable that excludes these effects.[13] This was also done for the ratio of government expenditures to GDP (to be discussed later in the paper).

D. Test for Structural Change

14. Total factor productivity began to rise rapidly in 1994 following the recession, coinciding with the adoption of an inflation target by the Riksbank (1993), the announcement in 1994 of a consolidation program to achieve fiscal balance by 1998, and Sweden's accession to the European Union in 1995. Given that both structural and cyclical effects were present at this time it is necessary to isolate cyclical effects to determine whether any structural change has taken place. To accomplish this, the estimate of TFP growth was regressed on a constant, a dummy for the 1994–98 period, the change in the adjusted

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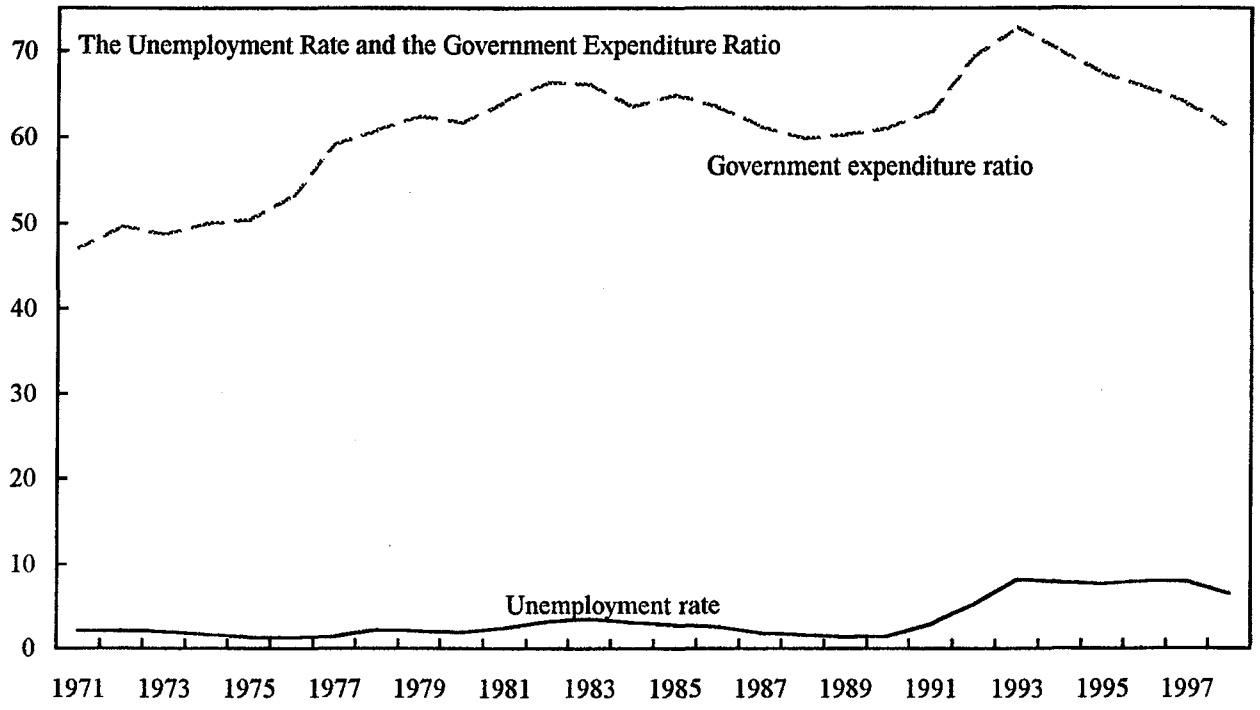
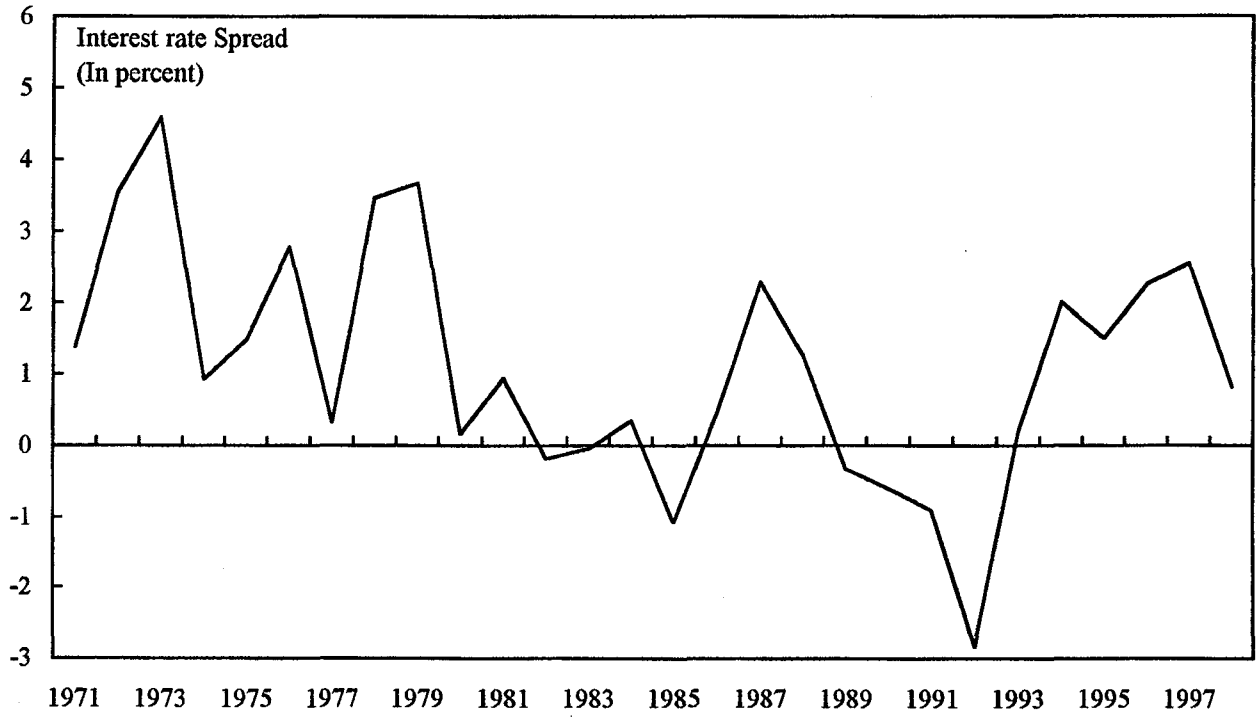
[12] This prediction is based on the assumption that movements in the spread are driven by movements in the short rate so that a more accomodative monetary stance would be expected to support output. Analyses that consider determinants of turning points in the economy generally find that an increase in the spread lowers the likelihood of a future recession (Estrella 1998).

[13] It must be recognized, however, that longer-term effects may still be present.

Figure II-2. Sweden: Cyclical Variables





Source: Statistics Sweden.

unemployment rate, the interest rate spread, and the growth in the broad money supply (M3) and in the Swedish stock index. Two lags of the dependent variable were also included to mitigate problems of autocorrelation.

15. The estimates in Table 1 indicate that both the interest rate spread and the adjusted unemployment rate are significant and have the correct signs whereas the growth in the money supply and in the stock price index have low explanatory power. Turning to the main hypothesis of interest, the dummy for the period after 1993 is insignificant, indicating the absence of a structural change in total factor productivity over this period when cyclical factors are included in the specification. It is possible, however, that the specification suffers from multicollinearity. To address this drawback the growth in the money supply and in the stock price index were excluded from the specification (Column 2). Now, the P-value of the constant term rises considerably, although it is still insignificant at the 10 percent significance level. Moreover, the dummy variable for 1994–98 is still insignificant.

16. The above analysis has assumed that once cyclical effects have been netted out, TFP growth is constant over time. In contrast, an extensive literature on long-term determinants of TFP growth has emphasized variables such as structural changes in government expenditure, R&D expenditures, and education enrollment. Smith (1975) and Gould (1983) find a significantly negative effect on GDP growth from changes in government consumption and investment spending among OECD countries. More recently, Grier and Tullock (1989) also find a significant negative effect. Hansson and Henrekson (1994) distinguish between the effects of government consumption and investment on TFP growth in the private sector and find that while changes in consumption expenditure have significant negative effects on TFP growth, the change in government investment has no effect. R&D is hypothesized to influence TFP growth because it fosters the development of new products. Consistent with this assumption, Fagerberg (1988) and Gittelman and Wolff (1994) find that the growth in civilian R&D has significant effects on growth in developed countries. Moreover, Coe and Helpman (1995) relate TFP convergence rates across countries to the domestic and foreign stock of R&D expenditures and find significant effects from both domestic and foreign sources. Human capital variables such as educational attainment have also provided significant explanatory power in equations explaining international productivity differences, although the effects are more muted in a sample of OECD countries compared with a broader range of countries (see Barro and Sala-I-Martin for a detailed discussion of this issue).

17. This study next incorporates some of these effects by adding the change in the ratio of government expenditures to GDP and the change in the real capital stock of the public sector to the cyclical variables identified above.[14] Of course, government expenditure has a strong cyclical component but it is assumed that this component is controlled for in the regression

[14] The public sector capital stock was extended through 1998 using the method outlined above for the private capital stock.

Table II-1. Sweden: Determinants of Total Factor Productivity 1/

Variable	(1)		(2)		(3)		(4)		(5)	
Constant	-0.004	(.56)	0.005	(.17)	-0.005	(.34)	-0.007	(.22)	-0.001	(.83)
d9498	0.008	(.31)	0.004	(.55)	0.005	(.45)				
TFP (-1)	0.138	(.50)	0.103	(.60)	-0.128	(.49)	-0.092	(.61)	-0.019	(.93)
TFP (-2)	-0.336	(.07*)	-0.255	(.14)	-0.304	(.04*)	-0.296	(.04*)	-0.346	(.04*)
lr-sr	0.003	(.09*)	0.005	(.01*)	0.002	(.28)	0.001	(.44)	0.004	(.04*)
Δu	-1.373	(.06*)	-0.969	(.13)	-0.391	(.49)	-0.148	(.80)	-0.822	(.19)
Δq	0.012	(.36)								
Δm	0.099	(.20)								
Δ gex					-0.501	(.01*)	-0.537	(.01*)		
Δgcs					0.616	(.03*)	0.691	(.02*)	0.402	(.13)
Δ gex*d9498							-0.453	(.22)		
Δgcs*d9498							-0.376	(.34)		
Δ rgex									-0.266	(.04*)
			Goodness of Fit Statistics							
R^2	0.57		0.51		0.72		0.74		0.60	
LM (AR2) stat	0.53		0.40		1.82		2.15		1.76	
Q (AR2) stat	0.14		0.33		1.39		1.80		1.72	

1/ Probability values in parentheses; an asterisk indicates that the coefficient is significant at the 10 percent level.

through the inclusion of the interest rate spread and the change in the unemployment rate.[15] Column (3) in Table 1 indicates that both the change in the government expenditure ratio and the change in the capital stock of the public sector have significant effects on TFP growth with the 1 percent per annum decline in the expenditure ratio over the past few years generating a 0.3 percentage point increase in TFP in the long-run and the average annual growth rate in the government capital stock of about 1¾ percent over the past few years providing an additional TFP growth impetus of about 0.75 percentage points. Tests were also conducted to discover whether an additional effect could be found for these variables over the 1994–98 period by interacting both variables with a time dummy. However, column (4) reveals that no significant effect was found.

18. It could be argued that regressing the expenditure ratio on a component of private GDP could lead to simultaneity bias because of supply constraints: the higher the ratio of public expenditures to GDP, the lower the available resources for the private sector. This concern can be mitigated by substituting the ratio of government expenditures to nominal GDP with the growth in real government expenditures relative to an estimate of 2.2 percent for potential output growth. [16] Of course, this analysis must be qualified because of the circularity of including an estimate of potential output growth in the process of estimating potential output growth as mentioned previously. Column (5) reveals that the estimates are broadly similar with the interest rate spread and the expenditure variable significant at the 5 percent level. The main difference between the specifications is in the size of the coefficient on the expenditure variable. Whereas a 1 percentage point decline in the expenditure ratio would lead to a 0.3 percent increase in TFP growth, a 1 percentage point decline in real government spending relative to the long-run potential growth rate of the economy is estimated to raise TFP growth by about half that much.

E. Long Term Potential Output Growth

19. To obtain a long-run estimate of TFP growth it is necessary to make assumptions about the value of the interest rate spread in steady state and about the future profiles of the expenditure GDP ratio and the growth in the capital stock of the public sector. Figure 1, Chart 2 presents the interest rate spread over the 1970–98 and reveals that the average interest rate spread is about 100 basis points. Assuming that this interest rate spread continues into the future, this variable would contribute about 0.1 percent per annum to long-term TFP growth. According to the government, the ratio of government expenditures to GDP is projected to decline by about 1¼ percent per annum over the next four years to 57½ percent of GDP in 2002. That decline would provide a growth impetus of about 0.4 percent of GDP per annum to the private sector. The capital stock of the public sector is projected to grow at an annual rate of about 1½ percent over the next few years, providing an additional GDP impetus of about 0.65 percent per annum. These estimates combined yield a

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[15] An alternative way of isolating the structural component of government expenditure would be to correct for movements in the output gap. However, this adjustment would require pre-existing measures of potential output which we are trying to calculate in this paper.

[16] The estimate for potential output growth corresponds to the estimate obtained below.

total private sector growth effect of 1.15 percent. Converting this estimate in terms of the whole economy would yield an annual increase of 0.95 percent assuming a private sector output weight of about 82 percent and the assumption of zero productivity growth in the public sector. A projected increase in the working age population of about 0.2–0.3 percent over the next few years and annual increases of about 3 percent in the capital stock would, therefore, yield a potential output growth rate of about 2.15 percent per annum.[17] Once the economy settles at a level in which the ratio of government expenditures to GDP is constant and the working age population remains stable, potential output growth would be estimated to fall to about 1.7 percent.

20. A comparable potential output growth estimate was obtained based on the specification using growth in real government expenditures. Assuming a 1 percentage point annual increase in real government expenditures over the 1999–2002 period and a 1½ percent rate of increase in the capital stock of the public sector, the private sector TFP growth rate would amount to about 0.8 percent per annum and would contribute to a potential output growth rate of 2 percent per annum. Over the long term, assuming that real government expenditures grow in line with economic capacity and that the working age population remains stable, potential output growth would again fall to about 1.7 percent per annum.

21. The estimates in this paper must be considered as tentative because of the prevalence of endogeneity problems. For example, many of the variables used to control for the cycle are endogenous in and of themselves (e.g. the unemployment rate, the interest rate spread). Moreover, while the endogeneity of the government expenditure variables has been mitigated by focusing on TFP growth in the private sector, an appropriate estimate for TFP growth in the public sector remains open. While there are considerable merits in using a structural approach to estimating potential output growth as against purely statistical methods, the drawbacks of the approach must clearly be recognized.

[17] This is only slightly below the latest estimate from the Riksbank at 2.3 percent per annum.

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III. Pension, Disability and Health Expenditures[17]

A. Introduction

1. The future aging of the population and the prospective decline in the participation of working-age men in work associated with the proliferation of early-retirement schemes has incited government authorities in OECD countries to develop strategies for containing these age-related expenditures. Many countries have addressed the pension component of these expenditures through wide-reaching pension reforms; for example, Switzerland, Denmark, and Canada have undertaken substantial reforms in recent years. Sweden is also in the process of finalizing a new pension system based on defined contributions. Most of the elements of this new pension system have previously been described (see, in particular, Sweden—Selected Issues SM/98/223). However, in recent months some additional information has been provided and is presented here.

2. While many countries are grappling with the future costs of their respective pension systems, health and disability expenditures—which are also projected to increase rapidly in the future—have received considerably less attention from national authorities. This paper, therefore, also provides a description and a rough estimate of the future costs of these age-dependent services for Sweden.

3. The paper finds that cost containment measures will have to be introduced for pensions, disability and health expenditures in order to ensure that future financing needs are met. The pension system should be sustainable, provided that the authorities deliver on their intention of activating a trigger mechanism, if the net present value of benefits exceeds the net present value of contributions. Disability expenditures will be contained if the current indexation to the CPI is maintained, while additional cost-cutting or financing measures will be required to cover future age-related increases in health expenditures.

B. The Swedish Pension System

4. In June 1998 the Swedish Riksdag announced that a new old-age pension system would be introduced with the objective of linking contributions and benefit entitlements more closely, ensuring the financial sustainability of the public pension system over the long run, and achieving more flexibility for people to combine work with partial retirement late in working life. The new pension system replaces the current national basic pension and supplementary pension and is projected to commence in 2001.

5. In June 1999, the authorities decided to transfer 45 billion kronor (US$5.3 billion) from the pension fund to the state budget in both 1999 and 2000, and an additional 155 billion kronor (US$18.2 billion) in 2001 to compensate for the shift in social security contributions

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[17] Prepared by Alun Thomas.

from the state budget to the pension fund associated with the pension reform (see Table 1).[18] The authorities intend to revisit the soundness of the central government accounts in 2004. If required, an additional transfer will be made from the pension fund to the central budget at that time.

6. The transfers from the pension fund to the state budget over the next few years will have no effect on general government net debt because they are offsetting. However, they will affect the consolidated gross debt because the liquidated holdings of the pension fund include mortgage bonds, shares, and real estate in addition to government bonds. [19] (The liquidation of government bonds has no effect on the consolidated gross debt because these bonds have already been factored out in the consolidation process). The effect is projected to be small: the consolidated gross debt is projected to decline by about SKr 300 billion over the period 1998–2002, about SKr 60 billion more than the reduction in net debt. [20]

7. After netting out the projected transfers to the state budget over the next three years, the pension fund will amount to about SKr 560 billion in 2001 in 1999 prices (30 percent of GDP) with a ratio of the present value of assets and liabilities of 1.12. Assuming that income growth and the real rate of return follows historical trends, the asset-liability ratio will remain above unity. Moreover, studies made by the authorities suggest that the financial stability of the new pension system is fairly robust to changes in the projected growth rate owing to the fact that pension benefits will be indexed by the growth rate in the wage bill. In contrast,

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[18] The new pension system involves two components: (1) a defined-contribution PAYG scheme in which contributions will be credited to a notional personal account that will finance a pension annunity and (2) a funded scheme with privately managed individual accounts. The private component of the pension scheme is to be introduced in 2001. To build up a sizeable stock of assets in this fund, disbursements will also be made from the state budget to the Premium Pension Authority (which is being administered by the pension fund) over the 2000–2002 period to compensate for the individual contributions which have been collected since 1995 in the state budget.

[19] In 1998, the National Pension Fund was valued at about SKr 735 billion, of which SKr 226 billion were in government bonds, SKr 179 billion in mortgage bonds, and the rest in index linked bonds, shares, and real estate.

[20] The elimination of net debt is the result of rising general government surpluses and privatization recepits from the government's remaining holdings in Pharmacia and Upjohn and the partial sale of Telia/Telenor.

Table III-1. Financial Savings and Net Financial Wealth

(In billions of Swedish kronor)

	1998	1999	2000	2001	2002
Central Government					
Balance exc. transfers from the National Pension Fund and transfers to the Premium Pension Auth (PPA)		23.2	33.7	37.1	25
Transfers to the PPA			-49.6	-21.2	-18.9
Transfers from National Pension Fund (NPF)		45	45	155	0
Financial Savings		68.2	29.1	170.9	6.1
Change in value of assets and liabilities		57.3	32.4	25.4	0
Change in Net Financial Wealth		125.5	61.5	196.3	6.1
Net Financial Wealth	-1030.4	-904.9	-843.4	-647.1	-641
Pension Fund					
Budget Balance exc. Transfers to the Central Government and transfers from the PPA		8.1	-2	-6.3	-17.7
Transfers to the Central Government		-45	-45	-155	0
Transfers from the PPA.			49.6	21.2	18.9
Budget Balance	7	-36.9	2.6	-140.1	1.2
Net Financial Wealth	735	698.1	700.7	560.6	561.8
Local Government					
Budget Balance	-1.6	2.2	9.1	9.1	4.2
Net Financial Wealth	18.4	20.6	29.7	38.8	43
General Government					
Net Financial Wealth	-277	-186.2	-113	-47.7	-36.2
(in percent of GDP)	-15.4	-10.1	-5.9	-2.4	-0.3
Consolidated Gross Debt	1359.4	1250.3	1192.8	1080.2	1057.8
(in percent of GDP)	75.6	67.6	62.2	54.2	51.0

Source: Ministry of Finance.

changes in the projected rate of return have significant effects on the financial position of the pension system. [21]

8. An important feature of the new pension system is that it includes a trigger mechanism which is intended to mitigate the likelihood of future financing shortfalls. The trigger mechanism will be implemented if the net present value of future contributions falls below the net present value of the pension liability (based on current assumptions about longevity and income growth) and will be applied to the indexation of pension annuities.

9. The government has recently revised its investment strategy for the pension fund in light of the fact that stocks have returned higher yields than bonds over long periods. In June the government announced that, in future, the pension fund will invest a greater proportion of its portfolio in stocks in order to improve its rate of return. Moreover, the fund will also diversify by increasing its share of investments in foreign assets to achieve a better balance of risks. The fund will target at least 30 percent of assets in interest bearing securities with low credit risks (for example, treasury bills and Swedish housing securities), and a maximum of 40 percent of assets in foreign stocks and bonds (compared with 14 percent currently). Domestic stocks will make up the remainder of the portfolio (14 percent currently).

C. Long-Term Projections of Disability and Health Expenditures

10. In contrast to the fairly detailed estimates of the future cost of the recently reformed pension system, projections of other age-dependent expenditures such as disability and health expenditures are more limited. The purpose of this section is to provide long-term estimates based on the most recent cross-sectional distribution of expenditures.

Disability expenditures

11. Pensions for the disabled and for survivors up through the age of 65 have not yet been incorporated into the pension reform, but are currently under review. The disability pension consists of a basic pension and an income-related supplementary pension (ATP). The determination of pension income is the same as for an old-age pension benefit, in which each year of residence entitles the recipient to one-fortieth of a full basic pension and persons with incomes in excess of one base amount are also entitled to a supplementary pension. The supplementary pension is based on income between 1 and 7½ times the base amount, with income from sickness and unemployment insurance and the parental cash benefit included in pension-rights income. The maximum pension is attained after thirty years of pensionable income. Individuals with no, or low, ATP are entitled to a special supplement, which is reduced on a one-to-one basis against the supplementary pension.

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[21] Assuming a long-term growth rate of 2 percent and a real rate of return on the fund of 3 percent per annum, the asset-liability ratio would stabilize at about 1.02. If the return on the fund is projected to be 5 percent, the asset-liability ratio would rise to 1.22.

Characteristics of the Pension System

Base Amount	Base Pension	Supplementary Pension	Special Supplementary Pension
$4500	0.96 x base amount	income-base amount	0.555 x base amount

12. A disability pension can be received from age 16. For an individual to be entitled to a permanent disability pension, a physician must certify that the individual's capacity to work is permanently reduced by at least 25 percent of working time on account of sickness or other specified causes. If the capacity to work is reduced for a long period, but not permanently, the individual is entitled to a temporary disability pension.[22]

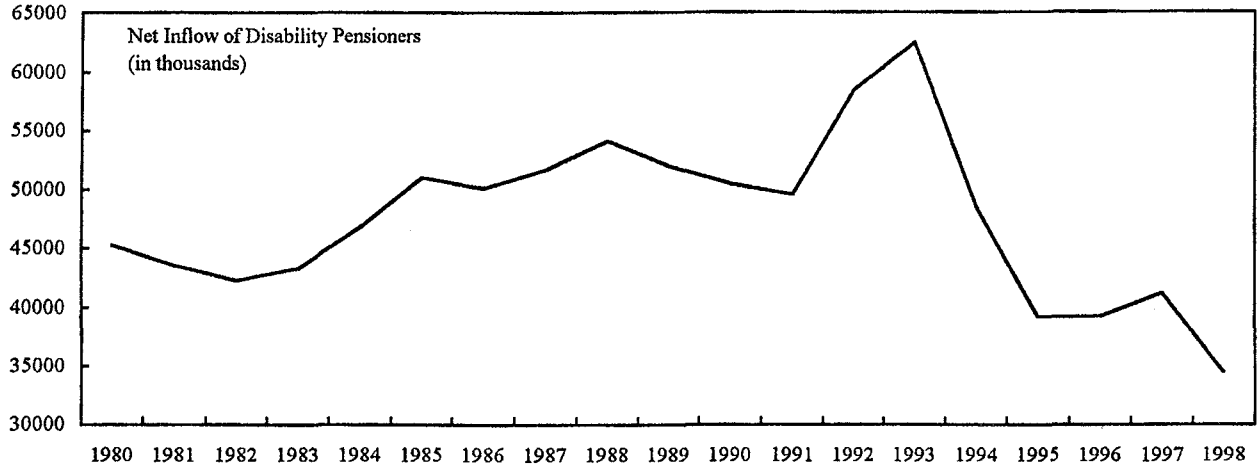
13. Disabled people who fulfil the condition of 30 years of employment receive income compensation equaling about two-thirds of their average gross income for the 15 years with the highest income. A disability pension is therefore much more generous than an actuarially-reduced old age pension which, if drawn at the age of 60, gives a 30 percent lower pension than a disability pension.

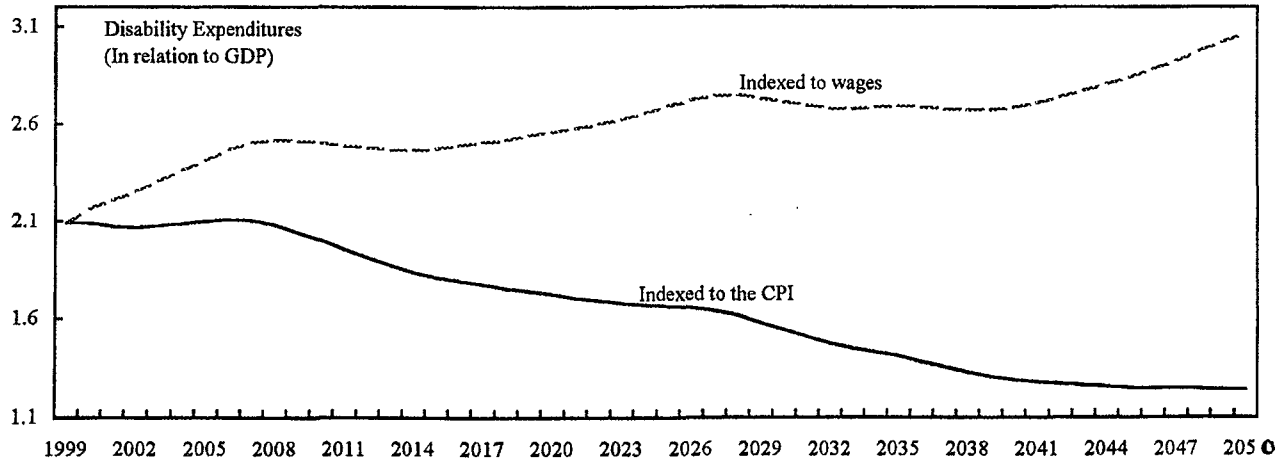
14. The requirements for obtaining disability pensions gradually became easier in the 1970s, when workers above 60 years of age were made eligible for a disability pension stemming from labor market considerations. For example, unemployed persons 60 years of age and older were entitled to disability pensions if they had used up their compensation rights from unemployment insurance. From 1977, the law on eligibility was softened further by allowing the status of being disabled, regardless of the cause of the disability, to be a sufficient condition for receiving a disability pension. This meant, for example, that alcoholics were now eligible for a disability pension. During the 1990s, access to a disability pension has become more stringent. Eligibility for a disability pension for labor market reasons only was discontinued in 1991, and eligibility for a disability pension based on a combination of medical and labor market grounds was discontinued in 1997.

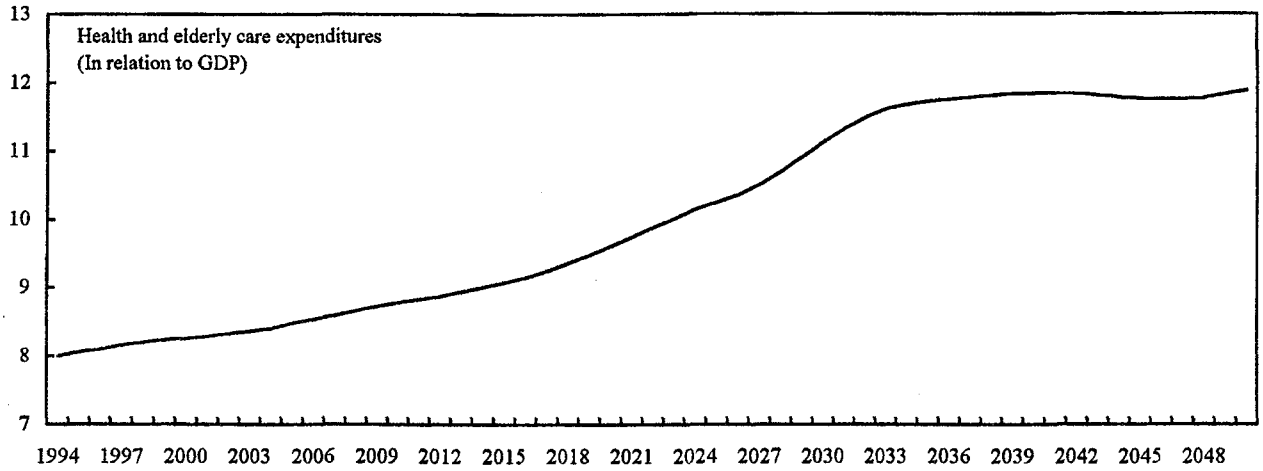
15. Chart 1 in Figure 1 indicates that the annual inflow of new disability pensioners has varied between 30,000 and 65,000 since 1980. During the 1980s, the numbers rose gradually with a noticeable peak in the early 1990s when individuals were granted a disability pension

[22] Entitlement rises in steps. Incapacity of 25–49 percent entitles one to 25 percent of a full pension, 50–74 percent, to 50 percent, and 75–99 percent, to 75 percent.

Figure III-1. Sweden: Disability and Health related Concepts







Source: Ministry of Finance; and staff estimates.

to decrease the length of sickness benefits. Indeed, Wadensjö (1996) and Erikssen and Palmer (1997) have argued that the increased flow of new disability pensioners between 1970 and 1991 can primarily be ascribed to changes in eligibility rules rather than to changes in the health of the population. Since then, however, eligibility requirements have been made more stringent and the net inflow of disability pension recipients has fallen accordingly.

Projections of disability benefits

16. This subsection presents estimates of disability and survivors pensions for those below 65, based on the current profile of benefits and population projections through 2050. Data were provided by the National Social Insurance Board on the average basic benefit, special supplement, ATP pension and average pension points for all age categories in 1997. The average basic benefit and the special supplement were projected forward by maintaining the ratio of the benefit to the basic amount though time across all age categories. The basic amount was indexed to the CPI in line with the current policy.[23]

The ATP pension (Y) is calculated as follows:

$$Y=0.6*AP*\min(N/30,1)*BA$$

where AP are the average pension points of an individual, N is the number of years the individual has recorded a pension-rights income greater than zero, and BA is the basic amount.

17. Information on the ATP pension and the average pension points across age groups was used to calculate the number of pension-rights years. Projecting forward, the number of pension-rights years were kept constant across age groups but the number of pension points were increased by 0.4 per decade in line with historical experience.[24]

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[23] Since the basic amount is decided each year by the government, it is possible for a majority in the Swedish Parliament to make discretionary changes which do not reflect movements in the CPI. For example, from November 1980 to November 1982, the basic amount was temporarily linked to a price index that was adjusted to put less weight on the large increases in oil and electric energy prices during that period. In addition, the price effects of the large devaluation of the krona in 1982 were not fully reflected in the basic amount. During the 1990s pensions did not fully compensate for price increases in order to contain government expenditures.

[24] This is roughly equivalent to a real wage increase of 1¾ percent per annum, comparable to the estimate of labor productivity. Although the real wage has grown faster than labor productivity in recent years, this is not a sustainable situation. This assumption, therefore, is

(continued...)

18. The profile of the ratio of disability expenditures to GDP over time presented in Chart 2 in Figure 1 indicates that provided that the basic amount is indexed to the CPI, the future burden on public finances of disability payments will be limited.[25] From a current ratio of about 2.1 percent of GDP, disability payments fall to about 1.2 percent in 2050. One of the innovative features of the new pension scheme is that pensions will be indexed by wage growth rather than by inflation. If the basic amount applied to disability pensions is also indexed by wages, the ratio of disability payments to GDP rises from 2.1 percent in 1998 to above 3 percent in 2050. This issue is currently being considered by the authorities and clearly has an important bearing on the future cost of the pension system.

Health expenditures

19. In Sweden, the financing of the healthcare system is a public sector responsibility carried out by the 23 county councils and three large local authorities (Gothenburg, Malmo, and Gotland). The county councils decide on the allocation of resources to the health services and are responsible for the overall planning of the services offered. A local income tax levied on residents covers a large fraction of healthcare costs. Additional charges are also imposed on visits to the doctor, in the range of SKr 100–300 (US$12–36) per visit, with a ceiling of SKr 900 (US$106) per 12-month period. Partial reimbursement for drugs is provided for payments which exceed SKr 400 (US$47) per 12-month period with full compensation above SKr 1800 (US$211).

20. Healthcare costs in Sweden rose rapidly from 3.3 percent of GDP in 1960 to near 10 percent by 1980. However, subsequent cost-control efforts have succeeded in reducing the ratio to about 8 percent in 1994, roughly at the OECD average. Cost-cutting measures have embraced a reduction in the number of beds at hospitals and cut-backs in the number of casualty wards that are open 24 hours a day. In addition, in the early 1990s, most county councils switched from providing fixed annual allocations to hospitals and primary care services in favor of allocating payments based on performance; for example, the funds received by a hospital now depend on the number of patients it treats. In parallel with the new financial control system, patients have been given greater opportunities to choose among the variety of medical services available.

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based on real wage growth leveling out at the rate of productivity growth over the next few years.

[25] Nominal GDP follows the latest WEO projection through 2004. Subsequently, real GDP growth falls to 1.7 percent, consistent with the latest estimate of potential output growth (see Chapter II), and the CPI and the GDP deflator is assumed to increase by 2 percent per annum.

21. By international standards, health in Sweden is relatively good. Infant mortality is low, at 4 deaths per 1000 births during the first year of life compared with an OECD average of 7½. Moreover, male life expectancy at the age of 65 is 16.1 years in Sweden, which is higher than the OECD average of 14.8 years. The increase in life expectancy has contributed to the rise in the number of elderly people, with the greatest rise in the age group 85 years and older.

Projections of health expenditures

22. The aging of the population is likely to put pressure on health related expenditures in the future. This section presents estimates of this expenditure burden, based on the assumption that per capita expenditures on health and elderly care incurred in 1994 are indexed by GDP growth per capita into the future. The table below presents per capita expenditures in 1994 according to six age groups and reveals that per capita expenditure on the youngest age group (0–4) is roughly 3 percent of per capita GDP; expenditure falls considerably for 5–14 year olds and then rises gradually for all age categories through retirement. Following retirement, health and elder care expenditure rises dramatically to about 50 percent of per capita GDP for those above 85. This age-dependent profile of health expenditures is comparable to that found by Franco and Munzi (1997) in a study of several European countries, with Sweden among the lowest cost providers in the group.[26]

Per-capita Health Expenditure

Age	0-4	5-14	15-44	45-64	65-74	75-84	85+
In percent of per-capital GDP	3.1	1.2	2.2	2.9	6.9	17.4	50.7

23. Chart 3 in Figure 1 presents total health related expenditures relative to GDP over the 1994–2050 period, with total expenditures defined as the product of per capita expenditures and the projected number of individuals in each age group. The chart indicates that the ratio of expenditures to GDP, currently at about 8 percent, rises gradually over time to level out at about 11.8 percent. This increase is comparable to the projected increase in health

[26] Franco and Munzi (1997) consider health expenditure profiles for Belgium, the Netherlands, Denmark, Finland, Germany, Italy, Spain, and Sweden and find that Belgium, Italy, and Sweden have the lowest healthcare expenditure profiles.

expenditures documented in studies on France and Canada, which is a little surprising because the other studies assume that costs rise beyond the effects of demography.[27]

24. This paper has discussed various aspects of age-related expenditures in Sweden and finds that while the future aging of the population will place a burden on finances, Sweden has already made inroads in addressing this issue in a meaningful way. The new pension system appears robust to changes in growth assumptions and the inclusion of a trigger mechanism will likely ensure the financial sustainability of Swedish pensions in the face of demographic revisions and changes in the real rate of return. While disability pension expenditures are likely to be contained provided that they remain indexed to the CPI, sizeable increases in health expenditures are projected over the long term. These projected expenditures will require additional financing or cost-cutting measures in the health area, if other expenditure priorities are to remain unaffected.

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[27] The projection for France assumes that healthcare expenditure grows in relation to the profile of gross wages plus a shift term that captures the historical excess in the growth of healthcare spending over what can be explained by income and demographics (see Habermeier and Lenseigne 1998). The projection for Canada assumes that healthcare prices increase by 1 percentage point more than the GDP deflator in each year and that real expenditures per capita increase at the average growth rate experienced between 1984 and 1991 (see Canada-Selected Issues 1997).

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IV. Monetary and Financial Sector Issues[28]

A. Introduction

1. A substantial strengthening of the monetary and financial sector policy frameworks is one of the key achievements of recent years in Sweden. Major policy reforms have been implemented in the monetary policy operating strategy, its legal and institutional framework, and financial sector supervision and regulation framework. As discussed in the sections below, the reforms have sought to establish and maintain monetary policy credibility after a somewhat checkered history; underpin and entrench those gains through legislation and institutional reform; and increase the robustness and flexibility of the financial sector to minimize the chances of any further financial crises like that of the early 1990s.

2. While policy reforms along the above lines were needed in any event given the modern environment of sophisticated and increasingly internationalized financial markets, a more specific impetus has also come from the need to make the most of the inevitable consequences of European economic and monetary integration for Sweden. Relatedly, the possibility of Sweden itself entering the European Monetary Union (EMU) may have further implications. In this and in other areas related to possible future accession to EMU, the Government's general approach has been to proceed with arrangements that are as consistent as possible with what would be required for participation, so that its options are effectively held open until a definite decision is made.

B. Some Aspects of Inflation Targeting in Sweden

3. When Sweden abandoned its peg to the ECU in late 1992, it was faced with the problem of developing an alternative nominal anchor and restoring the lost policy credibility inevitably associated with a forced exit. Specifically, there was an immediate need to ensure that the inflationary effect expected to follow from the depreciation of the krona (coupled with the effect of indirect tax changes at the time) did not feed into a more persistent surge in inflation. In addition, and seen especially from a current perspective, it is also clear that firm inflation control in the aftermath of the currency crisis and subsequently would be a central aspect of ensuring sufficient economic convergence for eventual EMU participation.

4. In early 1993, the Riksbank chose to follow a few other countries and adopt explicit inflation targeting as the policy anchor: in doing so, it has had to decide on some important issues concerning the definition of the chosen inflation targets, the implications of which can however be much more than technical.[29] What measure of inflation should be used? What

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[28] Prepared by Mark Swinburne.

[29] Though the inflation target was announced in early 1993, the regime was not considered to apply formally until 1995. In part at least, this relates to the lags in the monetary policy transmission mechanism. Because of such lags, the Riksbank, as with all inflation targeters,

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should the level of the target be and, if a range, how wide should it be? What should the periodicity of the target be (e.g., to be met constantly, or on average over a number of periods), and more generally how "hard edged" should the target be?

5. Underlying these questions are quite fundamental issues about whether and how monetary policy should respond to various temporary, exogenous influences on inflation trends, and in particular to large shocks whose impact on inflation may be costly to offset quickly.[30] Such shocks and transitory factors can be handled, at least in part, in several alternative ways through the different dimensions of the inflation target.[31] But in choosing among approaches, or combinations of approaches, there are frequently trade-offs to be struck between policy flexibility on the one hand, and policy credibility and transparency (especially as regards ease of communication with the general public) on the other. These trade-offs are likely to vary according to the relative importance and frequency of different types of problematic exogenous influences.

6. In Sweden's case, the choice of the headline (unadjusted) CPI as the formal target variable reflects some premium placed to date on its simplicity and familiarity to the public.[32] But it does put the onus on the Riksbank to explain and justify clearly the reasons for any divergence between headline inflation and the underlying inflation trends on which monetary policy decisions are in fact likely to be based. This task has not been entirely straightforward,

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could more strictly be described as targeting *forecast* inflation. The lags are of course variable and somewhat uncertain, but in Sweden(as elsewhere) are thought to be of the order of two years. An additional consideration is the degree of imprecision and uncertainty inherent in a necessarily forward-looking policy framework. For this reason, inflation targeting has to take into account the balance of risks and uncertainties around central forecast trends. See Berg (1999) for more discussion on these points.

[30] Supply shocks (an oil price shock is an oft-quoted example) can be particularly problematic, because they cause prices and real quantities to move in opposite directions.

[31] For example, scope to accommodate the first round effect of shocks can be allowed by defining the target in terms of an underlying, trend measure of inflation; through exceptions (perhaps pre-specified) to the defined inflation target; through establishing a wider target range than otherwise; or by specifying the target as an average over several periods.

[32] See Heikensten and Vredin (1998) and Berg (1999) for more detailed discussions of the Swedish inflation targeting experience and the issues surrounding the choice of target specification. The chosen level of 2 percent (+/- 1percent) for the inflation target apparently reflected no precise science (in common with the other early inflation targeters): according to Berg, it simply reflected an estimate of the underlying inflation rate at the time, together with the policy intention of preventing any increase in the inflation trend.

however, as the Riksbank has frequently undershot its 1 to 3 percent target range for headline inflation, due largely to the continuing influence of indirect tax changes and interest rate reductions on that variable. For example, headline CPI inflation in the 12 months to April 1999 was –0.1 percent, but excluding the effect of declining interest rates on house mortgage interest costs would add about 0.8 percent to that outcome, while further adjusting for the effect of changes in indirect taxes and subsidies would add a further 0.6 percent.[33] Additionally, excluding the prices of mainly imported goods, as well as the factors already mentioned gives a measure of underlying domestic inflation (UNDINHX) that showed an increase of 2.1 percent in the same period. Figure IV-1, Chart 1 gives a comparison of recent outcomes in the most commonly used adjusted CPI measures in Sweden.

7. In early 1999, the Riksbank issued a clarification of its inflation targeting procedures that may in the future help avert *ex post* misinterpretation of monetary policy performance. The clarification reiterated that monetary policy would continue to be guided by assessments of underlying trends in the CPI, but added that the bank would, henceforth, clarify *in advance* the magnitude of deviations from the target for headline CPI that would be accommodated owing to non-permanent factors such as changes in interest expenditure or indirect taxes and significant inflation shocks that would be unduly costly to reverse immediately.[34] The clarification has not yet proved sufficient to prevent criticism, however, based at least in part on the low headline CPI outcomes, that the bank has been biased towards unnecessarily tight monetary policy. The Standing Committee on Finance of the Riksdag (parliament) recently made such comments in its first semi-annual review of the bank's performance under the new Riksbank legislation (see below).

8. Beyond this procedural clarification, the Riksbank has also flagged that at some stage, the formal inflation target could be respecified in terms of an adjusted CPI measure that better reflects underlying trends, but it noted that no single measure would be fully satisfactory for all eventualities.[35] Though the Riksbank currently pays somewhat more attention to other published underlying inflation measures (UND1X and UNDINHX), from the point of view of further facilitating comparability with European measures, a leading candidate for a replacement index is the Harmonized Index of Consumer Prices (HICP) being constructed under EU auspices. Sweden already publishes its own estimated HICP, but this is a

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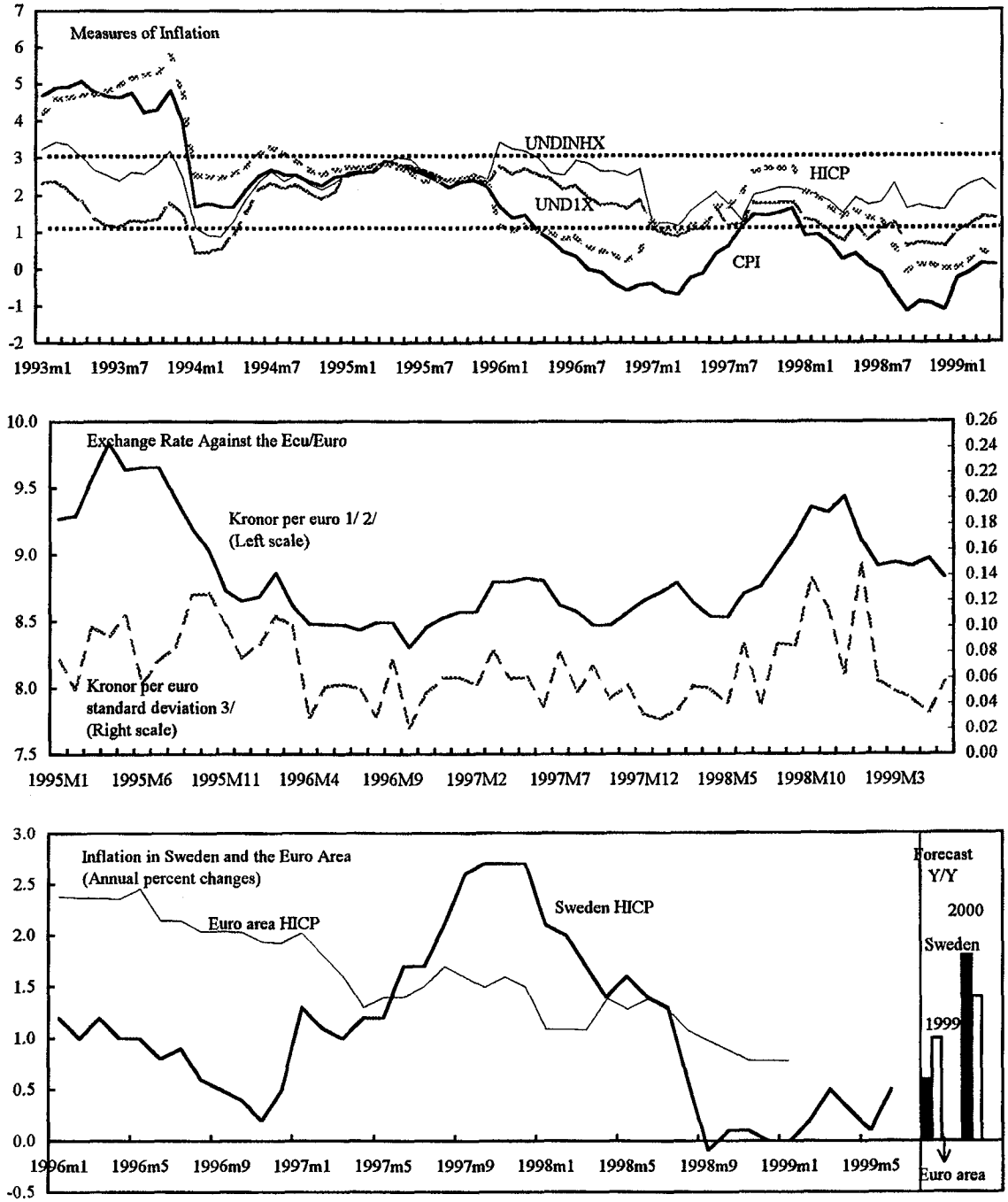
[33] Thus, UND1X, the measure of underlying inflation excluding these two types of effects, rose 1.4 percent in the 12 months to April 1999. See *Inflation Report*, June 1999, Sveriges Riksbank.

[34] See Heikensten (1999) for a more detailed discussion of this clarification.

[35] Inquiry into the CPI is due to issue its proposals shortly, and this could form the basis of such a respecification of the target.

Figure IV-1. Sweden: Inflation and the Exchange Rate



Source: Statistics Sweden; the Riksbank; the European Commission.; and staff calculations.

1/ Kronor per ECU prior to 1999.
2/ Average monthly rates.
3/ Standard deviation of daily rates.

provisional measure, as the exact definition of the HICP is still being finalized. Although having the important advantage of Euro-consistency, Sweden's HICP has, in recent periods, followed headline CPI inflation more closely than the other underlying inflation rates. In the 12 months to April 1999, for example, HICP inflation was 0.3 percent.[36]

9. Another important issue for the inflation targeting process in Sweden is the extent to which it might need to be modified in the transition towards EMU participation, if a decision is made to join. Clearly, much will depend on the exact conditions negotiated for entry, particularly in respect of exchange rate stability against the Euro during the transition period. If this criterion is similar to the wide exchange rate bands (+/- 15 percent) that applied during the transition into EMU for some current members, there would clearly be scope to continue direct inflation targeting for the interim period until the exchange rate has to be locked in. Indeed, in such a situation, there is a good case for arguing that the continuation of the inflation targeting process would be not only feasible but highly desirable to help anchor market expectations. Other things being equal, confidence that Sweden's inflation rate will stay close to that of the Euro area will be central to maintaining reasonable exchange rate stability. Figure IV-1, Chart 2 gives an indication of short-term exchange rate variability in recent periods.

10. In this regard, Sweden's inflation targeting regime is not directly comparable with the monetary policy operating framework in the Euro area, though the differences may not be very large. Relative cyclical positions will of course be an important consideration in determining the relative monetary stance in Sweden and the Euro area, but the Swedish cycle generally seems reasonably consistent with that in the Euro area. Euro area monetary policy is specified by a medium-term objective of keeping inflation as measured by the HICP under 2 percent. A precise comparison is complicated by the fact that the ECB's inflation objective is less explicit than Sweden's—no lower bound or mid-point is specified, nor has a specific indication been given of how the ECB would handle transitory factors and shocks.[37] Nevertheless, if the ECB keeps the inflation rate well below 2 percent, while Sweden's rises toward or above the midpoint of the Riksbank's target range, then some tensions could arise.[38] (See Figure IV-1, Chart 3 for a comparison of recent and forecast HICP inflation).

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[36] The HICP excludes mortgage interest costs, but not the effect of all indirect tax and subsidy changes. In addition it currently excludes a number of other items covered by the other indices—see *Inflation Report*, December 1998, Sveriges Riksbank.

[37] Some analysts, drawing implications from the ECB's "reference value" for M3 growth, have suggested 1.5 percent as a defacto "price norm" for the ECB. Berg (1999) notes this point.

[38] The Risksbank's latest published inflation forecasts (*Inflation Report*, June 1999) show the HICP increasing from an expected annual rate of 0.6 percent for 1999 to 1.8 percent for 2000.

(continued...)

11. Currently, the Riksbank takes a generally hands-off approach to the exchange rate and in particular does not put great weight on short-term movements in the exchange rate as an indicator of future inflation. This is in part because the pass through from exchange rate changes in Sweden appears to be less than earlier thought (Berg, 1999), in common with recent experiences in a number of other countries. In any event, the dynamics of the pass through are complex, involving both direct price level effects and indirect effects, and depend *inter alia* on the reasons for the exchange rate changes, expectations of their permanence or otherwise, and the nature of the monetary and exchange policy framework itself. An exchange rate forecast, conditioned by a view of the likely medium-term exchange rate trend, is an important component of the Riksbank inflation forecasts, but short-term deviations from that trend are viewed as unlikely to feed significantly into pricing behavior, unless they are sizeable and seem as if they might last for some time. In such a case, the Riksbank has the option of undertaking sterilized foreign exchange intervention as a signal that it views the exchange rate as sufficiently out of line with the expected medium-term trend and posing a risk to the inflation outlook; or, as a stronger signal, tightening monetary policy itself (equivalently, undertaking unsterilized intervention) to address the inflation risk. The exchange rate developments of the autumn of 1998 and the Riksbank's response, as discussed in the Staff Report, is the main example of the first category to date.

12. A transition into EMU could force some technical modifications to the way inflation targeting is implemented, especially if a real or perceived conflict developed between the inflation target and the required exchange rate range.[39] If the exchange rate remained comfortably within the agreed range for the transition, the Riksbank could continue to pursue its inflation target without threatening the exchange rate agreement. But a different situation could arise if the exchange rate is close to or moving rapidly toward one edge of the established range, at a time when other influences on inflation would preclude a stabilizing monetary policy response.

C. Riksbank Autonomy

13. The recent amendments to the Riksbank's governing legislation clarified and strengthened the autonomy of the central bank.[40] Previously, the Riksbank had wide formal

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By way of comparison, in April the European Commission forecast HICP inflation of 1 percent for 1999 for the Euro area and 1.4 percent for 2000 (*Monthly Bulletin*, June 1999, European Central Bank).

[39] The discussion abstracts from issues about the appropriate level of the chosen exchange rate against the Euro. For general discussions of the implications of, and preparations for, EMU, see Srejber (1999) and Bäckström (1999).

[40] The Riskbank operates under the Sveriges Riksbank Act (1988:1385, and amendments), pursuant to the Constitution Act and the Riksdag Act.

authority in respect of monetary and exchange rate policy,[41] and was accountable to the Riksdag (parliament) rather than the executive arm of government. Nonetheless, the Bank was required to consult with the relevant cabinet minister before making a major monetary policy decision, and the members of the Riksbank's decision-making Governing Board were appointed by the main political parties in the Riksdag in approximate proportion to their own representation.[42] Furthermore, the Board members' terms were coincident with the parliamentary electoral term.[43] These features opened, or at least could be seen to open, the possibility for direct political influence over monetary and exchange rate policy decisions. This risk was compounded by the fact that, in common with many other countries until recently, the legislation specified no clear objective to which monetary and exchange rate policy would be oriented.

14. The statutory amendments that took effect from the beginning of 1999 aimed to strengthen the legislative framework so as to further bolster confidence in Sweden's monetary policy, while bringing the legislation into conformity with the requirements of the Maastricht treaty for EU members. The thrust of the changes to the Riksbank's legislation had been agreed earlier among five political parties with a clear parliamentary majority and were announced in May 1997.

15. Specifically, the latest amendments to the legislation establish a clear medium-term objective of maintaining price stability and create a two-tier board structure with a more autonomous Executive Board. Monetary policy decision-making authority, oriented to the price stability objective, rests with the new six-member Executive Board, chaired by the Governor. [44] The obligation for prior consultation with the Government on major monetary

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[41] Article 10 of the previous version of the Riksbank Act stated explicitly that the Riksbank had the authority to decide the exchange rate regime. In contrast, most other independent central banks do not have final responsibility in respect of exchange rate policy; the authority to make basic regime choices typically rests with governments.

[42] It is important to note that, in parliamentary systems like Sweden's, the separation between executive and legislative arms of government is often less complete than in, say, the United States. In parliamentary systems, the government (executive arm) is, by definition, formed from the party (ies) commanding a majority in the house.

[43] Except for the Riksbank Governor who, from 1988, was elected by the seven Riksdag-appointed members of the (then) Governing Board, for a longer (five-year) term that was delinked from that of the Riksdag. Also from 1988, the former practice of having a Ministry of Finance representative chair the Governing Board was ended.

[44] The Governor and the other five members are appointed for six-year terms, except that the terms of the initial appointments under the amended Riksbank law are staggered to ensure

(continued...)

policy decisions was replaced with a lesser requirement to "inform" the relevant Minister, and there is an explicit stipulation that Executive Board members "shall not seek or take instructions" when fulfilling their monetary policy duties. Other control functions of the previous Governing Board (general financial and management oversight) were assumed by a new 11-member Governing Council, appointed by the Riksdag in a fashion similar to the former Governing Board.[45] The Council does not have a direct oversight role in respect of monetary policy, but it is responsible for appointing (and under certain circumstances dismissing) the Governor and other members of the Executive Board.

16. While the Riksbank's autonomy to pursue price stability has been more clearly formalized, the final responsibility for exchange rate regime choices has been shifted back to the Government. The Riksbank, however, retains the major advisory and implementation functions in respect of exchange rate policy. *Inter alia*, this allocation of responsibilities reflects the fact that basic regime choices, not least any future decision on whether or not Sweden will join EMU, are almost inevitably very political, rather than technical in nature.

17. Both the choice of an inflation targeting framework in general, and the choice of the particular inflation targets, are matters for the Riksbank itself (now through the Executive Board) to decide. This is fully consistent with the approach in most of Europe, and the ECB in particular. But it contrasts with some other inflation targeters where these matters are explicitly agreed in advance between the government and the central bank. This distinction potentially opens the arrangement to the general criticism that accountability to a principal (here, the Riksdag) is weaker when an agent (the Riksbank), sets his/her own specific performance targets.[46] It is also notable that there is no nonpolitical body, between the Executive Board and the relevant Parliamentary committee, charged with monitoring the Riksbank's monetary policy performance in a neutral, professional fashion.[47] Again, this is

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only one member's term expires each year. Minutes of Executive Board meetings are required, and as a matter of practice are published after a delay of around six–eight weeks.

[45] Articles on the management, organization and history of the Riksbank, including the names and party affiliations of the current Council members and their deputies, can be found on the Riksbank's web site.

[46] The contrast should not be overstated however, because it is likely that significant changes to the targeting framework would in practice be discussed in advance with other interested parties. Nevertheless, there is no formal requirement for the Riksbank to do more than inform the government.

[47] As in all inflation targeters, the market provides one form of presumably neutral arbiter, and the Riksbank puts considerable store on transparency and public information to help the market make well-informed assessments. But the market does not undertake these assessments on behalf of the Riksbank's principal.

common practice among most inflation targeters,[48] but could give rise to a more politicized accountability process than necessary. Nevertheless, the Riksdag is of course free to seek nonpolitical advice on the Riksbank's performance from whoever it chooses.

D. Trends in Financial Institutions and Markets[49]

Structural trends

18. The Swedish financial system has undergone substantial structural change since the banking crisis of the early 1990s, and the rapid pace of change continues. Mounting competitive pressures, both domestically and in the increasingly internationalized financial markets have been reflected in trends such as a significant decline in the share of bank deposits in household assets (from 39 percent in 1985 to 23 percent in 1998), and declining emphasis on traditional balance-sheet intermediation (reflected in a declining share of net interest income for the large banks from over 70 percent in 1990 to under 60 percent in 1998). (See Figure IV-2, Charts 1–3.) New entrants on the financial market in recent years have been particularly targeting the most rapidly growing market segments. Such trends are encouraging consolidation and the breaking down of old institutional distinctions in attempts to increase efficiency and strengthen competitive positions. There have been a number of mergers and acquisitions in recent years, involving the major banks, insurance companies, and exchanges (stock, futures, and options). Faced with competition from nonbank savings products in particular, as well as a loss of market share by the large banks in favor of small and foreign banks, banking groups are broadening their business lines and becoming wide ranging financial service companies, by offering insurance and fund management services, either directly or through related companies. Non-bank financial institutions in turn are also broadening their business lines.

19. While similar trends are visible in many other countries, for Sweden, the implementation of the EU's single market for financial services, and the advent of the Euro, are particularly important factors that are likely to further intensify the already strong competitive pressures. Though Swedish banking groups are small in European terms, the scope for much further consolidation in Sweden may be limited. Finansinspectionen (the Financial Supervision Authority, henceforth FSA) reports that all the major banks are

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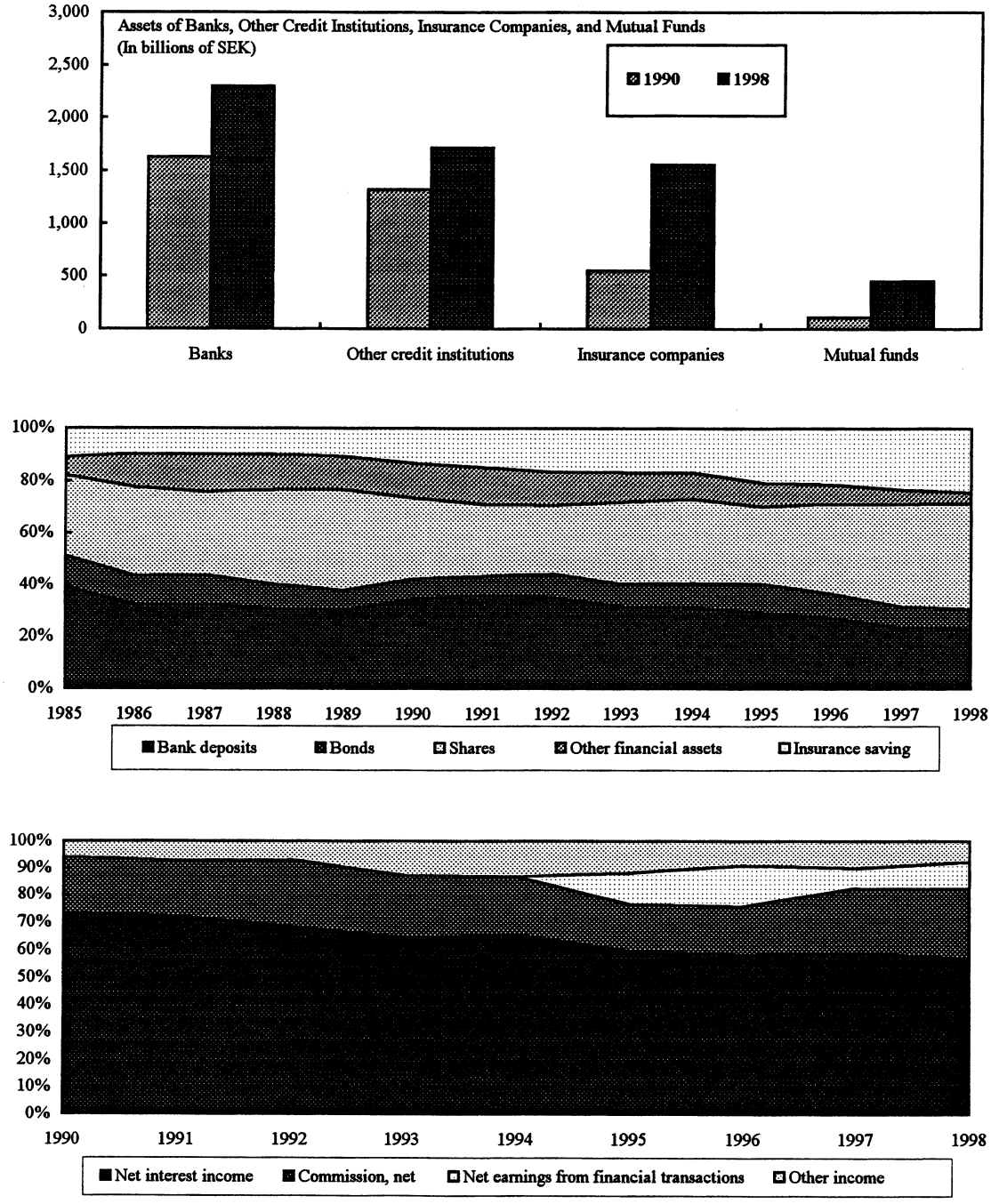
[48] With the notable exception of New Zealand, where more extensive formal accountability arrangements are in place than elsewhere.

[49] The discussion in this section is largely based on information and analyses published by the authorities. For more detail on the topics discussed here (and other related ones), see for example, *Financial Markets and Financial Firms: Trends in Development*, Government Report 1998:5, November 1, 1998, Finansinspektionen; and *Financial Stability Report*, I, May 1999, Sveriges Riksbank.

Figure IV-2. Sweden: Structural Trends in the Financial Sector



Source: The Riksbank; and Finansinspektionen.

Note: Average return on equity capital before tax is calculated as a percentage of the average of equity capital at the beginning and end of the year. Average return on equity capital after tax is calculated as net profit in percent of the average of equity capital at the beginning and end of the year.

considering expansion into other countries (notably into the Nordic and Baltic region), and one at least has already begun to move in this direction. At the same time, retaining a strong home customer base will be increasingly important especially in the event of Swedish membership in EMU, because losing large corporate customers could have a substantial effect on the banks' ability to earn noninterest income from foreign exchange and fixed income trading. The natural home country advantage here for the large banks is likely to be eroded over time through the continued growth of foreign banks in Sweden, and the increased scope for Swedish companies to deal with banks based elsewhere. In addition, the likely further development of the EMU area corporate securities market may increasingly require Swedish banks to price loans to major companies and municipalities more finely, while competing effectively for commission income in that market is likely to be difficult without very large volume activities.[50]

Profitability and capitalization

20. Notwithstanding these pressures, the profitability of Swedish banks and other major financial institutions remains sound, assisted by the generally favorable domestic economic climate and the fact that Swedish banks are quite efficient by international standards. Falling loan losses have been the major factor in the significant increase in bank profitability since the banking crisis. These are now very low, and the four large bank groups each reported a pre-tax return on equity comfortably in excess of 10 percent for 1998, with an average return of around 20 percent pre-tax and around 16 percent post-tax (Figure IV-3, Chart 1). There are some indications, however, that it may be difficult for the large Swedish banks to maintain such a high profit rate in coming years, notwithstanding the competitive advantage offered by low numbers of branches per resident and employees to total assets compared with other European countries. In real terms, for example, it is noteworthy that the level of bank earnings before loan losses has been declining in recent years,[51] and the rate of return in any event seems high given interest and inflation rates. Maintenance of current profit rates will be

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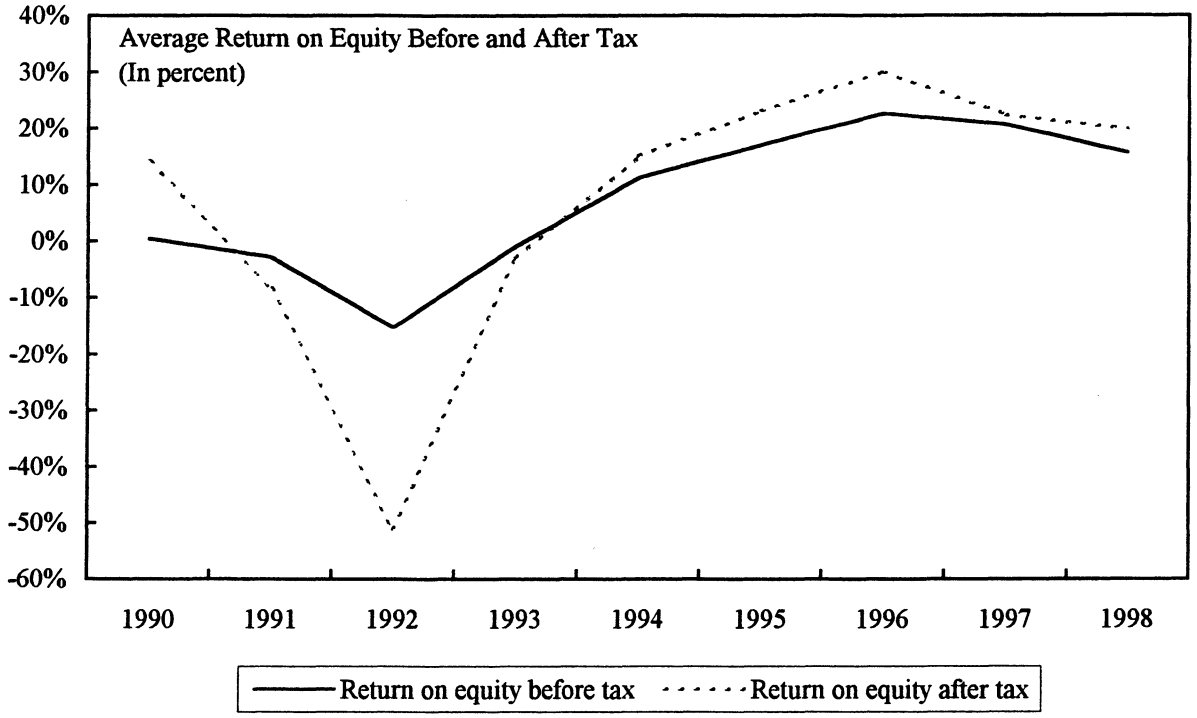
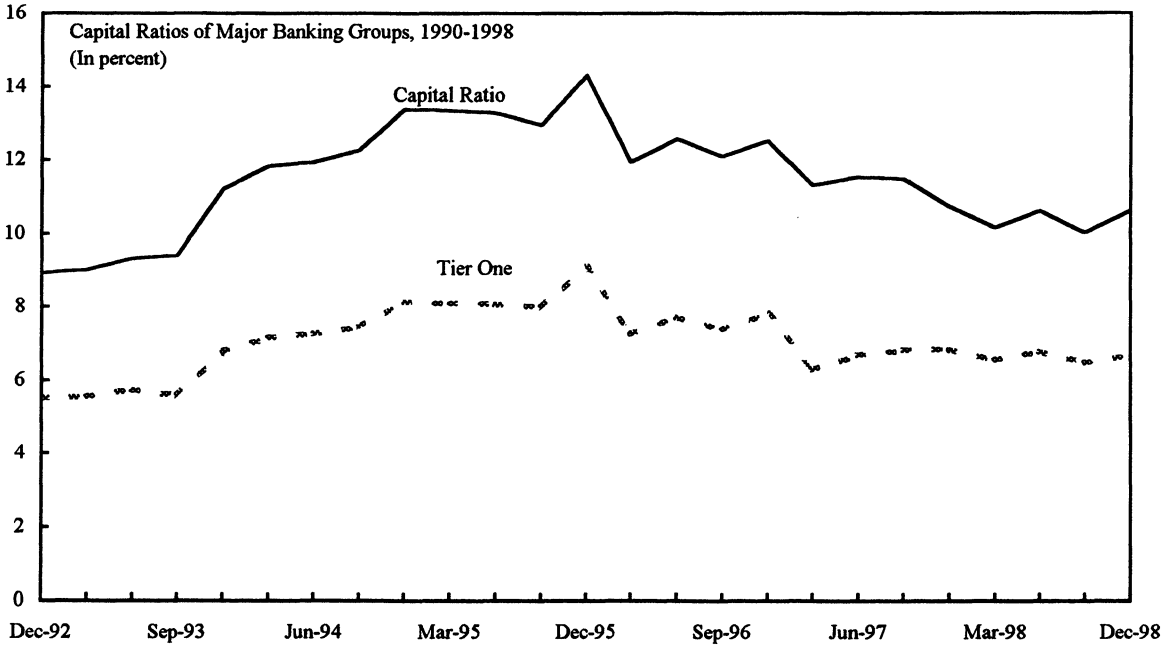
[50] More generally, banking sector preparations for the advent of the Euro have been going on for some years, based on the assumption that Sweden would enter EMU. Swedish banks are thus already offering services in Euro. The preparatory work has covered areas such as reorganization, education, information technology and product development. Inter alia, a parallel payments system was developed to allow banks (and the postal and giro systems) to make payments in Euro.

[51] This partly reflects declining interest spreads as, inter alia, falling inflation expectations have decreased longer rates (relevant to lending) compared to shorter rates (relevant to funding).

Figure IV-3. Sweden: Bank Earnings and Capital





Source: Riksbank.

especially difficult if the expected benefits of recent consolidation moves do not come to fruition.[52]

21. Banks' capital positions are also generally adequate, and comfortably above the statutory minimum. However, they have declined from the peaks reached in the mid-1990s, reflecting the effect of various strategic acquisitions and mergers, the phasing out of some large property investments, and reacceleration of bank lending growth in recent years. Overall capital remains at or above 10 percent of risk-weighted assets for the major banking groups, while the tier I capital ratio is around 6½ percent (Figure IV-3, Chart 2).[53]

Risk exposures

22. As noted in the Staff Report the risk of a significant resurgence in loan losses appears low currently, notwithstanding accelerating bank lending. Corporate bankruptcies have continued to decline (falling by 17 percent in 1998), and the risk of new insolvencies appears low overall according to various indicators of firms' capacity to pay, including the continued decline in the corporate debt-equity ratio from around 2 in 1994 to under 1.5 in 1998 for a sample of large companies.[54] Loans to the property sector, though accelerating, do not seem to be a major concern at this stage, with faster lending growth being recorded for property lending to households than to real estate companies.[55] With relatively high levels of indebtedness, these companies have benefited from the interest rate reductions to date (with the interest coverage ratio for sampled large companies increasing from under 2.5 in 1994 to approximately 3 in 1998). They are, however, very sensitive to any future interest rate

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[52] If unduly high target rates of return are retained, there may be a risk that banks turn to riskier assets over time to generate higher returns.

[53] In addition, capital to total assets is at or above 4 percent for three of the large banks, and a little under 4 percent for the fourth. In their most recent published report on Financial Sector Trends, the FSA also concluded that the positions of securities companies and insurance companies were relatively stable and robust and that, like the banks (see text), they had not been significantly harmed by the turbulence in international financial markets last year.

[54] In addition, according to a classification of corporate risks developed by the Riksbank and the Business and Credit Information Agency, the proportion of firms in the two highest risk categories has been falling for the last four years and is low (around 6.7 percent).

[55] Historically, lending to households has resulted in fewer loan losses that credit to firms. Rising credit to households more generally is resulting in an increase in the ratio of household debt to disposable income from historically low levels, but at the same time, the ratio of interest expenses to disposable income continues to fall. There appears to be scope for households' debt burden to continue increasing for some time, though this in turn will increase the vulnerability to interest rate increases or cyclical deterioration.

changes. Property prices themselves have continued to rise (albeit unevenly on a regional basis), but this seems to mainly reflect declines in interest rates and an apparent rise in real rental rates, rather than speculative excesses.

23. The direct exposure of the Swedish financial system to East Asia, Latin America and Russia is quite limited, and the effects of the international financial market difficulties have not been substantial to date (Figure IV-4). Indeed, in a number of cases, the banks acted quite promptly to reduce exposure to these regions as problems became apparent. By the end of 1998, banks' loans to those regions amounted to only around 5 percent of outstanding credit to nonresidents. Indirect exposure, however, seems to be more important, especially through wholesale market exposure to banks in the United States and western Europe. In particular, counterparty and settlement risk exposures to such banks have built up substantially in the last few years.

24. Counterparty and settlement risks more generally are one of the main sources of potential vulnerability for the Swedish banking system. This includes exposure among domestic institutions, as well as the exposure to foreign institutions, through foreign exchange, security, and derivative markets. Improved monitoring and reporting of such risks is planned, but since such exposures can change very quickly, the more fundamental issue is the need for continued strengthening of applicable risk management processes. The regulatory authorities have indicated that they intend to work towards strengthened international rules on risk management in foreign exchange trading (where such exposures are largest),[56] and have noted that exposure limits may need to be extended to cover counterparty and settlement risks more effectively.[57]

25. One subcategory here is stock market-related risks, which however appear to be small for the main Swedish banks, both in terms of direct and indirect exposures. For example, despite being very active on the stock market, securities companies are relatively well protected against the effects of stock market movements as the majority of share trading is on customers' behalf; while bank direct loan exposure to such companies is a very small share of total bank credit.[58] In addition, the acceleration in stock market prices over the last year or so,

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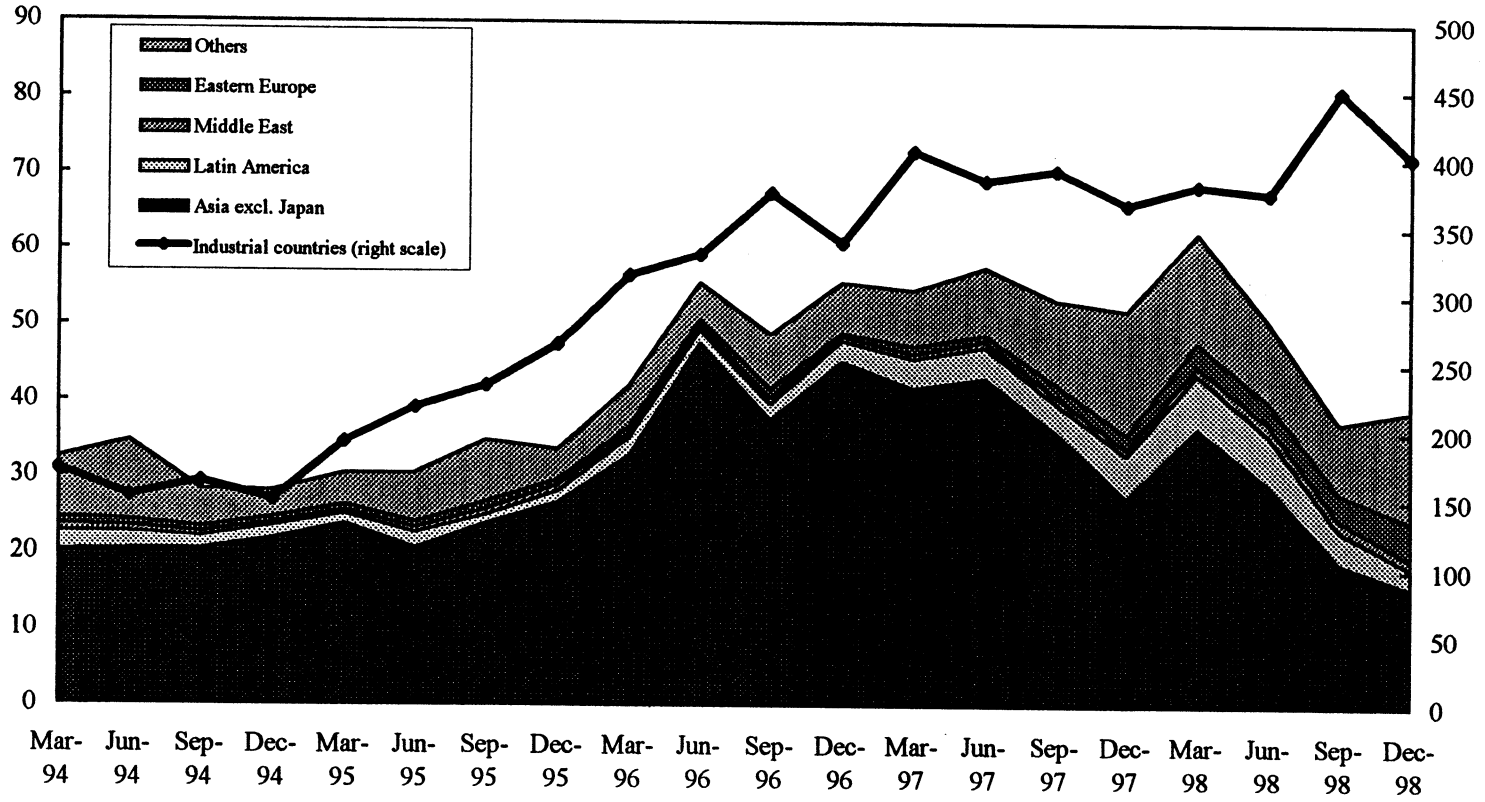
[56] The authorities have pointed to the recent closure of ECHO, a clearing house for foreign exchange transactions, as an important factor increasing the onus on banks to manage carefully their foreign exchange settlement exposures. ECHO had been the only means of handling foreign exchange settlement risks through an international intermediary.

[57] Bank exposure to housing institutions, through large holdings of housing paper, is another identified vulnerability in this area.

[58] Also, securities companies are not direct participants in the payments system, but need to channel their payments through banks who guarantee liquidity for the payments.

Figure IV-4. Sweden: The Banks' Exposures to Foreign Banks by Region
(In billions of SEK)



Source: The Riksbank.

like that in property prices, has to a large extent reflected reduced interest rates and does not at this stage appear to be inconsistent with fundamentals.[59] Nevertheless, the prospects for the Swedish equity market are linked importantly to major international markets, and a large, sharp downturn in those markets would be unlikely to leave the Swedish market unscathed.

Y2K issues

26. The Swedish financial system and its main participants are reported to be well prepared for the Y2K transition, but of course the need continues for close monitoring of this potentially important vulnerability. The FSA has investigated the state of Y2K preparations in around 500 financial sector organizations, ranging from banks to exchanges, to payment processing institutions. It has undertaken specific on-site examinations of around 90 of them. In the FSA's March 1999 report to Government on this issue,[60] it noted that most of these institutions had carried out tests of internal systems without serious problems arising. External system tests took place over the first half of 1999, and contingency plans had been, or were in the process of being, set up. Before the fourth quarter of 1999, the FSA intends to publish a list of the institutions that will not conclude their preparatory work in time for the new millennium. Meanwhile, the Riksbank has been undertaking tests on the payments system infrastructure in cooperation with banks, while also preparing contingency plans for providing back-up, manual, means of payment. In addition, the Riksbank has built up a contingency reserve of notes that would allow for a doubling of the current note issue, in case there is a sharp increase in the demand for cash. Banks have ample liquid assets to finance such an increase in the note issue if needed.

The policy framework

27. At an organizational level, both the FSA and the Riksbank have roles in the oversight of the financial system. The FSA is charged with promoting the stability and efficiency of the financial system and contributing to effective consumer protection. To this end, it is the supervisor for both bank and nonbank financial institutions, the latter including credit market companies, securities companies and exchanges, and insurance companies and brokers. The Riksbank's work is intended to complement the FSA's, but with a somewhat different focus derived from concerns about systemic risks that may arise from or be spread through the payments system, or that might force it to act in its capacity as lender of last resort. There are statutory obligations for the two organizations to consult and for information reported by

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[59] Indeed, since the mid-1990's Swedish interest rates have declined quite significantly relative to rates in the United States, for example.

[60] *The Financial Sector, Information Systems and Year 2000*, Government Report 1999:2, March 29, 1999, Finansinspektion.

financial institutions to be shared between them. At an operational level, the organizations work together quite closely, for example in joint contingency planning exercises.

28. A third institutional leg of the financial sector policy framework is the Deposit Guarantee Board (DGB), a small organization that operates a form of deposit insurance facility consistent with EU criteria. This facility superceded the blanket government guarantee of bank deposits established during the banking crisis. All nonfinancial institution deposits are covered by the guarantee, to a limit of SKr 250,000 per depositor.[61] The enabling legislation establishes an annual premium averaging 0.5 percent of covered deposits, which allows some small degree of risk adjustment of premia according to capital ratios. The premia are deposited in an interest bearing account at Sweden's National Debt Office, and any call on the facility in excess of paid-in premia would be funded through borrowing from that office.

29. The prudential regulatory framework in Sweden has been significantly upgraded over the 1990s, through the incorporation of almost all EU directives (especially as regards capital adequacy, large exposure limits, and the like) into the local regulatory framework. Nevertheless, the authorities have acknowledged that a number of aspects of the regulatory framework—some referred to above—need further strengthening. The main priorities identified by the authorities include further modernization of regulation and supervision of capital and risk exposures in coordination with the Basle process;[62] improved regulation and supervision of complex financial groups (potentially combining banking, securities market activities, insurance and fund management); further clarification of rules covering home versus host country control of cross-border banking organizations;[63] and improved standards, including in respect of capital, in the securities markets. In addition, proposals are being developed for revisions to the general banking legislation.[64]

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[61] An analogous investor compensation scheme covers investments with securities companies. Direct equity investments are not covered by this arrangement however.

[62] Aspects of particular importance include the need to allow scope for differentiation in the supervisory approach to capital, according to the nature of a bank and its activities; to address explicitly risks other than credit and market risks; to allow for better differentiation of capital charges against credit risk; to allow appropriately for new financial techniques, while closing loopholes and arbitrage opportunities in the current credit risk rules. See Norgren (1999) for more detail.

[63] Following the recent conclusion of an agreement in this area with the Finnish supervisory authorities, the FSA is contemplating the possibility of applying similar principles more broadly, including in respect of branches (rather than subsidiaries) of international banks.

[64] Current proposals are to clarify the distinction between bank and credit market companies, in terms of (direct) participation in the payment system; reduce restrictions on organizational

(continued...)

30. At a more general level, the banks need to have appropriate incentives to assess for themselves the capital backing for different risk exposures and to avoid window dressing or similar activities designed to minimize regulatory capital requirements in artificial ways. There is a risk that some banks will instead rely unduly on meeting (and "managing") the regulatory minima for capital backing and other prudential standards. Although it is clear that market participants' overall awareness and ability to manage important risks has improved significantly since the banking crisis of the early 1990s, there is still more to do in this constantly evolving field.

31. In this context, a particularly important aspect of the supervision regime is on-site examinations, which have been increasingly focussed on risk management processes and internal controls. As a practical matter, the examination process pays closest attention to around 15 large credit institutions, including the major banking companies and the major credit market (mortgage lending) companies. Particular attention is given in these examinations to verification of the magnitude, and especially management processes for market risk; compliance with related prudential requirements; and the size and handling of settlement risk in foreign exchange transactions. The assessments here include organizational aspects such as the existence of a business plan in relation to risk management, board-level involvement, and appropriate separation and independence of risk management units; comprehensive reporting of all on and off-balance sheet risks; and risk identification, measurement and control functions and internal audit.

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structure and investments; and require banks to have sufficient financial strength, to maintain transparency, and to be able to identify, measure and control risks.

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