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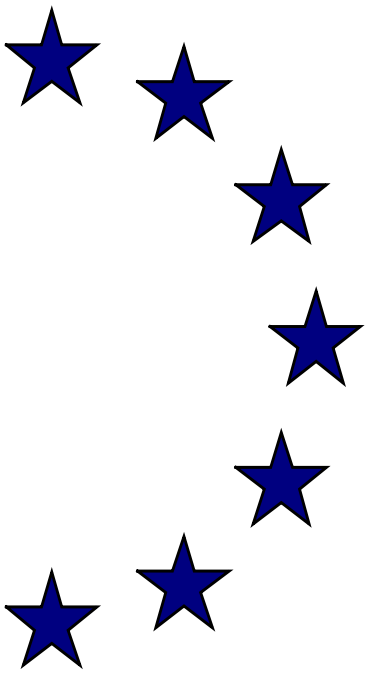

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Production function approach to calculating potential growth and output gaps – estimates for the EU Member States and the US

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PRODUCTION FUNCTION APPROACH TO CALCULATING POTENTIAL GROWTH AND OUTPUT GAPS
- ESTIMATES FOR THE EU MEMBER STATES AND THE US -

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INTRODUCTORY REMARKS

CONCEPT OF POTENTIAL OUTPUT : Any meaningful analysis of cyclical developments, of medium term growth prospects or of the stance of fiscal and monetary policies are all predicated on either an implicit or explicit assumption concerning the rate of potential output growth. Such pervasive usage in the policy arena is hardly surprising since potential output constitutes the best composite indicator of the aggregate supply side capacity of an economy and of its scope for sustainable, non-inflationary, growth. Given the importance of the concept, it is hardly surprising that the measurement of potential output is the subject of contentious and sustained research interest. Of course since it is an unobserved variable, before starting to measure it one must firstly clarify exactly what one means by the concept. This concept signifies different things to different people, especially when discussed over various time horizons, with the concept appreciated differently when placed in a short, medium or long term perspective :

- In the ***short run*** (i.e. less than one year), the physical productive capacity of an economy may be regarded as being quasi fixed and its comparison with the effective / actual output developments (i.e. in output gap analysis) shows by how much total demand can develop during that short period without inducing supply constraints and inflationary pressures.

- In the ***medium term*** (i.e. over the next five years), the expansion of domestic demand when it is supported by a strong upturn in the amount of productive investment may endogenously generate the productive output capacity needed for its own support. The latter is all the more likely to occur when profitability is high and either increased or supported by an adequate wage evolution with respect to labour productivity.

- Finally, in the ***long run*** (i.e. 10 years and beyond) the notion of full employment potential output is linked more to the future evolution of technical progress (or total factor productivity) and to the likely growth rate of labour potential. For the latter, the EU is paradoxically in a much better position than the US, thanks to its present very low employment rate (with respect to the population of working age) and its very high rates of structural and cyclical unemployment (as a proportion of the active population).

These medium and long run considerations should always be kept in mind when discussing potential output since the latter is often seen in an excessively static manner in some policy making fora, where the growth of capacity is often presented as invariant not only in the short run (where such an assumption is warranted) but also over the medium term as if the projection of fixed investment had no impact on productive capacity.

MEASURING POTENTIAL GROWTH FOR USE AS AN OPERATIONAL SURVEILLANCE TOOL : Notwithstanding the importance of the concept, and the consequent desire for clarity, the measurement of potential growth is far from straightforward and, being unobservable, can only be derived from either a purely statistical approach or from a full econometric analysis. It is clear however that conducting either type of analysis requires a number of arbitrary choices, either at the level of parameters (in statistical methods) or in the theoretical approach and choice of specifications, data and techniques of estimation (in econometric work). In other words, all the available

methods have "pros" and "cons" and none can unequivocally be declared better than the alternatives in all cases. Thus, what matters is to have a method adapted to the problem under analysis, with well defined limits and, in international comparisons, one that deals identically with all countries. This is the approach which is adopted in the present paper where the objective is to produce an economics based, production function, method which could be used for operational EU policy surveillance purposes.

The preference for an economic, as opposed to a statistical, approach was driven by a number of considerations. For example, with an economics based method, one gains the possibility of examining the underlying economic factors which are driving any observed changes in the potential output indicator and consequently the opportunity of establishing a meaningful link between policy reform measures with actual outcomes. An additional advantage of using an economic estimation method is that it is capable of highlighting the close relationship between the potential output and NAIRU concepts, given that the production function (PF) approach to calculating potential output requires estimates to be provided of "normal" or equilibrium rates of unemployment. At a wider level, another advantage is the possibility of making forecasts, or at least building scenarios, of possible future growth prospects by making explicit assumptions on the future evolution of demographic, institutional and technological trends. However, whilst economic estimation would appear to overcome, at least partially, many of the concerns in terms of appraising policy effectiveness which are linked to statistical approaches, on the negative side difficulties clearly emerge with regard to achieving a consensus amongst policy makers on the modelling and estimation methods to be employed. Policy makers are fully aware of these latter trade-offs which make any decision making process, regarding the specific details of the PF approach to calculating potential output, a difficult one to undertake in practice.

The PF estimates presented in this paper must therefore be assessed in the light of the above set of predetermined requirements and given the difficult trade-offs involved. Since the primary use of the methodology described in this paper is as an operational surveillance tool in the assessment of the annual stability / convergence programmes of the EU's Member States, it was important that the methodology respected a number of basic principles given the politically sensitive nature of the dossier. The main requirements from this PF approach is that it be a simple and fully transparent methodology where the key inputs and outputs are clearly delineated and where equal treatment of all of the EU's Member States is assured. In addition, given that the estimates are to be used for budgetary surveillance purposes, it was felt important to take a prudent view regarding the assessment of the past and future evolution of potential growth in the EU. In fact this was one of the explicit demands made when policy makers called for a new method to be developed for assessing structural budget balances since it was felt that past surveillance exercises had on a number of occasions produced an excessively optimistic picture of the degree of budgetary improvement in the upswing phase of previous cycles. This optimism was linked to some extent with the cyclicality of the trend GDP estimates which had been calculated using the HP filter statistical method and via which the estimates of structural budget balances had been generated. Consequently one of the key objectives laid out for the new PF methodology was to reduce the degree of cyclicality of the potential growth estimates to an absolute minimum in order to avoid

the mistakes of the past. This bias towards a prudent or cautious view is evident in all aspects of the PF estimation process, including for the elaboration of the medium-term extension to the method for the period 2004-2006.

Finally, it should be stressed that the methodology described in the paper should not be seen in static terms since there is a strong likelihood that specific details of the approach will continue to be amended in the years to come on the basis of the practical experience garnered from using the methodology in the annual budgetary surveillance exercises.

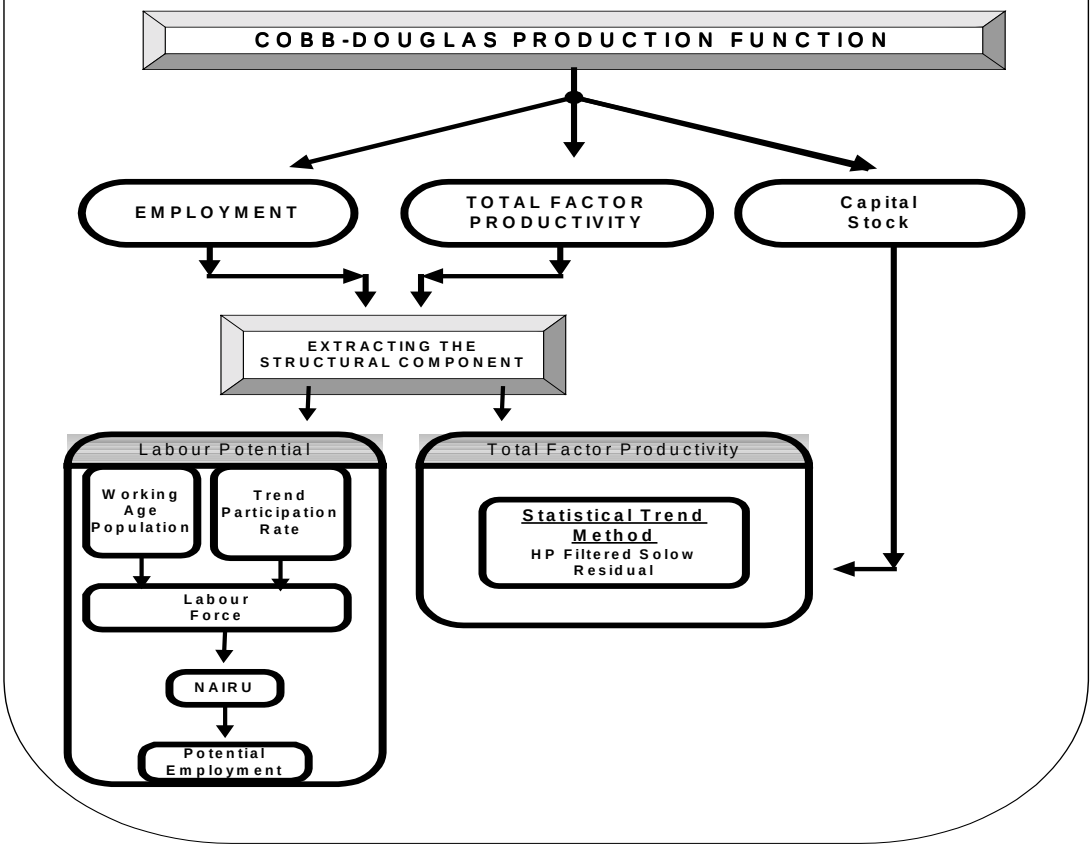
STRUCTURE OF PAPER : In terms of content, the paper is laid out as follows. Section 1 provides an overview of the PF methodology in conceptual terms, including a description of the Kalman Filter inspired NAIRU estimation method. Section 2 goes on to present the results from applying the methodology to the EU15, the Euro Zone as well as the US. A description of the results produced when applying the medium term extension to the EU15 and Euro Zone aggregates is also presented. In the concluding remarks section of the paper, the issue of making future changes to the methodology is tentatively explored, with some operating principles being suggested which could form the basis for any such modifications.

SECTION 1 : MEASUREMENT OF POTENTIAL OUTPUT USING A PRODUCTION FUNCTION APPROACH

1.1 OVERVIEW OF APPROACH

Instead of making statistical assumptions on the time series properties of trends and their correlation with the cycle, the production function approach makes assumptions based on economic theory. This latter approach focusses on the supply potential of an economy and has the advantage of giving a more direct link to economic theory but the disadvantage, as explained earlier, is that it requires assumptions on the functional form of the production technology, returns to scale, trend technical progress and the representative utilisation of production factors. As shown in graph 1, with a production function, potential GDP can be represented by a combination of factor inputs, multiplied with the technological level or total factor productivity (TFP). The parameters of the production function essentially determine the output elasticities of the individual inputs. With the Cobb-Douglas specification, it is necessary to estimate the trend components of the individual production factors, except capital. Since the capital stock is not detrended, estimating potential output amounts therefore to removing the cyclical component from both labour and TFP.

GRAPH 1 : MEASURING POTENTIAL OUTPUT USING A PRODUCTION FUNCTION APPROACH



COBB-DOUGLAS PRODUCTION FUNCTION[1] : In more formal terms, with a production function, GDP (Y) is represented by a combination of factor inputs - labour (L) and the capital stock (K) -, corrected for the degree of excess capacity (U_L, U_K) and adjusted for the level of efficiency (E_L, E_K). In many empirical applications, including the Quest II model, a Cobb Douglas specification is chosen for the functional form. This greatly simplifies estimation and exposition. Thus potential GDP is given by:

$$(1) \qquad Y = (U_L L\ E_L)^{\alpha} (U_K K E_K)^{1-\alpha} = L^{\alpha} K^{1-\alpha} * TFP$$

where total factor productivity (TFP), as conventionally defined, is set equal to :

$$(2) \qquad TFP = (E_L^{\alpha} E_K^{1-\alpha})(U_L^{\alpha} U_K^{1-\alpha})$$

which summarises both the degree of utilisation of factor inputs as well as their technological level. Factor inputs are measured in physical units. An ideal physical measure for labour would be hours worked. Unfortunately this information is not available for all Member States and the statistical information is not easily comparable across countries. Therefore we measure labour input simply by the number of employees. This implies that any changes in working time will be reflected in the efficiency index. For capital we use a comprehensive measure which includes spending on structures and equipment by both the private and government sectors.

Various assumptions enter this specification of the production function, the most important ones are the assumption of constant returns to scale and a factor price elasticity which is equal to one. The main advantage of this assumption is simplicity. However these assumptions seem broadly consistent with empirical evidence at the macro level. The unit elasticity assumption is consistent with the relative constancy of nominal factor shares. Also, there is little empirical evidence of substantial increasing/decreasing returns to scale (see, e.g.; Burnside et al. for econometric evidence).

The output elasticities of labour and capital are represented by α and $(1-\alpha)$ respectively. Under the assumption of constant returns to scale and perfect competition, these elasticities can be estimated from the wage share. The same Cobb-

[1] **CHOICE OF PRODUCTION TECHNOLOGY – WHY USE COBB-DOUGLAS ?** One of the big advantages of using Cobb-Douglas is undoubtedly its simplicity, in that it is easy to make sense out of the coefficients imposed. The Cobb Douglas assumption greatly simplifies estimation of output elasticities, conditional on an assumption on returns to scale. With a high average degree of competition in the goods market, the output elasticities can be equated to their respective factor shares. Thus, there is only one parameter to estimate. While a large variety of views on alternative specifications to the Cobb-Douglas approach of constant factor shares are available, one needs to be aware of the implications associated with these alternatives. For example, if one chooses to adopt an elasticity of less than 1, one is left with the problem of explaining why wage shares have fallen recently. If one goes for the alternative assumption of using an elasticity of greater than 1, then the lack of econometric evidence to support using such a function needs to be taken into account. Consequently, given the difficulties associated with the alternatives, the Cobb-Douglas assumption of unity appears to be a reasonable compromise. In addition, of course, if one were to use a CES function with an elasticity of 0.8 or 1.2 the results would not differ very strongly from Cobb-Douglas. Finally, the aggregation problem associated with having a mixture of low and high skilled workers in the workforce would also appear to lend support to the Cobb-Douglas view. In this regard, if you aggregate over both sets of workers one would come close to Cobb-Douglas, with low skilled workers having a high elasticity of substitution (EoS) with capital (EoS > 1) balancing out the low EoS associated with high skilled workers (EoS < 1). High skilled workers have generally a low EoS since such workers are regarded as being more complementary to K. This view regarding the distinction between low and high skilled workers is supported by a paper by Krussell et al. published in *Econometrica* in September 2000.

Douglas specification is assumed for all countries, with the mean wage share for the EU15 over the period 1960-2000 being used as the estimate for the output elasticity of labour, which gives a value of .63 for α for all Member States and, by definition, .37 for the output elasticity of capital. While the output elasticity for labour may deviate somewhat from the imposed mean coefficient in the case of individual Member States, such differences should not seriously bias the potential output results.

To summarise therefore, in moving from actual to potential output it is necessary to define clearly what one means by potential factor use and by the trend (i.e. normal) level of efficiency of factor inputs.

- **CAPITAL** : With respect to capital this task of defining potential factor use is straightforward since the maximum potential output contribution of capital is given by the full utilisation of the existing capital stock in an economy. Since the capital stock is an indicator of overall capacity there is no justification to smooth this series in the production function approach. In addition, the unsmoothed series is relatively stable for the EU and the US since although investment is very volatile the contribution of capital to growth is quite stable since net investment in any given year is only a tiny fraction of the capital stock figures. In terms of the measurement of the capital stock, the perpetual inventory method is used which makes an initial assumption regarding the size of the capital / output ratio.
- **LABOUR** : The definition of the maximum potential output contribution of employment is more involved since it is more difficult to assess the "normal" degree of utilisation of this factor of production. Since there is no strict physical limit, the definition that we therefore apply is the level of employment consistent with stable, non accelerating, (wage) inflation (NAWRU) - (see Section 1.2 for details). Potential employment is generated from a smoothed labour force series which is generated by applying a HP filtered participation rate to the working age population figures. With the smoothed participation rate leading to a less volatile labour force series, potential employment is then set equal to the labour force minus the NAIRU estimates for the respective countries. One of the big advantages of this approach is that it generates a potential employment series which is relatively stable whilst at the same time also providing for year-to-year changes to the series to be closely linked to long run demographic and labour market developments in areas such as the working age population, trend participation rates and structural unemployment.
- **TREND EFFICIENCY** : Within the production function framework, potential output refers to the level of output which can be produced with a "normal" level of efficiency of factor inputs, with this trend efficiency level being measured as the HP filtered Solow Residual.

Normalising the full utilisation of factor inputs as one, potential output can be represented as follows :

(3) $$Y^P = (L^P E_L^T)^{\alpha} (K E_K^T)^{1-\alpha}.$$

1.2 NAIRU ESTIMATION METHOD

THE THEORETICAL MODEL

By now there exists a large literature on Kalman Filter estimates of the NAIRU or alternatively the output gap or trend GDP. A seminal contribution, using the Kalman Filter for output gap estimation is Kuttner (1994) for the US. Gerlach and Smets (1999) have applied a variant of the Kuttner model to EMU data. A prominent reference for NAIRU estimation is Gordon (1997). In a series of papers Apel and Jansson (1999a,1999b) have applied this methodology to Sweden, the UK, the US and Canada. Recently, the OECD (2000) has taken up this approach for the estimation of NAIRU's in OECD countries. The theoretical specification chosen here heavily draws on the existing literature.

The idea behind Kalman filtering when applied to the estimation of the NAIRU is essentially the following. Firstly, the unemployment rate is assumed to be composed of an unobserved cyclical and trend component. The Kalman Filter extracts these components subject to certain general specifications of the processes generating the cyclical and trend components. Both components are, however, treated differently as regards the economic information used. No attempt is made to model the trend component using economic information which could potentially explain structural shifts in the unemployment rate. These factors are regarded as unobservable. Instead a time series model which captures the general statistical properties of the unemployment trend, such as the non stationarity of the structural component is specified. More economic information is used for modelling the cyclical component of unemployment. Especially the link between changes in wage inflation and cyclical unemployment as expressed in the Phillips curve is used in identifying the cyclical component. This section briefly outlines the model.

The observed unemployment rate (U_t) is decomposed into a trend (T_t) and a cyclical component (C_t)

(1) $$U_t = T_t + C_t .$$

To make this decomposition economically meaningful and interpretable, macroeconomic theory is used to help identify the cyclical component. For this purpose a Phillips curve relationship is postulated which links the change in wage inflation ($\Delta\pi_t^w$) to the unemployment gap C_t plus other exogenous/predetermined variables X_t such as lagged changes in the unemployment rate or terms of trade shocks. Other unobserved shocks are captured by the error term u_t which can be autocorrelated

(2) $$\Delta\pi_t^w = \mu + \gamma X_t + \beta C_t + u_t \quad with \quad u_t = \sum_{i=0}^{I} \theta_i \varepsilon_{t-i}$$

Besides having predictive power for wage inflation, the cyclical component of unemployment must also obey certain business cycle restrictions:

- It should be an autocorrelated process, preferably second order**.**
- It should be stationary.
- It should have a sample mean of zero.

Such a process is characterised by the following equation

(3) $C_t = \phi_1 C_{t-1} + \phi_2 C_{t-2} + v_t$

where stationarity requires $\phi_1 + \phi_2 < 1$. Notice, this is a rather parsimonious specification. More economic information could in principle be used to specify the cyclical component.

Finally the model is closed by specifying the trend component. No economic theory is used here for the moment. The trend component is simply modelled as a random walk with drift

(4) $T_t = \mu_t + T_{t-1} + z_t$

The drift term itself is allowed to follow a random walk

(5) $\mu_t = \mu_{t-1} + a_t$

The drift term can either be a constant or itself a random walk. Both *z* and *a* are IID. In the estimation results presented below we allow the drift term to be stochastic in all cases. The rationale for choosing such a specification is the observed non-stationarity of the unemployment rate.

ESTIMATION METHOD

The equations (1), (2), (3), (4) and (5) of the model postulated above are estimated with maximum likelihood for each individual member state on annual data over the period 1963 to 2003. Both Newton type and simulated annealing algorithms are used to find the maximum of the likelihood function. The Newton algorithm has the advantage of being fast but may converge to a local maximum, while the SA algorithm searches for a global maximum. However, we also encounter an estimation problem that has been noticed before, namely that certain assumptions regarding the smoothness of the NAIRU need to be made a priori in order to arrive at plausible results.

SMOOTHNESS OF THE NAIRU: While with the Kalman Filter, the standard deviation of the trend innovations can in principle be estimated, there exists the problem often encountered in this literature that the estimated trends either appear too smooth or too excessive. In practice this problem is often overcome by fixing the variance of the

estimated unemployment trend (see, for example Gordon (1997) or OECD (2000)). Gordon suggests a "smoothness prior" which allows the NAIRU to move "subject to the qualification that sharp quarter to quarter zig zags are ruled out." A literature survey conducted by the Bank of England (1998) arrives at the conclusion that values for the variance of the trend innovation, relative to the inflation innovation in the range between .1 and .5 are usually chosen. We have generally restricted the variance of the trend innovation close to the lower bound of .1 in order to generate smooth NAIRU series. It must be noted that the likelihood function appears to be rather flat with respect to alternative smoothness priors, i.e. a likelihood ratio test does not reject this bound. If one is interested in maximum smoothness there seems to be a criterion which can be used, namely the stationarity requirement of the cyclical unemployment component.. For each choice of the smoothing factor a unit root test for the cyclical component can be carried out by transforming equation (3) into first differences

$$(3'') \qquad \Delta C_t = (\phi_1 + \phi_2 - 1)C_{t-1} - \phi_2 \Delta C_{t-1} + v_t$$

and testing whether the coefficient of the lagged level term in equation (3'') is significantly different from zero. The t statistics from this regression suggest that we can reject non-stationarity. Therefore judged by this criterion the trend chosen for the unemployment rate does not seem to be too smooth.

ESTIMATION RESULTS

The estimation results are contained in Tables 1a and 1b and are based on a broadly harmonised specification across countries, with a uniform sample length starting in 1963 now applied. As can be seen, for most countries, the results obey the theoretical predictions of the model. The unemployment gaps have clear cyclical properties as shown by an estimated stationary AR(2) process (i.e. a second order autoregressive process) with highly significant coefficients which are typical for cyclical variables. The coefficients in the Phillips curve equation always have the correct sign but they are not always significant at conventional significance levels. However, a uniform specification that would be valid for all countries could not be found. For some countries, notably the Scandinavian countries, the change of the unemployment rate seems to be more important for explaining changes in wage inflation than the unemployment gap rate while for other countries the unemployment gap plays a more crucial role. In terms of the actual results, a comparison with the NAIRU estimates from other international organisations reveals that the estimated unemployment trends are fairly similar, although for some countries there are differences concerning the average level of the NAIRU, with ECFIN tending to be somewhat higher. These level differences are most likely due to the fact that both the OECD and the IMF do not formally impose the restriction that the cyclical unemployment component sums to zero over the sample period.

TABLE 1A: ESTIMATION RESULTS WITH ANNUAL DATA : KALMAN FILTER (1963-2003)

	BELGIUM	GERMANY	DENMARK	SPAIN	FRANCE	GREECE	IRELAND
PHILLIPS CURVE							
CYCLICAL COMPONENT (-1)	-.55	-.26**	-.52*	-.41*	-.29**	-.29*	-.07*
UNEMPLOYMENT RATE (1. DIFF.)		-.47**	-.14(*)	-.54**			
R2**	0.10	.25	.32	.23	.26	0.12	.20
IS CURVE							
CYCLICAL COMPONENT (-1)	1.41**	1.25**	1.06**	1.47**	1.02**	1.53**	1.52**
CYCLICAL COMPONENT (-2)	-.60**	-.65**	-.52**	-.73**	-.11**	-.76**	-.54**
T-STATISTIC (UNIT ROOT)	-3.42	-4.73	-3.43	-5.14	-3.07	-4.23	-1.96
-2LOGLIKE	136.27	132.13	143.72	114.37	140.22	120.22	244.95

* Denotes significance at the 10% level.

** Denotes significance at the 5% level

TABLE 1B: ESTIMATION RESULTS WITH ANNUAL DATA : KALMAN FILTER (1963-2003)

	ITALY	LUX	NETHS	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK
PHILLIPS CURVE								
CYCLICAL COMPONENT (-1)	-14*	-0.45*	-.46**	-.62*	-.16			-.29**
UNEMPLOYMENT RATE (1. DIFF.)	-.31**			-.41**	-.25*	-.30**	-.27**	-.53**
R2**	0.27	.57	.27	.29	.12	.18	.12	.25
IS CURVE								
CYCLICAL COMPONENT (-1)	1.34**	.93**	.97**	.81**	1.41**	1.53*	1.42**	1.22**
CYCLICAL COMPONENT (-2)	-.63**	-.20**	-.42**	-.47**	-.80**	-.76*	-.64**	-.71*
T-STATISTIC (UNIT ROOT)	-3.68	-3.43	-2.07	-3.97	-3.58	-4.71	-4.82	-4.72
-2LOGLIKE	141.96	84.52	145.99	146.07	137.09	133.09	139.13	127.51

* Denotes significance at the 10% level.

** Denotes significance at the 5% level

GRAPH 2 : BREAKDOWN OF EURO ZONE ACTUAL UNEMPLOYMENT RATE INTO ITS TREND (=NAIRU) AND CYCLICAL COMPONENTS

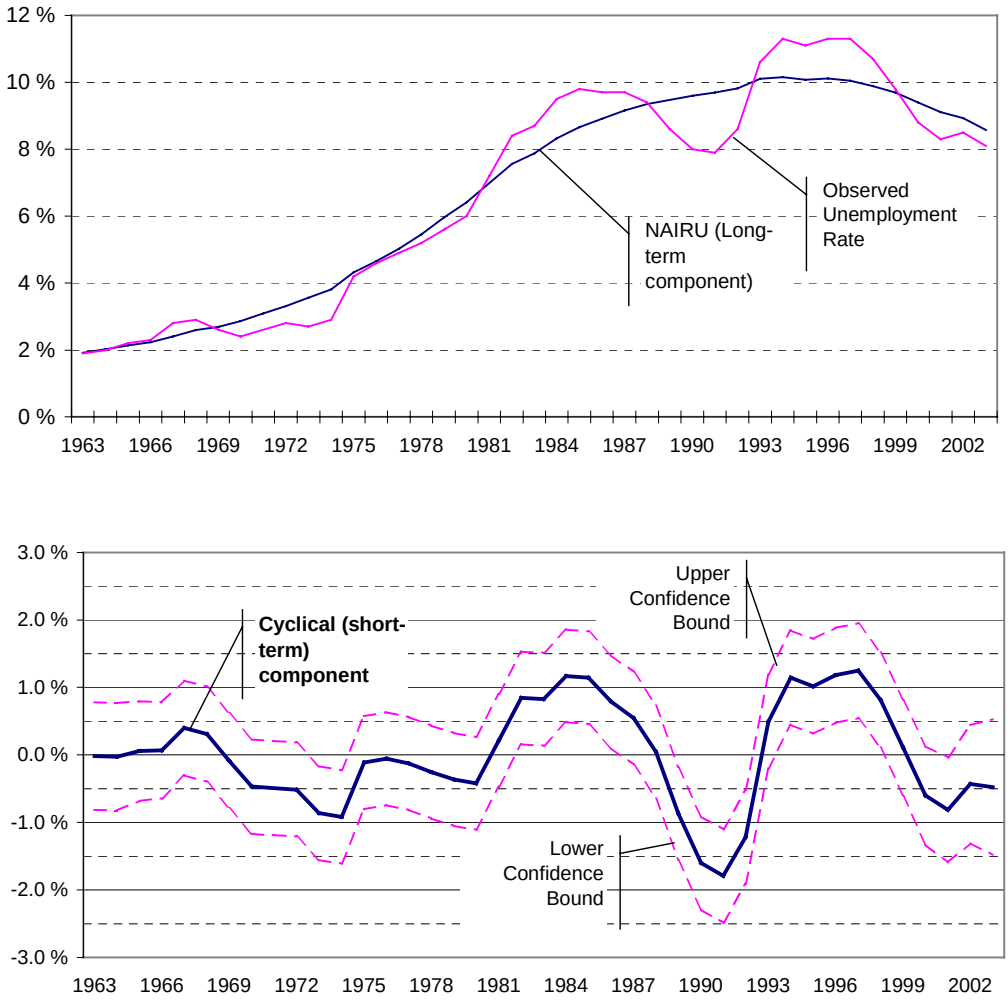


TABLE 2 : BREAKDOWN OF EURO ZONE ACTUAL UNEMPLOYMENT RATE INTO ITS TREND (=NAIRU) AND CYCLICAL COMPONENTS

	1963	1968	1973	1978	1983	1988	1993	1998	2003
Trend Component (i.e. NAIRU)	1.9	2.6	3.6	5.5	7.9	9.4	10.1	9.9	8.6
Cyclical Component	0.0	0.3	-0.9	-0.3	0.8	0.0	0.5	0.8	-0.5
Observed Unemployment Rate	1.9	2.9	2.7	5.2	8.7	9.4	10.6	10.7	8.1

NB: These results are estimated by the Kalman filter algorithm when applying the theoretical model to aggregated Euro zone data. The Euro zone NAIRU used for the calculation of output gaps (see section 2) results from the aggregation of the estimated NAIRU's for the individual member states.

SECTION 2 : POTENTIAL OUTPUT AND OUTPUT GAP ESTIMATES - EU15, EURO ZONE AND US

2.1 ESTIMATES FOR EU15, EURO ZONE AND US (1981-2003)

ESTIMATES OF POTENTIAL OUTPUT AND OUTPUT GAPS : This sub-section presents estimates (in graphical and tabular form) on the growth rate of potential output in the EU15, Euro Zone and the US based on the variant of the production function approach presented in Section 1. In addition to the potential growth estimates, the tables and graphs presented also include actual growth rates and the associated output gaps[2], as well as the decomposition of potential growth into its respective labour, capital and TFP components, for each year of the period 1981-2003. In addition, in order to provide an insight into the key driving forces behind the figures, the series for the important determining variables which lie behind these estimates are also provided, namely trend total factor productivity, Kalman Filter derived NAIRU's, the population of working age, participation rate changes and finally the investment to GDP ratio. All the estimates have been calculated on the basis of clear assumptions regarding the latter exogenous variables and using the following data sources and inputs : for the historical period the series have been taken from ECFIN's AMECO databank, with the Commission services final Spring 2002 forecasts for the years 2002-2003 being used. These latter forecasts have been produced by ECFIN's country desk officers. Finally, annex 1 contains a series of equivalent tables and graphs for all of the individual Member States of the EU.

COMPARISON OF EU15, EURO ZONE AND US : GROWTH COMPONENTS : When comparing the growth contributions of labour, capital and TFP in the EU15 / Euro Zone over the last two decades compared with the experience of the US over the same period, there are striking differences. As shown in the accompanying graphs and tables, the US boom in the 1990's is clearly driven by capital formation and an acceleration of TFP, with the annual average growth rate increasing from 2 ¾% over the period 1991-1995 to 3 ½% for the period 1996-2000. The figures for Europe are clearly less impressive in terms of the overall growth rate acceleration and the compositional changes are also different to that of the US. While growth accelerated in both the EU15 and the Euro Zone in recent years, when one looks at period averages one sees that for 1996-2000 the potential growth rate averaged 2.2-2.3% in both areas which is virtually identical to the outturn achieved for 1991-1995. In terms of the composition of potential growth, both the EU15 and the Euro Zone both witnessed an improvement of about a ¼ of a % point in the contribution of labour to growth over the 1996-2000 period, with this gain being largely offset by small declines in the remaining components of growth (see Annex 2).

[2] It should be noted that the ECFIN production function approach is estimated to ensure that the output gaps produced are symmetric i.e. the mean of the output gap over the sample period is zero. In addition, the data for EU15 and the Euro Zone shown in this paper differ slightly from those of ECFIN's AMECO database since for illustrative purposes the production function methodology is applied directly to the aggregated AMECO series.

TABLE 3 : EUROPEAN UNION (EU15) OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-0.7	-0.6	2.0	2.0	0.1	0.9	1.0	1.1	66.6	7.7	19.9
1982	-1.9	-1.6	2.0	2.0	0.1	0.7	1.1	1.1	66.6	8.4	19.3
1983	-2.1	-2.0	2.1	2.2	0.4	0.7	1.1	1.0	66.6	8.8	18.9
1984	-1.9	-1.7	2.1	2.1	0.3	0.7	1.1	0.9	66.6	9.2	18.8
1985	-1.7	-1.2	2.2	2.1	0.2	0.7	1.2	0.5	66.6	9.5	18.9
1986	-1.3	-0.7	2.3	2.2	0.3	0.7	1.2	0.4	66.7	9.6	19.3
1987	-1.0	-0.1	2.4	2.3	0.3	0.8	1.2	0.4	66.8	9.7	19.9
1988	0.7	1.6	2.4	2.5	0.4	0.9	1.3	0.4	66.9	9.7	21.1
1989	1.9	2.5	2.4	2.7	0.5	1.0	1.2	0.5	67.0	9.6	22.0
1990	2.7	2.6	2.4	2.8	0.6	1.0	1.2	0.6	67.1	9.5	22.2
1991	2.3	1.9	2.3	2.5	0.4	0.9	1.2	0.5	67.2	9.5	21.5
1992	1.3	0.7	2.2	2.3	0.3	0.8	1.1	0.4	67.3	9.5	21.0
1993	-1.3	-1.5	2.2	1.9	0.1	0.6	1.1	0.4	67.4	9.9	19.4
1994	-0.7	-0.8	2.2	2.1	0.3	0.6	1.1	0.3	67.6	10.0	19.5
1995	-0.5	-0.5	2.2	2.2	0.4	0.7	1.1	0.3	67.7	9.8	19.7
1996	-1.1	-0.9	2.2	2.1	0.4	0.7	1.0	0.3	67.9	9.8	19.7
1997	-0.8	-0.5	2.2	2.2	0.5	0.7	1.0	0.2	68.2	9.7	20.0
1998	-0.2	0.1	2.3	2.4	0.6	0.7	1.0	0.2	68.4	9.4	20.8
1999	0.1	0.2	2.3	2.5	0.7	0.8	1.0	0.2	68.7	9.0	21.3
2000	1.1	0.9	2.3	2.6	0.8	0.8	1.0	0.3	69.0	8.6	21.7
2001	0.3	0.0	2.3	2.6	0.8	0.7	1.0	0.4	69.3	8.3	21.2
2002	-0.5	-0.8	2.3	2.5	0.7	0.7	1.0	0.3	69.6	8.0	20.8
2003	0.0	-0.5	2.3	2.6	0.7	0.7	1.1	0.2	69.9	7.5	21.1
Periods	Period Averages										
1981-1990	-0.5	-0.1	2.2	2.3	0.3	0.8	1.2	0.7	66.7	9.2	20.0
1991-2000	0.0	0.0	2.2	2.3	0.4	0.7	1.1	0.3	67.9	9.5	20.5
1991-1995	0.2	0.0	2.2	2.2	0.3	0.7	1.1	0.4	67.4	9.8	20.2
1996-2000	-0.2	0.0	2.3	2.3	0.6	0.7	1.0	0.3	68.4	9.3	20.7
2001-2003	0.0	-0.4	2.3	2.5	0.8	0.7	1.0	0.3	69.6	7.9	21.0

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH 3 : EUROPEAN UNION (EU15) OUTPUT GAP AND DETERMINANTS

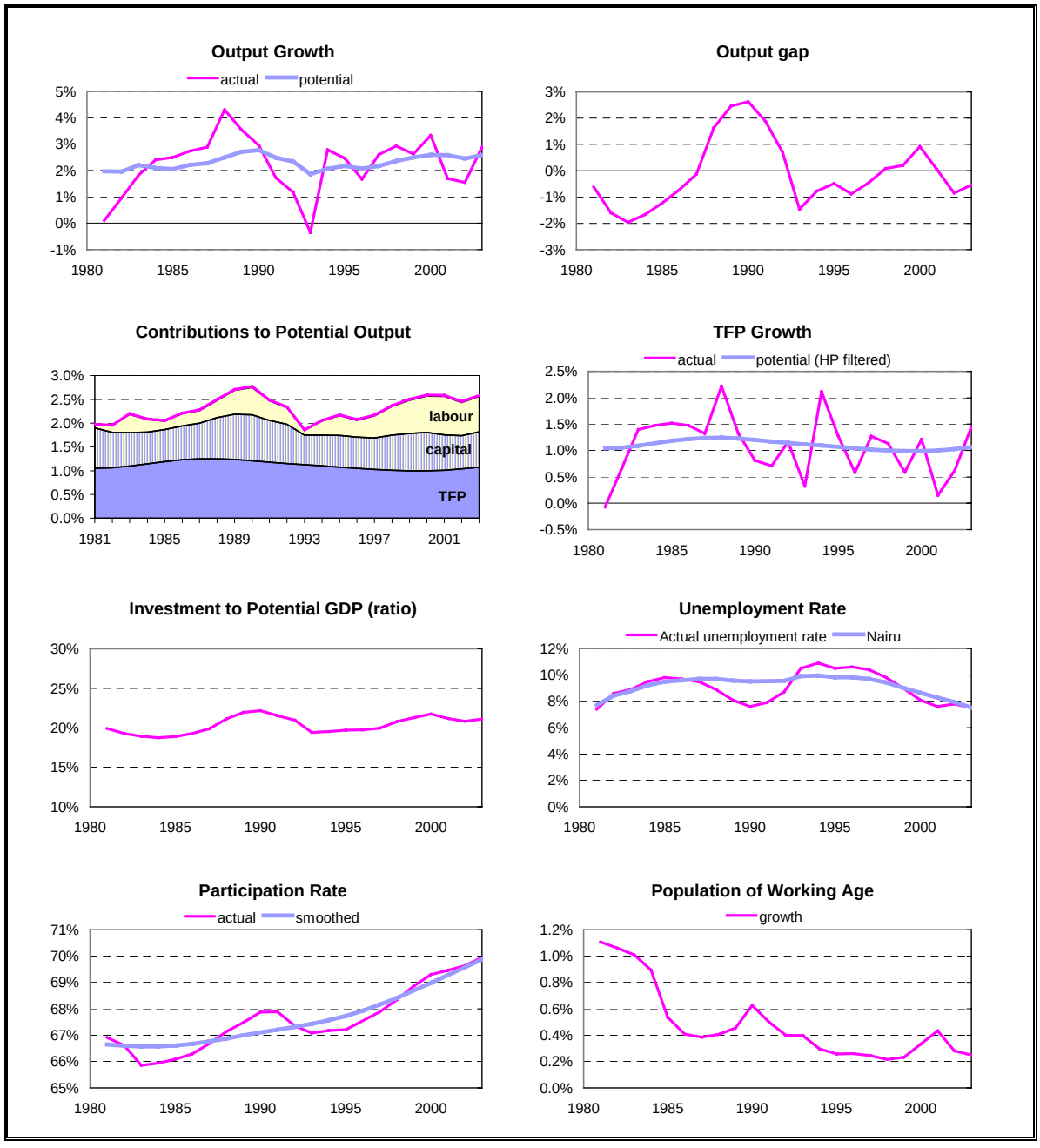


TABLE 4 : EURO ZONE (EU12) OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-0.1	0.1	2.1	2.2	0.2	1.0	1.0	1.3	64.7	7.7	21.3
1982	-1.5	-1.2	2.1	2.0	0.2	0.8	1.0	1.2	64.7	8.5	20.3
1983	-2.0	-1.9	2.1	2.2	0.4	0.8	1.0	1.1	64.6	8.8	19.8
1984	-1.9	-1.7	2.1	2.0	0.2	0.7	1.1	0.9	64.6	9.3	19.3
1985	-1.9	-1.4	2.2	2.0	0.2	0.7	1.1	0.6	64.6	9.7	19.4
1986	-1.8	-1.1	2.3	2.1	0.2	0.7	1.2	0.4	64.6	9.8	19.8
1987	-1.7	-0.7	2.4	2.2	0.2	0.8	1.2	0.4	64.7	10.0	20.3
1988	0.0	1.0	2.5	2.5	0.3	0.9	1.2	0.5	64.8	10.0	21.4
1989	1.5	2.2	2.5	2.7	0.5	1.0	1.2	0.5	64.9	9.9	22.3
1990	2.8	2.8	2.4	2.9	0.6	1.0	1.2	0.7	65.0	9.8	22.8
1991	2.9	2.7	2.3	2.6	0.5	1.0	1.2	0.6	65.1	9.8	22.5
1992	2.2	1.6	2.3	2.5	0.4	0.9	1.1	0.5	65.3	9.8	22.0
1993	-0.8	-1.1	2.2	1.9	0.2	0.7	1.1	0.5	65.5	10.3	20.2
1994	-0.6	-0.9	2.1	2.0	0.3	0.7	1.0	0.3	65.7	10.4	20.2
1995	-0.5	-0.6	2.1	2.1	0.4	0.7	1.0	0.2	65.9	10.3	20.4
1996	-1.2	-1.1	2.1	2.0	0.4	0.7	0.9	0.2	66.2	10.3	20.3
1997	-1.0	-0.8	2.2	2.1	0.5	0.7	0.9	0.2	66.5	10.3	20.5
1998	-0.4	-0.2	2.2	2.3	0.6	0.7	0.9	0.2	66.8	10.1	21.1
1999	0.0	0.1	2.2	2.4	0.7	0.8	0.9	0.1	67.1	9.7	21.8
2000	1.1	1.0	2.3	2.5	0.8	0.8	0.9	0.3	67.5	9.3	22.3
2001	0.3	0.1	2.3	2.5	0.9	0.7	0.9	0.4	67.9	9.0	21.7
2002	-0.6	-0.8	2.3	2.4	0.7	0.7	0.9	0.2	68.2	8.7	21.3
2003	0.0	-0.5	2.3	2.5	0.8	0.7	1.0	0.2	68.6	8.2	21.6
Periods	**Period Averages**										
1981-1990	-0.7	-0.2	2.3	2.3	0.3	0.8	1.1	0.8	64.7	9.4	20.7
1991-2000	0.2	0.1	2.2	2.2	0.5	0.8	1.0	0.3	66.2	10.0	21.1
1991-1995	0.6	0.3	2.2	2.2	0.4	0.8	1.1	0.4	65.5	10.1	21.1
1996-2000	-0.3	-0.2	2.2	2.2	0.6	0.7	0.9	0.2	66.8	9.9	21.2
2001-2003	-0.1	-0.4	2.3	2.5	0.8	0.7	0.9	0.3	68.2	8.6	21.5

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH 4 : EURO ZONE (EU12) OUTPUT GAP AND DETERMINANTS

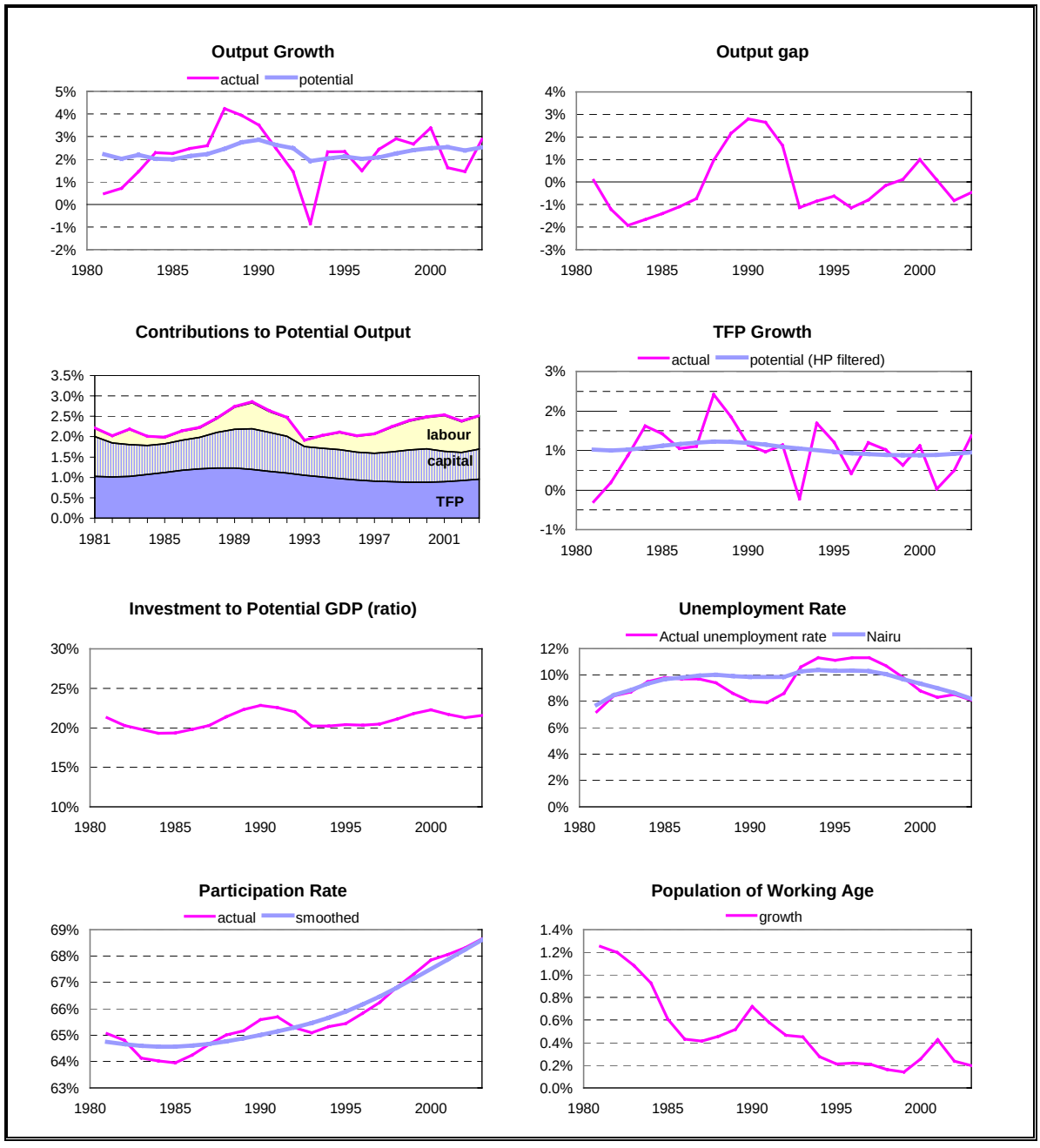
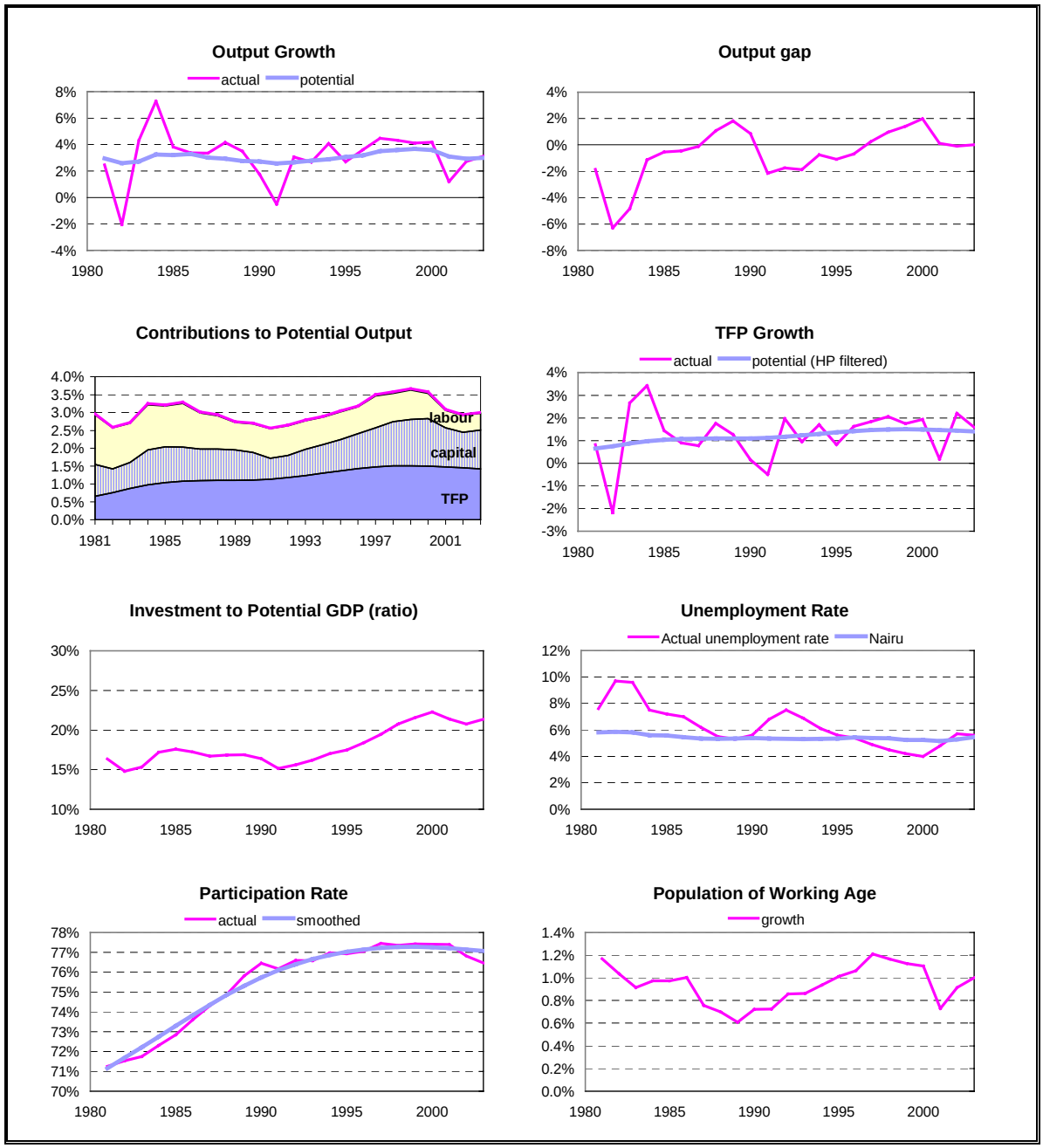


TABLE 5 : UNITED STATES (US) OUTPUT GAP AND DETERMINANTS

	Output Gap (% of Potential Output)	Potential Growth (annual % change)	Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
			Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-1.9	3.0	1.4	0.9	0.7	1.2	71.2	5.8	16.4
1982	-6.3	2.6	1.1	0.7	0.8	1.0	71.7	5.8	14.8
1983	-4.8	2.7	1.1	0.7	0.9	0.9	72.2	5.8	15.3
1984	-1.1	3.2	1.3	1.0	1.0	1.0	72.8	5.6	17.2
1985	-0.5	3.2	1.1	1.0	1.0	1.0	73.3	5.6	17.6
1986	-0.4	3.3	1.2	1.0	1.1	1.0	73.8	5.5	17.3
1987	-0.1	3.0	1.0	0.9	1.1	0.8	74.3	5.4	16.7
1988	1.1	2.9	0.9	0.9	1.1	0.7	74.8	5.3	16.8
1989	1.8	2.7	0.8	0.9	1.1	0.6	75.3	5.4	16.9
1990	0.9	2.7	0.8	0.8	1.1	0.7	75.7	5.4	16.4
1991	-2.1	2.6	0.8	0.6	1.1	0.7	76.1	5.3	15.1
1992	-1.8	2.7	0.8	0.6	1.2	0.9	76.4	5.3	15.6
1993	-1.9	2.8	0.8	0.7	1.2	0.9	76.7	5.3	16.2
1994	-0.7	2.9	0.8	0.8	1.3	0.9	76.9	5.3	17.0
1995	-1.1	3.0	0.8	0.9	1.4	1.0	77.0	5.4	17.5
1996	-0.7	3.2	0.7	1.0	1.4	1.1	77.1	5.4	18.4
1997	0.3	3.5	0.9	1.1	1.5	1.2	77.2	5.4	19.4
1998	1.0	3.6	0.8	1.2	1.5	1.2	77.3	5.4	20.7
1999	1.4	3.7	0.8	1.3	1.5	1.1	77.3	5.3	21.6
2000	2.0	3.6	0.7	1.3	1.5	1.1	77.3	5.2	22.3
2001	0.1	3.1	0.5	1.1	1.5	0.7	77.2	5.2	21.4
2002	-0.1	2.9	0.5	1.0	1.5	0.9	77.1	5.3	20.8
2003	0.0	3.0	0.5	1.1	1.4	1.0	77.1	5.5	21.3
Periods	**Period Averages**								
1981-1990	-1.1	2.9	1.1	0.9	1.0	0.9	73.5	5.6	16.5
1991-2000	-0.4	3.1	0.8	1.0	1.4	1.0	76.9	5.3	18.4
1991-1995	-1.5	2.8	0.8	0.7	1.2	0.9	76.6	5.3	16.3
1996-2000	0.8	3.5	0.8	1.2	1.5	1.1	77.2	5.3	20.5
2001-2003	0.0	3.0	0.5	1.1	1.5	0.9	77.1	5.3	21.2

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH 5 : UNITED STATES (US) OUTPUT GAP AND DETERMINANTS



2.2 MEDIUM-TERM EXTENSION (2004-2006) – EU15 AND EURO ZONE

While the production function derived potential output estimates for the EU15, the Euro Zone and the US presented in 2.1 provide a good picture of the present output capacity of both economies, they should not however be seen as forecasts of medium-term sustainable rates of growth but more as an indication of likely developments if past trends were to persist in the future. If, for example, a country's potential growth is 3% in 2003, it can only be sustained at that rate in future years if none of the underlying driving forces change. Any longer term assessment would need therefore to be based on a careful evaluation of the likelihood that present rates of growth for labour potential, productive capacity and TFP will persist over the time horizon to be analysed. By way of illustration as to the kind of numbers which emerge if one wished to carry out a simple technical extrapolation for the three years following the end of the forecast period, it was decided to produce such an exercise for the years 2004-2006. It is important to stress that this technical extension is in no way a forecast for these years, it is simply an attempt to illustrate what would happen if the trends of recent years were to continue on, using established and transparent ARIMA procedures.

It is in this context that the illustrative estimates for the years 2004-2006 for the EU15 and the Euro Zone which are shown at the end of this section should be assessed, with the potential growth rates for those years being calculated using the following key inputs :

- **1.TREND TOTAL FACTOR PRODUCTIVITY (TFP):** Trend TFP is modelled as the HP filtered Solow Residual. TFP can be calculated until the end of the short term forecast horizon, using the forecasts for GDP, employment and the capital stock. From 2004 until 2008 a TFP forecast is generated with a simple autoregressive model, where the log of current TFP is explained by a constant, a time trend and lagged values of TFP. Lags up to three years are allowed such as to render the residual white noise. This is the simplest time series representation and is likely to provide smooth projections. The HP trend is then calculated on the whole series up to 2008. Obviously, there is an end point bias problem in 2008. However, given that we are working under the technical assumption that output gaps will be closed in 2006 this bias does not seem to be severe.

- **2.KALMAN FILTER NAIRU'S**: The trend specification chosen for the NAIRU implies that the best prediction for the change in the NAIRU in future periods is the current estimate of the intercept. This basically implies that the slope of the NAIRU in 2003 should be used for the projection until 2006. Such a specification seems problematic for longer-term projections since it will eventually violate economic constraints (such as non-negativity of the NAIRU, for example). An alternative specification which is more consistent with the common notion of the NAIRU as a stable long run level of the unemployment rate would be a random walk without drift. This specification would imply a flat extrapolation of the last NAIRU value. Though this specification does not work well in estimation for European data where persistent trend changes of the unemployment rate can be observed, it may be

a more plausible specification for projections. The projections produced at the end of this section constitute a compromise between the two concepts. The NAIRU is projected according to the following rule:

$$NAIRU_{t+1} = NAIRU_t + .5*(NAIRU_t - NAIRU_{t-1})$$

In forecasting the NAIRU we allow 50% of the most recent decline. This implies that the NAIRU is practically stable in 2006, because after 3 years the change in the NAIRU only amounts to 12.5% of the decline in 2003.

- **3.POPULATION OF WORKING AGE**: In terms of a projection for the population of working age for the three years 2004-2006, since Eurostat periodically produce long range population projections for all of the EU's Member States, it was decided that the most recent Eurostat projections should be used for the extension to 2006.

- **4.PARTICIPATION RATE CHANGES** – While it would be more appropriate to split the overall participation rate into its male and female components, investigations into the feasibility of doing so suggested, at this stage at least, that without an improvement in data availability that this breakdown would not provide a significant degree of additional information over and above that provided by the total participation rate. The most significant problem was in terms of the timeliness of the data and the short sample length for the necessary series. While unharmonised data is available for most of the EU's Member States for the period 1983-2001, there are some significant gaps for a number of countries which result in EU15 data being available only over the period 1992-1997. In addition it should be stressed that this is unharmonised data, with a recent attempt by Eurostat to harmonise this data producing a broadly comparable series of figures, but only from 1990 and again with data for all the Member States only being available up until 1997. Due to these data constraints it was felt, at this point in time, to continue to work with the total participation rate series. On the basis of the forecasts by ECFIN desk officers for the labour force and the population of working age for the individual countries, the implied, detrended, total participation rate up to the end of the forecasting period (i.e. 2003) is produced and this latter series is extended to 2006 on the basis of simple autoregressive projections with an estimated time trend.

- **5.INVESTMENT TO (POTENTIAL) GDP RATIO** – Since the purpose of the exercise is to get an estimate for potential output in 2006, the investment to potential GDP series is used as an exogenous variable. An AR process allowing for a constant and a time trend is specified and estimated until 2003. Notice, this makes investment endogenous. For a constant investment to GDP ratio, investment responds to potential output with an elasticity equal to one.

TECHNICAL SPECIFICATION OF THE MODEL USED

The model used can be summarised as follows:

EXOGENOUS VARIABLES

- *POPW - (Population of Working Age)*
- *PARTS - (Smoothed Participation Rate)*
- *NAIRU - (Structural Unemployment)*
- *IYPOT - (Investment to Potential GDP Ratio)*
- *SRHP - (HP Filtered Solow Residual)*

ENDOGENOUS VARIABLES

- *LP - (Potential Employment)*
- *I - (Investment)*
- *K - (Capital Stock)*
- *YPOT -(Potential Output)*

1. POTENTIAL EMPLOYMENT

$$LP = POPW * PARTS * (1 - NAIRU)$$

2. INVESTMENT AND CAPITAL

$$I = IYPOT * YPOT$$

$$K = I + (1 - dep)K(-1)$$ [3]

3. POTENTIAL OUTPUT

$$YPOT = LP^{.65} K^{.35} SRHP$$

4. OUTPUT GAP

$$YGAP = (Y / YPOT - 1)$$

[3] The depreciation rate was assumed to remain constant over the projection period.

TABLE 6 : EUROPEAN UNION (EU15) OUTPUT GAP AND DETERMINANTS
MEDIUM TERM EXTENSION

	Output Gaps (% of Potential Output)	Potential Growth (annual % change)	Contributions to Potential Growth			Determinants of Labour Potential and Capital Accumulation			
			Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
2000	0.9	2.6	0.8	0.8	1.0	0.3	69.0	8.6	21.7
2001	0.0	2.6	0.8	0.7	1.0	0.4	69.3	8.3	21.2
2002	-0.8	2.5	0.7	0.7	1.0	0.3	69.6	8.0	20.8
2003	-0.5	2.6	0.7	0.7	1.1	0.2	69.9	7.5	21.1
2004	-0.4	2.3	0.5	0.7	1.1	0.1	70.2	7.3	20.9
2005	-0.2	2.3	0.4	0.7	1.1	0.1	70.5	7.2	20.8
2006	0.0	2.3	0.4	0.7	1.1	0.1	70.8	7.1	20.9

TABLE 7 : EURO ZONE (EU12) OUTPUT GAP AND DETERMINANTS
MEDIUM TERM EXTENSION

	Output Gaps (% of Potential Output)	Potential Growth (annual % change)	Contributions to Potential Growth			Determinants of Labour Potential and Capital Accumulation			
			Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
2000	1.0	2.5	0.8	0.8	0.9	0.3	67.5	9.3	22.3
2001	0.1	2.5	0.9	0.7	0.9	0.4	67.9	9.0	21.7
2002	-0.8	2.4	0.7	0.7	0.9	0.2	68.2	8.7	21.3
2003	-0.5	2.5	0.8	0.7	1.0	0.2	68.6	8.2	21.6
2004	-0.3	2.2	0.5	0.7	1.0	0.0	69.0	8.0	21.3
2005	-0.2	2.2	0.4	0.7	1.0	0.0	69.4	7.9	21.2
2006	0.0	2.2	0.4	0.7	1.0	0.0	69.8	7.8	21.4

CONCLUDING REMARKS

KEY GUIDING PRINCIPLES FOR FUTURE WORK ON THE PRDOUCTION FUNCTION METHODOLOGY

With regard to the specific issue of the present PF methodology, it is clear that since the PF method is envisaged to become the sole method to be used by the Commission services for calculating structural budget balances that the pressure for changing particular aspects of the approach will become intense over a short to medium term time horizon. It is important in this respect that any changes to the methodology are assessed on the basis of some basic operating principles, with the following the most important ones to be retained :

- **SIMPLICITY** : while many academically more complex suggestions could be put forward for changing the present PF methodology, the simplicity of the present approach, where the key inputs and outputs are clearly delineated, is something which should be retained in the future given the possible use of these figures in an operationally sensitive area such as structural budget balance calculations.

- **TRANSPARENCY / EQUAL TREATMENT FOR ALL MEMBER STATES** : This principle is closely linked with the first principle of simplicity, since individual Member States must be happy that any methodology which would be used for policy surveillance purposes is fully transparent and replicable as well as being as judgement free and automated as possible. In addition it is accepted that any changes to the methodology described in sections 1 and 2 should only occur following an open and fair consultation process with all of the Member States. Furthermore, adjustments for individual country specificities should be kept to an absolute minimum in any future revisions, with equal treatment for all countries being a principle which should be assiduously respected.

- **PRUDENCE** : One of the guiding principles which has been adhered to in drawing up the particular variant of the PF method presented in this paper is the need to take a "prudent" view regarding changes to the methodology in terms of assessing the past and future evolution of potential growth in the EU. In this regard the cyclicality of the estimates produced is a very serious issue, with the ideal PF method being one which produced a potential growth series which was less cyclical than the commonly used HP filter method, with output gaps growing quickly in the downswing and closing rapidly in the upswing. In this regard while it is accepted that at present the differences in terms of cyclicality between the PF and HP filter methods may be small, nevertheless reducing the cyclicality of the PF estimates to an absolute minimum should be actively striven for in any future changes to the method. This cyclicality issue is particularly important in avoiding the generation of an excessively optimistic picture for potential growth, and by implication structural budget balance positions, in the upswing stage of the cycle. Consequently any changes to the present estimation methodology must be biased towards taking a prudent view. In fact the medium term extension for the period 2004-2006, described in section 2.2, is an example of the prudence principle and especially the rules imposed regarding changes to the NAIRU and the population of working age, where a cautious position has been retained.

FUTURE RESEARCH AGENDA

While a lot of work has already been done in this area, it is clear that this is an ongoing research topic, with future research likely to be concentrated on the following themes :

- ongoing experimentation with new methodologies, most notably Kalman Filters, where consideration will be given to their use in areas other than in NAIRU estimation;
- examining the possibility of a further decomposition of the labour potential component of potential growth in terms of hours worked (see annex 3) and in terms of male and female participation rates.
- looking again at the issue of the cyclicality of the overall methodology and experimenting, in this context, with the use of capacity utilisation indicators or model simulations to estimate the size of any pro-cyclical estimation bias which may exist;
- and finally, a range of other issues will need to be looked at including, use of the capital services versus the perpetual inventory method in evaluating the capital component of potential growth; possible use of the vintage method for calculating total factor productivity; business sector potential growth versus total economy estimates; and finally, extending and deepening the analysis of "new" economy influences on potential growth developments.

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LIST OF ANNEXES

Note : All figures presented in these annexes are based on data available in mid-April 2002 in the AMECO databank and using the Commission services final Spring 2002 forecasts.

ANNEX 1 : DETAILED TABLES AND GRAPHS FOR THE 15 EU MEMBER STATES

TABLE A1.1 : BELGIUM OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	0.5	-0.4	1.9	1.7	-0.4	0.9	1.2	0.5	60.4	8.2	17.5
1982	-1.0	-1.6	1.9	1.6	-0.3	0.7	1.2	0.5	60.2	8.8	16.1
1983	-2.5	-3.4	1.9	2.2	0.5	0.5	1.2	0.8	60.0	8.6	14.8
1984	-2.0	-2.6	1.9	1.7	0.0	0.5	1.2	0.6	59.8	8.9	15.0
1985	-2.0	-2.5	2.0	1.8	0.0	0.5	1.2	0.3	59.7	8.8	15.7
1986	-2.4	-2.3	2.1	1.6	-0.2	0.5	1.2	0.1	59.6	9.0	16.0
1987	-1.8	-1.2	2.2	1.6	-0.2	0.6	1.2	0.0	59.5	9.3	16.7
1988	0.5	1.2	2.3	2.1	0.1	0.8	1.2	0.2	59.6	9.3	18.9
1989	2.0	2.6	2.3	2.5	0.3	1.0	1.2	0.1	59.7	9.1	20.8
1990	2.7	3.1	2.2	2.4	0.2	1.1	1.1	0.0	59.8	9.0	22.1
1991	2.3	2.4	2.2	2.4	0.4	0.9	1.0	0.0	60.0	8.7	20.6
1992	1.8	1.7	2.1	2.3	0.4	0.9	1.0	0.1	60.2	8.6	20.5
1993	-1.8	-1.8	2.1	2.1	0.4	0.8	1.0	0.2	60.5	8.7	19.5
1994	-1.2	-1.2	2.1	2.0	0.3	0.7	1.0	0.1	60.8	8.8	19.1
1995	-0.7	-0.9	2.1	2.3	0.5	0.8	1.0	0.0	61.1	8.5	19.7
1996	-1.7	-1.8	2.2	2.1	0.4	0.7	1.0	0.0	61.5	8.4	19.5
1997	-0.4	-0.5	2.2	2.3	0.5	0.7	1.0	0.0	61.8	8.3	20.4
1998	-0.5	-0.4	2.3	2.2	0.3	0.8	1.1	0.0	62.1	8.3	20.8
1999	0.2	0.2	2.3	2.4	0.5	0.8	1.1	0.1	62.4	8.1	21.0
2000	1.9	1.8	2.3	2.5	0.7	0.6	1.1	0.1	62.6	7.5	21.0
2001	0.6	0.4	2.3	2.4	0.7	0.6	1.1	0.4	62.9	7.3	20.6
2002	-0.5	-0.6	2.3	2.1	0.5	0.5	1.1	0.3	63.1	7.3	20.3
2003	0.0	-0.1	2.3	2.3	0.6	0.6	1.1	0.2	63.4	7.0	20.5
Periods	Period Averages										
1981-1990	-0.6	-0.7	2.1	1.9	0.0	0.7	1.2	0.3	59.8	8.9	17.4
1991-2000	0.0	0.0	2.2	2.3	0.5	0.8	1.0	0.1	61.3	8.4	20.2
1991-1995	0.1	0.1	2.1	2.2	0.4	0.8	1.0	0.1	60.5	8.7	19.9
1996-2000	-0.1	-0.1	2.3	2.3	0.5	0.7	1.0	0.1	62.1	8.1	20.6
2001-2003	0.1	-0.1	2.3	2.3	0.6	0.6	1.1	0.3	63.1	7.2	20.5

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.1 : BELGIUM OUTPUT GAP AND DETERMINANTS

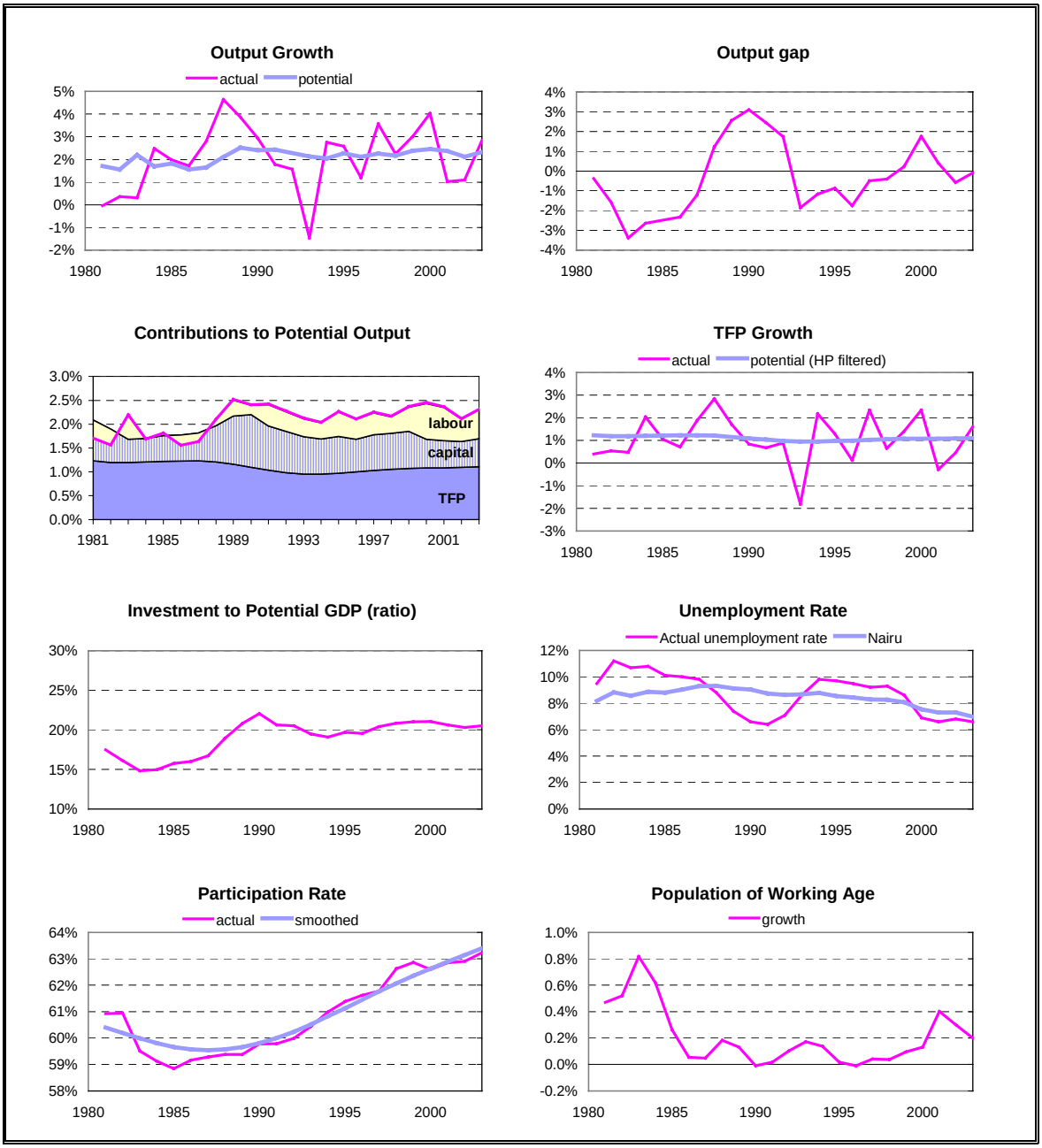


TABLE A1.2 : DENMARK OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-3.6	-2.8	1.5	0.4	-0.2	0.1	0.4	0.7	77.9	7.8	14.5
1982	-2.5	-1.7	1.5	1.5	0.8	0.2	0.5	0.6	78.4	7.8	15.3
1983	-2.3	-1.8	1.6	1.9	1.1	0.3	0.5	0.5	78.8	7.2	15.3
1984	-0.6	0.0	1.7	1.6	0.7	0.4	0.5	0.4	79.3	7.1	16.7
1985	1.3	1.6	1.7	2.0	0.8	0.6	0.6	0.3	79.7	6.9	18.7
1986	3.6	3.3	1.7	2.3	0.9	0.9	0.6	0.4	80.1	6.5	21.2
1987	2.0	1.3	1.6	1.9	0.5	0.7	0.6	0.5	80.4	6.5	20.7
1988	1.6	1.0	1.6	1.5	0.3	0.5	0.7	0.3	80.7	6.7	19.7
1989	0.2	-0.1	1.6	1.3	0.0	0.5	0.8	0.3	80.7	7.1	19.3
1990	-0.4	-0.7	1.6	1.6	0.1	0.4	1.0	0.4	80.7	7.2	18.6
1991	-0.9	-1.1	1.6	1.5	0.0	0.3	1.1	0.4	80.6	7.5	17.7
1992	-2.0	-1.9	1.8	1.5	0.0	0.2	1.3	0.3	80.4	7.6	17.1
1993	-3.9	-3.1	1.9	1.3	-0.3	0.1	1.4	0.3	80.1	8.1	16.2
1994	-0.6	-0.1	2.1	2.2	0.4	0.2	1.5	0.3	79.8	7.4	17.1
1995	-0.1	0.3	2.2	2.4	0.4	0.4	1.6	0.4	79.5	6.9	18.7
1996	0.1	0.4	2.3	2.4	0.3	0.4	1.6	0.4	79.3	6.6	18.9
1997	0.8	0.7	2.3	2.7	0.5	0.6	1.5	0.2	79.2	5.8	20.5
1998	0.9	0.8	2.3	2.4	0.2	0.6	1.5	0.1	79.1	5.5	22.0
1999	0.9	0.9	2.3	2.2	0.3	0.5	1.4	0.1	79.1	5.1	21.7
2000	1.6	1.5	2.3	2.4	0.4	0.7	1.3	0.1	79.1	4.7	23.5
2001	0.2	0.3	2.3	2.2	0.3	0.6	1.3	0.1	79.1	4.4	23.0
2002	-0.3	-0.1	2.2	2.2	0.2	0.7	1.2	0.1	79.2	4.3	23.5
2003	0.0	0.1	2.2	2.3	0.3	0.8	1.2	0.2	79.2	4.1	24.2
Periods	Period Averages										
1981-1990	-0.1	0.0	1.6	1.6	0.5	0.5	0.6	0.4	79.7	7.1	18.0
1991-2000	-0.3	-0.2	2.1	2.1	0.2	0.4	1.4	0.3	79.6	6.5	19.3
1991-1995	-1.5	-1.2	1.9	1.8	0.1	0.3	1.4	0.4	80.1	7.5	17.4
1996-2000	0.8	0.9	2.3	2.4	0.4	0.6	1.5	0.2	79.1	5.5	21.3
2001-2003	0.0	0.1	2.3	2.2	0.3	0.7	1.2	0.1	79.2	4.3	23.6

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.2 : DENMARK OUTPUT GAP AND DETERMINANTS

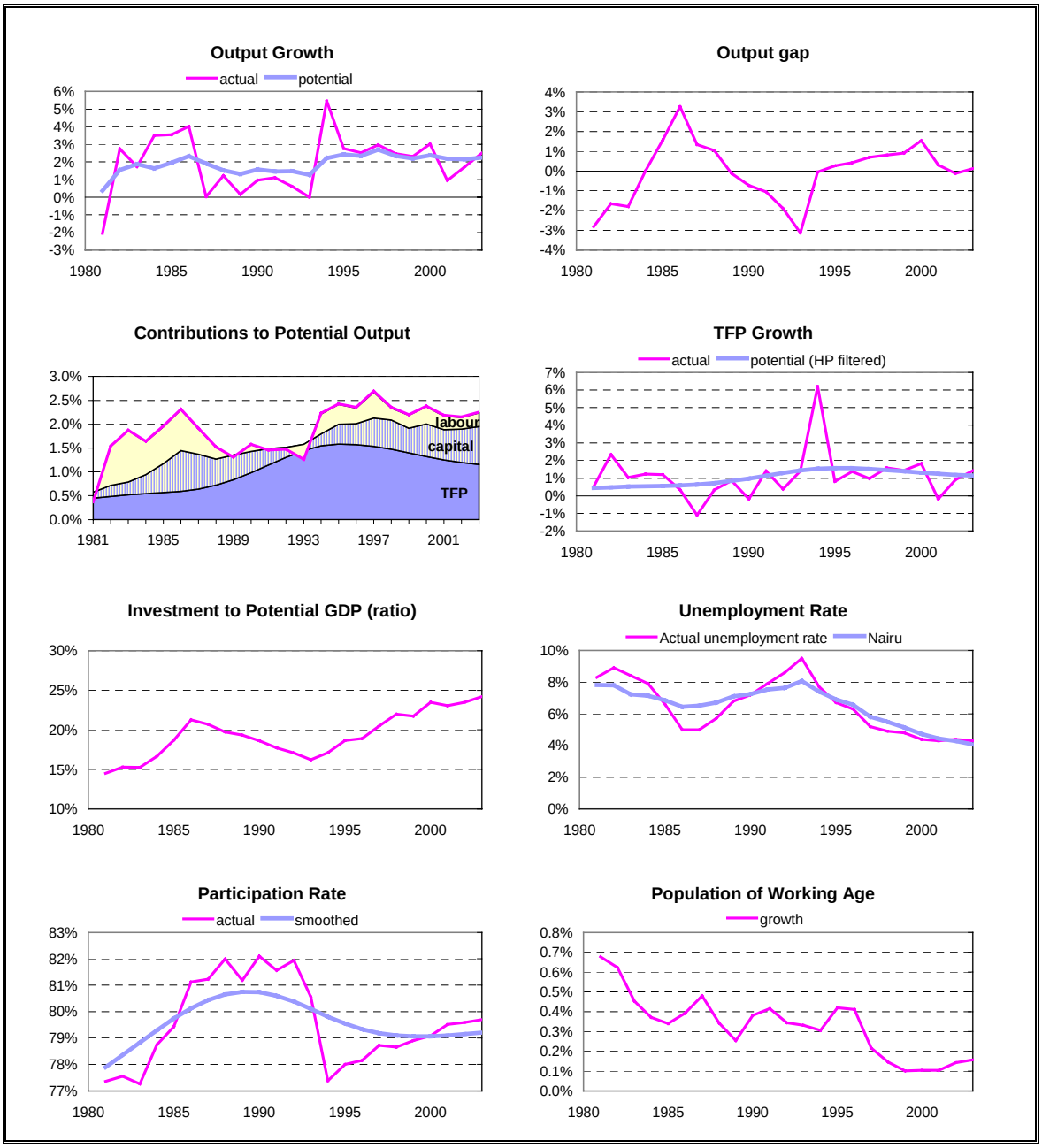


TABLE A1.3 : GERMANY OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	0.4	1.1	1.8	2.0	0.3	0.9	0.8	1.5	71.7	7.0	23.3
1982	-2.4	-1.5	1.8	1.7	0.1	0.7	0.9	1.3	71.7	8.0	21.6
1983	-2.5	-1.5	1.9	1.7	0.1	0.7	0.9	1.0	71.7	8.8	21.9
1984	-1.7	-0.7	2.0	2.0	0.3	0.7	1.0	0.6	71.8	9.1	21.5
1985	-1.9	-0.3	2.2	1.7	-0.1	0.6	1.1	0.2	71.8	9.5	21.1
1986	-1.8	-0.2	2.4	2.2	0.3	0.7	1.2	0.1	72.0	9.4	21.3
1987	-2.7	-0.8	2.5	2.2	0.2	0.7	1.3	0.1	72.1	9.4	21.3
1988	-1.6	0.3	2.6	2.5	0.4	0.7	1.4	0.3	72.2	9.2	21.6
1989	-0.6	0.8	2.7	3.1	0.9	0.8	1.5	0.7	72.3	8.8	22.3
1990	2.4	2.7	2.7	3.8	1.4	0.9	1.5	1.6	72.4	8.4	23.3
1991	4.3	4.5	2.6	3.2	0.8	0.9	1.5	0.9	72.4	8.1	23.9
1992	4.1	3.5	2.5	3.2	0.8	1.0	1.4	0.6	72.5	7.7	24.2
1993	0.6	0.1	2.3	2.3	0.2	0.8	1.2	0.5	72.5	7.9	22.6
1994	0.8	0.4	2.1	2.0	0.1	0.8	1.1	0.1	72.6	8.0	23.1
1995	0.6	0.2	2.0	2.0	0.2	0.8	1.0	0.2	72.7	8.0	22.5
1996	-0.5	-0.8	1.9	1.7	0.1	0.7	0.9	0.2	72.9	8.3	21.9
1997	-0.9	-0.9	1.8	1.5	0.0	0.7	0.9	0.1	73.0	8.7	21.7
1998	-0.7	-0.7	1.8	1.8	0.3	0.7	0.8	0.0	73.2	8.5	22.0
1999	-0.6	-0.5	1.7	1.7	0.2	0.7	0.8	-0.1	73.5	8.5	22.5
2000	0.6	0.6	1.7	1.9	0.3	0.7	0.8	0.1	73.7	8.4	22.6
2001	-0.5	-0.7	1.7	1.9	0.5	0.5	0.9	0.4	73.9	8.4	21.1
2002	-1.4	-1.5	1.8	1.6	0.2	0.5	0.9	0.0	74.2	8.3	20.3
2003	-0.5	-0.7	1.8	1.9	0.4	0.5	1.0	-0.1	74.4	8.0	20.6
Periods	Period Averages										
1981-1990	-1.3	0.0	2.3	2.3	0.4	0.7	1.2	0.7	72.0	8.8	21.9
1991-2000	0.8	0.7	2.0	2.1	0.3	0.8	1.0	0.3	72.9	8.2	22.7
1991-1995	2.1	1.8	2.3	2.5	0.4	0.9	1.2	0.5	72.6	7.9	23.3
1996-2000	-0.4	-0.4	1.8	1.7	0.2	0.7	0.8	0.1	73.3	8.5	22.1
2001-2003	-0.8	-1.0	1.8	1.8	0.4	0.5	0.9	0.1	74.2	8.2	20.6

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.3 : GERMANY OUTPUT GAP AND DETERMINANTS

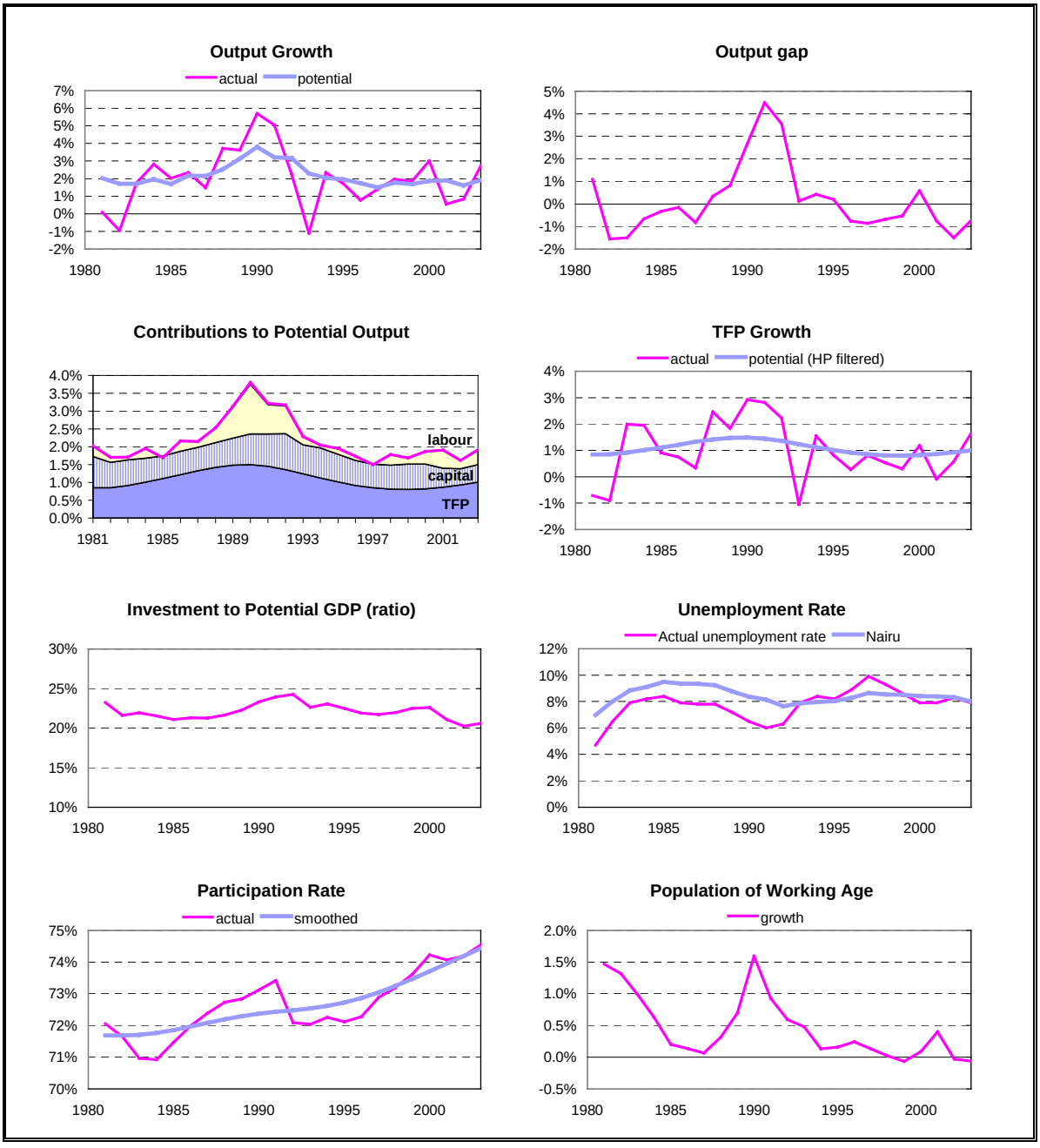


TABLE A1.4 : GREECE OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	0.7	0.0	1.4	1.5	0.9	1.4	-0.8	1.5	57.4	4.2	20.4
1982	-1.5	-1.9	1.1	0.8	0.6	1.2	-1.0	1.1	57.7	4.9	19.8
1983	-3.4	-3.8	0.9	0.8	0.6	1.3	-1.1	1.1	57.9	5.5	20.6
1984	-2.2	-2.4	0.8	0.6	0.7	0.9	-1.0	1.0	58.1	5.8	17.3
1985	-0.5	-0.5	0.8	0.5	0.4	1.0	-0.9	0.9	58.3	6.3	18.8
1986	-0.8	-0.6	0.8	0.7	0.4	1.0	-0.7	0.8	58.4	6.6	18.6
1987	-3.9	-3.3	0.9	0.4	0.1	0.9	-0.5	0.6	58.4	7.1	17.4
1988	-0.8	0.1	1.0	0.8	0.2	0.9	-0.3	0.6	58.5	7.4	18.4
1989	1.8	2.8	1.1	1.1	0.2	1.0	-0.2	0.7	58.5	7.8	19.5
1990	0.6	1.3	1.3	1.5	0.5	1.0	0.0	0.8	58.6	8.0	20.2
1991	2.3	2.3	1.4	2.1	0.9	1.0	0.1	1.6	58.7	8.3	20.7
1992	1.5	1.2	1.5	1.8	0.6	0.9	0.3	1.1	58.9	8.8	19.7
1993	-1.9	-2.2	1.7	1.8	0.5	0.8	0.4	0.8	59.1	9.2	18.7
1994	-1.8	-2.0	1.9	1.9	0.5	0.7	0.6	0.6	59.4	9.5	17.8
1995	-1.9	-2.0	2.2	2.0	0.4	0.7	0.8	0.4	59.8	9.8	18.2
1996	-2.0	-2.0	2.5	2.4	0.5	0.8	1.1	0.3	60.1	10.0	19.3
1997	-1.1	-1.1	2.8	2.7	0.5	0.9	1.3	0.3	60.5	10.1	20.1
1998	-0.8	-0.3	3.0	2.5	0.1	1.0	1.5	0.1	60.8	10.6	21.7
1999	-0.4	0.4	3.2	2.8	0.2	1.0	1.6	0.1	61.2	10.9	22.4
2000	0.2	1.2	3.4	3.3	0.5	1.1	1.7	0.0	61.4	10.6	23.3
2001	0.8	1.9	3.5	3.3	0.5	1.2	1.6	0.2	61.7	10.4	24.2
2002	0.9	2.6	3.6	3.1	0.2	1.3	1.5	0.2	61.9	10.6	25.8
2003	1.4	3.5	3.7	3.3	0.5	1.4	1.4	0.2	62.1	10.4	27.4
Periods	Period Averages										
1981-1990	-1.0	-0.8	1.0	0.9	0.5	1.1	-0.6	0.9	58.2	6.4	19.1
1991-2000	-0.6	-0.5	2.4	2.3	0.5	0.9	0.9	0.5	60.0	9.8	20.2
1991-1995	-0.4	-0.5	1.7	1.9	0.6	0.9	0.5	0.9	59.2	9.1	19.0
1996-2000	-0.8	-0.4	3.0	2.8	0.3	1.0	1.4	0.2	60.8	10.4	21.3
2001-2003	1.0	2.6	3.6	3.2	0.4	1.3	1.5	0.2	61.9	10.5	25.8

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.4 : GREECE OUTPUT GAP AND DETERMINANTS

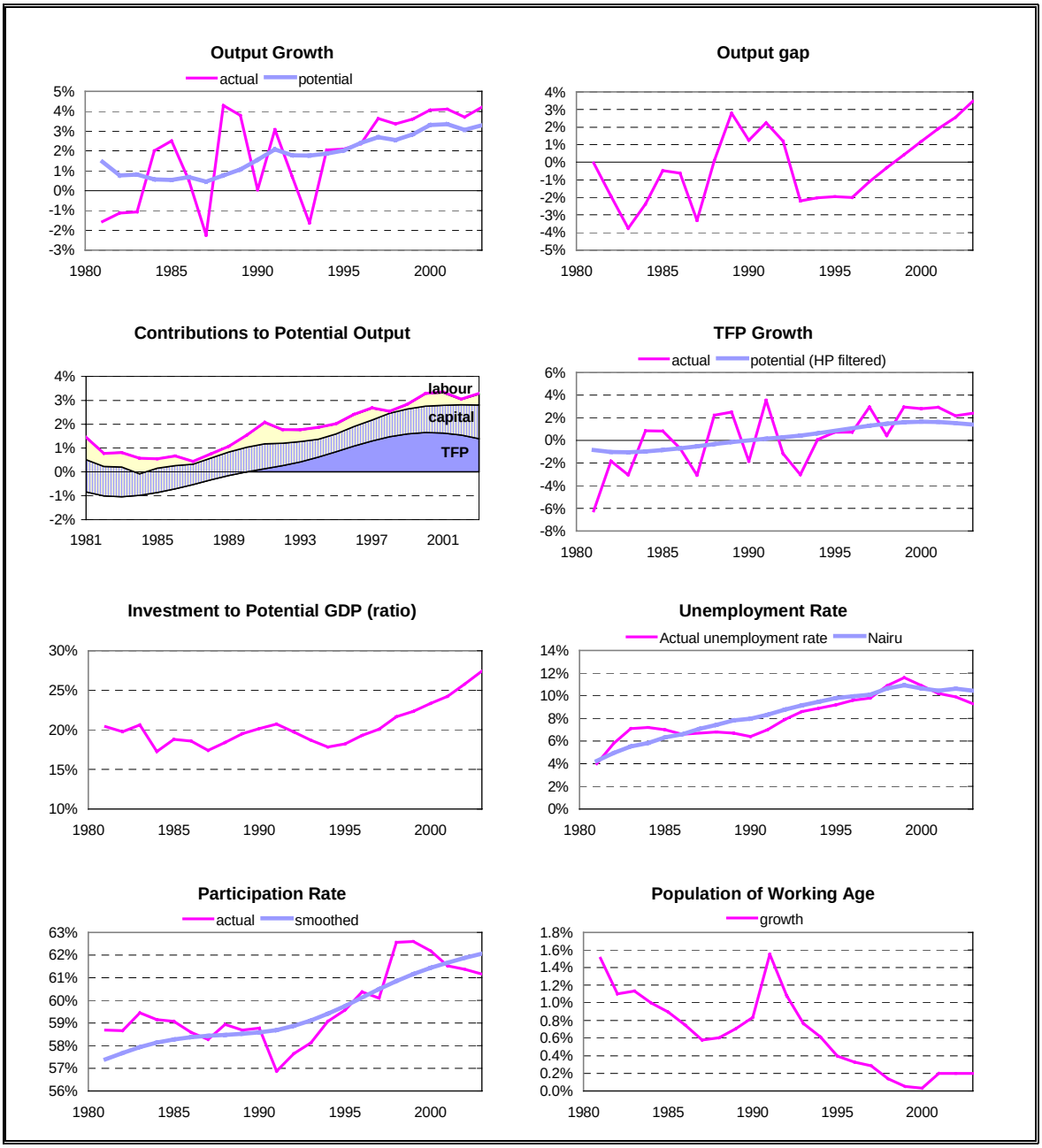


TABLE A1.5 : SPAIN OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-2.4	-2.6	1.7	1.4	-0.9	1.0	1.4	1.2	55.7	13.8	18.6
1982	-3.0	-3.0	1.8	1.7	-0.6	0.9	1.4	1.1	55.5	15.3	18.5
1983	-3.1	-3.3	2.0	2.1	-0.1	0.8	1.4	1.1	55.4	16.2	17.9
1984	-3.5	-3.0	2.2	1.4	-0.6	0.6	1.4	1.0	55.4	17.8	16.8
1985	-3.6	-2.6	2.4	1.9	-0.1	0.7	1.3	0.9	55.5	18.9	17.6
1986	-3.1	-2.0	2.7	2.7	0.5	0.9	1.3	0.8	55.8	19.2	18.9
1987	-0.6	0.5	2.9	2.9	0.6	1.1	1.2	0.8	56.0	19.6	20.6
1988	1.5	2.4	3.0	3.1	0.6	1.4	1.2	0.8	56.4	19.9	22.7
1989	3.3	3.2	3.0	4.0	1.2	1.6	1.1	0.8	56.7	19.4	24.5
1990	4.2	3.5	2.9	3.5	0.8	1.7	1.0	0.7	57.0	19.6	25.2
1991	3.9	2.7	2.8	3.4	0.9	1.6	0.9	0.8	57.4	19.5	24.8
1992	2.1	0.8	2.7	2.8	0.6	1.3	0.8	0.8	57.7	19.9	23.1
1993	-1.6	-1.9	2.7	1.7	0.0	1.0	0.7	0.7	58.1	20.9	20.7
1994	-2.0	-2.0	2.7	2.5	0.9	1.0	0.7	0.6	58.5	20.9	20.5
1995	-2.0	-2.4	2.8	3.1	1.5	1.1	0.6	0.5	58.8	20.0	21.5
1996	-2.4	-2.4	2.9	2.5	1.0	1.0	0.4	0.4	59.3	19.6	21.4
1997	-1.5	-1.2	3.0	2.7	1.2	1.1	0.4	0.3	59.7	18.9	21.8
1998	-0.3	0.2	3.1	2.9	1.4	1.2	0.3	0.3	60.1	18.0	23.3
1999	0.7	0.8	3.1	3.6	2.0	1.4	0.2	0.4	60.6	16.5	24.5
2000	1.6	1.3	3.2	3.5	2.0	1.4	0.1	0.8	61.1	15.2	25.0
2001	1.2	0.7	3.1	3.3	2.0	1.4	0.0	0.8	61.5	14.0	24.8
2002	0.3	-0.2	3.1	3.1	1.8	1.3	0.0	0.6	62.0	12.8	24.5
2003	0.4	-0.3	3.1	3.3	2.0	1.3	0.0	0.5	62.4	11.3	24.7
Periods	Period Averages										
1981-1990	-1.0	-0.7	2.5	2.5	0.1	1.1	1.3	0.9	56.0	18.0	20.1
1991-2000	-0.2	-0.4	2.9	2.9	1.2	1.2	0.5	0.5	59.1	18.9	22.6
1991-1995	0.1	-0.6	2.8	2.7	0.8	1.2	0.7	0.7	58.1	20.2	22.1
1996-2000	-0.4	-0.3	3.1	3.0	1.5	1.2	0.3	0.4	60.1	17.6	23.2
2001-2003	0.6	0.1	3.1	3.2	1.9	1.3	0.0	0.7	62.0	12.7	24.6

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.5 : SPAIN OUTPUT GAP AND DETERMINANTS

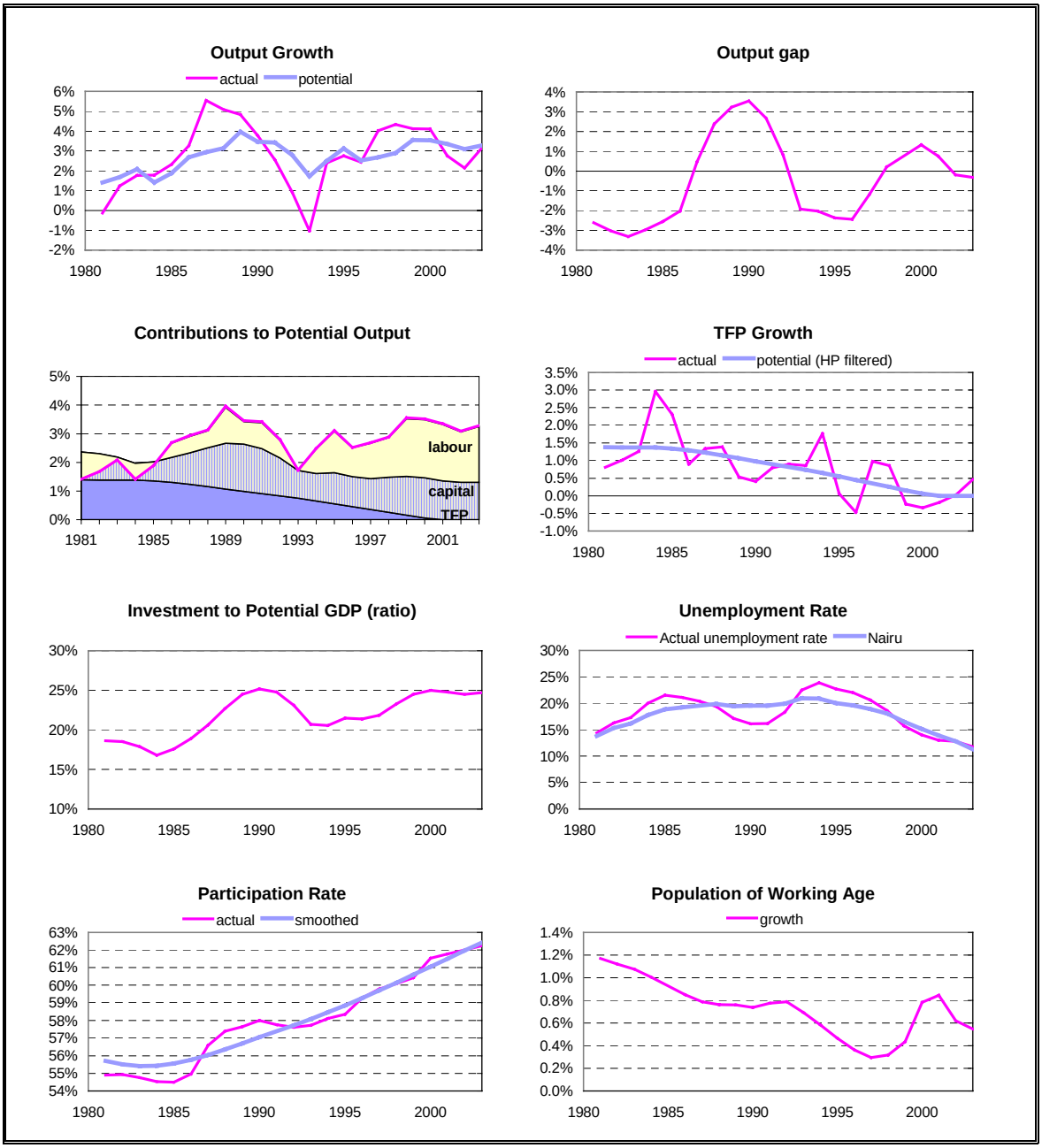


TABLE A1.6 : FRANCE OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-0.6	-0.5	2.3	2.5	0.3	1.0	1.2	1.4	66.5	7.1	19.4
1982	-0.2	-0.3	2.2	2.4	0.3	0.9	1.2	1.4	66.3	7.6	18.9
1983	-0.9	-1.3	2.2	2.4	0.4	0.8	1.2	1.3	66.1	7.9	18.1
1984	-1.4	-1.7	2.2	2.1	0.2	0.7	1.2	1.1	66.0	8.5	17.5
1985	-2.1	-2.2	2.2	2.1	0.1	0.7	1.2	0.8	65.8	8.8	17.7
1986	-1.9	-1.9	2.2	2.1	0.1	0.7	1.2	0.5	65.7	9.0	18.4
1987	-1.7	-1.5	2.3	2.2	0.1	0.8	1.2	0.6	65.7	9.4	19.1
1988	0.6	0.5	2.2	2.5	0.3	0.9	1.2	0.6	65.7	9.4	20.4
1989	2.6	2.0	2.2	2.6	0.4	1.0	1.1	0.5	65.8	9.5	21.3
1990	3.1	2.3	2.1	2.4	0.3	1.0	1.1	0.4	65.9	9.6	21.5
1991	2.1	1.3	2.0	2.0	0.1	0.9	1.0	0.2	66.1	9.9	20.8
1992	1.7	1.0	1.9	1.8	0.1	0.8	0.9	0.2	66.2	10.2	20.1
1993	-1.0	-1.4	1.8	1.5	0.1	0.6	0.8	0.2	66.5	10.5	18.6
1994	-0.8	-0.9	1.8	1.6	0.2	0.6	0.8	0.2	66.7	10.7	18.5
1995	-1.0	-1.0	1.9	1.7	0.4	0.6	0.8	0.2	67.0	10.8	18.6
1996	-1.8	-1.7	1.9	1.8	0.5	0.5	0.8	0.3	67.3	10.8	18.3
1997	-1.9	-1.7	2.0	1.9	0.6	0.5	0.8	0.3	67.6	10.6	17.9
1998	-0.7	-0.4	2.1	2.0	0.6	0.6	0.8	0.3	67.9	10.5	18.8
1999	0.0	0.2	2.2	2.4	0.9	0.6	0.9	0.3	68.3	10.0	19.5
2000	0.8	0.9	2.3	2.4	0.8	0.7	0.9	0.4	68.6	9.7	20.2
2001	0.5	0.4	2.3	2.5	0.9	0.7	0.9	0.5	69.0	9.4	20.3
2002	-0.2	-0.6	2.4	2.6	1.0	0.7	0.9	0.5	69.3	8.8	19.7
2003	0.2	-0.3	2.4	2.5	0.8	0.7	0.9	0.5	69.7	8.5	19.8
Periods	Period Averages										
1981-1990	-0.2	-0.5	2.2	2.3	0.3	0.9	1.2	0.9	66.0	8.7	19.2
1991-2000	-0.3	-0.4	2.0	1.9	0.4	0.6	0.9	0.3	67.2	10.4	19.1
1991-1995	0.2	-0.2	1.9	1.7	0.2	0.7	0.9	0.2	66.5	10.4	19.3
1996-2000	-0.7	-0.5	2.1	2.1	0.7	0.6	0.8	0.3	67.9	10.3	18.9
2001-2003	0.1	-0.2	2.4	2.6	0.9	0.7	0.9	0.5	69.3	8.9	19.9

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.6 : FRANCE OUTPUT GAP AND DETERMINANTS

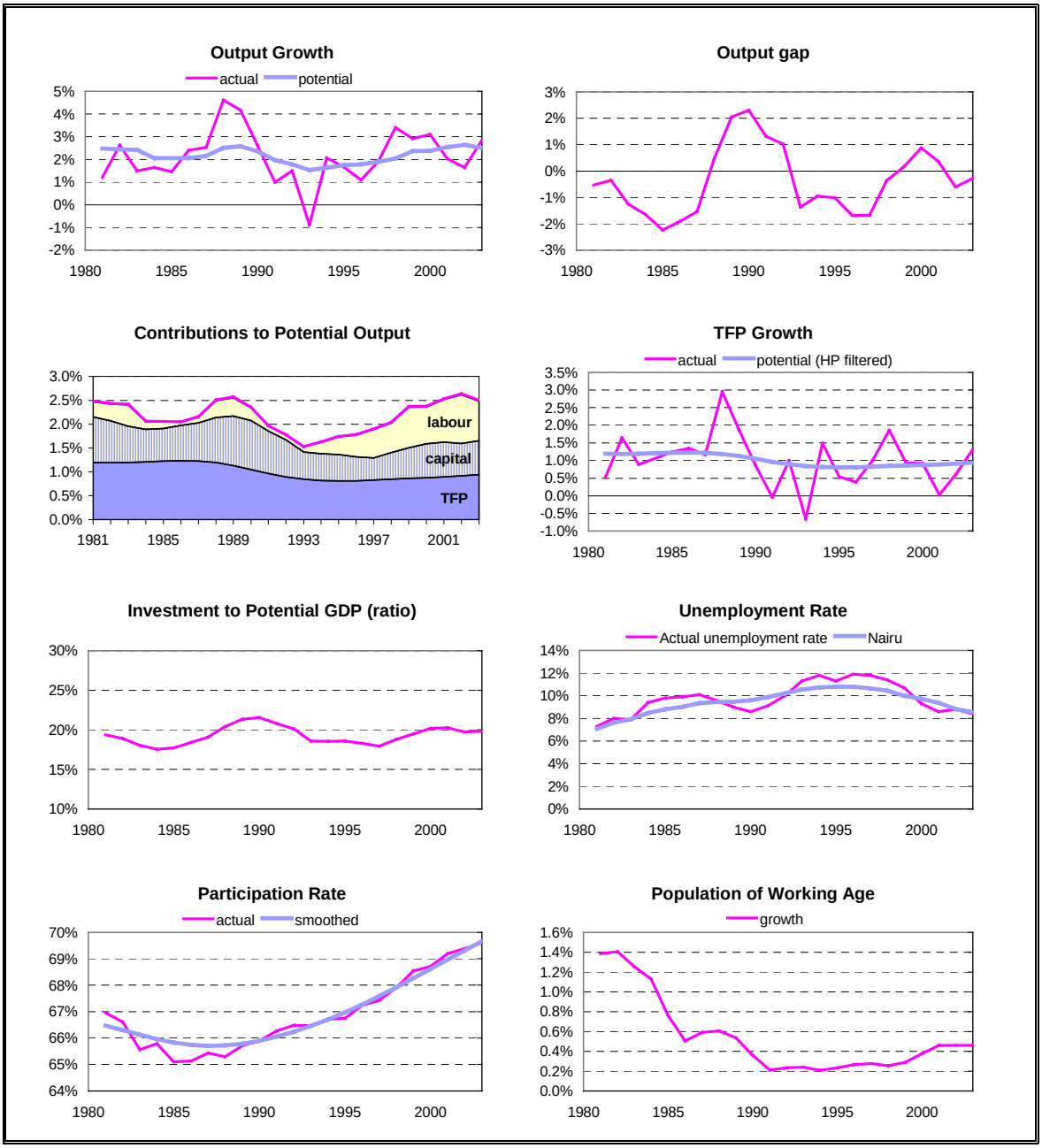


TABLE A1.7 : IRELAND OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	2.8	1.1	3.3	3.9	0.4	1.9	1.6	1.5	62.1	11.0	27.3
1982	1.9	0.0	3.1	3.4	0.1	1.7	1.6	1.2	62.0	11.8	25.5
1983	-1.3	-3.4	3.0	3.3	0.3	1.3	1.7	1.4	61.9	12.4	22.5
1984	-0.1	-2.3	3.0	3.1	0.1	1.2	1.8	1.2	61.8	13.1	21.2
1985	-0.1	-2.2	3.1	3.0	0.0	1.0	2.0	0.7	61.6	13.5	19.0
1986	-3.0	-4.7	3.3	2.9	-0.1	0.9	2.2	0.4	61.5	13.9	18.4
1987	-2.0	-3.4	3.6	3.3	0.1	0.8	2.4	0.5	61.4	14.0	17.4
1988	-1.7	-2.7	3.9	3.5	0.2	0.7	2.5	0.3	61.4	13.9	16.6
1989	0.2	-0.4	4.2	3.7	0.1	0.9	2.7	-0.3	61.4	13.6	18.5
1990	3.1	2.9	4.6	4.3	0.3	1.1	2.8	0.2	61.5	13.5	19.9
1991	0.0	-0.3	5.0	5.1	1.3	0.8	2.9	1.4	61.7	13.3	17.6
1992	-2.0	-2.2	5.5	5.4	1.5	0.8	3.1	1.6	62.0	13.0	16.7
1993	-5.0	-4.8	6.0	5.5	1.5	0.6	3.2	1.2	62.3	12.5	15.0
1994	-5.7	-5.3	6.5	6.3	2.0	0.7	3.4	1.5	62.8	11.7	15.8
1995	-3.1	-2.4	7.0	6.8	2.2	0.9	3.5	1.8	63.3	11.1	16.8
1996	-2.8	-2.0	7.5	7.4	2.4	1.1	3.6	1.8	64.0	10.2	18.2
1997	-0.1	0.6	7.8	8.0	2.7	1.4	3.7	2.0	64.7	9.3	19.9
1998	0.6	0.6	7.9	8.6	2.9	1.7	3.7	2.1	65.5	8.2	21.2
1999	3.3	2.8	7.9	8.5	2.6	1.9	3.7	1.8	66.3	7.4	22.2
2000	6.8	5.9	7.8	8.2	2.5	2.0	3.6	1.8	67.1	6.7	22.0
2001	6.0	4.7	7.5	8.0	2.4	1.8	3.5	2.0	67.9	6.3	20.6
2002	2.3	0.8	7.2	7.4	2.1	1.7	3.5	1.7	68.8	6.0	19.6
2003	1.5	-0.3	7.0	7.3	2.0	1.7	3.4	1.7	69.6	5.8	19.0
Periods	Period Averages										
1981-1990	0.0	-1.5	3.5	3.4	0.1	1.1	2.1	0.7	61.7	13.1	20.6
1991-2000	-0.8	-0.7	6.9	7.0	2.2	1.2	3.4	1.7	64.0	10.4	18.5
1991-1995	-3.1	-3.0	6.0	5.8	1.7	0.8	3.2	1.5	62.4	12.3	16.4
1996-2000	1.6	1.6	7.8	8.1	2.6	1.6	3.7	1.9	65.5	8.4	20.7
2001-2003	3.3	1.7	7.3	7.6	2.2	1.7	3.5	1.8	68.8	6.0	19.7

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.7 : IRELAND OUTPUT GAP AND DETERMINANTS

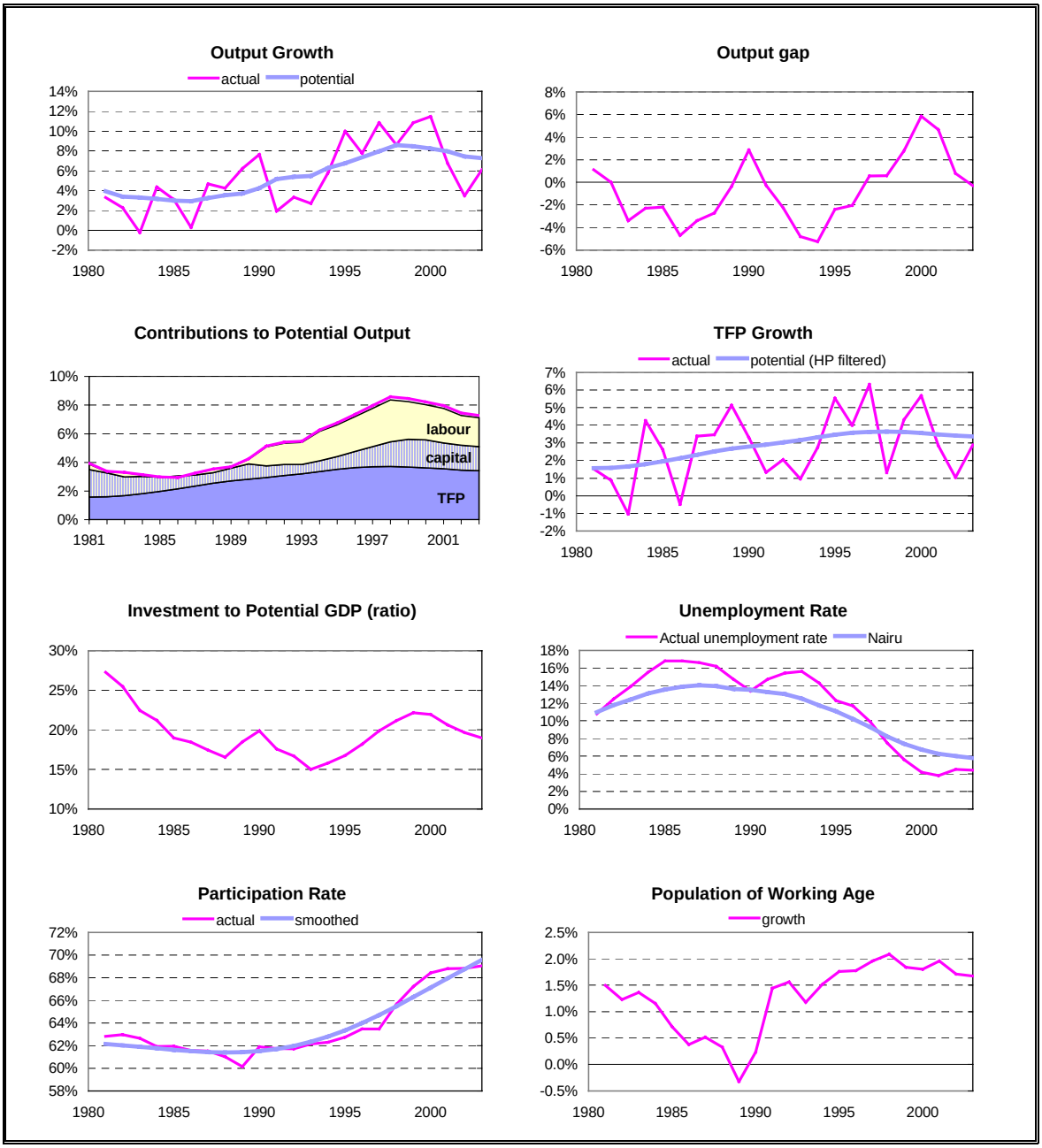


TABLE A1.8 : ITALY OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	0.8	0.9	2.6	2.8	0.5	1.1	1.2	1.0	59.2	7.5	21.3
1982	-1.0	-1.1	2.5	2.6	0.5	1.0	1.1	1.1	59.2	7.8	20.0
1983	-2.2	-2.6	2.4	2.8	0.8	0.9	1.1	1.1	59.2	7.7	19.2
1984	-1.8	-2.3	2.4	2.4	0.4	0.9	1.2	1.0	59.2	8.0	19.4
1985	-1.2	-1.7	2.4	2.3	0.3	0.8	1.2	0.6	59.1	8.2	19.1
1986	-1.1	-1.3	2.3	2.1	0.0	0.8	1.2	0.3	59.1	8.4	19.1
1987	-0.4	-0.4	2.3	2.1	0.0	0.8	1.2	0.4	59.1	8.8	19.5
1988	1.3	1.4	2.2	2.2	0.0	0.9	1.2	0.3	59.1	9.1	20.4
1989	2.1	2.2	2.1	2.0	-0.1	0.9	1.2	0.3	59.0	9.5	20.8
1990	2.1	2.0	2.0	2.2	0.0	1.0	1.2	0.3	58.9	9.6	21.2
1991	1.7	1.4	1.8	2.0	-0.1	0.9	1.2	0.2	58.8	9.8	21.0
1992	0.7	0.3	1.7	1.9	-0.1	0.8	1.2	0.2	58.7	9.9	20.3
1993	-1.8	-1.9	1.7	1.3	-0.4	0.5	1.2	0.2	58.6	10.4	17.9
1994	-1.3	-1.2	1.7	1.5	-0.1	0.5	1.1	0.1	58.5	10.6	17.6
1995	-0.1	0.2	1.7	1.5	-0.2	0.6	1.1	-0.1	58.5	10.8	18.4
1996	-0.7	-0.4	1.7	1.7	0.0	0.6	1.0	-0.1	58.5	10.8	18.7
1997	-0.4	-0.1	1.7	1.7	0.2	0.6	1.0	0.0	58.7	10.9	18.8
1998	-0.4	-0.2	1.8	1.9	0.3	0.6	0.9	-0.1	58.9	10.7	19.2
1999	-0.7	-0.5	1.9	1.9	0.4	0.7	0.9	-0.2	59.2	10.5	19.9
2000	0.2	0.2	1.9	2.1	0.5	0.8	0.8	-0.1	59.6	10.3	20.7
2001	0.1	-0.3	2.0	2.3	0.7	0.8	0.9	-0.1	59.9	9.9	20.7
2002	-0.5	-1.2	2.0	2.3	0.5	0.8	0.9	-0.1	60.4	9.6	20.9
2003	0.1	-0.9	2.0	2.4	0.6	0.8	1.0	-0.3	60.8	9.2	21.4
Periods	Period Averages										
1981-1990	-0.1	-0.3	2.3	2.4	0.2	0.9	1.2	0.7	59.1	8.5	20.0
1991-2000	-0.3	-0.2	1.8	1.8	0.0	0.7	1.0	0.0	58.8	10.5	19.2
1991-1995	-0.2	-0.3	1.7	1.6	-0.2	0.7	1.1	0.1	58.6	10.3	19.0
1996-2000	-0.4	-0.2	1.8	1.9	0.3	0.7	0.9	-0.1	59.0	10.6	19.5
2001-2003	-0.1	-0.8	2.0	2.3	0.6	0.8	0.9	-0.2	60.4	9.6	21.0

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.8 : ITALY OUTPUT GAP AND DETERMINANTS

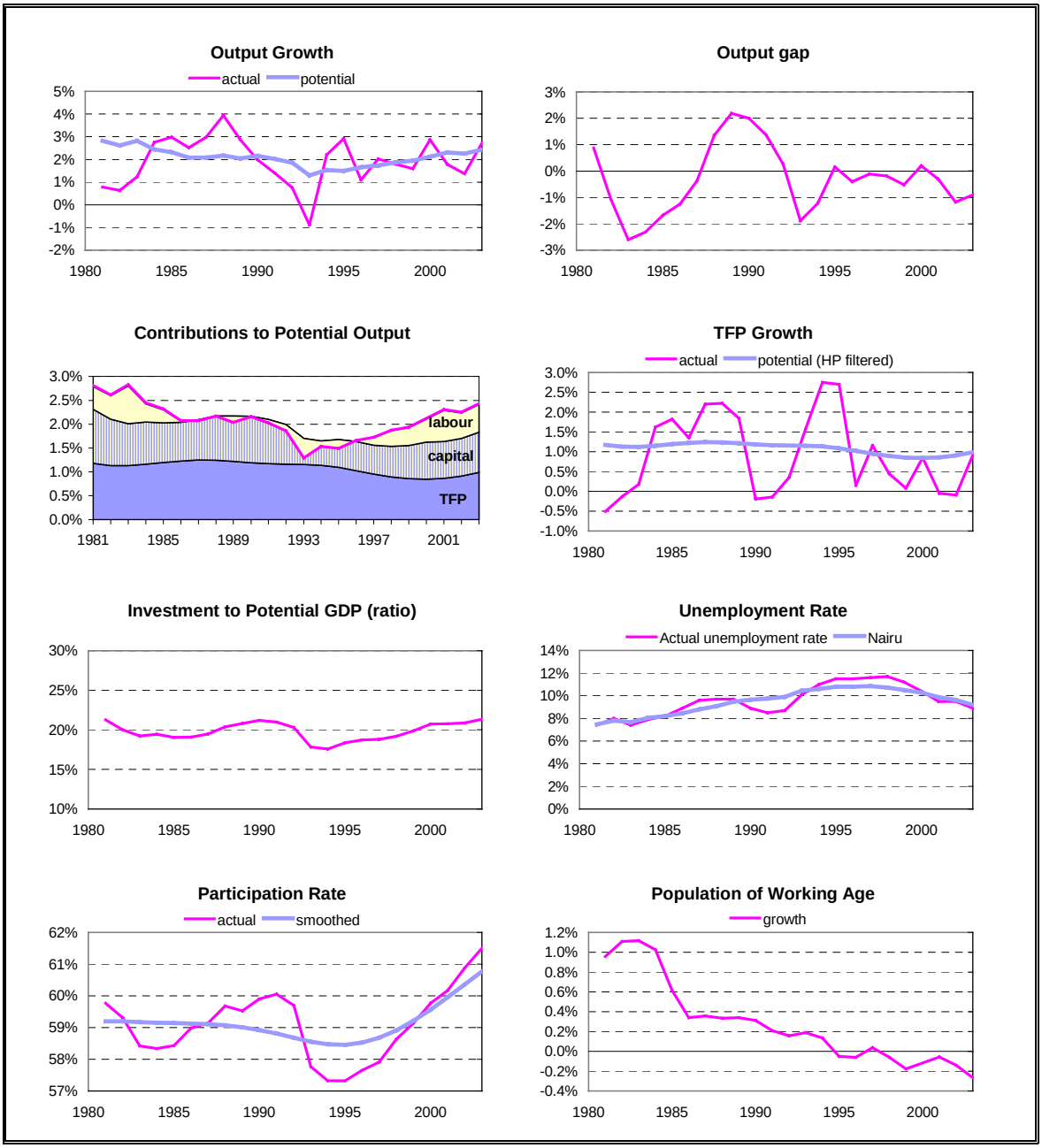
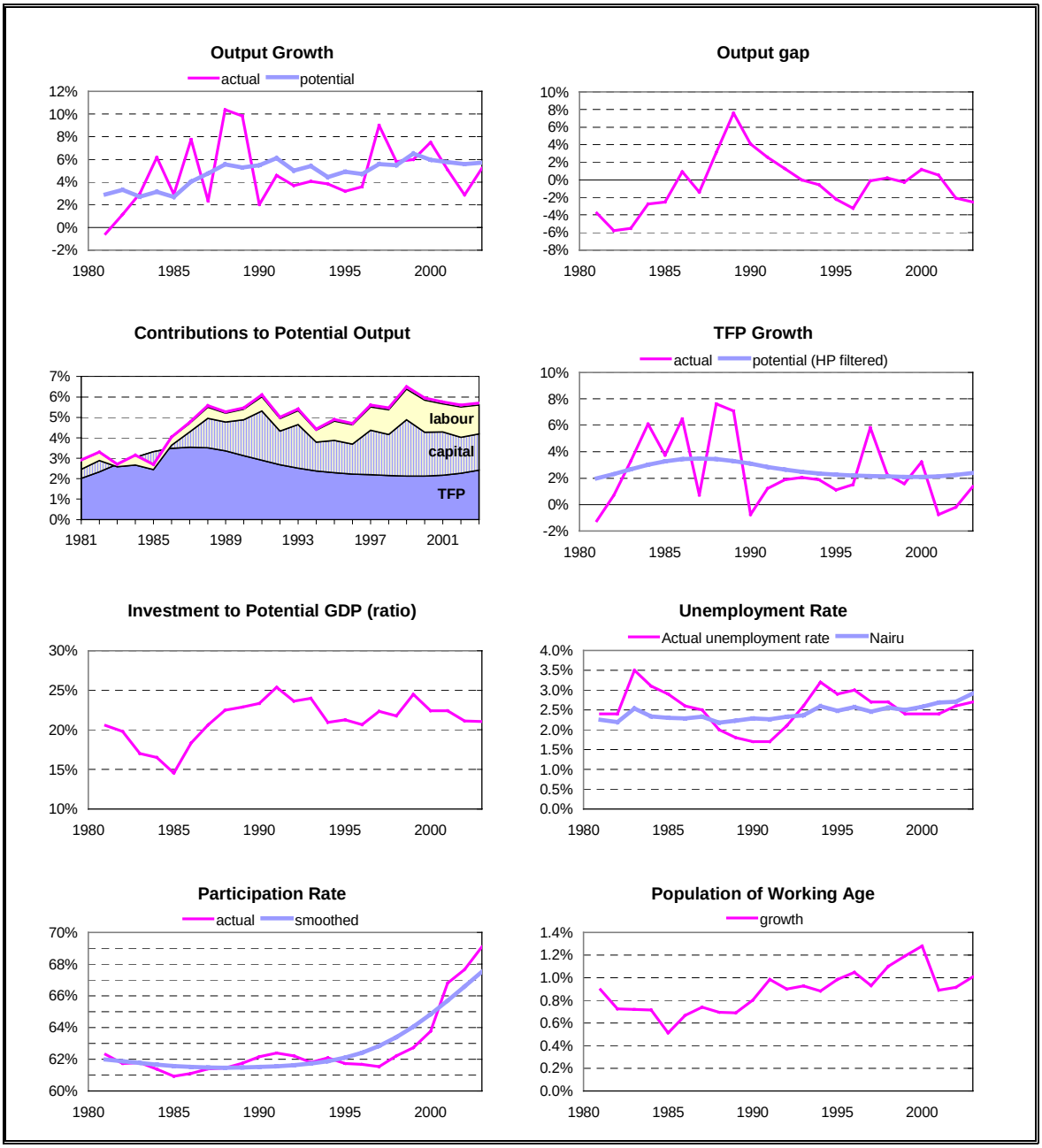


TABLE A1.9 : LUXEMBOURG OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-2.9	-3.8	2.5	2.9	0.4	0.4	2.0	0.9	62.0	2.3	20.6
1982	-4.5	-5.8	2.8	3.3	0.4	0.5	2.3	0.7	61.9	2.2	19.8
1983	-4.7	-5.5	3.2	2.7	0.1	-0.1	2.7	0.7	61.8	2.5	17.0
1984	-2.4	-2.8	3.7	3.1	0.5	-0.4	3.0	0.7	61.7	2.3	16.5
1985	-3.6	-2.5	4.1	2.7	0.3	-0.9	3.3	0.5	61.6	2.3	14.6
1986	-0.6	0.9	4.5	4.0	0.4	0.2	3.5	0.7	61.5	2.3	18.3
1987	-3.0	-1.4	4.8	4.8	0.4	0.7	3.5	0.7	61.5	2.3	20.6
1988	1.9	3.1	5.1	5.6	0.5	1.4	3.5	0.7	61.5	2.2	22.5
1989	6.4	7.6	5.2	5.3	0.4	1.4	3.4	0.7	61.5	2.2	22.9
1990	3.2	4.1	5.2	5.5	0.5	1.8	3.1	0.8	61.5	2.3	23.3
1991	2.7	2.6	5.1	6.1	0.7	2.4	2.9	1.0	61.6	2.3	25.4
1992	1.3	1.3	5.1	5.0	0.6	1.6	2.7	0.9	61.6	2.3	23.6
1993	0.4	0.0	5.0	5.4	0.7	2.1	2.5	0.9	61.7	2.4	24.0
1994	-0.8	-0.6	5.1	4.4	0.6	1.4	2.4	0.9	61.9	2.6	20.9
1995	-2.6	-2.2	5.1	4.9	0.9	1.6	2.3	1.0	62.1	2.5	21.3
1996	-4.0	-3.2	5.2	4.7	0.9	1.5	2.2	1.0	62.4	2.6	20.7
1997	-0.6	-0.1	5.3	5.6	1.1	2.2	2.2	0.9	62.8	2.5	22.4
1998	-0.2	0.2	5.3	5.5	1.2	2.0	2.2	1.1	63.4	2.6	21.8
1999	0.5	-0.3	5.3	6.5	1.5	2.8	2.1	1.2	64.1	2.5	24.5
2000	2.6	1.2	5.3	6.0	1.6	2.1	2.1	1.3	64.8	2.6	22.4
2001	2.5	0.5	5.2	5.8	1.4	2.1	2.2	0.9	65.7	2.7	22.4
2002	0.3	-2.1	5.1	5.6	1.5	1.8	2.3	0.9	66.6	2.7	21.1
2003	0.5	-2.5	5.0	5.7	1.4	1.8	2.4	1.0	67.5	2.9	21.0
Periods	Period Averages										
1981-1990	-1.0	-0.6	4.1	4.0	0.4	0.5	3.0	0.7	61.6	2.3	19.6
1991-2000	-0.1	-0.1	5.2	5.4	1.0	2.0	2.4	1.0	62.6	2.5	22.7
1991-1995	0.2	0.2	5.1	5.2	0.7	1.8	2.6	0.9	61.8	2.4	23.0
1996-2000	-0.4	-0.4	5.3	5.7	1.3	2.1	2.2	1.1	63.5	2.5	22.3
2001-2003	1.1	-1.4	5.1	5.7	1.4	1.9	2.3	0.9	66.6	2.8	21.5

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.9 : LUXEMBOURG OUTPUT GAP AND DETERMINANTS



TALBE A1.10 : NETHERLANDS OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-0.7	-0.8	1.6	1.3	0.2	0.6	0.5	1.3	66.9	8.0	19.8
1982	-3.4	-2.7	1.6	0.8	-0.2	0.5	0.5	1.1	66.7	9.1	18.9
1983	-3.4	-3.3	1.7	2.3	1.2	0.5	0.6	1.1	66.5	8.2	18.9
1984	-2.1	-1.7	1.9	1.6	0.4	0.6	0.6	1.2	66.4	8.4	19.7
1985	-1.1	-0.9	2.1	2.2	0.9	0.7	0.7	1.1	66.4	8.2	20.6
1986	-0.7	-0.7	2.3	2.5	1.0	0.8	0.7	1.0	66.5	7.8	21.5
1987	-1.6	-1.9	2.4	2.7	1.1	0.7	0.8	0.9	66.8	7.4	21.1
1988	-1.2	-1.4	2.6	2.6	1.0	0.8	0.8	0.8	67.1	7.2	21.7
1989	1.0	0.8	2.7	2.7	1.0	0.8	0.9	0.6	67.6	7.0	22.2
1990	2.3	2.0	2.8	2.9	1.2	0.7	0.9	0.6	68.2	6.6	22.2
1991	2.0	1.8	2.8	2.7	1.1	0.7	0.9	0.6	68.9	6.5	21.6
1992	0.9	0.6	2.8	2.9	1.3	0.6	0.9	0.6	69.6	6.1	21.2
1993	-1.0	-1.1	2.8	2.6	1.1	0.5	0.9	0.5	70.4	6.0	20.0
1994	-1.3	-1.1	2.9	2.6	1.1	0.5	0.9	0.4	71.2	5.9	19.9
1995	-1.3	-0.9	2.9	2.7	1.2	0.6	0.9	0.3	72.0	5.6	20.1
1996	-1.2	-0.7	3.0	2.9	1.3	0.7	0.9	0.3	72.9	5.3	20.8
1997	-0.4	0.0	3.0	3.1	1.4	0.8	0.9	0.4	73.8	4.8	21.5
1998	0.9	1.2	3.0	3.1	1.4	0.8	0.9	0.4	74.7	4.3	21.7
1999	1.7	1.8	2.9	3.1	1.4	0.9	0.9	0.5	75.7	3.9	22.7
2000	2.4	2.2	2.8	3.1	1.4	0.9	0.8	0.6	76.6	3.6	22.9
2001	0.8	0.5	2.7	2.8	1.3	0.8	0.8	0.6	77.5	3.5	22.0
2002	-0.3	-0.9	2.6	2.9	1.4	0.7	0.8	0.6	78.4	3.1	21.2
2003	-0.1	-0.8	2.5	2.6	1.2	0.7	0.8	0.6	79.3	3.0	21.2
Periods	Period Averages										
1981-1990	-1.1	-1.1	2.2	2.2	0.8	0.7	0.7	1.0	66.9	7.8	20.7
1991-2000	0.3	0.4	2.9	2.9	1.3	0.7	0.9	0.5	72.6	5.2	21.2
1991-1995	-0.2	-0.1	2.9	2.7	1.2	0.6	0.9	0.5	70.4	6.0	20.6
1996-2000	0.7	0.9	2.9	3.1	1.4	0.8	0.9	0.4	74.8	4.4	21.9
2001-2003	0.1	-0.4	2.6	2.8	1.3	0.7	0.8	0.6	78.4	3.2	21.5

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.10 : NETHERLANDS OUTPUT GAP AND DETERMINANTS

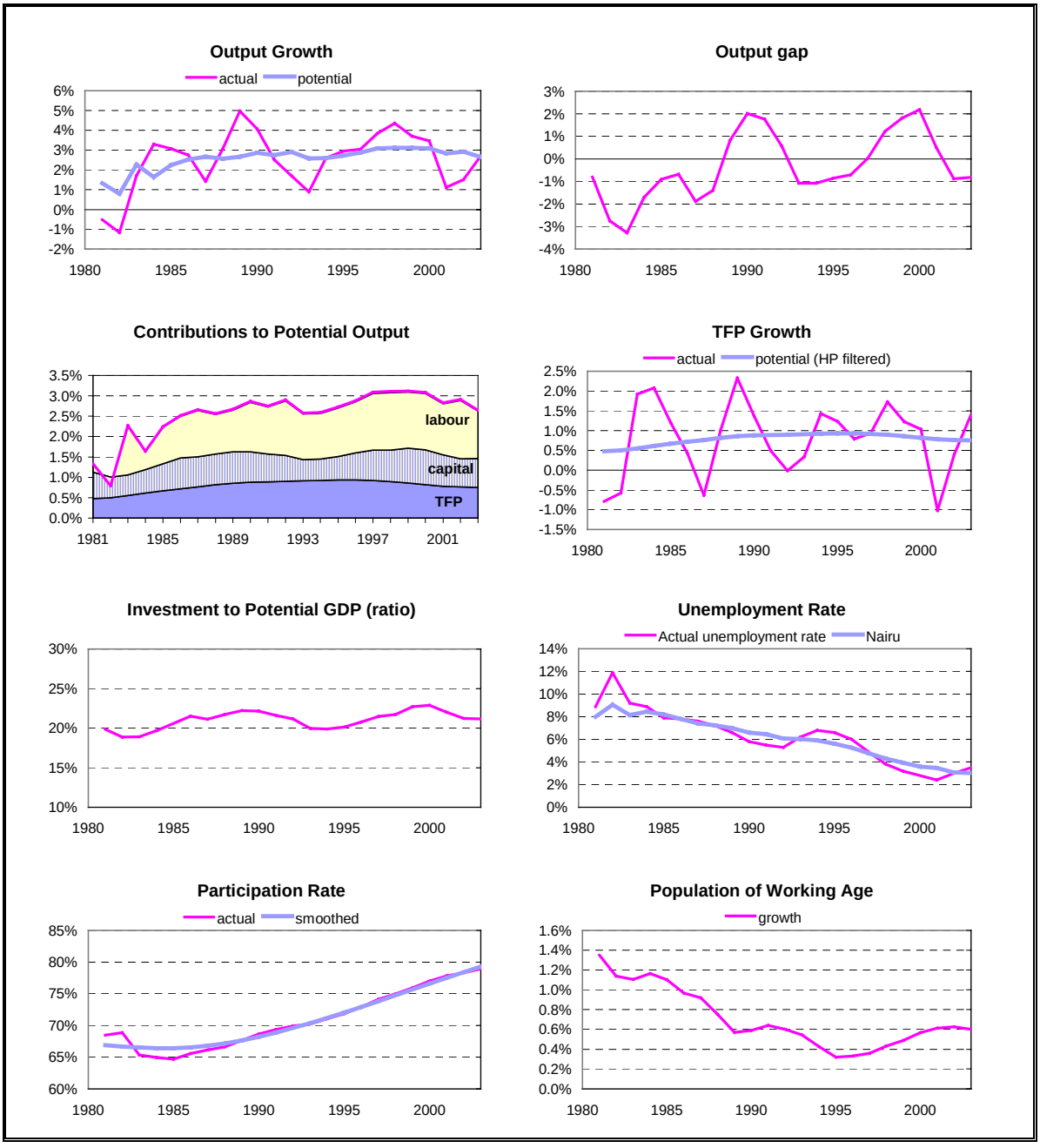


TABLE A1.11 : AUSTRIA OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-0.7	-1.3	2.2	2.8	1.1	1.2	0.5	1.4	64.5	1.8	23.4
1982	-0.8	-1.7	2.2	2.4	1.1	0.9	0.4	1.3	64.7	1.8	21.0
1983	-0.1	-0.8	2.1	2.0	0.7	0.9	0.4	0.9	65.0	2.1	20.8
1984	-1.8	-2.3	2.2	2.0	0.7	0.8	0.4	1.0	65.3	2.5	20.3
1985	-1.6	-1.7	2.2	1.8	0.4	0.9	0.5	0.6	65.7	2.9	21.1
1986	-1.8	-1.2	2.3	1.5	0.1	0.9	0.6	0.3	66.1	3.7	21.1
1987	-2.6	-1.9	2.5	2.4	0.8	0.9	0.7	0.2	66.5	3.3	21.4
1988	-1.8	-1.0	2.6	2.5	0.7	1.0	0.8	0.2	67.0	3.1	22.4
1989	-0.2	0.6	2.6	2.6	0.8	1.0	0.8	0.3	67.4	2.9	22.7
1990	1.8	2.2	2.7	3.0	1.1	1.1	0.8	1.2	67.9	3.1	23.4
1991	2.4	2.4	2.6	3.1	1.2	1.2	0.8	1.3	68.4	3.3	24.2
1992	2.2	2.0	2.6	2.7	0.8	1.1	0.7	0.6	68.9	3.3	23.7
1993	0.1	-0.5	2.5	3.0	1.3	1.0	0.7	1.8	69.4	3.7	22.8
1994	0.3	-0.2	2.4	2.3	0.5	1.1	0.7	0.3	69.9	3.8	23.3
1995	-0.4	-0.6	2.3	2.0	0.3	1.0	0.7	0.1	70.3	4.0	23.1
1996	-0.7	-0.7	2.3	2.0	0.3	1.0	0.7	0.2	70.6	4.2	23.2
1997	-1.3	-1.3	2.3	2.2	0.4	1.0	0.8	0.3	70.8	4.2	23.1
1998	-0.1	0.1	2.2	2.1	0.3	1.0	0.8	0.2	71.1	4.3	23.4
1999	0.6	0.5	2.2	2.3	0.5	1.0	0.8	0.4	71.3	4.1	23.2
2000	1.4	1.2	2.1	2.2	0.4	1.0	0.8	0.4	71.5	4.1	23.9
2001	0.3	0.2	2.1	2.1	0.4	0.9	0.8	0.1	71.6	3.8	23.0
2002	-0.5	-0.4	2.0	1.8	0.2	0.9	0.8	0.2	71.8	3.8	22.7
2003	0.1	0.1	2.0	2.0	0.4	0.9	0.7	0.2	71.9	3.7	23.2
Periods	Period Averages										
1981-1990	-1.0	-0.9	2.4	2.3	0.7	1.0	0.6	0.7	66.0	2.7	21.8
1991-2000	0.5	0.3	2.4	2.4	0.6	1.0	0.7	0.5	70.2	3.9	23.4
1991-1995	0.9	0.6	2.5	2.6	0.8	1.1	0.7	0.8	69.4	3.6	23.4
1996-2000	0.0	0.0	2.2	2.2	0.4	1.0	0.8	0.3	71.0	4.2	23.4
2001-2003	0.0	0.0	2.0	2.0	0.3	0.9	0.8	0.2	71.8	3.7	23.0

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.11 : AUSTRIA OUTPUT GAP AND DETERMINANTS

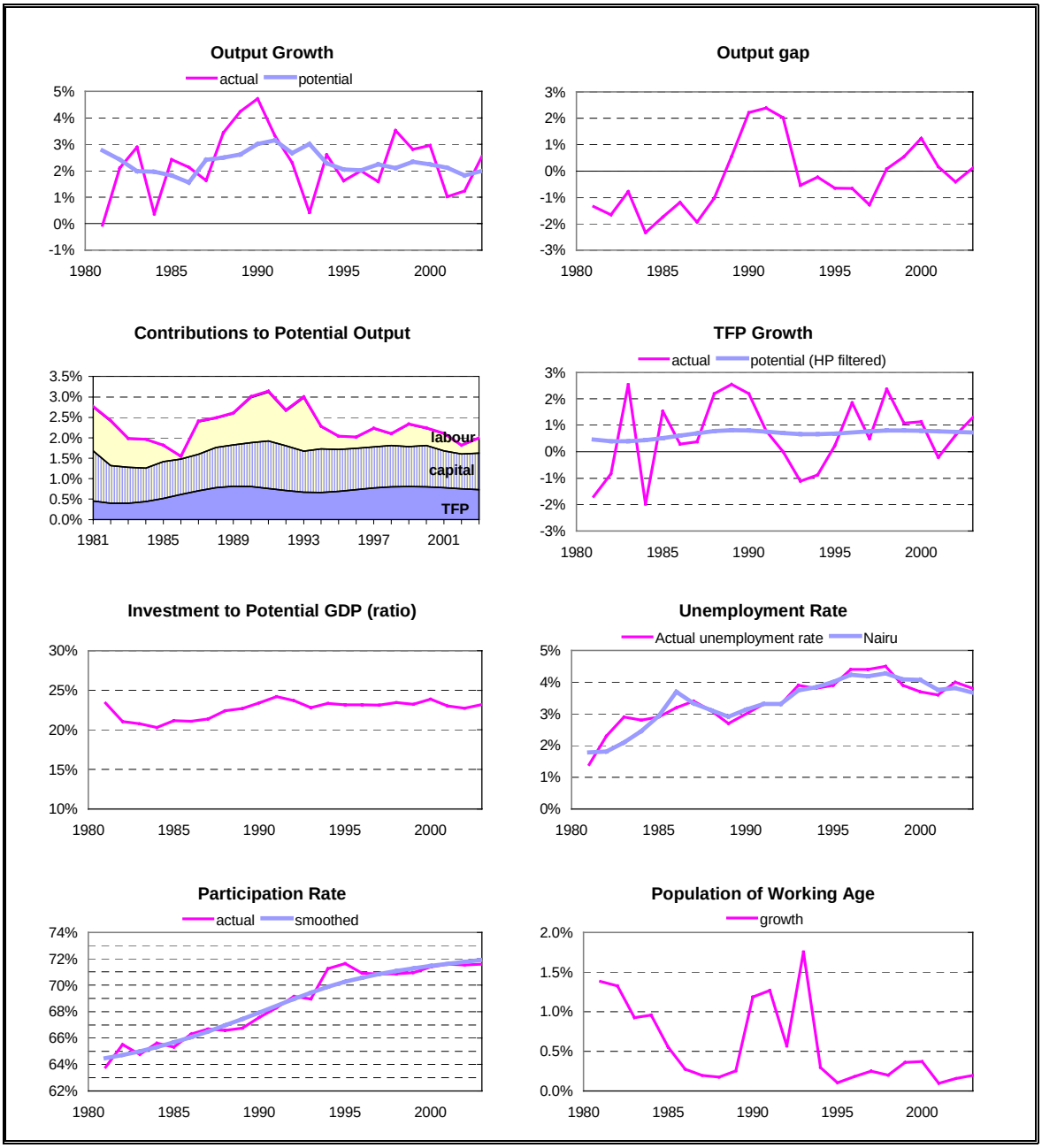


TABLE A1.12 : PORTUGAL OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	2.2	1.3	2.8	3.5	0.8	2.1	0.6	1.7	69.1	8.2	24.1
1982	1.6	0.2	2.7	3.3	0.8	2.0	0.5	1.1	69.1	8.0	23.9
1983	-1.3	-2.8	2.7	2.8	0.6	1.6	0.5	1.0	69.1	8.1	21.5
1984	-5.8	-6.9	2.8	2.4	0.8	0.9	0.7	0.9	69.2	7.9	17.4
1985	-6.0	-6.5	3.0	2.4	0.7	0.7	0.9	0.7	69.3	7.6	16.4
1986	-5.2	-5.1	3.3	2.6	0.5	0.8	1.2	0.4	69.4	7.4	17.7
1987	-2.6	-2.5	3.5	3.5	0.9	1.2	1.4	0.3	69.5	6.6	20.2
1988	1.1	1.1	3.6	3.7	0.7	1.5	1.5	0.3	69.7	6.2	22.3
1989	3.9	4.1	3.6	3.4	0.3	1.4	1.6	0.2	69.9	6.1	22.4
1990	4.3	4.7	3.5	3.4	0.3	1.5	1.5	0.2	70.1	6.1	23.3
1991	5.4	5.5	3.3	3.5	0.6	1.4	1.4	0.3	70.3	5.7	23.2
1992	3.2	3.2	3.2	3.4	0.6	1.4	1.3	0.5	70.4	5.5	23.5
1993	-1.8	-1.6	3.0	2.7	0.4	1.1	1.2	0.6	70.6	5.7	21.6
1994	-3.8	-3.3	3.0	2.7	0.4	1.1	1.2	0.6	70.8	5.9	21.6
1995	-2.5	-1.8	3.0	2.7	0.6	1.1	1.1	0.4	71.0	5.8	22.4
1996	-1.7	-0.7	3.0	2.7	0.5	1.2	1.0	0.3	71.2	5.7	23.2
1997	-0.7	0.3	2.9	2.9	0.4	1.5	0.9	0.3	71.5	5.7	25.7
1998	0.9	1.2	2.9	3.6	0.9	1.8	0.8	0.3	71.8	5.1	27.6
1999	1.5	1.6	2.8	3.0	0.4	1.8	0.8	0.2	72.1	5.2	28.7
2000	2.2	1.8	2.7	3.2	0.5	1.9	0.7	0.3	72.5	5.1	29.1
2001	1.4	-0.1	2.5	3.6	1.2	1.7	0.7	1.3	72.8	5.0	28.0
2002	0.5	-1.6	2.4	3.1	0.8	1.5	0.8	0.7	73.2	5.0	27.3
2003	0.4	-2.6	2.3	3.2	0.9	1.4	0.8	0.8	73.5	4.8	27.0
Periods	Period Averages										
1981-1990	-0.8	-1.2	3.2	3.1	0.7	1.4	1.0	0.7	69.4	7.2	20.9
1991-2000	0.3	0.6	3.0	3.0	0.5	1.4	1.1	0.4	71.2	5.5	24.7
1991-1995	0.1	0.4	3.1	3.0	0.5	1.2	1.3	0.5	70.6	5.7	22.5
1996-2000	0.4	0.8	2.8	3.1	0.5	1.6	0.9	0.3	71.8	5.3	26.9
2001-2003	0.8	-1.4	2.4	3.3	1.0	1.5	0.8	0.9	73.2	5.0	27.4

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.12 : PORTUGAL OUTPUT GAP AND DETERMINANTS

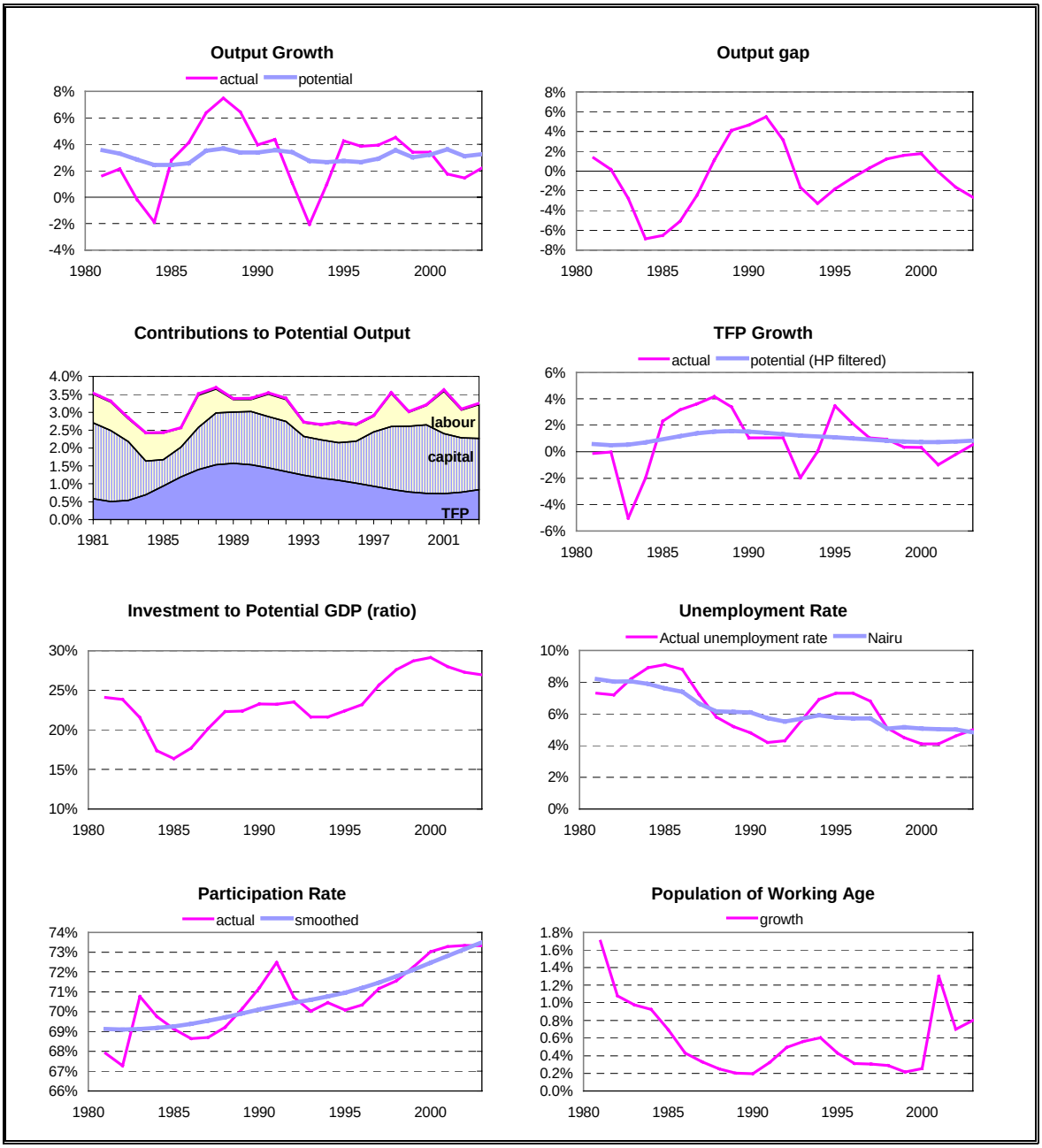


TABLE A1.13 : FINLAND OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-0.5	-1.0	3.2	2.9	0.5	1.0	1.4	0.7	75.2	3.5	24.5
1982	-0.5	-1.1	3.1	3.2	0.7	1.0	1.4	0.8	75.6	3.7	25.0
1983	-0.7	-1.5	3.0	3.2	0.6	1.1	1.5	0.7	75.8	3.8	25.0
1984	-0.2	-1.1	2.9	3.0	0.6	0.9	1.5	0.6	76.0	3.7	23.8
1985	0.2	-0.7	2.7	2.7	0.2	0.9	1.6	0.4	76.0	3.9	23.8
1986	0.2	-0.4	2.5	2.2	-0.3	0.9	1.6	0.1	76.0	4.4	23.6
1987	2.2	1.6	2.2	2.2	-0.4	0.9	1.6	0.1	75.9	4.8	24.2
1988	5.0	4.1	1.9	2.2	-0.5	1.1	1.6	0.0	75.6	5.3	26.3
1989	8.6	6.5	1.6	2.8	-0.2	1.3	1.6	0.0	75.4	5.3	28.9
1990	7.2	3.9	1.4	2.6	-0.1	1.1	1.6	0.3	75.0	5.2	26.9
1991	-0.8	-4.1	1.2	1.6	-0.6	0.5	1.7	0.7	74.6	6.3	21.6
1992	-5.3	-7.7	1.3	0.5	-1.4	0.0	1.9	0.2	74.2	8.0	17.9
1993	-7.8	-9.1	1.5	0.3	-1.4	-0.3	2.1	0.3	73.8	9.9	14.8
1994	-5.9	-7.2	1.9	1.9	-0.1	-0.4	2.3	0.2	73.5	9.8	14.2
1995	-4.6	-6.0	2.3	2.4	0.1	-0.2	2.5	0.2	73.3	9.5	15.3
1996	-3.3	-4.4	2.7	2.4	-0.1	-0.1	2.6	0.2	73.2	9.8	16.2
1997	-0.3	-1.6	3.0	3.3	0.5	0.1	2.6	0.3	73.2	9.4	17.6
1998	1.8	0.4	3.2	3.2	0.3	0.3	2.6	0.4	73.3	9.4	18.6
1999	2.4	0.7	3.4	3.7	0.8	0.3	2.5	0.6	73.4	8.9	18.5
2000	4.6	3.2	3.4	3.1	0.3	0.4	2.4	0.2	73.6	8.9	18.8
2001	1.9	0.6	3.4	3.4	0.7	0.4	2.2	0.2	73.8	8.4	18.6
2002	0.2	-0.7	3.3	2.9	0.4	0.4	2.1	0.1	74.1	8.2	17.8
2003	0.2	-0.5	3.3	3.1	0.6	0.4	2.0	0.2	74.3	7.8	17.8
Periods	Period Averages										
1981-1990	2.2	1.0	2.4	2.7	0.1	1.0	1.5	0.4	75.6	4.4	25.2
1991-2000	-1.9	-3.6	2.4	2.2	-0.2	0.1	2.3	0.3	73.6	9.0	17.4
1991-1995	-4.9	-6.8	1.7	1.3	-0.7	-0.1	2.1	0.3	73.9	8.7	16.8
1996-2000	1.0	-0.4	3.1	3.1	0.4	0.2	2.5	0.3	73.4	9.3	18.0
2001-2003	0.8	-0.2	3.3	3.1	0.6	0.4	2.1	0.2	74.1	8.1	18.1

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.13 : FINLAND OUTPUT GAP AND DETERMINANTS

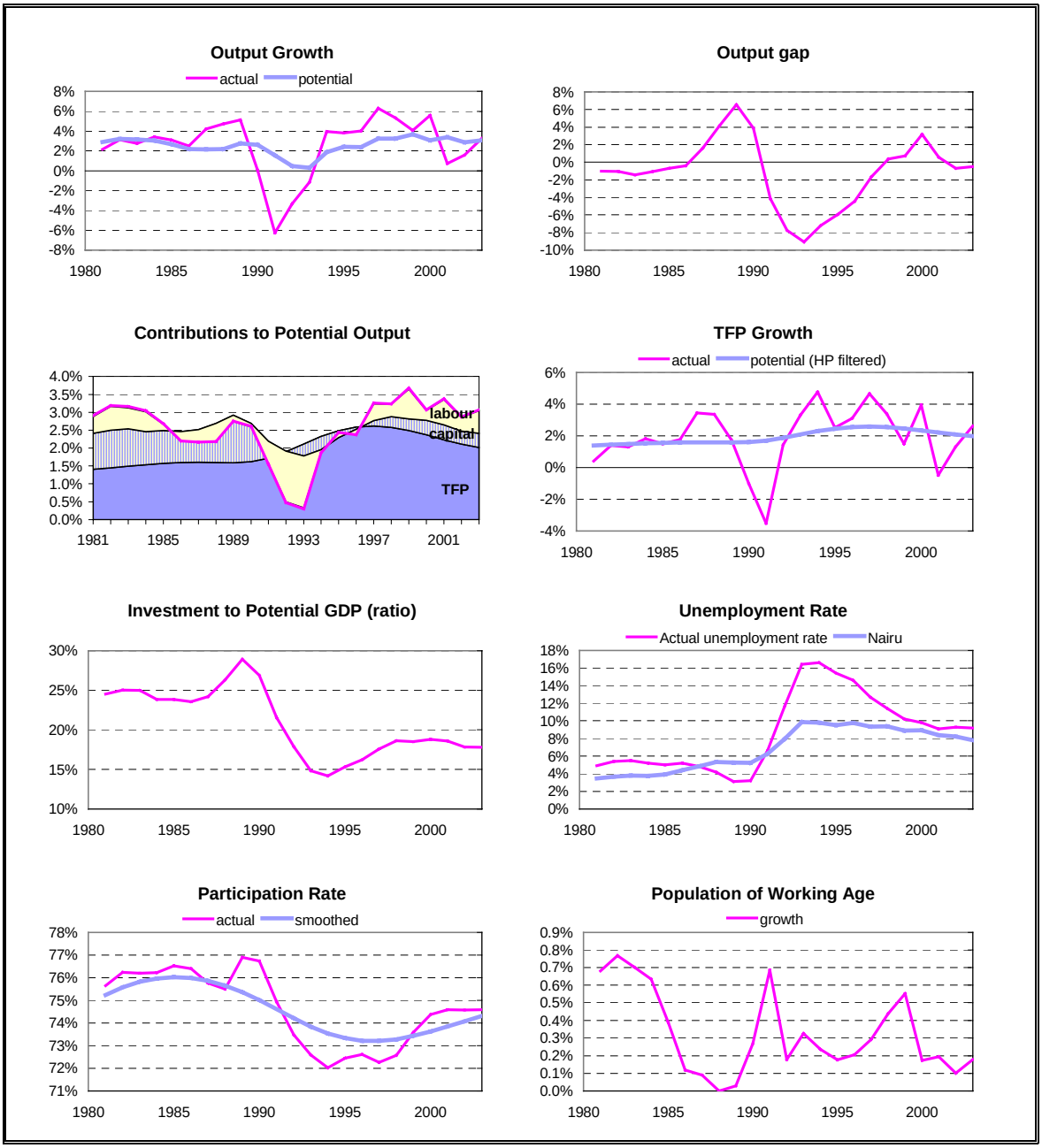


TABLE A1.14 : SWEDEN OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-1.9	-2.1	1.8	1.7	0.4	0.5	0.7	0.4	81.0	2.2	15.7
1982	-2.6	-2.5	1.8	1.6	0.3	0.5	0.8	0.3	81.4	2.5	15.6
1983	-2.6	-2.3	1.9	1.7	0.2	0.5	0.9	0.2	81.6	2.7	15.7
1984	-0.4	-0.1	2.0	2.0	0.4	0.6	1.1	0.2	81.8	2.5	16.5
1985	-0.2	0.0	2.0	2.0	0.2	0.6	1.1	0.0	81.9	2.4	17.4
1986	0.6	1.0	1.9	1.8	0.0	0.6	1.2	0.0	81.9	2.5	17.2
1987	2.1	2.2	1.9	2.1	0.2	0.7	1.2	0.3	81.9	2.4	18.2
1988	3.0	2.6	1.7	2.2	0.1	0.8	1.2	0.4	81.7	2.4	19.0
1989	4.1	3.0	1.6	2.2	0.0	1.0	1.3	0.6	81.5	2.7	20.8
1990	3.7	2.0	1.4	2.2	-0.1	0.9	1.3	0.7	81.1	3.1	20.4
1991	1.2	-0.4	1.3	1.3	-0.8	0.6	1.4	0.5	80.6	4.1	18.4
1992	-1.8	-2.7	1.3	0.6	-1.3	0.3	1.5	0.3	80.1	5.7	16.2
1993	-5.0	-4.4	1.4	-0.1	-1.7	-0.1	1.7	0.4	79.6	7.9	13.8
1994	-2.6	-1.9	1.6	1.5	-0.3	0.1	1.8	0.5	79.1	8.3	14.4
1995	-0.8	-0.5	1.8	2.3	0.1	0.2	1.9	0.5	78.6	8.0	15.4
1996	-1.7	-1.0	2.0	1.5	-0.7	0.3	1.9	0.2	78.2	8.6	15.9
1997	-1.9	-0.7	2.2	1.8	-0.4	0.2	1.9	0.2	77.9	8.9	15.5
1998	-0.7	-0.1	2.4	2.9	0.6	0.3	1.9	0.3	77.6	8.0	16.3
1999	1.3	1.4	2.5	3.0	0.7	0.4	1.9	0.5	77.4	7.2	17.3
2000	2.3	2.2	2.6	2.8	0.6	0.4	1.8	0.3	77.3	6.5	17.7
2001	0.9	0.7	2.6	2.7	0.6	0.3	1.8	0.4	77.1	5.8	17.5
2002	0.0	0.1	2.6	2.3	0.2	0.3	1.7	0.4	77.0	5.7	17.4
2003	0.2	0.4	2.6	2.5	0.4	0.4	1.7	0.4	76.9	5.4	17.7
Periods	Period Averages										
1981-1990	0.6	0.4	1.8	1.9	0.2	0.7	1.1	0.3	81.6	2.5	17.6
1991-2000	-1.0	-0.8	1.9	1.8	-0.3	0.3	1.8	0.4	78.6	7.3	16.1
1991-1995	-1.8	-2.0	1.5	1.1	-0.8	0.2	1.7	0.4	79.6	6.8	15.6
1996-2000	-0.2	0.4	2.3	2.4	0.2	0.3	1.9	0.3	77.7	7.8	16.5
2001-2003	0.4	0.4	2.6	2.5	0.4	0.4	1.7	0.4	77.0	5.6	17.5

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

GRAPH A1.14 : SWEDEN OUTPUT GAP AND DETERMINANTS

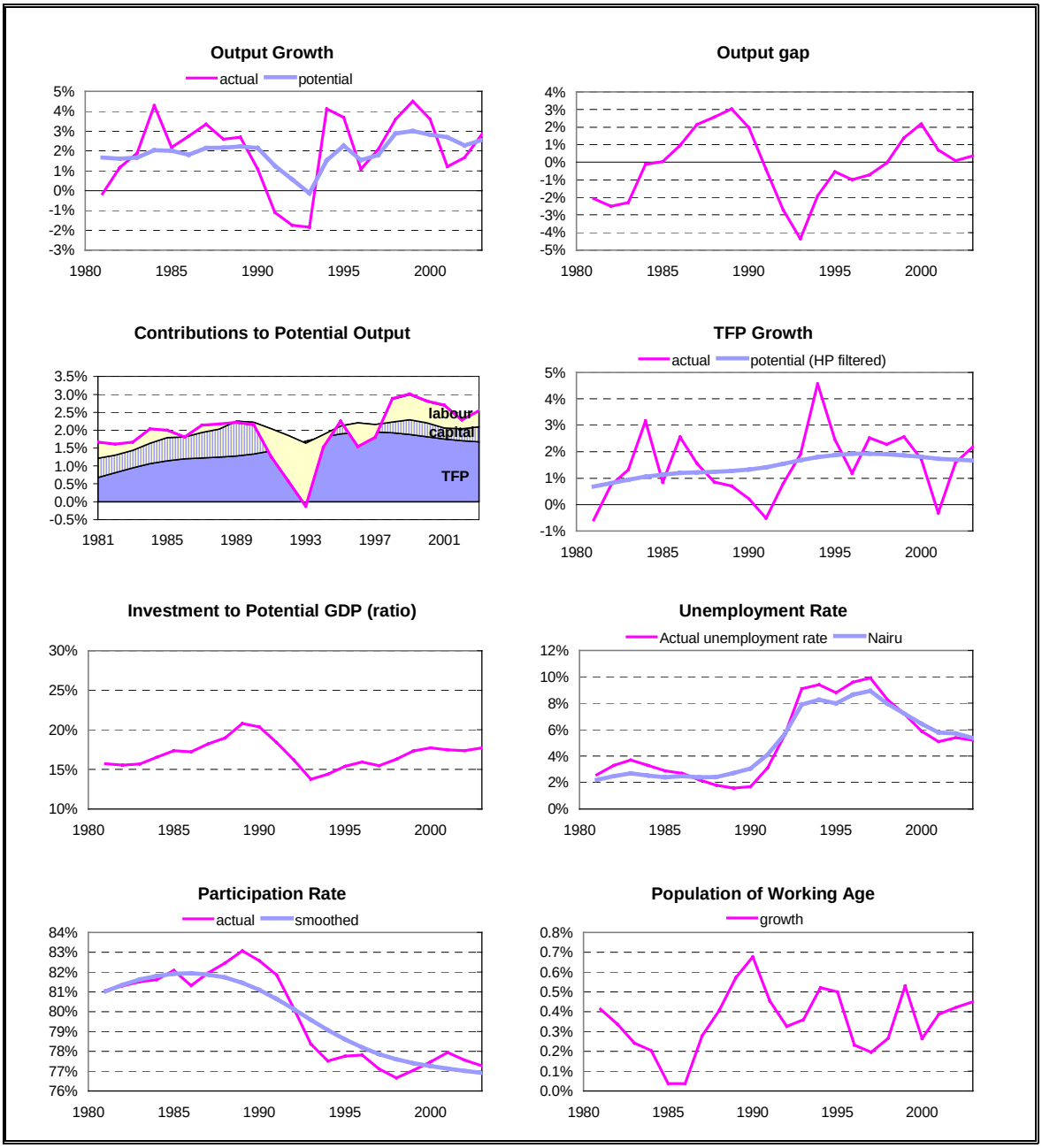
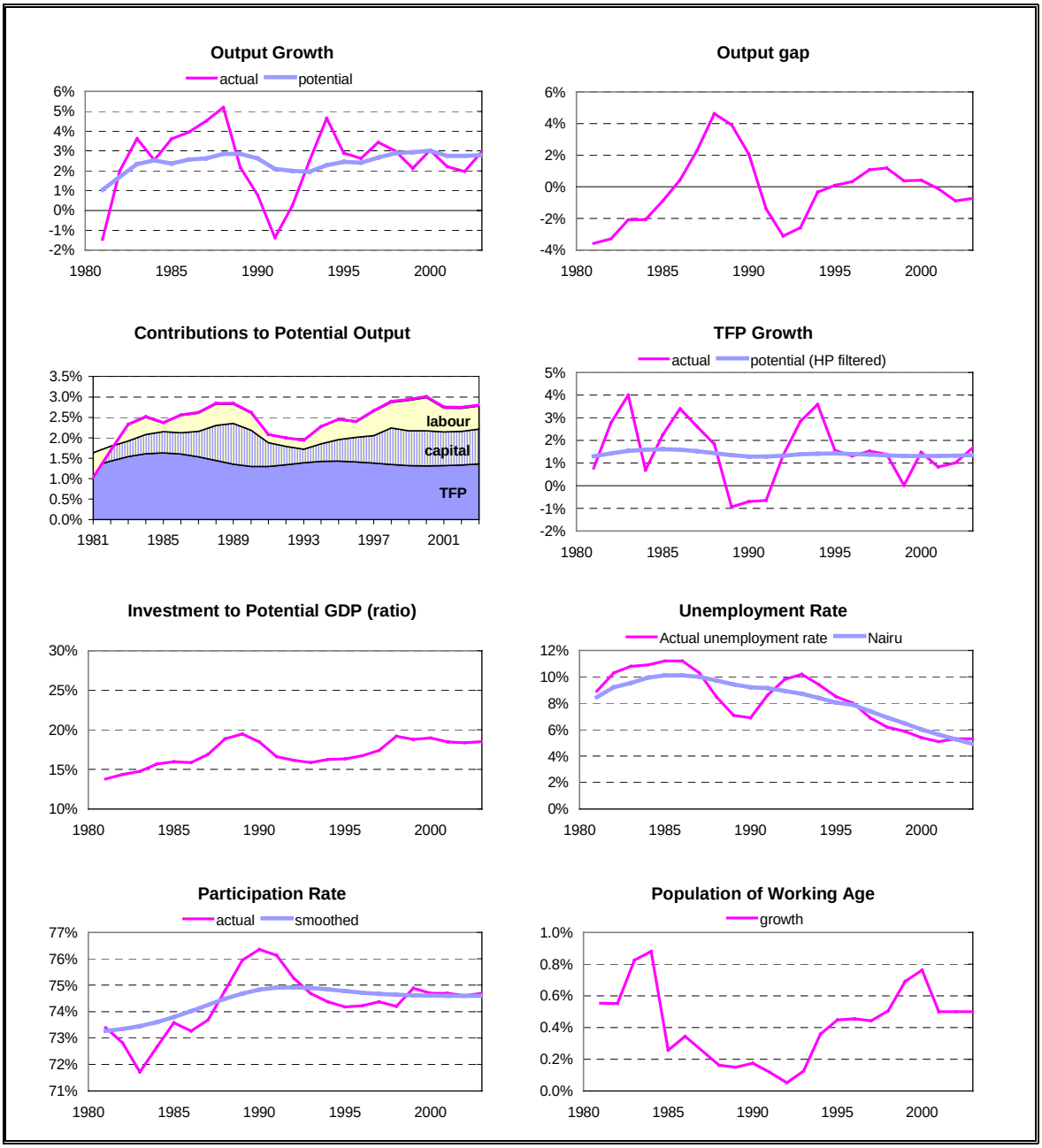


TABLE A1.15 : UNITED KINGDOM OUTPUT GAP AND DETERMINANTS

	Output Gaps (% of Potential Output)		Potential Growth (annual % change)		Contributions to Potential Growth*			Determinants of Labour Potential and Capital Accumulation			
	HP Filter	PF method	HP Trend Growth	PF Potential Growth	Labour Contribution	Capital Accumulation Contribution	TFP Contribution	Growth of Working Age Population (annual % change)	Trend Participation Rate (% of Working Age Population)	NAIRU (% of Labour Force)	Investment Ratio (% of Potential Output)
1981	-3.9	-3.6	1.8	1.0	-0.6	0.3	1.3	0.6	73.3	8.5	13.8
1982	-3.9	-3.3	1.9	1.7	-0.1	0.4	1.4	0.6	73.3	9.2	14.4
1983	-2.5	-2.1	2.1	2.3	0.4	0.4	1.5	0.8	73.5	9.5	14.8
1984	-2.3	-2.1	2.3	2.5	0.4	0.5	1.6	0.9	73.6	9.9	15.7
1985	-1.2	-0.9	2.5	2.4	0.2	0.5	1.6	0.3	73.8	10.1	16.0
1986	0.1	0.4	2.6	2.6	0.4	0.5	1.6	0.3	74.0	10.1	15.9
1987	2.0	2.3	2.6	2.6	0.4	0.6	1.5	0.3	74.3	10.0	16.9
1988	4.6	4.6	2.6	2.8	0.5	0.9	1.4	0.2	74.5	9.7	18.9
1989	4.3	3.9	2.5	2.8	0.5	1.0	1.4	0.1	74.7	9.4	19.5
1990	2.7	2.1	2.4	2.6	0.4	0.9	1.3	0.2	74.8	9.2	18.5
1991	-1.0	-1.4	2.3	2.1	0.2	0.6	1.3	0.1	74.9	9.1	16.6
1992	-3.0	-3.1	2.3	2.0	0.2	0.5	1.3	0.1	74.9	8.9	16.1
1993	-2.9	-2.6	2.4	1.9	0.2	0.3	1.4	0.1	74.9	8.7	15.9
1994	-0.8	-0.3	2.4	2.3	0.4	0.4	1.4	0.4	74.8	8.4	16.3
1995	-0.4	0.1	2.5	2.5	0.5	0.5	1.4	0.4	74.8	8.0	16.3
1996	-0.4	0.3	2.6	2.4	0.4	0.6	1.4	0.5	74.7	7.9	16.7
1997	0.4	1.1	2.6	2.7	0.6	0.7	1.4	0.4	74.7	7.4	17.4
1998	0.8	1.2	2.6	2.9	0.6	0.9	1.4	0.5	74.6	6.9	19.2
1999	0.3	0.4	2.6	2.9	0.7	0.8	1.3	0.7	74.6	6.5	18.8
2000	0.8	0.4	2.6	3.0	0.8	0.9	1.3	0.8	74.6	6.0	19.0
2001	0.5	-0.1	2.5	2.8	0.6	0.8	1.3	0.5	74.6	5.6	18.5
2002	-0.1	-0.9	2.5	2.7	0.6	0.8	1.3	0.5	74.6	5.3	18.4
2003	0.4	-0.7	2.5	2.8	0.6	0.9	1.4	0.5	74.6	4.9	18.5
Periods	Period Averages										
1981-1990	0.0	0.1	2.3	2.3	0.3	0.6	1.5	0.4	74.0	9.6	16.4
1991-2000	-0.6	-0.4	2.5	2.5	0.5	0.6	1.4	0.4	74.8	7.8	17.2
1991-1995	-1.7	-1.5	2.4	2.2	0.3	0.5	1.4	0.2	74.9	8.6	16.2
1996-2000	0.4	0.7	2.6	2.8	0.6	0.8	1.4	0.6	74.7	6.9	18.2
2001-2003	0.3	-0.6	2.5	2.8	0.6	0.8	1.3	0.5	74.6	5.3	18.5

** : Labour and Capital contributions are labour and capital growth rates adjusted for their respective factor shares. Labour, Capital and TFP contributions sum up to Potential Growth : any apparent discrepancies are due to rounding.*

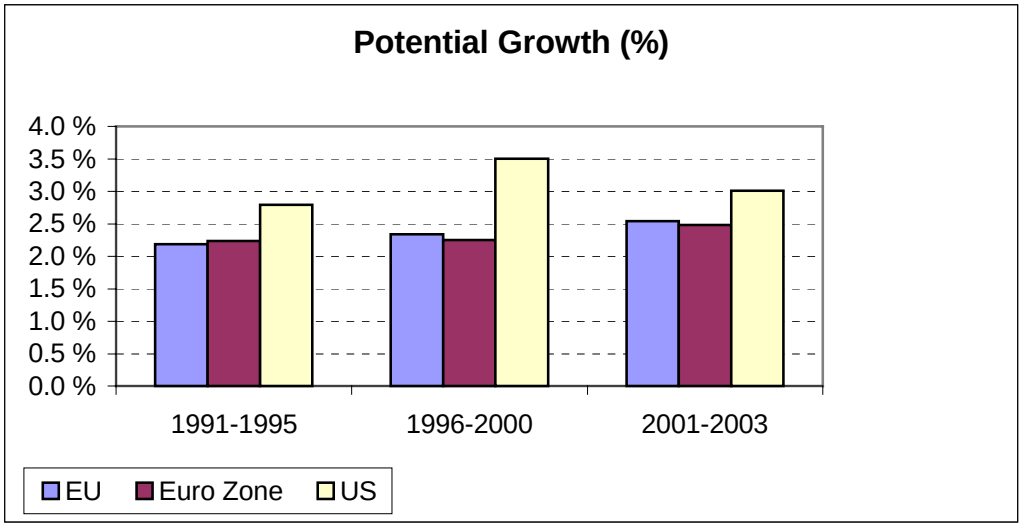
GRAPH A1.15 : UNITED KINGDOM OUTPUT GAP AND DETERMINANTS



ANNEX 2 : COMPARATIVE TABLES AND GRAPHS FOR EU15, THE EURO ZONE AND THE US

TABLE A2.1 : POTENTIAL GROWTH AND POTENTIAL GROWTH PER CAPITA

	Potential Growth (%)			Potential Growth per capita (%)		
	EU	Euro Zone	US	EU	Euro Zone	US
1981	2.0	2.2	3.0	1.7	1.8	1.9
1985	2.1	2.0	3.2	1.9	1.8	2.3
1990	2.8	2.9	2.7	2.1	2.1	1.6
1995	2.2	2.1	3.0	1.9	1.8	1.8
2000	2.6	2.5	3.6	2.2	2.1	2.4
2003	2.6	2.5	3.0	2.3	2.2	2.2
	Period averages					
1981-1990	2.3	2.3	2.9	2.0	2.0	2.0
1991-2000	2.3	2.2	3.1	1.9	1.9	1.9
1991-1995	2.2	2.2	2.8	1.7	1.8	1.4
1996-2000	2.3	2.2	3.5	2.1	2.0	2.3
2001-2003	2.5	2.5	3.0	2.2	2.1	2.0



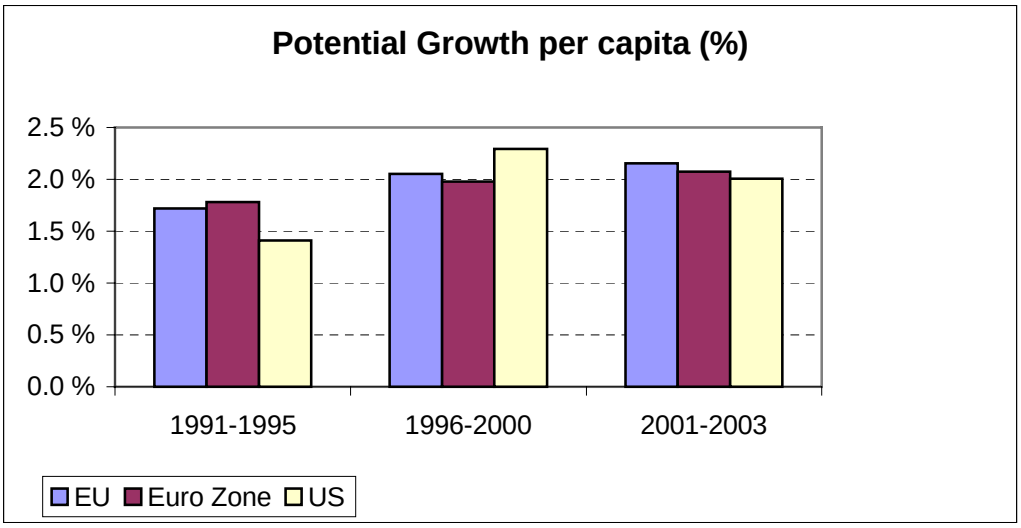
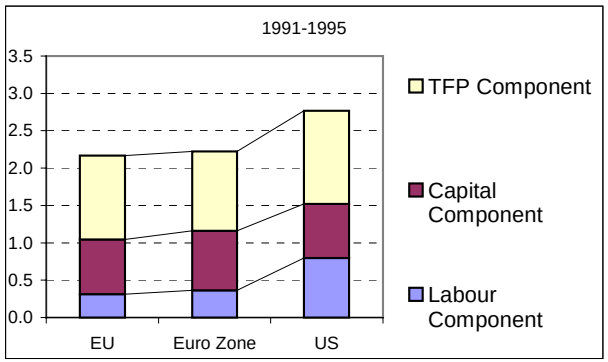


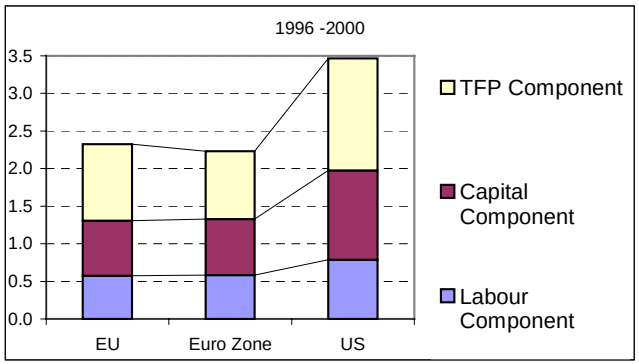
TABLE A2.2 : DECOMPOSITION OF POTENTIAL GROWTH INTO ITS LABOUR, CAPITAL AND TFP COMPONENTS

	Potential Growth (%)			Labour Contribution to Potential Growth *			Capital Contribution to Potential Growth*			TFP Contribution to Potential Growth		
	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	USA	EU	Euro Zone	USA
1981	2.0	2.2	3.0	0.1	0.2	1.4	0.9	1.0	0.9	1.0	1.0	0.7
1985	2.1	2.0	3.2	0.2	0.2	1.1	0.7	0.7	1.0	1.2	1.1	1.0
1990	2.8	2.9	2.7	0.6	0.6	0.8	1.0	1.0	0.8	1.2	1.2	1.1
1995	2.2	2.1	3.0	0.4	0.4	0.8	0.7	0.7	0.9	1.1	1.0	1.4
2000	2.6	2.5	3.6	0.8	0.8	0.7	0.8	0.8	1.3	1.0	0.9	1.5
2003	2.6	2.5	3.0	0.7	0.8	0.5	0.7	0.7	1.1	1.1	1.0	1.4
	Period averages											
1981-1990	2.3	2.3	2.9	0.3	0.3	1.1	0.8	0.8	0.9	1.2	1.1	1.0
1991-2000	2.3	2.2	3.1	0.4	0.5	0.8	0.7	0.8	1.0	1.1	1.0	1.4
1991-1995	2.2	2.2	2.8	0.3	0.4	0.8	0.7	0.8	0.7	1.1	1.1	1.2
1996-2000	2.3	2.2	3.5	0.6	0.6	0.8	0.7	0.7	1.2	1.0	0.9	1.5
2001-2003	2.5	2.5	3.0	0.8	0.8	0.5	0.7	0.7	1.1	1.0	0.9	1.5

* i.e. Labour and Capital Growth Rates adjusted for their respective factor shares

Potential Growth = Labour Component + Capital Accumulation Component + TFP Component





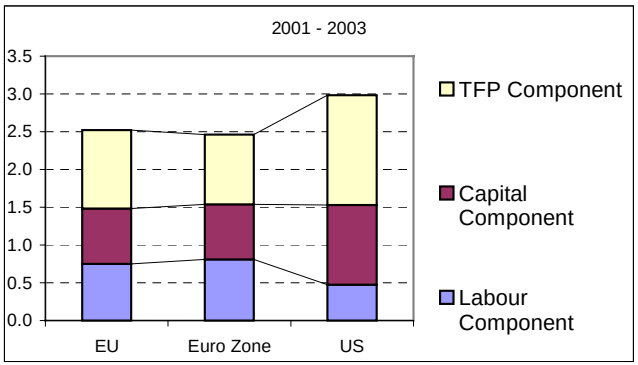
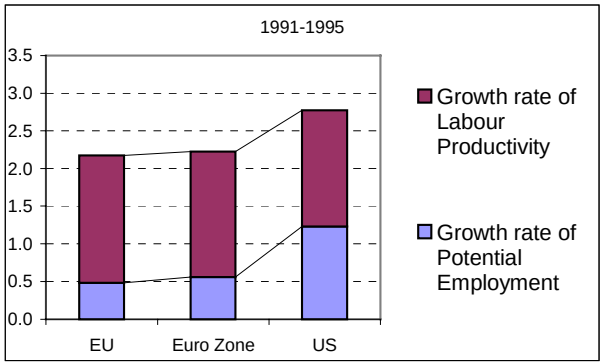
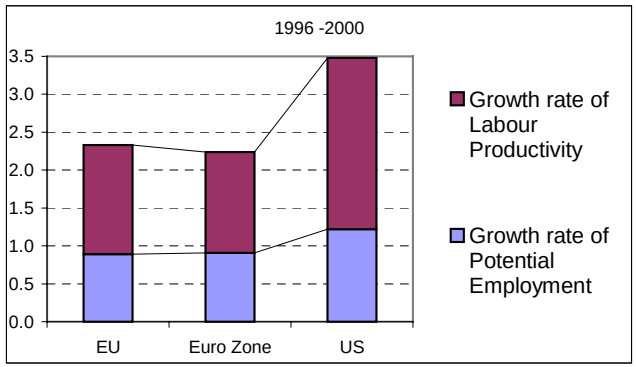


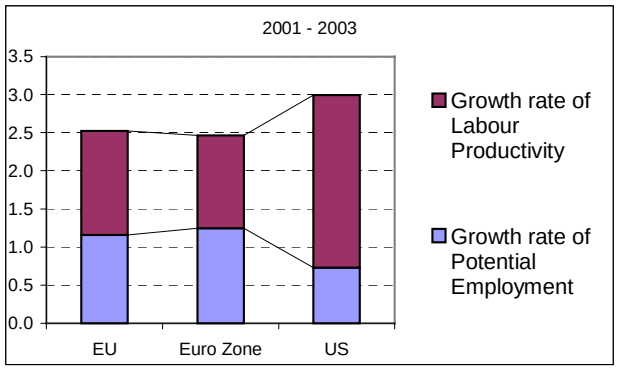
TABLE A2.3 : POTENTIAL GROWTH, POTENTIAL EMPLOYMENT AND PRODUCTIVITY PER PERSON EMPLOYED

	Potential Growth (%)			Growth rate of Potential Employment (annual % change)			Growth rate of Labour Productivity (Output per Person Employed)		
	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US
1981	2.0	2.2	3.0	0.1	0.3	2.1	1.9	1.9	0.8
1985	2.1	2.0	3.2	0.3	0.2	1.8	1.8	1.7	1.4
1990	2.8	2.9	2.7	0.9	1.0	1.2	1.9	1.9	1.5
1995	2.2	2.1	3.0	0.6	0.6	1.2	1.5	1.5	1.8
2000	2.6	2.5	3.6	1.2	1.2	1.1	1.4	1.3	2.5
2003	2.6	2.5	3.0	1.1	1.2	0.7	1.4	1.3	2.3
	Period Averages								
1981-1990	2.3	2.3	2.9	0.5	0.5	1.7	1.8	1.8	1.3
1991-2000	2.3	2.2	3.1	0.7	0.7	1.2	1.6	1.5	1.9
1991-1995	2.2	2.2	2.8	0.5	0.6	1.2	1.7	1.7	1.5
1996-2000	2.3	2.2	3.5	0.9	0.9	1.2	1.4	1.3	2.3
2001-2003	2.5	2.5	3.0	1.2	1.2	0.7	1.4	1.2	2.3

Growth rate of Labour Productivity = Potential Growth - Growth Rate of Potential Employment. Any apparent discrepancies are due to rounding.







ANNEX 3 : HOURS WORKED: ADJUSTMENT OF POTENTIAL GROWTH AND ITS COMPONENTS FOR HOURS WORKED PER PERSON EMPLOYED (EU15, EURO ZONE AND THE US)

TABLE A3.1 : HOURS WORKED PER PERSON EMPLOYED

	Hours worked			Annual % change in Hours worked		
	EU	Euro Zone	US	EU	Euro Zone	US
1981	1733	1743	1815	-1.0	-1.1	-0.9
1985	1683	1681	1825	-0.4	-0.6	0.1
1990	1656	1654	1819	-0.5	-0.4	-0.6
1995	1619	1612	1840	-0.2	-0.3	0.8
2000	1607	1598	1879	-0.5	-0.5	0.4
2003 *	1608	1599	1868	0.0	0.0	0.0
	Period averages					
1981-1990	1687	1687	1815	-0.6	-0.6	-0.1
1991-2000	1620	1615	1839	-0.3	-0.3	0.3
1991-1995	1626	1623	1817	-0.4	-0.5	0.2
1996-2000	1615	1606	1860	-0.1	-0.2	0.4
2001-2003 *	1608	1599	1868	0.0	0.0	-0.2

** : For the US, hours worked in 2002 and 2003 are identical to hours worked in 2001. For the EU, the base year is 2000.*

Source : University of Groningen and the Conference Board, GGDC Total Economy Database, 2002.

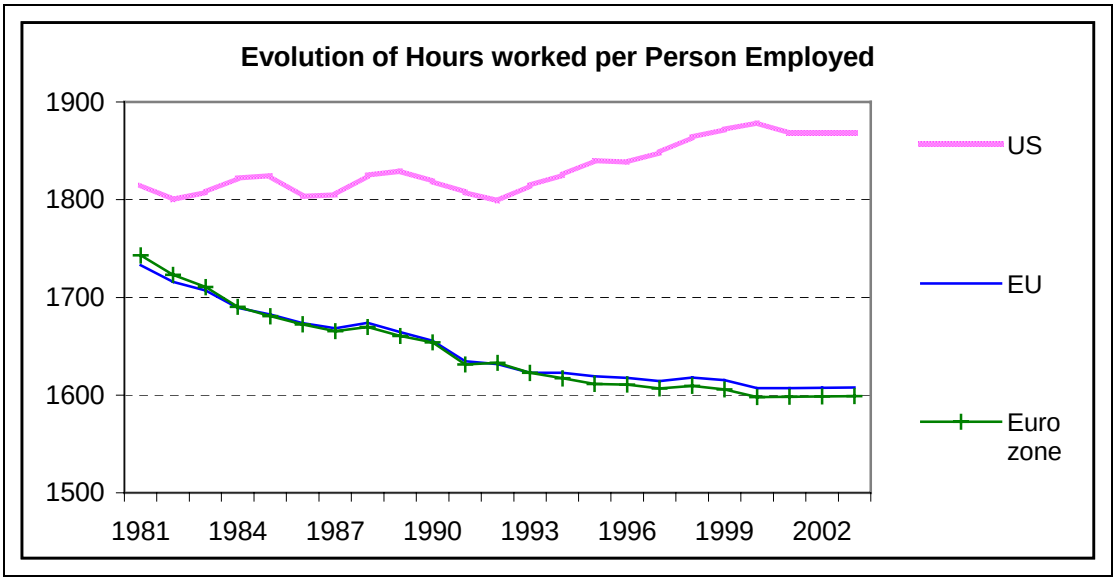
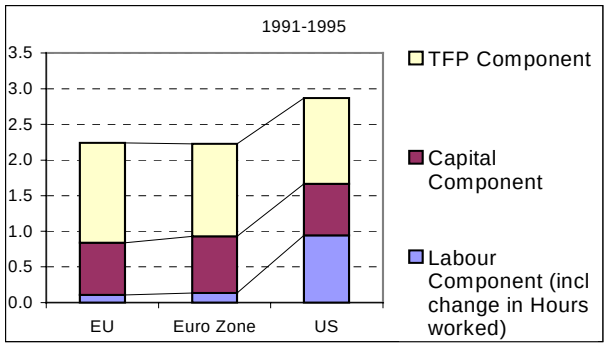
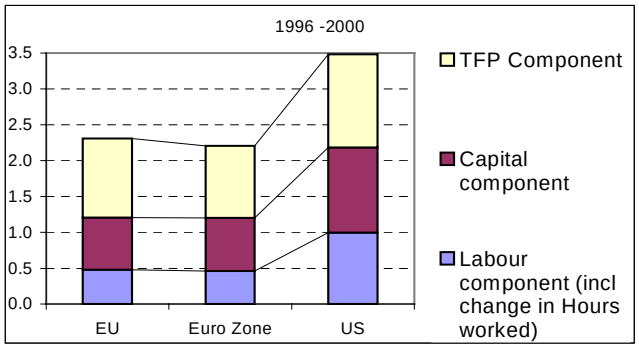


TABLE A3.2 : DECOMPOSITION OF POTENTIAL GROWTH INTO ITS LABOUR (INCL. HOURS WORKED), CAPITAL AND TFP COMPONENTS

	Potential Growth (%) *			Labour Contribution (incl. change in Hours worked) to Potential Growth *			Capital Contribution to Potential Growth			TFP Contribution to Potential Growth *		
	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US
1981	2.0	2.2	3.0	-0.5	-0.4	1.2	0.9	1.0	0.9	1.6	1.6	0.9
1985	2.1	2.0	3.2	-0.2	-0.3	1.1	0.7	0.7	1.0	1.6	1.6	1.1
1990	2.8	2.9	2.7	0.3	0.3	0.9	1.0	1.0	0.8	1.5	1.5	1.1
1995	2.2	2.1	3.1	0.3	0.2	1.0	0.7	0.7	0.9	1.2	1.2	1.2
2000	2.5	2.4	3.6	0.7	0.7	0.9	0.8	0.8	1.3	1.0	0.9	1.3
2003	2.4	2.3	3.0	0.7	0.7	0.6	0.7	0.7	1.1	0.9	0.8	1.2
	Period averages											
1981-1990	2.3	2.3	2.9	-0.1	-0.1	1.0	0.8	0.8	0.9	1.6	1.6	1.0
1991-2000	2.2	2.2	3.1	0.3	0.3	1.0	0.7	0.8	1.0	1.2	1.1	1.2
1991-1995	2.2	2.2	2.8	0.1	0.1	0.9	0.7	0.8	0.7	1.3	1.3	1.1
1996-2000	2.3	2.2	3.5	0.5	0.5	1.0	0.7	0.7	1.2	1.1	1.0	1.3
2001-2003	2.4	2.3	3.0	0.7	0.7	0.6	0.7	0.7	1.1	0.9	0.8	1.3

* Hours worked are HP-filtered and then enter the calculation of the potential labour input and subsequently that of potential output. As a result the Solow residual is adjusted and the potential TFP contribution changes. From 2001 onwards, hours worked are kept to their level of 2000-2001, which explains the differences at the end of the series with previous tables.





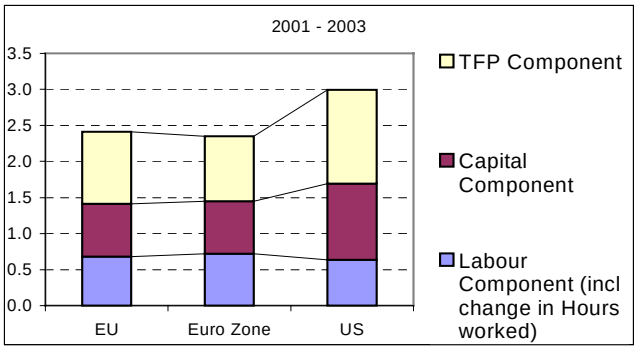
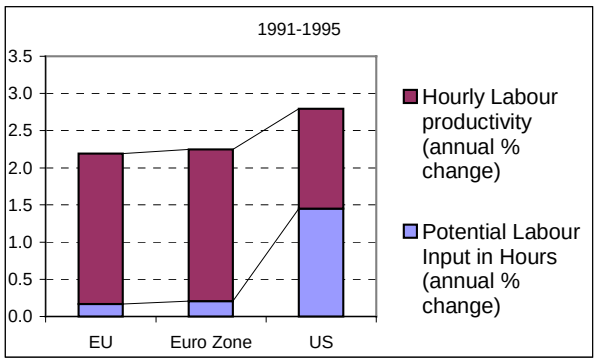
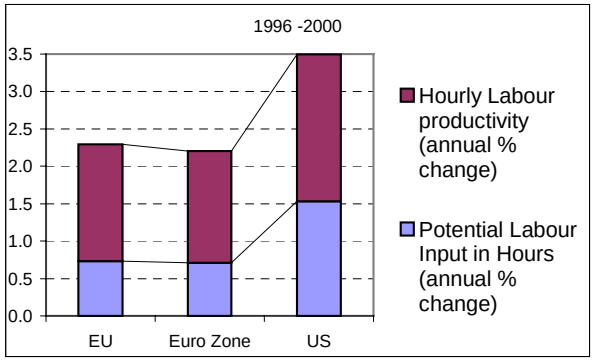


TABLE A3.3 : POTENTIAL GROWTH, POTENTIAL EMPLOYMENT CHANGE (INCL. CHANGE IN HOURS WORKED) AND HOURLY PRODUCTIVITY

	Potential Growth (%)			Potential Labour Input in Hours (Annual % change)			Hourly Labour productivity (annual % change)		
	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US
1981	2.0	2.2	3.0	-0.7	-0.5	1.8	2.7	2.7	1.1
1985	2.1	2.0	3.2	-0.3	-0.4	1.7	2.4	2.4	1.6
1990	2.8	2.9	2.7	0.5	0.5	1.3	2.3	2.3	1.4
1995	2.2	2.1	3.1	0.4	0.4	1.5	1.8	1.8	1.6
2000	2.5	2.4	3.6	1.1	1.0	1.4	1.4	1.4	2.2
2003	2.4	2.3	3.0	1.0	1.1	1.0	1.3	1.2	2.0
	Period averages								
1981-1990	2.3	2.3	2.9	-0.1	-0.2	1.6	2.4	2.5	1.4
1991-2000	2.2	2.2	3.1	0.5	0.5	1.5	1.8	1.8	1.7
1991-1995	2.2	2.2	2.8	0.2	0.2	1.5	2.0	2.0	1.3
1996-2000	2.3	2.2	3.5	0.7	0.7	1.5	1.6	1.5	2.0
2001-2003	2.4	2.3	3.0	1.1	1.1	1.0	1.3	1.2	2.0





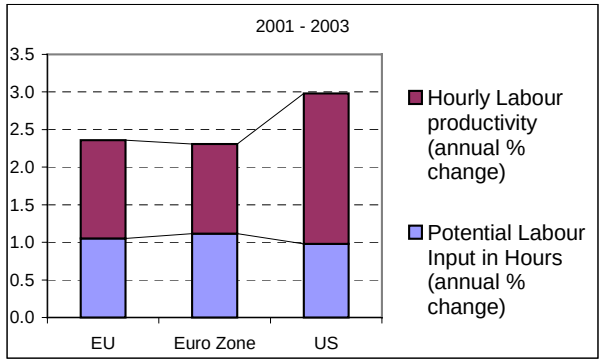
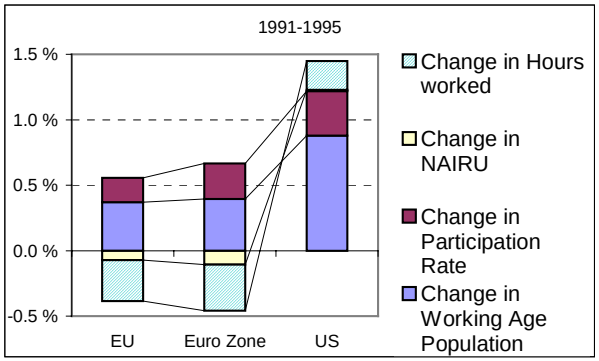
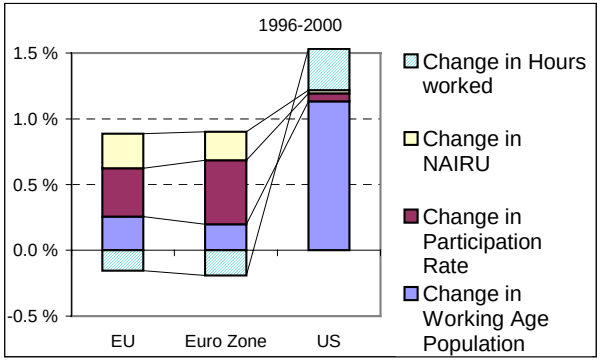


TABLE A3.4 : DECOMPOSITION OF POTENTIAL EMPLOYMENT CHANGE (INCL. CHANGES IN HOURS WORKED) INTO ITS DETERMINANTS

	Annual % change in Potential Labour Input in Hours			Annual % change in Population of Working Age			Annual % change in Trend Participation Rate			Annual percentage change in (1-NAIRU)			Annual % change in (trend) Hours Worked per Person Employed		
	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US
1981	-0.7	-0.5	1.8	1.1	1.3	1.2	-0.1	-0.1	0.8	-0.9	-0.8	0.2	-0.8	-0.8	-0.3
1985	-0.3	-0.4	1.7	0.5	0.6	1.0	0.1	0.0	0.7	-0.3	-0.4	0.0	-0.6	-0.7	-0.1
1990	0.5	0.5	1.3	0.6	0.7	0.7	0.2	0.2	0.6	0.1	0.1	-0.1	-0.4	-0.5	0.1
1995	0.4	0.4	1.5	0.3	0.2	1.0	0.2	0.4	0.2	0.1	0.1	0.0	-0.2	-0.3	0.3
2000	1.1	1.0	1.4	0.3	0.3	1.1	0.4	0.5	0.0	0.4	0.4	0.0	-0.1	-0.2	0.3
2003	1.0	1.1	1.0	0.2	0.2	1.0	0.4	0.5	-0.1	0.5	0.5	-0.2	-0.1	-0.1	0.2
	Period averages														
1981-1990	-0.1	-0.2	1.6	0.7	0.8	0.9	0.1	0.0	0.7	-0.3	-0.3	0.1	-0.6	-0.6	-0.1
1991-2000	0.5	0.5	1.5	0.3	0.3	1.0	0.3	0.4	0.2	0.1	0.1	0.0	-0.2	-0.3	0.3
1991-1995	0.2	0.2	1.5	0.4	0.4	0.9	0.2	0.3	0.3	-0.1	-0.1	0.0	-0.3	-0.4	0.2
1996-2000	0.7	0.7	1.5	0.3	0.2	1.1	0.4	0.5	0.1	0.3	0.2	0.0	-0.2	-0.2	0.3
2001-2003	1.1	1.1	1.0	0.3	0.3	0.9	0.4	0.5	-0.1	0.4	0.4	-0.1	-0.1	-0.1	0.2

Change in Potential Labour Input = Change in Working Age Population + Change in Participation Rate + Change in (1-NAIRU) + Change in Hours worked.
Any apparent discrepancies are due to rounding.





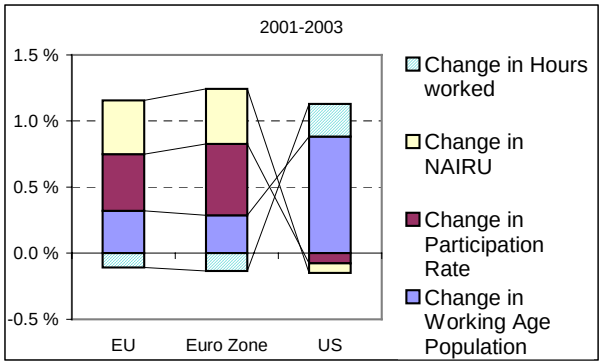
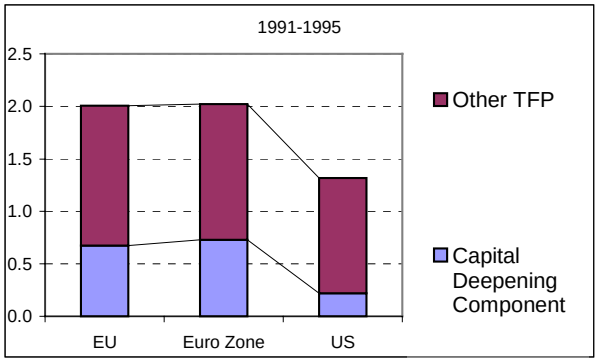
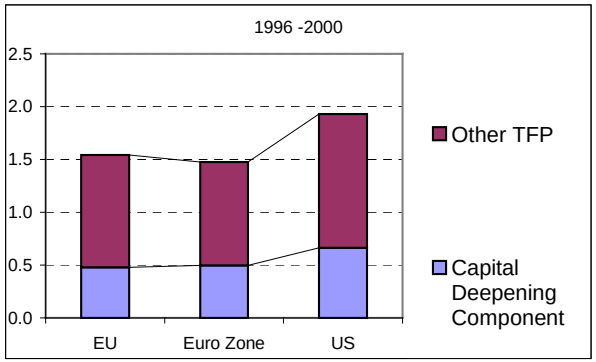


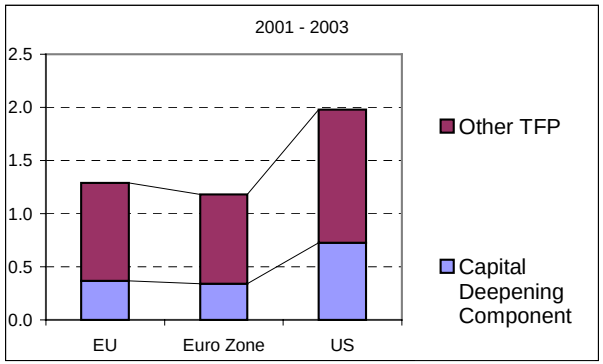
TABLE A3.5 : DECOMPOSITION OF THE GROWTH OF HOURLY LABOUR PRODUCTIVITY INTO CAPITAL DEEPENING AND TFP COMPONENTS

	Hourly Labour productivity (annual percentage change)			Capital Deepening Component			Other TFP		
	EU	Euro Zone	US	EU	Euro Zone	US	EU	Euro Zone	US
1981	2.7	2.7	1.1	1.1	1.2	0.3	1.6	1.6	0.9
1985	2.4	2.4	1.6	0.8	0.9	0.4	1.6	1.6	1.1
1990	2.3	2.3	1.4	0.8	0.8	0.3	1.5	1.5	1.0
1995	1.8	1.8	1.6	0.5	0.6	0.4	1.2	1.2	1.2
2000	1.4	1.4	2.2	0.4	0.5	0.9	1.0	0.9	1.3
2003	1.3	1.2	2.0	0.4	0.4	0.8	0.9	0.8	1.2
	Period averages								
1981-1990	2.4	2.5	1.4	0.8	0.9	0.3	1.6	1.5	1.0
1991-2000	1.8	1.8	1.7	0.6	0.6	0.4	1.2	1.1	1.2
1991-1995	2.0	2.0	1.3	0.7	0.7	0.2	1.3	1.3	1.1
1996-2000	1.6	1.5	2.0	0.5	0.5	0.7	1.1	1.0	1.3
2001-2003	1.3	1.2	2.0	0.4	0.3	0.7	0.9	0.8	1.3

Change in Hourly Labour productivity = Capital Deepening + TFP Change. Any apparent discrepancies are due to rounding







ANNEX 4 : CALCULATING MULTIPLIERS FOR INDIVIDUAL MEMBER STATES

TABLE A4.1 : GROWTH DIFFERENTIAL DUE TO AN INCREASE IN THE GROWTH RATE OF THE WORKING AGE POPULATION

For an increase of one percentage point in the growth rate of the Working Age Population, sustained over the period 2001-2006 …	Growth differential in 2001	Growth differential in 2006
US	+ 0.685 %	+ 0.721 %*
EU15	+ 0.679 %	+ 0.752 %
EU12	+ 0.678 %	+ 0.752 %
Belgium	+ 0.678 %	+ 0.758 %
Denmark	+ 0.681 %	+ 0.764 %
Germany	+ 0.672 %	+ 0.741 %
Greece	+ 0.682 %	+ 0.752 %
Spain	+ 0.684 %	+ 0.759 %
France	+ 0.679 %	+ 0.750 %
Ireland	+ 0.708 %	+ 0.775 %
Italy	+ 0.679 %	+ 0.749 %
Luxembourg	+ 0.721 %	+ 0.894 %
Netherlands	+ 0.680 %	+ 0.757 %
Austria	+ 0.678 %	+ 0.748 %
Portugal	+ 0.691 %	+ 0.797 %
Finland	+ 0.686 %	+ 0.740 %
Sweden	+ 0.680 %	+ 0.748 %
United Kingdom	+ 0.679 %	+ 0.753 %

* In the case of the US, the growth differential refers to the year 2003 instead of 2006 since no medium-term extension for the US has been calculated.

TABLE A4.2 : GROWTH DIFFERENTIAL DUE TO AN INCREASE IN THE PARTICIPATION RATE

For an (absolute) increase of one percentage point in the Participation Rate over the period 2001-2006 …	Growth differential in 2001	Growth differential in 2006
US	+ 0.894 %	+ 0.024 %*
EU15	+ 0.983 %	+ 0.014 %
EU12	+ 1.003 %	+ 0.013 %
Belgium	+ 1.082 %	+ 0.017 %
Denmark	+ 0.861 %	+ 0.019 %
Germany	+ 0.912 %	+ 0.012 %
Greece	+ 1.107 %	+ 0.016 %
Spain	+ 1.122 %	+ 0.014 %
France	+ 0.989 %	+ 0.013 %
Ireland	+ 1.063 %	+ 0.006 %
Italy	+ 1.131 %	+ 0.012 %
Luxembourg	+ 1.106 %	+ 0.020 %
Netherlands	+ 0.883 %	+ 0.007 %
Austria	+ 0.947 %	+ 0.016 %
Portugal	+ 0.960 %	+ 0.019 %
Finland	+ 0.930 %	+ 0.012 %
Sweden	+ 0.884 %	+ 0.018 %
United Kingdom	+ 0.914 %	+ 0.018 %

* In the case of the US, the growth differential refers to the year 2003 instead of 2006 since no medium-term extension for the US has been calculated.

TABLE A4.3 : GROWTH DIFFERENTIAL DUE TO A DECREASE IN THE NAIRU

For an (absolute) *decrease* of one percentage point in the NAIRU over the period 2001-2006 …	Growth differential in 2001	Growth differential in 2006
US	+ 0.727 %	+ 0.021 %*
EU15	+ 0.743 %	+ 0.013 %
EU12	+ 0.749 %	+ 0.013 %
Belgium	+ 0.735 %	+ 0.015 %
Denmark	+ 0.713 %	+ 0.015 %
Germany	+ 0.737 %	+ 0.012 %
Greece	+ 0.763 %	+ 0.014 %
Spain	+ 0.802 %	+ 0.014 %
France	+ 0.753 %	+ 0.014 %
Ireland	+ 0.770 %	+ 0.014 %
Italy	+ 0.753 %	+ 0.013 %
Luxembourg	+ 0.747 %	+ 0.026 %
Netherlands	+ 0.709 %	+ 0.014 %
Austria	+ 0.705 %	+ 0.013 %
Portugal	+ 0.737 %	+ 0.018 %
Finland	+ 0.750 %	+ 0.012 %
Sweden	+ 0.724 %	+ 0.013 %
United Kingdom	+ 0.723 %	+ 0.013 %

* In the case of the US, the growth differential refers to the year 2003 instead of 2006 since no medium-term extension for the US has been calculated.

TABLE A4.4 : GROWTH DIFFERENTIAL DUE TO A CHANGE IN THE INVESTMENT RATIO

For an (absolute) increase of one percentage point in the investment ratio (e.g. from 20% to 21% of potential output), sustained over the 2001-2006 period	Growth differential in 2001	Growth differential in 2006
US	+ 0.152 %	+ 0.134 %*
EU15	+ 0.119 %	+ 0.095 %
EU12	+ 0.116 %	+ 0.092 %
Belgium	+ 0.128 %	+ 0.102 %
Denmark	+ 0.128 %	+ 0.095 %
Germany	+ 0.102 %	+ 0.084 %
Greece	+ 0.083 %	+ 0.062 %
Spain	+ 0.125 %	+ 0.087 %
France	+ 0.131 %	+ 0.105 %
Ireland	+ 0.166 %	+ 0.145 %
Italy	+ 0.114 %	+ 0.091 %
Luxembourg	+ 0.278 %	+ 0.147 %
Netherlands	+ 0.122 %	+ 0.097 %
Austria	+ 0.111 %	+ 0.083 %
Portugal	+ 0.148 %	+ 0.094 %
Finland	+ 0.136 %	+ 0.121 %
Sweden	+ 0.141 %	+ 0.119 %
United Kingdom	+ 0.133 %	+ 0.106 %

* In the case of the US, the growth differential refers to the year 2003 instead of 2006 since no medium-term extension for the US has been calculated.

TABLE A4.5 : GROWTH DIFFERENTIAL DUE TO AN INCREASE IN TFP GROWTH

For an increase of one percentage point in the growth rate of TFP, sustained over the 2001-2006 period	Growth differential in 2001	Growth differential in 2006
US	+ 1.069 %	+ 1.129 %*
EU15	+ 1.056 %	+ 1.168 %
EU12	+ 1.055 %	+ 1.167 %
Belgium	+ 1.055 %	+ 1.182 %
Denmark	+ 1.055 %	+ 1.187 %
Germany	+ 1.057 %	+ 1.146 %
Greece	+ 1.046 %	+ 1.166 %
Spain	+ 1.059 %	+ 1.178 %
France	+ 1.070 %	+ 1.170 %
Ireland	+ 1.057 %	+ 1.214 %
Italy	+ 1.120 %	+ 1.158 %
Luxembourg	+ 1.052 %	+ 1.398 %
Netherlands	+ 1.126 %	+ 1.181 %
Austria	+ 1.060 %	+ 1.157 %
Portugal	+ 1.051 %	+ 1.240 %
Finland	+ 1.084 %	+ 1.147 %
Sweden	+ 1.064 %	+ 1.166 %
United Kingdom	+ 1.057 %	+ 1.173 %

* In the case of the US, the growth differential refers to the year 2003 instead of 2006 since no medium-term extension for the US has been calculated.