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Potential growth in Europe

How to measure it and how to boost it?

Edited by Alain Henriot

April 2008

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Until 2006, Euren published a report on the economic outlook in Europe twice a year. From 2007, the Euren network has produced a bimonthly newsletter on the economic situation in Europe. This report intends to focus on more structural issues. It has been written by Euren teams and coordinated by Alain Henriot.

Content

Introduction : potential growth at stake

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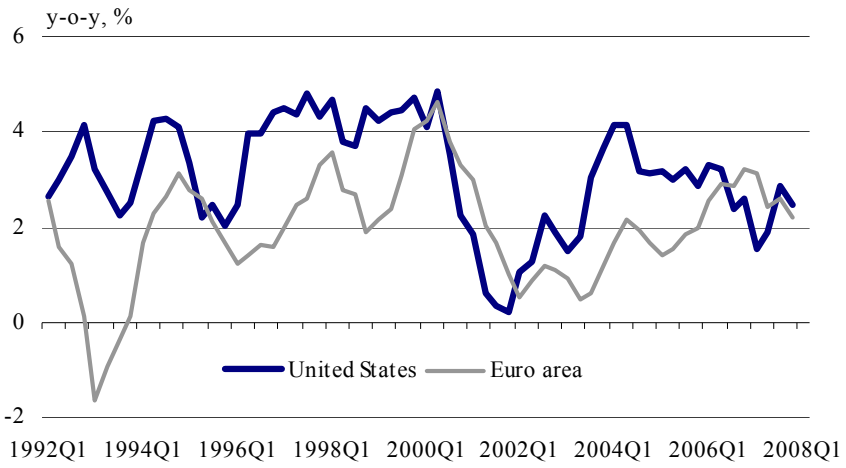
In the beginning of the decade, economic growth in Europe was disappointing, lagging below the U.S. growth (1.3% on average between 2002 and 2005, compared to 2.7% in the U.S.). However, a strong acceleration occurred in 2006 (2.9 %) while the annual average of 2007 reached a robust 2.6% although a deceleration took place in the course of the year. This phase of stronger growth after gloomy years raised again the question of the sustainability of this movement, as it had already been the case at the end of the 1990's. Was it the signal of higher potential growth, in the wake of structural reforms undertaken in several countries, in particular in Germany? Alternatively, was this acceleration in economic growth momentum the consequences of the traditional business cycle, after several years of subdued economic growth?

The weakening of activity, which began in the course of last year and should continue in 2008, does not put an end to this debate. After this downswing phase of the business cycle, can we expect or not in the coming years substantial stronger economic growth in Europe?

GDP growth



Source : OECD

The concept of potential growth has become very popular and not only for academic researchers. It is also intensively used by business economists as well as forecasters working in administrations and in international organisations.

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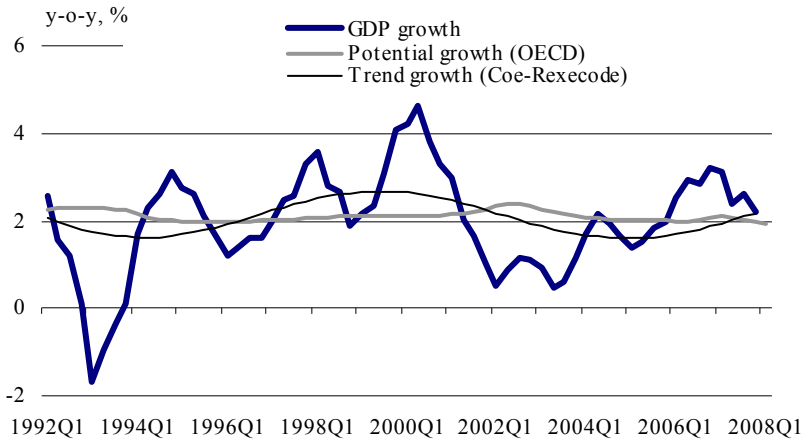
Several questions are however attached to the generalisation of the use of this concept. Are the measures based on several techniques reliable? Why is the concept of potential growth useful although its measurement remains delicate? What kind of actions can policymakers undertake to boost it?

1. The difficulty to measure potential growth in real time

Regarding movements of economic activity, short term fluctuations can cover a large spectrum of causes. As a first step, economists are used to correct rough data from seasonal volatility. But even when seasonally adjusted data are considered, the main task of the economists observing economic movements in real time consists in distinguishing short term fluctuations (the business cycle) from the trend. It is common to assess trend growth through various statistical models (Anas and Ferrara, 2004). The most popular approach consists in using Hodrick Presscott filters, or alternatively more sophisticated filters like the Cristiano-Fitzgerald filter.

However, as can be seen on the following graph, trend growth based on statistical filters still includes a cyclical component. Therefore, economists prefer to refer to the concept of potential growth rather than trend growth. As a first approximation, it appears that potential growth is more or less the average trend growth along a full business cycle, including the upswing and downswing phases. For instance, between the average of trend growth between the trough in mid-1990's and the peak in early 2000's was slightly above 2% for the Euro area, a figure which is very close to the estimation of potential growth by the OECD for this period.

Euro area : GDP growth



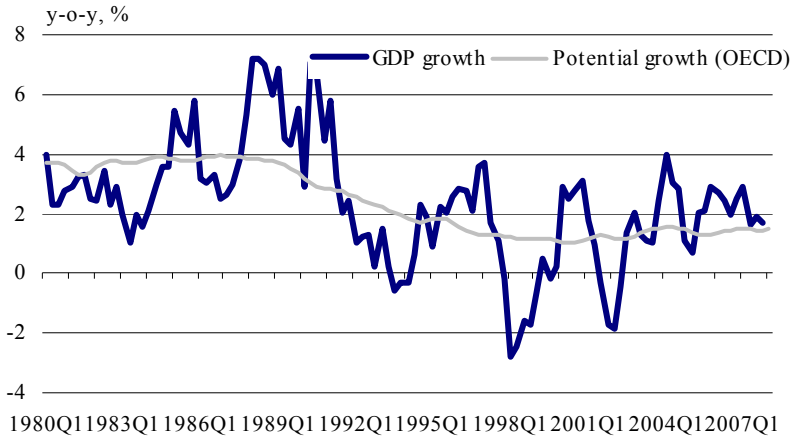
Sources : OECD and Coe-Rexecode

Economically, potential growth can be defined as the rate of economic growth, which is sustainable in the medium run without triggering inflationary pressures. Therefore, it is based on a production function approach and estimates can vary according to the components used in the

production function as well as the statistical techniques used to measure those components.

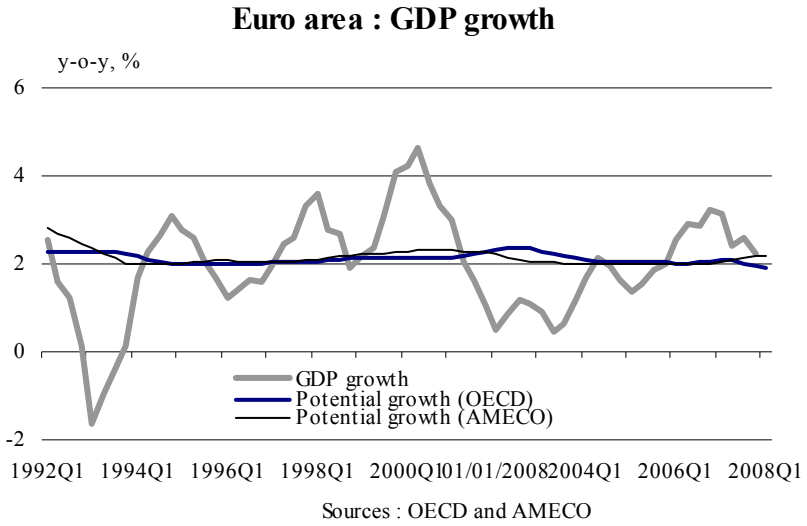
It is worth to mention that potential growth can also be influenced by the recent economic developments, although it should be theoretically independent from them. For instance, capital stock variation can be affected by a long period of low economic growth. Historically, Japan economical developments in the 1990's is a good example of persistent downward revision of potential growth. At the beginning of the decade, potential growth was assumed to be around 3 %. As Japan economic growth remained sluggish during most of the decade, potential growth fell to 1 % in the beginning of the current decade[2]. It was then gradually revised upwards, following stronger effective GDP growth.

Japan GDP growth



Source: OECD

Therefore, potential growth is not invariant through time and it can be influenced by recent economic conditions. It is one of the reasons that explains why the assessment can differ according to different types of approach. For instance, for 2007, the European Economic Commission estimates potential growth to 2.2 % for the Euro area, while OECD assessment is 2%. It means that its assessment in real time is influenced by the accuracy of the evaluation of the various components. It also means that considering the future, forecasting potential growth implies to be able to use appropriate forecasts of the different components of the production function. If for instance economic policy tries to encourage higher employment rate and is successful, other things elsewhere equal, potential growth must be revised upwards. Obviouly, the accuracy of the forecast of potential growth would in this case be function of the ability to assess the effectiveness of policy measures to boost the employment rate.



Sources : OECD and AMECO

2. Why it makes sense to focus on the concept of potential growth?

The spread in the measurement of potential growth is often used as an argument to reject the pertinence of this concept, and its usefulness. But it would be a mistake to ignore this concept, even if specific measures must be taken carefully.

Two main reasons can be clearly identified to give a strong interest to potential growth.

The first one is the usefulness of this concept for policymakers. Let us take two examples. In the Euro Area, monetary policy is based on an inflation target. One intermediate objective is the monetary growth in nominal terms. It means that the target for monetary growth is roughly the product between the inflation target and real potential growth, considering the speed of the monetary circulation as constant. The quantitative equation of money is given by:

$M.V = P.Q$

With *M* monetary supply, *V* speed of circulation of the money, *P* inflation target and *Q* potential growth.

It appears that if potential growth is not correctly assessed, the stance of monetary policy can be inappropriate.

Another field of economic policy where potential growth is often used is public finance. To assess the stance of fiscal policy it is common to split current developments between what is the consequence of the business cycle and what is linked to discretionary measures. This procedure requires to use potential growth as a benchmark. It allows to calculate a cyclically

adjusted net lending (or borrowing) of the general government. Of course, as in the case of monetary policy, the estimation of potential growth is crucial to assess correctly the fiscal stance, taking into account the effect of the business cycle on public finances. At the end of the 1990's, when economic growth was strong in Europe, some analysts suggested that this upswing was the consequence of stronger potential growth. A common idea was that IT revolution came into Europe with a lag compared to the US. This can probably explain why European governments were not keen to strictly control public expenditures at this time, as they expected stronger receipts in the longer run, thanks to this supposed firmer potential growth. Unfortunately, we now know that this acceleration of economic growth in Europe at the end of the 1990's mainly reflected a cyclical upswing rather than higher potential growth. This mistake had very negative effects on GDP growth in the subsequent years as governments had to adopt restrictive fiscal policy to reduce fiscal imbalances after the Internet crisis in 2000/2001. It is one of the reasons why the Euro area recovery lagged behind the US upswing in the first half of this decade. This episode illustrates how important the assessment of potential growth is for economic policy.

Besides its use to run economic policy, more structurally, potential growth can also be seen as the potential income growth of the population. Consequently, its evolution, in the past and in the future, reflects the ability for a country to increase its wealth, when the latter is measured by GDP. This is why one the central aim of economic policy is to strengthen potential growth.

3. How to boost potential growth?

A useful way to describe formally potential growth consists in using the subsequent formula:

GDP = GDP/ N * N or

gdp = (gdp-n) + n in terms of growth rate,

where *gdp* is potential growth, *gdp-n* growth of labour productivity and *n* employment growth.

Using this simple formula, it clearly appears that potential growth can be boosted through two main channels: firstly, by increasing labour productivity and secondly in rising employment.

Using a Cobb-Douglas function, it appears that labour productivity is a function of the capital stock per labour unit and of total factor productivity (Henriot, 2007). Therefore, the main channel to boost labour productivity is to increase the intensity of capital and its efficiency. For this latter aspect it

is obvious that research development is a good candidate, as stressed in the Lisbon agenda.

Another way to increase potential growth consists in increasing the number of hours worked. Besides demographic trends, higher employment rate and higher number of hours worked per capita are two key instruments that can be identified to foster economic growth. Again, in the wake of the Lisbon agenda, European countries have undertaken a number of reforms of the labour market in order to increase employment rate and also, in some cases, the number of hours worked by worker.

The table below gives an illustration of key data regarding some factors explaining potential growth in the case of Euro area. The evolution of some variables in the first half of the decade seems to have been directed towards higher potential growth, especially employment rate. The capital stock per person employed grew also a bit quicker recently. The number of hours worked continued to decline, although it seems to have been stabilised in most recent years. Other trends are less encouraging, as the stagnation of the level of research-development expressed in percentage of GDP. Labour productivity per hour worked stagnated again in the first half of the decade[3].

Table 1
Components of potential growth for the Euro Area

	2000	**2006**
Productivity per hour worked (1)	-0.2	-0.1
Employment rate (%)	61.5	64.8
R&D expenditures in % GDP	1.84	1.85
Numbers of hours worked per person engaged	1609	1583 (2)
Net capital stock per person employed (1)	1.1	1.4

(1) Annual average growth (%) 1995-2000 and 2000-2006
(2) 2004
Source : OECD, Eurostat

The following report addressed the main questions raised in this introduction. Stella Balfoussias reviews the main techniques used to assess potential growth, while Julian Perez and Jorge Rodriguez give recent estimates in the case of Euro area. The dynamic of potential growth and of its components is discussed through two case studies on Germany (Roland Doehrn and Tobias Zimmermann) and Italy (Valentina Ferraris and Carlo Dell'Aringa).

[3] More recent data suggest an upswing in productivity gains in 2006 and at the beginning of 2007. But it seems more linked to the business cycle rather than to structural adjustments. Indeed, this positive trend already weakened in the course of 2007.

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Methodological issues in estimating potential output

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The methods used to estimate potential output and output gap start from purely statistical techniques, involving simple linear time trends and mechanical filters, to complex, full scale, structural econometric models. However, quite often, the approaches used combine statistical techniques with economic information. In what follows we classify and review the main econometric approaches according to the methodology used, with a view to show the complexities of different techniques, highlight the pros and cons and emphasize the need for judgment in the face of underlying uncertainty. The approaches to be examined here include univariate statistical tools involving detrending and filtering techniques, multivariate unobservable components methods, decompositions based on Structural Vector Autoregressive models and production function approaches.

1. Univariate statistical techniques

1.1 Filtering techniques

In a simple univariate framework, the estimation of potential output, or output gap, reduces to a question of separating the trend from the cycle for a given GDP series. In this context, the simplest way to estimate potential output is to use a linear trend approach. The trend is estimated on the basis of logarithmic quarterly GDP data under the assumption that output follows a deterministic trend and potential output grows at a constant rate. The residual from removing that trend should be a stationary series representing output gap.

The assumption that potential output grows at a constant rate is, however, difficult to accept, especially as it is not reflected in the time series properties of the gap estimate. If output follows a stochastic trend, then the residual from removing a linear trend is still non-stationary and the usual assumption, that shocks have no persisting effect, is violated. Hence, the need for a more general, time-varying, approach. A time-varying approach is also preferable on economic grounds, especially when the economy undergoes considerable structural change.

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If output is an integrated series of order one, following a stochastic trend, then, the residual from removing a linear trend is still non-stationary. This situation would require a detrending procedure that renders the output gap stationary. One such detrending procedure, which contains the linear trend as a special case, is that suggested by Hodrick and Prescott (1997).

Formally, the trend component is calculated as the outcome of the minimization of the loss function, *L*,

$$L = \sum_{t=1}^{S} (Y_t - T_t)^2 + \lambda \sum_{t=2}^{S-1} \left((T_{t+1} - T_t) - (T_t - T_{t-1}) \right)^2$$

where Yt is the actual output, Tt represents potential or trend output, S is the number of observations and λ is the smoothing factor.

The advantage of the HP filter is that it renders the output gap stationary over a wide range of smoothing values and it allows the trend to change over time. However, the selection of the smoothing parameter is arbitrary and this matters to the estimate. A high value of the parameter means a smoother estimated potential output and higher differences from real GDP. In other words, the size of the output gap, as well as the relative scale and timing of peaks and troughs in output, vary with the smoothing parameter.

Another filtering method is the band-pass filter (BK) proposed by Baxter and King (1995) and has similar properties with the HP filter. A problem with the HP filter, common to BK, is the end-point problem. Because the loss function contains leads and lags of output, the estimate of potential output is a symmetric two-sided filter at the middle of the sample. As a result the estimate of the gap at the end of the sample may be subject to substantial revision as new observations become available. Baxter and King (1995) recommend discarding a number of quarterly observations, at both ends of the sample, when using the these filters.

Because of the end-point problem the above filters have been heavily criticized, especially, with regard to their usefulness to policy-makers, in identifying the absolute value of the output gap at the current point in time.

1.2. Unobserved Components approach

Another approach for identifying potential output, using univariate models, is the unobserved components (UC) technique, which distinguishes a permanent and a transitory component of the GDP series, where the two components correspond to the potential output and output gap respectively. This approach was first introduced by the Beveridge- Nelson (1981) (BN) model and later by the method set out by Watson (1986). In both cases, permanent, or potential, output is assumed to follow a random walk.

The BN decomposition defines potential output as the level of output that is reached after all transitory dynamics have worked themselves out. In the Watson model potential output is written in state-space form, where the evolution of the observed variable is described, in the measurement equation, as a function of the unobserved state variables. Estimates of the parameters of the model and the unobserved state variables are obtained by maximising the likelihood function using the Kalman filter.

These models do not suffer from the end-point problem, but, at the same time, in comparison to filters which are readily available in standard econometric packages, are far more complex in their implementation. Nevertheless, as with linear detrending and the HP filter, these models are statistical tools which do not use economic or structural information. Because of this lack of economic structure, univariate characterizations are criticised as mechanical. In the words of Quah (1992) such models are "uninformative for the relative importance of the underlying permanent and transitory components".

2. Multivariate statistical tools which use economic or structural information

Partly in response to the criticisms for univariate models a variety of multivariate methods have been proposed which generate permanent-transitory decompositions that can be given a structural interpretation, or appear less arbitrary.

2.1. Multivariate HP filter

One example of combining statistical techniques with economic considerations, in measuring the output gap, is the multivariate HP filter (MVF), an extension of the standard HP filter which takes into account additional sources of information on the output gap. Such

information is usually contained in important macroeconomic relations like the Phillips curve, or, the Okun's Law. The information contained in the Phillips curve would state that inflation will be above expectations when output is above the non-accelerating inflation level of potential output. Similar information may be contained in the equation for unemployment. According to the Okun's Law, output is above potential when the unemployment rate is below the non-accelerating inflation rate of unemployment (NAIRU). By conditioning the potential output estimate on the information contained in one or more structural equations, the minimisation of the loss function results in a more precise estimate of potential output, and hence of the output gap.

The multivariate filter equation sets potential output to minimise a weighted average of deviations of output from potential and errors in the conditioning structural relationships. The estimation of the conditioning equations and the computation of potential output is obtained by an iterative procedure which uses the HP filter as a first step. For example, in the case of a Phillips curve structural relationship, a simple HP filter is employed in order to estimate the parameters of the Phillips curve. Then the output gap is estimated by the MVF given the estimated Phillips curve coefficients. The Phillips curve coefficients are then re-estimated with this new output gap, and these coefficients are used to construct a new MVF estimate of the output gap. The procedure continues until the change in the output gap estimate from one step to the next falls below a pre-specified convergence criterion.

Obviously, the estimation depends on the choice and specification of the conditioning relationships and on how those relationships are weighted in the loss function.

2.2. Multivariate extensions of UC models

One further example of introducing economic information in the statistical models used to identify the trend component of output is offered by the multivariate extensions of UC models. The multivariate extension of the Beveridge-Nelson decomposition method (MBN), often, incorporates a Phillips-curve equation (Evans and Reichlin, 1994). Similarly, the Watson (1986) decomposition has also been augmented with a Phillips-curve equation (Kuttner, 1994). Along the same lines, a further decomposition method was proposed by Cochrane (Cochrane, 1994). This model is based on the permanent-

income theory and uses consumption to define the permanent component of output.
The introduction of economic information adds more structure in the unobservable components models, alleviating to some extent the criticism of atheoretical approach. However, a major restriction in the univariate context is maintained in the above multivariate extensions. In the Beveridge-Nelson decomposition, but also in the other models potential output is constrained to follow a random-walk process. Notwithstanding the introduction of economic information, modelling the trend in output as a random walk is inconsistent with a widely held interpretation of productivity growth, namely, that it is driven by technological developments. Indeed, it is generally believed that technology shocks are gradually absorbed by the economy so that the permanent component of output is, at least in part, driven by technological innovations. Other characteristics of the growth process, like adjustment costs and learning and diffusion processes, also imply richer dynamics than a random walk.

2.3. Structural Vector Autoregressive Methodology

The Structural Vector Autoregressive models (SVAR) method was, first employed by Blanchard and Quah (1989)[5] for identification of the permanent component of output. The models belonging to this category incorporate a diffusion process for permanent shocks that can differ from the random walk.

The decomposition of permanent and transitory components proposed in the SVAR methodology does not impose restrictions on the short-run dynamics of the permanent component of output. Instead, certain, limited, long-run restrictions are imposed to separate the temporary and permanent components. The rationality behind this approach is based on economic considerations. In particular, it is assumed that fluctuations in output are attributed to either supply or demand shocks but, even though both shocks can affect the level of prices, only one of the two shocks affects output in the long run. So the long run restriction used to identify the structural disturbances is that demand shocks have no long-run effect on output. Under the assumptions of orthogonality of the demand and supply shocks, this single restriction is sufficient to identify the structural shocks. The output gap is then computed as the cumulative response of the level of output to all past transitory shocks.

[5] It was also used by King et al. (1991). St-Amant and van Norden (1997) use the same approach for the Canadian economy, Astley and Yates (1999) for the U.K.

The main drawback embodied in the SVAR methodology lays in the assumption that demand and supply shocks are uncorrelated, which is imposed by the identifying restriction. As a consequence of this identifying assumption, the output gap and potential output are also uncorrelated. There is, therefore, no channel whereby potential output is allowed to affect the output gap.

3. Production function approach

Estimation of potential output on the basis of production function models represents an economic, as opposed to a statistical, approach. The estimate of potential output obtained by models based on, or incorporating, a production function is determined by the underlying economic factors such as productivity and the actual factor inputs involved. The evolution of these variables also determines, at any given point, the relative importance of the permanent and transitory components of GDP. The structural nature of this method allows 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. An additional advantage of the production function approach is the implication of a meaningful link between policy measures and actual growth outcomes.

A general representation of the aggregate production function involving two inputs takes the form

$$Q(t) = A(t)F(K(t), L(t)) \quad (2)$$

where, ***K(t)*** denotes the flow of capital services used at time ***t, L (t)*** *is* the flow of labour services, and ***A(t)*** is an efficiency parameter which allows for a Hicks'-neutral shift in the production function. If the inputs are at their equilibrium, or potential values, then, the production function provides an estimate of potential output and, hence, output gap.

One way to derive an estimate of potential output is to specify a parametric functional form for the technology and to estimate the parameters of this function. Potential output is then obtained by substituting equilibrium values of inputs in the estimated production function. This method may be very demanding in terms of data requirements and in properly specifying the econometric production model. Alternatively, one can proceed non-parametrically, on the basis of standard growth accounting framework, which has been

particularly popular to calculate potential output growth on the basis of sample averages.
The information that is incorporated in growth accounting framework, largely abstracts from conceptual and methodological issues. It allocates the growth rate of real output between a multifactor productivity effect (MFP) and a multifactor input effect using data on output and on the prices and quantities of all relevant inputs. Hence it breaks down economic growth into the contributions from supply-side factors that determine the evolution of potential output growth over medium term horizon.

By logarithmically differentiating (2), and dropping the time indexes for clarity exposition we obtain,

$$\frac{\dot{Q}}{Q} = \frac{\dot{A}}{A} + \varepsilon_K \frac{\dot{K}}{K} + \varepsilon_L \frac{\dot{L}}{L} \quad (3)$$

Dots over variables indicate derivatives with respect to time, and $\dot{Q}/Q$ is thus a growth rate, while $\boldsymbol{\varepsilon_K}$ and $\boldsymbol{\varepsilon_L}$ are elasticities of output with respect to capital and labour:

$$\varepsilon_K = \frac{\partial Q}{\partial K}\frac{K}{Q} \qquad \varepsilon_L = \frac{\partial Q}{\partial L}\frac{L}{Q} \qquad (4)$$

Equation (3) allocates the growth rate of *Q(t)* among *A(t),* K (t), and *L (t)*. However, as ε_K and ε_L are not observable, one further assumption is required, namely that inputs are paid the value of their marginal product, thus:

$$\frac{\partial Q(t)}{\partial K(t)} = \frac{P_K(t)}{P_q(t)} \qquad \frac{\partial Q(t)}{\partial L(t)} = \frac{P_L(t)}{P_q(t)} \qquad (5)$$

where $P_q(t)$, $P_K(t)$, $P_L(t)$ are the prices of output, capital services, and labour services, respectively. Combining (3), (4) and (5) yields

$$\frac{\dot{A}}{A} = \frac{\dot{Q}}{Q} - S_K \frac{\dot{K}}{K} - S_L \frac{\dot{L}}{L} \qquad (6)$$

where S_k and S_L. are the income shares of capital and labour and are equal to the elasticities $\boldsymbol{\varepsilon}_K$ and $\boldsymbol{\varepsilon}_L$.

All variables in equation (6) are measurable, except $\dot{A}$ /A, which can be obtained as a residual. Equation (6) is the fundamental equation of

growth accounting in its continuous time, or Divisia index form. So the multifactor productivity residual is calculated as the residual growth rate of output not explained by the Divisia index of inputs. In practice continuous growth rates of (6) are replaced by the annual difference in the logarithms of the variables, e.g.,

$$\dot{Q}(t)/Q(t) = \log Q(t) - \log Q(t-1) .$$

Growth of potential output is then obtained by a weighted average of growth in inputs, with factor shares as weights and growth TFP. Thus, the growth in physical capacity through investment, the rate of technological progress, and the growth in the available supply of labour are the factors that determine potential output growth.

In practice the data requirements of the production function approach are often too stringent, as the specific measures used for factor inputs require careful consideration.

The first important choice relates to the appropriate measurement of factor input quantities. To start with, the degree to which the existing labour force may be utilised, at a certain point in time, relates to the existence and measurement of structural unemployment. The unit of measuring labour quantity is also extremely important. If labour inputs are measured in terms of employed persons, then estimated TFP growth would incorporate the effect of changes in average hours worked per person employed. Similarly, measures of the capital stock typically do not take into account the degree to which capital is used at a specific point in time. Changes in capacity utilisation rates would thus be reflected in the estimate of TFP growth.

A second issue relates to input quality. Measured changes in factor inputs only reflect changes in the quantities of labour and capital. For example, measures of aggregate hours worked, typically, do not take into account differences in efficiency that may be associated with education or work experience. Growth accounting exercises, which do not take into account changes in labour quality, tend to understate the contribution to growth from labour and overstate that from TFP. Estimated TFP growth may also include any likely quality changes of capital inputs and can, thus, not be associated with pure technical progress or innovation.

The quality aspect of inputs is likely to be reflected in the composition of the labour force and the capital stock. For instance, for a given rate of growth in overall output and a given rate of growth in total hours

worked, the contribution from labour inputs would be larger, if, at the same time, the share of experienced, or, more qualified, or, better educated workers were to have increased. Even though it is usually very difficult to aggregate the various categories of labour skills into a meaningful overall labour quality indicator, the quality issue needs to be addressed.

Similar considerations can be made regarding quality changes in the capital stock. A distinction can be made between, categories of capital like machinery and equipment, which are considered highly productive and other categories like buildings and structures which are considered less productive. Thus, shifts between different categories of capital reflect changes in overall capital quality. A quantitative measure of quality adjusted capital inputs should, therefore, be constructed by appropriately aggregating different categories of capital inputs.

It follows from the above that the estimate of TFP incorporates both technological progress and all measurement problems relating to changes in the quality of factor inputs and in their intensity of use. As a result, researchers find it necessary to smooth the growth accounting residual, in order to derive a figure for trend TFP growth. This requires the introduction of statistical tools. The same is true with regard to estimates of a structural rate of unemployment, which is necessary in order to determine potential employment. So, in effect, statistical methods for extracting the permanent component of output or unemployment, most often HP filters, are employed within the production function context.

In conclusion, the key advantage associated with the growth accounting method is that the exercise is very transparent. On the other hand, and in contrast to the elaborate statistical methods, this approach does not allow for any assessment of the underlying uncertainty around the estimates. In terms of forecast the future, both the growth accounting and statistical approaches, rely on past behaviour of certain aggregate variables. To take into account the potential effects of more complex economic processes requires the implementation of more well-developed economic models, using more economic theory.

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Measuring the euro area potential growth

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In 2006 and early 2007, we saw strong growth in the Euro area, at levels which have not been seen since the technology bubble at the end of the 1990's and the first quarter of 2000. This movement has been, predominantly, the result of an intensive accumulation in gross fixed capital so it could lead in a new and high potential output of the area.

The European Central Bank has often repeated in its communicates its fear that the Euro area could suffer from higher consumer price increase because of the better situation of the labour market (lower unemployment rate). An additional risk mention by the ECB is a sharp increase in wages accompanied with tensions on oil and other commodity prices.

Hence, the ECB watches regularly the labour market conditions, particularly the path of the NAIRU, the capacity utilization rate in manufacturing, as well as the developments regarding M3. Thus, the potential output of an economy is vital for the policy makers to take appropriate decisions because it determines movements in the inflation rates and future GDP. So, a lot of models have been developed trying to estimate the output gap.

In this chapter, we are going to estimate the potential growth of the Euro area through two different ways. In the first part, we are going to explain, briefly, the different methods. In the second part, we will establish the two methods used here, a univariate Hodrick Prescott filter and a production function approach. Thirdly, we explain our database and how we work with it, and finally we show our results.

1. Methods to estimate the potential output

In recent years the estimation of the potential output has been developing in terms of number models and studies, although it is still difficult to know which is the best model because all of them have its advantages and disadvantages. We can consider four kinds of

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methods[7]: a) *Trend methods*, where it is typical to see linear trend and split trend. It usually involves a linear regression of the log of real GDP on a constant and a time trend; b) *Univariate filters*, of which the most common representative is the Hodrick Prescott (HP) filter. But other filters must be considered as Baxter-King filter, Beveridge Nelson decomposition and Kalman filter Those methods generally use a filter to extract the measure that they want to get. c) *Multivariate filters*, such as the HP with conditioning structural relationship. Others that include this kind of structures are Beveridge Nelson decomposition and Kalman filter. d) *Production function approaches* such as full structural models, production function with exogenous trends and structural VAR.

Statistical methods (trend and univariate filters) seem to have more shortcomings than the economic methods. Kalman filters, one of the multivariate filters, is probably the best tool, but it is not the most transparent method and is usually highly affected by the latest observations. The production function approach is more transparent and has no direct end-point problem, but it does not provide information about uncertainties.

2. Hodrick Prescott and the Production Functions

As it has been pointed out, there is not an optimal way to estimate the potential growth so we have developed two different methods trying to compare them and getting the best approximation for assessing the potential output of the euro area.

The simplest method is the univariate Hodrick Prescott filter. This filter extracts a trend component by introducing a trade off between a good fit to the actual series and the degree of smoothness of the trend series. Formally, the trend component is obtained by the minimization of the following function:

$$Min \sum_{t=1}^{S} (Y_t - T_t)^2 + \lambda \sum_{t=2}^{S-1} \left((T_{t+1} - T_t) - (T_t - T_{t-1}) \right)^2$$

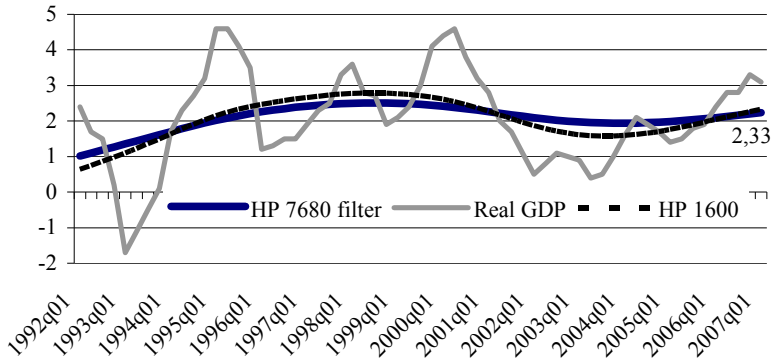
Where Yt is the actual GDP, Tt represents the trend component of GDP, S is the number of observations and λ is the smooth parameter. The parameter will depend on the frequency of the time series but a

[7] For more information, see: "Estimates of potential output: benefits and pitfalls from a policy perspective", Cotis et al. (2003).

high value of the parameter means a smother estimated potential output and higher differences with real GDP.

In our case, we have used a λ parameter equal to 7680, as in Raven and Uhlig (2002). This value is generally used in the Eurosystem exercises. If we use the proposal of Hodrick Prescott (λ = 1600), we get smaller economic cycles and more volatile potential growths, as it is illustrated in the following graph.

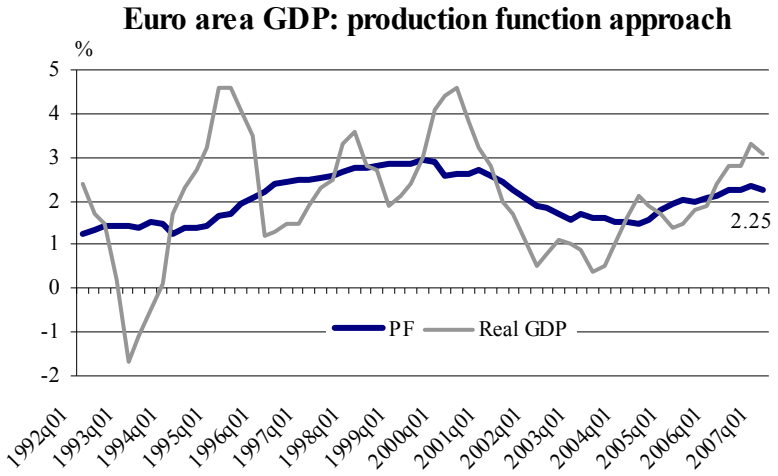
Euro area GDP growth: Hodrick Prescott filter



Although there are different alternative formulations for the production functions, the most popular is the Cobb Douglass approach taking the following form:

$Y_t=A_tL_t^{\alpha}K_t^{1-\alpha}$ where $0 < \alpha < 1$

Where Y_t is the real GDP, A_t is the total factor productivity, K_t represents the capital stock, L_t is the quantity of labour and α is the elasticity between the output and the labour factor.



3. Dataset

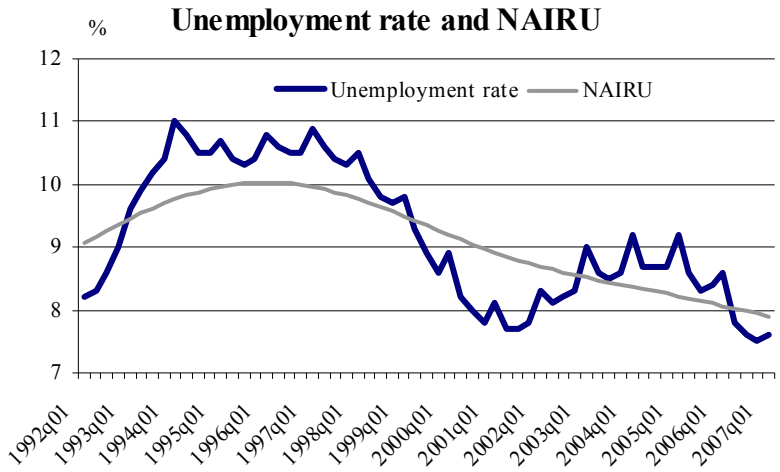
Hodrick Prescott method only requires the real GDP series, generally, in log difference. The simplicity of the method has made this process widely used.

In the case of the production function we have got the series of our research from the Eurostat and the ECB databases.

The data on capital stock for the Euro area come from the European Central Bank database. They have been transformed in quarterly series using the procedure of Boot et al. (1967).

The labour factor (L) is estimated using active population (AP) of the Euro area and a measure of the natural unemployment rate (U). These variables are exogenous and the labour product is calculated as follow:

$L_t = AP_t\ (1-U_t)$

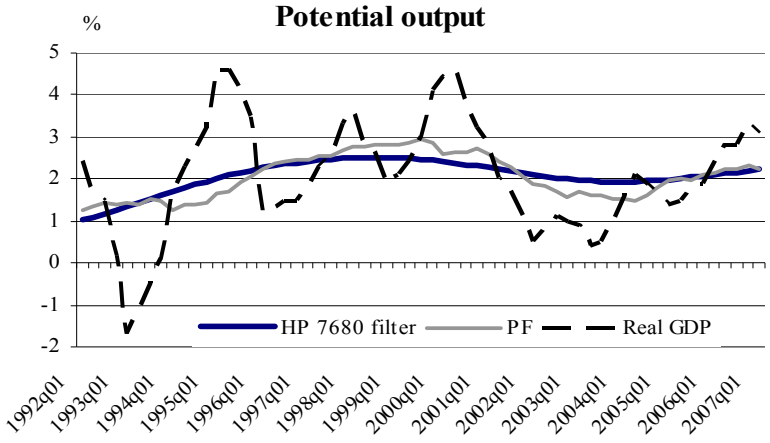


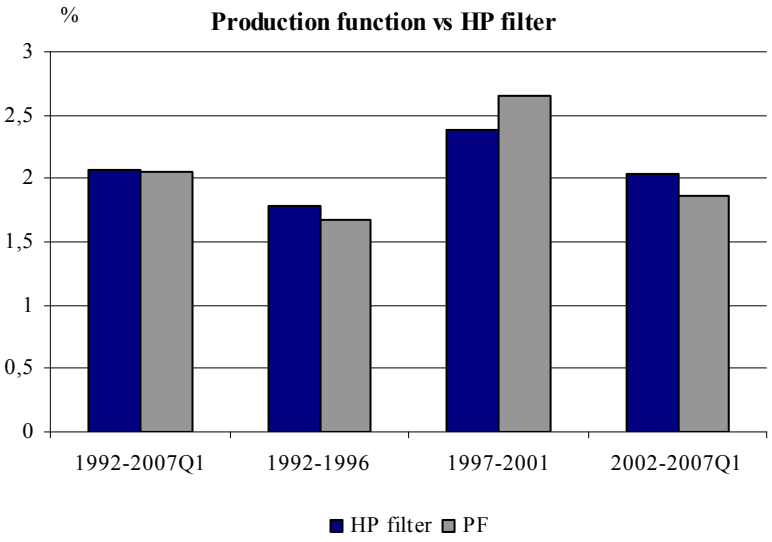
Total factor productivity (A_t) is estimated through the Solow residual, and is calculated as the inverse of the production function. In this case we have use HP filter to extract the trend component of the residual estimation.

4. Main results

Both methods show that the Euro area had experienced in the last couple of years a growth exceeding its potential (around one point). This can justify to some extent the fears of the ECB about the sustainability of this process and on the consequences regarding the developments of consumer prices.

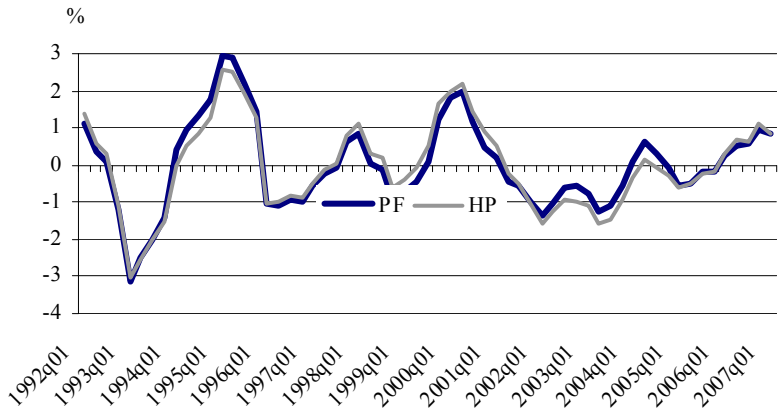
The results are robust according to both methodologies and they show a gain in the momentum of the Euro area until the beginning of 2007, but of course not at the level of real GDP growth which was around 3% at this time. For the full period (1992-2007Q1) the average growth of the euro area reached 2.1%. Two periods can be distinguished: firstly between the recovery of the economy in 1993 until the end of the technology bubble; secondly the new phase of upswing mid-2000's. As we can see in the next graph, both methods have a similar trend, but the production function seems to be more volatile.





If we compare the series derived from the two methods with real GDP, we can see that the production function approach may offer a little less variability (measured by the standard deviation) than the HP filter, but it is not significant. In the first quarter of 2007 the deviation between potential output derived from the two methods and level of real GDP was close to one point. This recovery was more the result of a cyclical upswing than a structural increase in potential growth, a sentiment that has been confirmed since then by the slowdown observed at the end of 2007.

Deviation between potential output growth and GDP growth



One of the advantages of the production function method is that it includes in the specification some variables very interesting to analyse the behaviour of the economy. In this case, we can see which are the growth contributions of labour, capital stock and the total factor productivity.

First of all, we have compared our assessment of potential output through a production function with the ECB estimation for the period of 1993-2003. During this period real GDP grew on average at 2.1% per year.

The detailed decomposition of the contributions to real gdp growth is presented below.

Comparison of calculated contributions to GDP growth (1993-2003, percentage points)

ECB production function				EUREN production function			
GDP	Capital Stock	Labour Factor	Total Factor Productivity	GDP	Capital Stock	Labour Factor	Total Factor Productivity
2,0	0.9	0.4	0.8	2.1	1.1	0.5	0.6
100%	*45%*	*18%*	*37%*	*100%*	*49%*	*23%*	*28%*

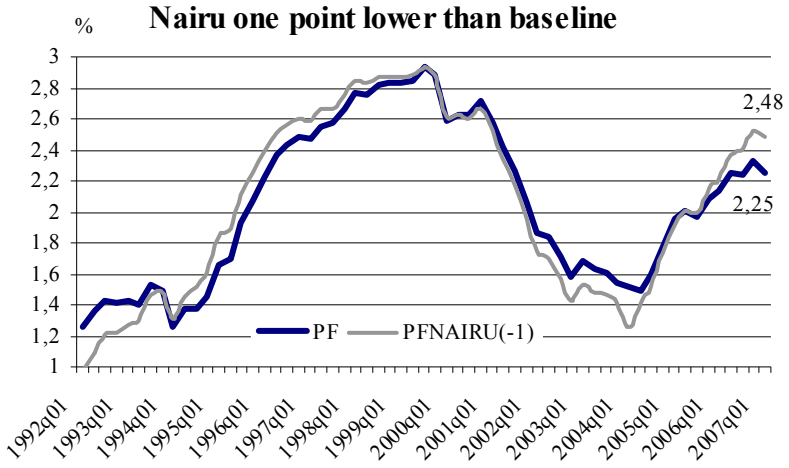
Source: ECB (2005) and own calculations.

If we analyze the full period, we can remark that the main contribution to GDP growth comes from the capital stock (1.1 point).This contribution seems almost constant in all sub-periods, and reached only a peak during the Internet bubble.

The second main contributor to GDP growth is the labour factor. This variable has been influenced by the recession in the first half of the 1990's, and its contribution was very low at this time. But in the rest of the period its contribution to GDP growth is constant around 0,6-0,7 points.

Moreover, we can be surprised by the weakness of the contribution of total factor productivity in the last four years. But once put aside the period of economic slowdown between 2002-2004, its contribution is close to historical standard.

Finally, we have analysed the sensibility of our results to one of the exogenous variables that is the NAIRU. It is not clear what is the best measure to identify this variable. Thus, we test the consequences of a change of this variable, fixing its level one point lower than in our first estimation. In this case, the results show a better perspective for potential GDP in the Euro area (2.48 early 2007, that is to say two tenth more than the baseline estimate).



5. Final Remarks

Various methods used to assess potential output in the Euro area show that its value has been close to 2% during the last fifteen years. The most recent estimations of this aggregate show a slight increase at 2.3%. Real GDP expands above the potential rate until the beginning of 2007. Even if economic growth has moderated since then, it can explain why the ECB mentioned fears about future inflation pressures.

In terms of contribution to GDP growth, the capital stock has been the main contributor. Labour and total factor productivity have been influenced by short-term movements but their contribution has remained rather stable in the medium run.

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Why was growth so sluggish in Germany? : A growth accounting approach

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RWI Essen

Growth in Germany seems to follow a downward trend for many years now. After having reached 2.8% in the 1970s, it came down to 1.9% between 1980 and 1989. The re-unification boom brought two years of extraordinary high growth, with rates beyond 5%. After that, the slowing of expansion continued. Only in 2000, when the economy was spurred by the new economy boom, and the international environment was extremely favourable, GDP in Germany grew at a rate above the 1970s' average. After 2000 problems even seem to have aggravated, with growth reaching merely 1.0% on average. But more recently, more favourable rates of 2.9% and 2.6% in 2006 and 2007 give some hope that the downward trend has been stopped. What are the reasons behind the long term decline of growth rates? And what factors could have caused a turn around? A growth accounting for Germany and a comparison with the U.S. and the Euro area could offer some insights to answer these questions.

Theoretical background of the growth accounting approach is a Cobb-Douglas production function with labour and capital as factor inputs. Labour in this context is defined in terms of hours worked. To achieve comparability for the countries considered and to rely on data for the entire period analysed, a hypothetical capital stock is calculated applying the perpetual inventory method. For that purpose we draw on national accounts figures on gross investment and the depreciation of the capital stock, using an estimate for the initial capital stock in 1980[11]. The contribution of labour and capital to GDP growth is calculated in a rather mechanical way by multiplying factor input growth by the share of the factor in national income. The difference between the contribution of labour growth and capital growth on the one hand and GDP growth on the other is defined as the contribution

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[10] The authors wish to thank Törge Middendorf, Fabienne Rasel, and Torsten Schmidt for their assistance.
[11] This procedure has also been employed by Musso and Westermann (2005). Oliner and Sichel who did similar work on the US calculated productive capital stocks instead. Compared to the results presented here, capital tends to contribute somewhat more and the MFP somewhat less to growth.

of multi factor productivity (MFP)[12], which captures improvements in the quality of labour and capital as well as organisational and technological progress. The calculations have been carried out for Germany, the Euro area and the U.S.

The most prominent feature of Germany's unfavourable growth performance between 1991 and 2006 is the negative contribution of labour input to growth (table 1). Already in the 1980's labour input stagnated in Germany and the Euro area, whereas it was an important factor contributing to growth in the U.S. In the 1990's the differences between the regions became even more evident: Whereas the contribution of labour input in Germany was negative, its average impact in the U.S. even increased moderately. After 2000 labour input remained to be a growth obstacle in Germany. Contrarily, it continues to be a driver of growth in the U.S., and it had an increasingly positive impact in the Euro area. The contribution of MFP to growth declined on average in Europe. In the 1980s, MFP in the Euro area as well as in Germany still grew faster than it did in the U.S. In the 1990s yet, its contribution to growth in the US was two times as large as in Germany. After the turn of the millennium MFP growth in the US moderately decreased roughly to the level of the 1980's. At the same time MFP growth remained moderately in Germany and collapsed in the Euro area. On the other hand, the contribution of capital input to growth did not differ much, neither between the regions nor over time. However, the composition of capital input varies between regions. In the US, ICT capital played a more important role compared to most European countries[13]. Furthermore in Germany the contribution of capital declined after 2000.

[12] Also dominated total factor productivity in other parts of this report.
[13] Inklaar et al. (2003.

Table 1 De-composition of GDP Growth in Germany, the Euro Area, and the US; 1980-2006, contribution to growth in %-points

	Real GDP growth (%, annual avg.)	Annual average contribution of		
		Hours worked	Capital	Multi Factor Productivity
	1980-1991			
Germany	2.6	0.0	1.0	1.5
Euro Area	2.4	0.0	0.7	1.7
US	2.9	0.9	1.0	1.1
	1991-2000			
Germany	1.8	-0.2	1.3	0.7
Euro Area	2.0	0.1	0.8	1.2
US	3.7	1.2	1.1	1.4
	2000-2006			
Germany	1.0	-0.2	0.6	0.6
Euro Area	1.6	0.5	1.0	0.2
US	2.4	0.4	1.0	1.0

Source: RWI calculations based on figures from the Federal Statistical Office, BEA, ECB, and from the Groningen Growth and Development Centre (www.ggdc.net)

As labour input seems to be a decisive factor to explain the differences between the regions, it will subsequently be examined in more detail. For that purpose, total hours worked are split into the number of persons employed and the hours worked per person. Furthermore, the number of persons employed can be derived by definition as the share of the labour force in total population (activity rate) multiplied by the share of persons employed in percent of the labour force (employment rate, which is the complement of the unemployment rate).

Table 2 De-composition of the contribution of labour input to GDP Growth in Germany, the Euro Area, and the US; 1980-2006, contribution to growth in %-points

	Contribution of labour input to growth	Annual average contribution of			
		Population	Activity Rate	Employment Rate	Hours Worked per Person Employed
	1980-1991				
Germany	0.0	0.2	0.5	-0.1	-0.6
Euro Area	0.0	0.2	0.4	-0.2	-0.4
US	0.9	0.8	0.2	0.0	-0.2
	1991-2000				
Germany	-0.2	0.2	0.0	-0.1	-0.3
Euro Area	0.1	0.2	0.1	0.0	-0.3
US	1.2	0.8	0.1	0.2	0.0
	2000-2006				
Germany	-0.2	0.0	0.1	-0.1	-0.2
Euro Area	0.5	0.3	0.3	0.1	-0.2
US	0.4	0.8	-0.1	-0.1	-0.1

Source: RWI calculations based on figures from the Federal Statistical Office, BEA, ECB, and from the Groningen Growth and Development Centre (www.ggdc.net)

Most eye-catching in table 2 is the difference in population growth rate in Europe on the one hand and in the U.S. on the other. A good deal of the differences between the regions can be explained by just this demographic factor. In the 1980's and 1990's population growth in Germany was equal to population growth in the Euro area. In recent times, however, population growth in the Euro area has slightly increased while population is now stagnating in Germany. Concerning the remaining factors, Germany shows the least favourable figures among these regions. Hours worked per person employed, which had a negative contribution in all periods as well as in all regions, declined most sizeable in Germany in the 1980's. The activity rate, which had been growing significantly in Germany and in the Euro area in the 1980's, has been more or less constant in all regions afterwards. More recently, a positive effect of the activity rate on growth can be observed in the Euro area. Finally, the surge of unemployment shows up in a negative impact of the employment rate on German growth in all periods. In the Euro area, which performed even worse in the 1980s, a turnaround can be observed since the 1990s. In the U.S., the influence of the employment rate was negligible, but slightly positive in the 1990s. To sum up a turnaround which shows up in increasing population growth, activity rate and employment rate after 2000 can be observed in the Euro area. In contrast, all mentioned figures remain small and often negative in Germany. In the U.S. a rapidly growing population remains the main cause for growing labour input, while the other influence factors have became less important in recent times.

Table 3 offers a more detailed look on the situation in Germany after unification. To distinguish clearer between demographic factors and the decision of individuals to participate in the labour market, the activity rate is split into the dependency rate (working age population in percent of total population) and participation rate (persons employed in percent of working age population). Furthermore, the change in the hours worked is split into two components: The contribution of working hours as they are negotiated between employers and trade unions in the wage agreements on the one hand, a time drift factor that in particular covers the growing importance of part time employment, but also other sources of deviations from the negotiated working time such as overtime and short time work. To show trends in these components clearer, furthermore more sub-periods are considered. As growth seems to have speeded up in the two most recent years, we extended our data to 2007, using estimates based on official figures for the first three quarters.

Table 3: De-composition of GDP Growth in Germany 1991-2007, contribution to growth in %-points, annual averages

	1991-1995	1995-2000	2000-2005	2005-2007
Labour	-0.5	0.0	-0.3	0.3
Population	0.3	0.1	0.0	-0.1
Dependency Rate	-0.1	-0.1	-0.2	0.0
Participation Rate	-0.3	0.4	0.3	-0.2
Employment Rate	-0.3	0.0	-0.3	0.6
Negotiated Working Hours	-0.1	-0.1	0.0	-0.1
Time Drift	0.1	-0.3	-0.3	-0.1
Capital	1.4	1.2	0.6	0.7
Multi Factor Productivity	0.6	0.9	0.4	1.8
GDP Growth	1.5	2.0	0.6	2.8

Source: RWI calculations based on figures from the Federal Statistical Office and of the WSI-Tarifarchiv

As can be seen from the table, the contribution of the various factors to growth varies over time. In the period 1991 to 1995 the negative contribution of labour input was strongest, followed by the period 2000-2005 where the contribution of labour input was also negative. However, the period 1991-1995 is a special case since it was markedly influenced by the German re-unification: in Eastern Germany the participation rate as well as employment rate initially have been much higher as in the Western part, but both fell significantly, which is also reflected in the German total. The aging of the German population appears in a negative impact of the dependency rate. Only in the last two years, this component shows no impact on labour input growth. The participation rate, on the other hand, is on the rise since the middle of the 1990s, but again this is only valid till 2005. Afterwards

the impact of the participation rate is slightly negative. While the employment rate had no impact on growth between 1995 and 2000, a remarkable negative effect of this figure is recorded for the period 2000-2005.

In the last two years, however there are signs of a turnaround. For the first time since re-unification the employment rate increased significantly. The decomposition of working time makes clear, that in the beginning of the 1990s mainly negotiated working time reductions played a role. Afterwards it was more and more a negative time drift (namely the shift towards part time employment) that dampened the growth of labour input. In the last two years the negative influence of the time drift on growth seems to have moderated.

To sum up, it becomes evident that the negative influence of labour input on growth was caused by a growing dependency rate, a decreasing employment rate and a negative time drift. These effects were partly compensated by an increasing participation rate. Since 2004 these trends look like having been stopped and reversed to some extent. In particular, the impact of the employment rate turned into positive. According to provisional figures for 2007, this tendency can be expected to have continued, since the unemployment rate has fallen sharply.

What are the reasons behind this change? Firstly, it may be attributed to labour market reforms introduced after 2002, which were described as "Agenda 2010". Secondly, in part as a result of these reforms, but also due to the increasing pressure of globalisation wages increased only very moderately in particular when compared to the Euro area (table 4). Therefore, growth in Germany became more labour intensive.

Table 4: Negotiated wages in the Euro area and in Germany 2001-2006, yoy increase in %

	2001	2002	2003	2004	2005	2006
Germany	2.0	2.6	2.0	1.2	0.9	1.1
Euro area	2.6	2.7	2.4	2.1	2.1	2.3

Source: Bundesbank, ECB.

However, it also becomes evident that the slowdown of GDP growth after 2000 cannot solely be attributed to the decline of labour input. In the most recent years the contribution of capital input was cut in more than an half. Also the growth of MFP slowed down significantly even if it has recovered in the last two years. It remains unsettled whether

this is a cyclical phenomenon only. However, at least concerning MFP there are some signs that the slowdown is structural. Even between 1995 and 2000, which was a cyclical upswing, the growth of MFP was lower than in the 1980s. More recently, in the years 2005 to 2007, MFP grew at a higher rate again which is comparable to the increase in the second half of the 1990s. At the same time, however, capital contributed little to growth. But the upswing in investment had not seen its peak yet in 2006.

This growth accounting approach is only a descriptive way to divide GDP growth in its components. In particular, the MFP appears, as Romer rated, as a measure of our lack of knowledge in this concept. Therefore the approach does not really give an explanation why German growth was so weak. But the analysis clarifies the shortcomings of the German economy that were valid at least until 2005: the decline of labour input and the slowing of productivity growth. As far as labour input declines for demographic reasons, this trend cannot be changed in the short run. The more important it has been to increase the participation as well as the employment rate and to stop the trend towards shorter working time. Labour market policy has stimulated the creation of so called minijobs, which are filled by persons that work less than 20 hours a week as a rule. This policy could potentially explain a reduction of hours worked in recent years. Because at the same time the attractiveness of taking a job is increased for housewives, pensioners, or students, also the participation rate has gone up. Hence, these measures do only pay off in a higher labour input, if in particular full time employment is not displaced by such minijobs. The figures of the last two years suggest that these objections have not dominated so far. According to our calculations labour input has positively contributed to growth for the first time in awhile. This has been achieved since the employment rate shows a significant positive contribution while the time drift effect is only slightly negative.

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Recent trends in the Italian labour market

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What has happened to the Italian labour market since the middle of the nineties is very peculiar because Italy has experienced a marked reduction in its unemployment rate despite a stagnating economy. The figures are puzzling because Italy has been the major industrialised country with the lowest GDP growth rate and at the same time with the greatest fall in unemployment. The debate on the causes and consequences of these trends is still very much alive and there are no clear conclusions. The main explanation is based on the labour market reforms adopted during the 1990's. However, many commentators remain quite sceptical about the results achieved. One fairly common argument insists on problems of measurement due to the large size of the informal labour market in Italy. Another argument points to the increase in inactivity.

This paper aims at giving the reader a brief description of the main characteristics of the change in the performance of the Italian labour market.

A short description of the reforms introduced since the middle of the 1990's is proposed in the first section. The main changes in the composition of the structure of the workforce are described in the second section, where we show the contributions of immigrants and new temporary contracts to the total employment growth. In the third section we review new jobs by their main characteristics: gender, age, sectors and regional disparities.

The fourth section comments on the reduction in the unemployment rate. As the main purpose of this paper is to provide a summary of the characteristics of the Italian labour market, no attempt is made to explain these trends. However in the last paragraph we try to put the main findings for the labour market in a growth accounting framework, to show how the growth in employment can be compatible with the poor economic performance.

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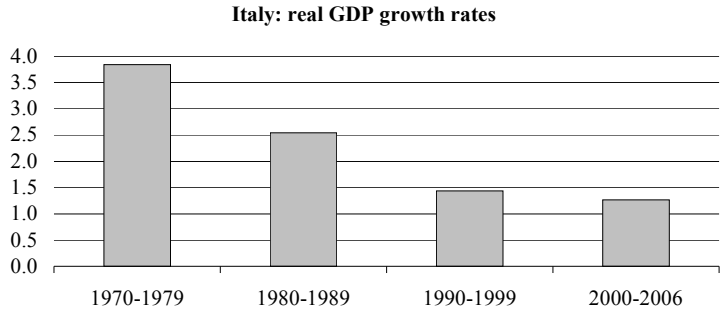
1. The reforms of the last years

The pace of economic expansion in Italy has shown a noticeable slowdown since the early 1990's: while in the previous decades the average annual growth rate was above 2.5%, in recent years it has decelerated to a rate of around 1.3%. Even if growth rates for other industrialised countries also decelerated, once the less developed countries had caught up with their more developed neighbours, the slowdown in the Italian economy was particularly intense.

The sluggish growth rate has gone hand in hand with surprisingly strong growth in employment rates. In the first half of the nineties, employment suffered from the effects of the 1993 recession; in the second half of the last decade there was substantial growth in employment, even if the effect on the unemployment rate was still limited. But, with the new decade, the growth in employment continued. Despite the unfavourable cyclical phase, there was no fall in employment (only a few temporary decrease).

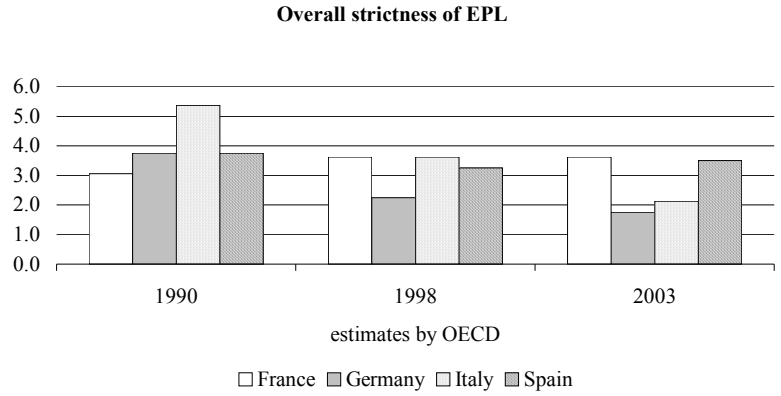


average annual growth rates, calculations on ISTAT data

average annual growth rates, calculations on ISTAT data

One possible explanation for the growth in employment without strong growth in GDP might be the introduction of Italian labour market reform and deregulation, which increased flexibility and favoured an increase in labour supply and demand. The reforms

started in the second half of the 1990's and continued even into the beginning of the new decade. As shown by the OECD assessment of the strictness of EPL (Employment Protection Legislation), at the beginning of the nineties, Italy was characterised by the highest strictness of regulation among the main Euro area countries: thirteen years later, the situation has improved.



Until the first half of the 1990's, the Italian labour market was rigidly regulated to a high degree. Given the guarantees offered to employees in terms of job security, the utilization of labour faced a series of strict constraints. The need for flexibility was satisfied by turning to *Cassa Integrazione*[15], or using self-employed workers, such as "co.co.co" workers, which saw considerable growth from the second half of the 1990's onwards. The co.co.co are self-employed workers but are sometimes hired and given work like employees.

In 1997 law 196/1997, known as the "**pacchetto Treu**", introduced new types of contract to the Italian labour market. This law facilitated the use of some already existing forms of contract for employees, such as fixed-terms contracts, part-time and training contracts. These forms of contract existed even before but their use was so strictly regulated that in reality they were not applied. However the law also introduced new forms of contract, previously not present in Italy, such as the *temporary job contract*. This new form of contract is characterised by the relationship between the worker and a supplier company (the temporary work agency) which provides the services of the worker to

[15] This is a fund which is linked to state pension and social security schemes from which benefits are paid to workers who have been fully or partially laid off (when business is slack and the demand for labour reduced). Although they are laid off and not dismissed (a very complicated procedure given the legal constraints), their employers pay them no wage during this period and they do not represent a cost.

a user company when the needs are temporary. The law also has reformed the appointments system, opening it to the private sector.

Another labour market reform was introduced in 2003 with the law 30/2003 (**legge Biagi**). The new law was designed to increase the flexibility of the market, improving its efficiency, in order to favour the creation of new employment and thus to reduce the unemployment rate. Law 30/2003 has regulated training and internship contracts and part-time work and it has introduced new forms of contract. The regulation of part-time work has been modified to favour the use of these types of contract; the definition of work conditions and procedures has been made more flexible than before and now it is possible to change the number of working hours when needed.

The "integration contract" and the apprenticeship contract have replaced the former training contract. The "integration contract" is designed to integrate (or re-integrate) marginal workers in the labour market (young workers, women in regions where the female employment rate is very low by comparison with the male rate, long-term unemployed, disabled, and old unemployed workers), by providing them with skills. The *apprenticeship contract* is for young workers still at an educational age or for those who need professional qualifications.

The law also introduced new forms of contract , such as the "project" contract, the "work on call" contract, the "job sharing" and the "job on supply" contracts (staff leasing arrangements). In the latter, as with temporary work, the worker is an employee of the agency supplier, which has a commercial contract with the user. The employment contract between the worker and the supplier can be a fixed-term or an open-end term contract. If the contract is open-end term, the provision is allowed only for certain kind of jobs and when the worker does not work, he/she must be at disposal of the supplier. In the case of fixed-term contracts, there is more flexibility concerning the needs to be satisfied by the job that are allowed. The job on call contract is allowed for all kinds of workers but only for some discontinued or intermittent services, while for young workers or old unemployed persons there are no limitations concerning the assignments or the activity. These two kinds of contracts are currently under discussion; some changes are likely in the near future. The job sharing contract is between an employer and two workers, who are bound jointly to the obligations of the job and who can arrange between themselves the working hours and the substitutions.

The project contract has replaced the old "co.co.co" contract where it was used for a specific project: instead, the contracts where the work is for a single employer, without reference to a specific project (and consequently a sort of camouflaged ordinary employee type job) should be transformed into open-end term contracts. The law sets some requirements for project contracts (definition of a specific project, independence of the worker).

2. The growth in employment

The average degree of flexibility in the Italian labour market has been increased by the introduction of the new forms of contract. However, the reforms have not modified the acquired rights of employees with open-ended contracts. *De facto*, two segments have been created in the market: the main one (with high protection and high rigidity), and the other (where newcomers are employed) characterised by a high degree of flexibility but also by low job security for workers.

The changes have affected labour demand by decreasing the implicit cost of this input, making it more attractive by reducing the rigidities in industrial relations and encouraging the development of the secondary segment. Indeed, even if the employment in the main segment (i.e. full-time employees with open-end contracts) has increased, the number of new forms of contract has risen, with a crucial contribution to growth in total employment.

According to national accounts, the number of employed persons has increased by 1.8 million people in the period between 2000 and 2006; in 2006 people in employment numbered more than 24.7 million. The minimum number in employment was recorded in 1995, due to the lag-over effects of 1993 recession: 21.8 million in employment. The labour force survey carried out by the Italian bureau of statistics (ISTAT) signals a lower level of employment (23 million in employment on average in 2006). The main difference is in the estimates of hidden activity contained in the national accounts. Nevertheless, the increase in employment at the beginning of the decade is almost the same.

2.1. The contribution of immigration

The immigration phenomenon is quite new in Italy, but it is gaining in importance: until the beginning of the 1990's, the country was mainly a transit place for immigrants going to continental Europe. More recently Italy is among those countries towards which immigration

growth is accelerating. At the end of 2006 the number of immigrants living in Italy was close to 3 million; the growth rate was particularly high in the period 2003-2005, in which the effects of "regularising" clandestine immigrants by granting them valid stay and work permits was concentrated as a result of laws 189/02 and 2002/02. It has had the consequence of interrupting the declining trend in total population observed since the beginning of the nineties.

Since immigrants are prevalently of working age (and young) and characterised by a higher activity rate than Italian people, substantial growth in the immigrant labour supply was observed, which partially also reflects the effect of the emergence of informal workers recorded by the "regularisation" process. At the end of 2006 the immigrant labour force in the 15-64 year age band amounted to 1.5 million people, an increase of 13.4% on the previous year.

Unfortunately, data availability on the employment of immigrants is limited to a very short period, from 2005 to the first half of 2007. Nevertheless the available figures show the importance of immigration in explaining the growth in total employment in the recent years. Indeed, in the period considered, the growth in the number of immigrants in employment, which also reflects the effects of "regularisations", explains almost half of the increase in total employment observed between 2005 and the first half of 2007, having made a contribution of 1.1% (on a total increase of 2.3%).

2.2. The contribution of new forms of contract

The new forms of contract have gained in importance in the labour market, helping to explain trends. In 2004, the labour force survey carried out by the Italian bureau of statistics (ISTAT) was modified with the introduction of new questions designed to give a better understanding of changes in the structure of the labour market. One of these questions relates to the new forms of contract that have emerged in recent years. Therefore, it is now possible to assess this kind of work in the whole labour market and how it evolves. The definition of temporary workers adopted by ISTAT takes into account those workers having forms of contract which offer limited guarantees with regard to the duration of the job and/or access to social security. Following this definition, workers with a fixed-term contract, temporary job contract workers, the job on call workers and those with an integration or an apprenticeship are classified as temporary employees: they numbered 2.2 million in 2006, almost 10% of total employment. If those workers not classified in the statistics as

employees are included, such as "co.co.co" and casual, the number of temporary workers was 2.7 million in 2006. The new forms of contract have therefore had far from negligible effect on the total labour market, since they account for more than 12% of total employment.

This kind of contract is particularly widespread among younger workers: in the age bracket 15-29 year-old more than 28% of the employed were temporary in 2006. This is consistent with the goal of these contracts, which do aim to facilitate access to the labour market. What may be a little more worrying is the not insubstantial proportion of temporary contracts for the cohorts in the 30-39 age bracket, who is assumed have been in the labour market for a long time; in other words, this could be an indicator of persistency in the temporary forms of contract (characterised by some insecurity). Furthermore, the temporary forms of contract are especially common among workers who have received higher education: around 16% of university graduates are in temporary jobs. So these forms of contracts are not just for marginal and unskilled workers.

These new forms of contract account for a substantial proportion of the new employment created in recent years. In 2006 alone, the increase in the numbers of this kind of worker contributed by 1 percentage point to the growth in total employment, i.e. half of the highest growth[16] in employment has been realised with non-standard forms of contract.

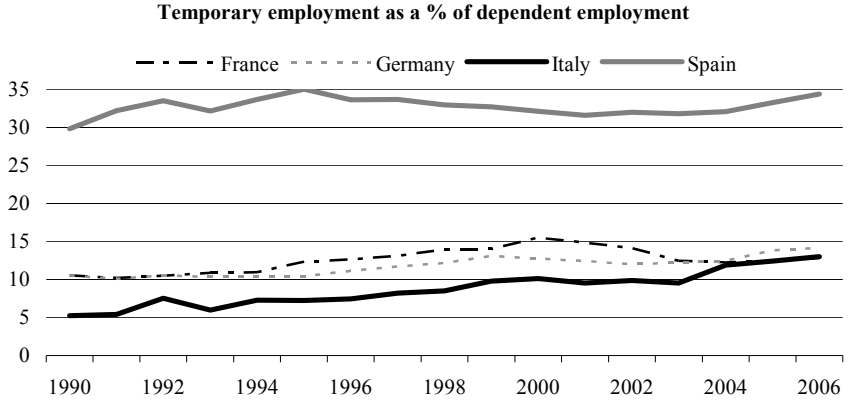
Table 1 – structure of employment by sex, age and education (2006, %)

	Permanent employees	Fixed-term contract employees	Collaborators and occasional wokers	Temporary workers	Self-employed	TOTAL
SEX						
Males	61.9	7.8	1.5	9.3	28.8	100
Females	67.0	12.5	3.1	15.7	17.3	100
AGE						
15-29 years old	57.7	23.9	4.4	28.3	14.0	100
30-39 years old	65.8	8.9	2.2	11.1	23.1	100
40-49 years old	67.6	6.3	1.2	7.5	24.9	100
50 and more years old	61.4	4.2	1.6	5.8	32.8	100
EDUCATION						
Primary and lower secondary	61.6	9.5	1.1	10.6	27.8	100
Upper secondary	67.6	9.4	2.2	11.6	20.8	100
Graduates	59.7	10.9	4.7	15.6	24.7	100
Post-graduates	56.0	11.2	6.8	17.9	26.0	100

Source: REF. elaboration on ISTAT microdata

[16] The growth rate in total employment reached a record peak in 2006.

However, as shown by OECD data, in the international comparison Italy does not have a very high level of incidence of temporary workers on total dependent employment: the rate is not far from the one observed in France or in Germany. Spain is the country, among the main Euro area members, where temporary employment has the highest importance. Anyway, Italy is the country where the increase in the incidence has been the largest.



source: OECD

3. Some characteristics of the new employment

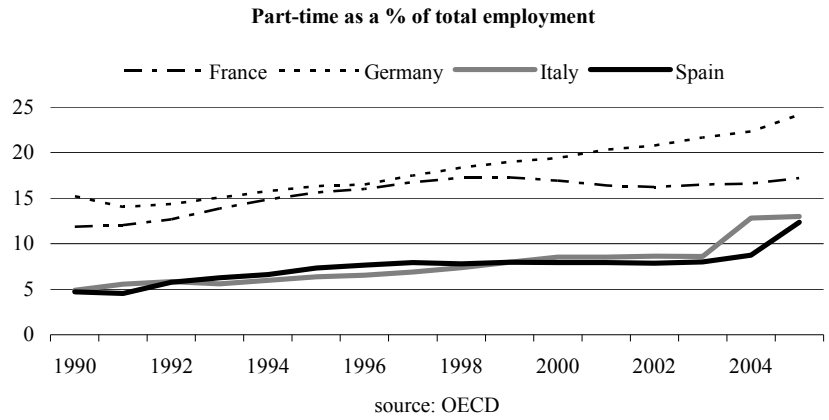
3.1. More women and elderly workers

The increase in total employment has affected both genders, but it has been stronger for females. Demographic effects have been a bit more favourable for men when considering only the working age population (i.e. 15-64 year-old persons). The total increase in this population between 2000 and 2006 was moderate (400 000 persons), and it has been concentrated in the years 2003, 2004 and 2005, as an effect of the regularisation of immigrants. Even if the growth of population has been slightly higher for males, the rise in employment has been stronger for females (more than 1 million persons in the period considered) thanks to the larger expansion of the female employment rate.

In Italy, female employment rates are at a very low level, especially in the regions of the South, where in 2006 less than one woman of working age out of three (31.2%) was employed. The national average is higher (46.3% in 2006). Even if the level is still far from the Lisbon targets, it should be pointed that in ten years (since 1996) it has increased by more than 8 percentage points. The rise in female employment rate was particularly strong in the period between 2000

and 2006 (4.5 percentage points of cumulated increase), counterbalancing the moderate growth in population.

Some factors explain the development of the female employment: one of these is the spread of part-time work, helped by the relaxation of the legislation which regulates it. The number of part-time workers has increased at more than twice the rate of growth in total employment: this means that its frequency has risen in the recent years, especially for women, who are more frequently the applicants for this kind of contract (when asked) as they attempt to reconcile work and family life.

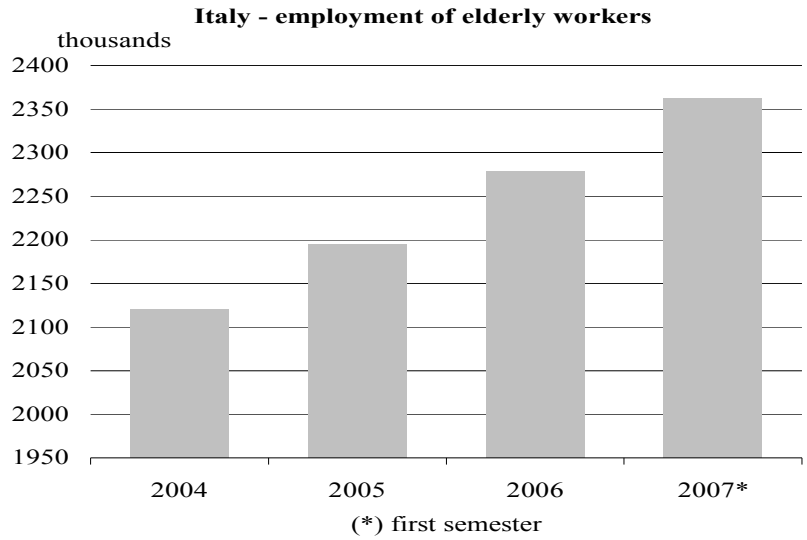


source: OECD

The trends in different sectors have also been of importance in explaining the expansion of female employment: it accounts for less than 40% of total employment in Italy, but is over-represented in service sectors, where women are nearly one half (48%) of those employed. This means that the female employment is more sensitive to growth in labour demand in the service industries. The service sector has been characterised by important growth in employment, the effect of both the general trend towards the expansion of the service sector and the greater growth in activity: in the period between 2000 and 2006, the number of persons employed in the sector increased by more than 1.4 million, to give a cumulative growth rate of 10.7%.

There is also a cohort effect that should be taken into account. Younger cohorts are characterised by higher participation rates in the labour market and thus by higher employment rates. The arrival of these cohorts and the exit of the older ones (characterised by very low levels of both rates) has resulted an increase in the average level of the rates.

An analysis of employment trends by age groups shows that employment growth has been stronger (in the period for which we have detailed data, i.e. between 2004 and the first semester of 2007) for workers above 35 years old, while employment has decreased for workers below that age. There are two effects affecting this trend and they have operated in the same way: demographic trends and changes in employment rates (i.e. in the decision to participate in the labour market and in the employability). The demographics is favourable to middle age band and in particular to older workers, whose cohorts are larger than those who preceded them, while for the younger cohorts we see the size of the cohorts thinning as a consequence of the fall in fertility rates. In addition, the increase in the average level of schooling (i.e. more years, on average, in education) cuts activity and employment rates for younger persons (aged 15-24 years old). On the contrary, for older workers, in the 55-64 age band, the employment rate has increased by almost 3 percentage points from 2004 to 2007;. This is a good outcome, reflecting both an increase in activity rates for these cohorts (who may be able to choose early or late retirement), and higher demand for labour demand, able to absorb this kind of supply.



3.2. More skilled workers

The average level of education for Italian employment is low, when compared with other countries. Unskilled[17] workers accounted for almost 40% of total employment in 2006, when for the Euro area this group accounted for less than 30%. Skilled[18] workers in Italy accounted for only the 15% of employment, more than 10 percentage points lower than the Euro area. Even if the gap with the Euro area is still wide, it has narrowed in the last ten years, at least for the lowest side of the distribution: the gap for unskilled workers as a percentage of total employment has halved. This is not true for the highest side: even if the share of skilled workers in Italy increased in the period 1995-2006 (rising from 9.5 to 15.2%), the upsurge is modest when compared with that observed in the same period in the Euro area. That means that the gap has widened. This is because in Italy the proportion of workers with an upper secondary education has increased more.

The higher incidence of unskilled employment has a negative effect also on the average employment rate. Workers with very low levels of education have lower employment rates, because there is less demand for them, given the high rates of obsolescence, they are destined to leave the labour market earlier. This is also because their participation

[17] Workers with a primary or lower secondary education, as the highest level of education attained, (levels 0-2 in the ISCED classification).
[18] Workers having at least a tertiary education (levels 5-6 in the ISCED classification).

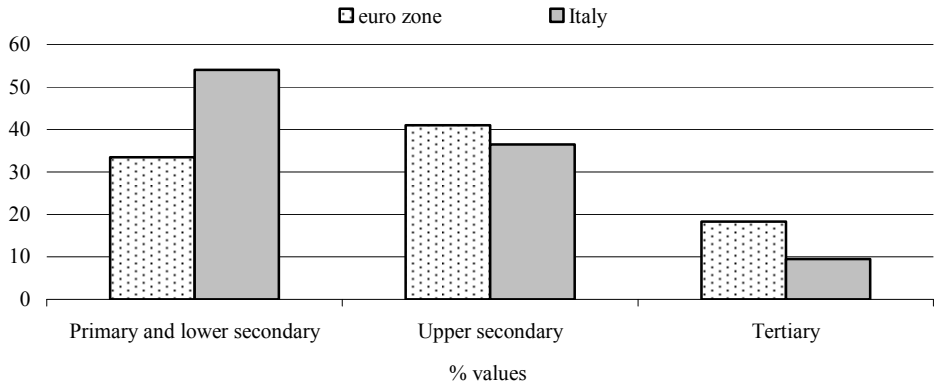
rate in the labour market is lower: the unsatisfactory wages they are able to get limit the incentive to participate (especially for women).

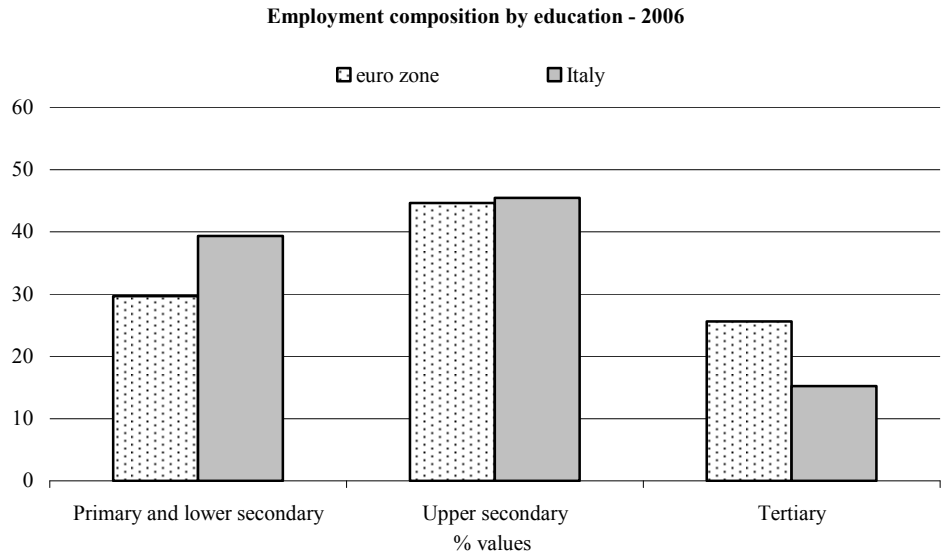
Even if the number of skilled workers in Italy is still low by comparison, their share has increased. Growth in employment has in fact been concentrated on persons with the highest levels of education. From 2004 to the first half of 2007, total employment increased by 3 percentage points (i.e. more than 655 000 people in new employment). The increase in the number of high-skilled workers (with a university degree or a post-graduate qualification) has represented a large proportion of this growth, with a contribution of 2.4%. A larger contribution was provided the workers with an upper secondary education (2.8%). On the other hand, the trend for the employment of unskilled workers has contributed negatively.

Trends also reflect the changes across generations. Younger cohorts, which are gradually replacing the older cohorts, are characterised by higher education levels on average.

A comparison of young and old workers (i.e. between 25-34 and 35-64 year old age brackets), shows that the number of the young workers has increased only for university graduates in employment. while for lower levels of education and unskilled workers, employment has fallen. For older workers, the increase in employment has affected all levels of education (with the important exception of unskilled workers with a primary education as the highest level), and especially for those with an upper-secondary education.

Employment composition by education - 1995





3.3. The sectors: growth in services and construction

Examining trends for the first part of this decade, high employment is quite widespread among the main sectors, even if they have obviously grown to different extents. The highest increases in employment between 2000 and 2006 were observed in the services and in the construction sectors. Where the activity recorded an expansion in recent years, the labour demand grew, on average, at a strong rate. In the manufacturing industry employment has stagnated. This is actually quite a good result when considering the strong reduction observed in the activity levels. More specifically, the strongest growth in employment in the services sector has been observed in those sectors where human capital is on average higher, such as the financial intermediation and, especially, the real estate, renting and business activities sectors. Only the computer, the research and the business services sectors have recorded an increase in the number of persons employed of more than 590 000 persons, almost one third of the total growth in employment observed in the period.

On the opposite side, a drop in the number of employed has been recorded in the agriculture sector and in the industry (manufacturing, energy and mining and quarrying). The reduction in the former is consistent with a long-run trend. The agriculture sector in Italy was still oversized at the beginning of the 1980's, and the prolonged ejection of the workforce has diminished with the loss of importance of the sector in the economy.

In the industrial sectors, where in general the production levels showed a reduction in the period 2000-05, labour input were limited, without labour shedding (as opposed to the previous recessions). Some cuts in employment have been observed in those sectors that have more suffered from competitive pressure and which have recorded the largest drops in production, but only in a few cases (leather, paper, rubber and chemical sector) were the decreases in employment during the first part of the decade more intense than those in activity. In the manufacturing sector as a whole the decrease in labour in the period between 2000 and 2006 has been limited (3 200) persons. The overall stagnation of industrial employment has been made possible by the increases recorded in some sectors where the activity has been more dynamic, such as the manufacturing of metals and the production of machinery.

3.4. The North-South dualism

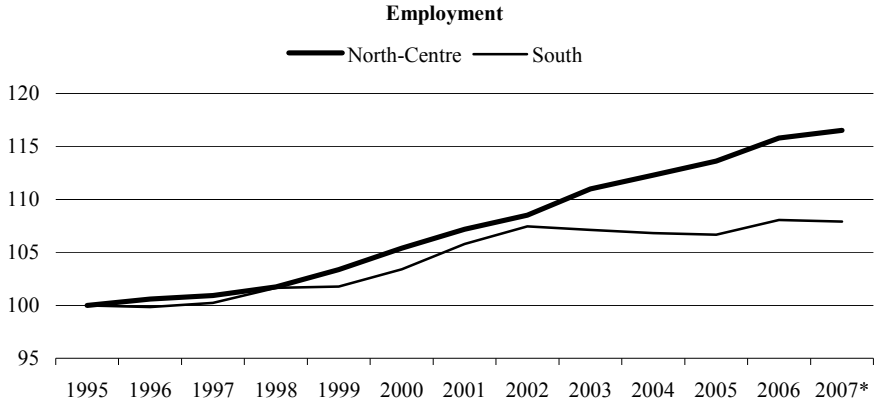
The Italian labour market is characterised by a dualism between the North (and the Centre) of the country and the South. The Northern labour market is generally more lively with strong creation of employment able to absorb an increasing labour supply including that which comes from other areas of the country. In the South, the labour market is very feeble, at least for the official market and the levels of employment are modest.

In recent years two trends have been observed: between 1995 and 2002 there has been a partial reversal of what was experienced before. In fact, employment in the South has grown at a similar pace to that of the Centre-North; the cumulative increase was 7.5 percentage points, not very far from the increase recorded in the other areas of the country (8.5%). In the second part of the period considered, on the contrary, employment in the South stagnated (between 2002 and the first half of 2007 the cumulative increase is only 0.4 percentage points and this is only because sufficient growth was recorded in 2006 to compensate for the decreases in previous years). However, in the Centre and North employment continued to rise at an even higher annual average rate. At the end of the period, employment in the South was higher by only 270 000 persons than it was in 2000, just 15% of the total rise in Italian employment in the same period, a very modest increase considering that 36% of the working age population live in the South.

It is thus clear that this area suffers from a problem of a low employment rate, which can be summarised by a shortage of supply (the activity rate is very low, in particular for women, compared to the national average) and there are some troubles in labour demand.

Considering only the limited period between 2004 and the first half of 2007, the very small increase in employment in the South has not received any support from the trend for the employment rate, which has remained substantially unchanged, both for men and for women, while in the same period the employment rate in the North and in the Centre increased. In the latter, the employment rate was 62.2% in the first half of 2007 (and 51.7% for women), while in the North the levels were higher (66.4% in total and 56.6% for women), not too far from the Lisbon targets (70% and 60%, respectively, to be attained by 2010). On the other hand, in the South employment rates are still at very low levels, with a 20 percentage point gap between it and the North (and more than 25 percentage points for women).

Thus, it seems that the dualism North-South is still far from being overcome.



Index 1995=100 - (*) first semester
REF. elaboration on ISTAT data

4. The fall of unemployment to historical minimum levels

4.1. Changes in the equilibrium unemployment

The profile of the unemployment rate in recent years is consistent with the hypothesis that there has been a structural change in the labour market. A first comment has to be related to the "growth – unemployment" relationship, as the unemployment rate at the end of the cycle of the 1990's had fallen below the levels of the previous maximum of the business cycle. The recent recovery has also brought the unemployment rate below the previous minimum. Figures show a reversal of the historical growth trend in the unemployment rate (the phenomenon known as "unemployment hysteresis").

When a reduction in the unemployment rate occurs, one expects to see some consequences on one other set of variables and one possible candidate among these variables is clearly the wage dynamic. The usual distinction between structural and cyclical reductions in unemployment seems a useful starting point. Unfortunately, a traditional limitation to the use of the NAIRU concept is that this variable is not observable and it is not easy to calculate when its level changes. Estimates of the Italian NAIRU in recent years have sought to identify the level to which this variable is moving and the estimated level has been continuously downgraded. The main facts to note are the continuous reduction in the unemployment rate and the moderate growth of wages in both nominal and real terms. A role could have been played by the start of the euro, that has probably influenced the mechanism of inflationary expectations. Actually, no signs of wage acceleration have been recorded in the statistics, mainly when the public sector is excluded from the computation.

However, an analysis in terms of the inflation-unemployment trade-off clearly wouldn't be meaningful in the framework of a monetary union, because a reduction in unemployment in a country is not expected to affect expected inflation too much. For our purposes, it seems sufficient to note that both inflation, as measured by consumer prices, and the wage dynamic have been quite stable at low levels in recent years.

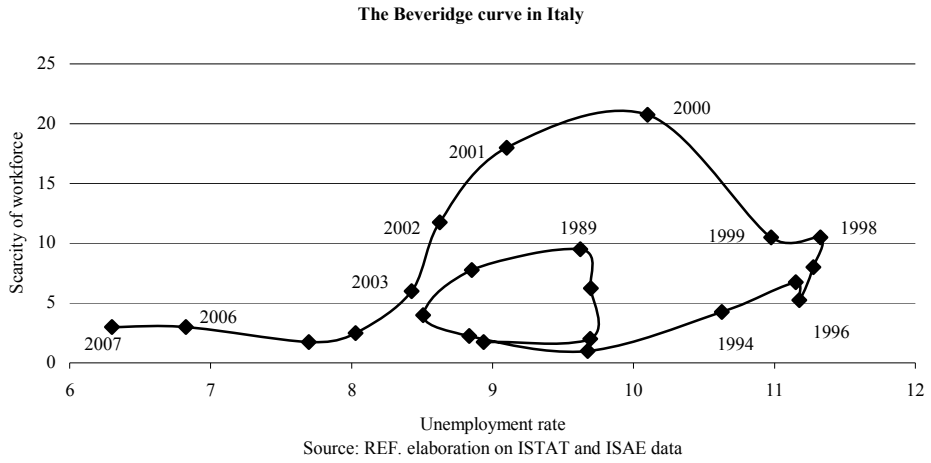
The first conclusion is that the fall in the unemployment rate in Italy is a structural phenomenon. This result seems quite meaningful once the differences in the regional dispersion in unemployment rates are taken into account, such as for example in Northern regions the

unemployment rate has been stable at around 4 percent since 2001 and has recently reached a minimum of 3.5 percent.

The Beveridge curve is a tool for the analysis of the labour market and it shows the relationship between the number of vacant jobs and unemployment. Generally, these are negatively correlated: the more vacant jobs there are, the easier it is for an unemployed person to get a job and consequently the unemployment rate will be lower (and *vice versa*). Usually, then, the Beveridge curve is negatively sloping. When the movements are along the curve, i.e. the variables change in opposite direction (the number of vacant jobs decreases and unemployment increases or *vice versa*), they reflect the cycles of economic activity. However, when the curve moves towards the origin of the axes (or outwards) this can be a signal of an improvement (or deterioration) in labour market functioning, i.e. faster matching of labour and supply. For a given unemployment rate, fewer vacant jobs can mean a more efficient and quicker process of matching labour supply and labour demand.

By using a qualitative proxy variable[19] for the missing job vacancy rate indicator, it is possible to plot a Beveridge curve for Italy. In the period 1987-1993 the curve shows an anticlockwise movement describing cyclical shocks to economic activity. The marked expansion recorded in the last part of the 1980's had the effect of slightly reducing the unemployment rate and raising the scarcity of workforce. A symmetrical movement is shown for the crisis period 1991-1993, with a significant increase of unemployment.

[19] We used the percentage of manufacturing companies, requested for the monthly survey conducted by ISAE, which single out workforce scarcity as the main constraint to expansion of the production capacity.



Source: REF. elaboration on ISTAT and ISAE data

An upsurge of both variables (the unemployment rate and the scarcity of workforce) is observed for the period 1994-95. A possible interpretation considers the role of the devaluation of the lira versus the German mark, that probably caused a quick expansion of exports and thus of production in the manufacturing sector, fostering the perception of scarcity of labour input. On the other hand, the unemployment rate increase may reflect the restructuring of the Italian economy, but also the persistence of labour market rigidities, which stressed the lag between the production and the employment cycles.

While the movement of the curve for the second half of the 1990's describes the cyclical recovery recorded in that period, for the subsequent time interval (2001-2005) the curve moved inwards (towards the origin of axes). Both the unemployment rate and the scarcity of workforce decreased. This is probably the effect of the structural changes made in the Italian labour market with the introduction of the two main reforms (Legge Treu and Legge Biagi) since the second half of the last decade that have improved the functioning of the market.

4.2. Inactivity and "moonlighting"

Since the last years of the 1990's it is possible to observe an intense drop in the Italian unemployment rate. This fall is even more important when it is considered that it is widespread across areas, affecting even those areas which have been traditionally afflicted by chronic high unemployment rates. Rates have recorded record minimums in all areas. In the North, the unemployment rate reached a level of 3.5% in the first part of 2007 (and 3.2% in the North-East, which is the most dynamic area of the country), which can be defined

as just frictional unemployment, substantially revealing a situation of full employment. In the South, even if the reduction has been large (almost 9 percentage points in eight years), the level was still quite high at 11% in the first part of 2007.

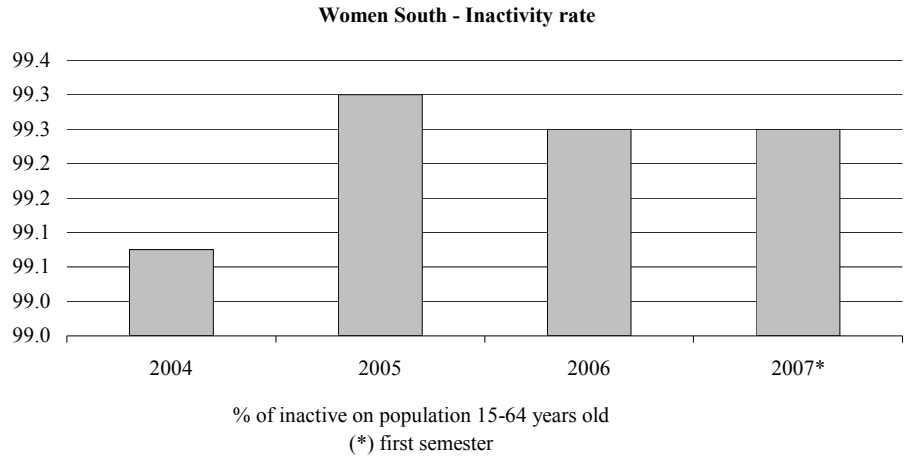
What is quite surprising is the strong reduction in the unemployment rate in the South, considering that the creation of employment has not been so intense as in other areas of the country (and especially in the North). The reduction in the number of unemployed in the South is more related to changes in the labour supply than to important gains in terms of labour demand.

Some of the effects on the supply also derived from the performance of demand at local geographical level. Internal migratory flows are growing (from stagnant labour demand areas towards more lively areas), but in some cases labour supply has also been reduced as a reaction of sluggish demand.

Just to give some stylised facts: in the North, the growth in employment has been predominantly satisfied by an increase in labour forces (in other words, the supply), given the very low numbers of unemployed. A quite similar trend can be observed in central Italy: growth in employment that is slightly higher than that of labour supply has absorbed a part of the unemployed. In the South, however, a fall in unemployment has been recorded in a context of a reduction in the labour supply and substantial stagnation of employment. This could signal a movement from unemployment to inactivity[20]. The inactivity rate[21] in the South has increased by more than 2 percentage points between 2004 and the first half of 2007. The increase was stronger for women, whose inactivity rate reached the level of 63.8%. It is thus more frequent among women living in the southern area of the country to remain out of (or to go out of) the labour market.

[20] An unemployed is someone who participates actively to the labour market, who does not have a job but who is seeking one, while an inactive is someone who is out of the labour market, i.e. who is not seeking work.

[21] The inactivity rate is calculated as the complement of the activity rate; the number of working age inactive persons (i.e. not participating in the labour market) is expressed as a percentage of total working age population.



This is concentrated particularly on younger cohorts. Excluding the youngest, for whom the increase in inactivity can be a consequence of the rise in schooling, this can be a worrying trend for the central age brackets that suggests a possible discouraged-worker effect. According to the discouraged-worker effect, the participation rate will decrease when it is difficult to get a job, so that people move out of labour force. These women may have decided to move out of the labour market, changing their status from unemployed to inactive.

They may choose to attend some training, in order to increase their chances of getting a job, or to move to informal work, inside the family (so, care-giving activities for children or disabled relatives), or outside, that means looking for a job in the black economy.

5. The Italian slowdown and the "paradox" of the employment expansion without growth

The performance observed in recent years has caused some debate over the paradox of job creation without economic growth, since the acceleration in employment growth has been recorded in a context of a stagnating economy. The latter is one of the determinants of labour demand, and, on the other hand, stronger employment growth is supposed to activate a higher rate of economic growth. These trends have therefore raised some puzzles about the possible explanation.

In 2006 a recovery of economic activity was recorded: Italian GDP grew at a rate of 1.9% over the previous year. The reaction of labour demand was in line with the upturn: employment (measured in terms of employed persons) grew at a rate by 1.7%, with strong acceleration in the first part of the year. In other terms, there were no significant

lags between the recovery in activity and the acceleration of employment. This is the highest increase recorded by the employment in Italy and it is quite surprising that this record high was observed in a year of not so intense recovery and after some years when there were not any strong cutbacks in the levels of labour demand (nevertheless, excessive stocks of employed persons were not a burden on companies).

The Italian labour market gives the impression that it has increased its responsiveness to the cycle. In fact, the "elasticity of labour demand to GDP growth" in recent years is higher than that observed in the past and the developments recorded in 2006 confirmed this trend. An increased elasticity of employment to the business cycle, i.e. a higher employment content of growth, means, on the other hand, a reduced contribution from the productivity of labour, for which the trend is falling.

There are some explanations for this weak productivity phenomenon and we will attempt to illustrate the main ones in this section.

5.1. Growth accounting signals productivity stagnation

One of the possible explanations for falling productivity uses the theoretical framework of growth accounting[22]. By using this model, it is possible to determine the connection between labour productivity and the total factor productivity (TFP). The growth rate of labour productivity (measured as added value per hour worked[23]) can be expressed as the sum of the increased rate of the capital input per hour worked, weighted by the capital share in value added and the rate of increased in TFP (which summarises the technological and organisational progress).

Applying this theoretical framework to the ISTAT data on production, hours worked and stock of capital, it is possible to give an accounting explanation to the falling growth trend for output, clarifying the reciprocal contribution to output dynamics.

[22] This uses the neoclassical theory of production, which represents technology as a production function that creates a relationship between inputs (productive factors), technological progress and output; the last is a function of the first, given technological progress. By a logarithmical differentiation, it is possible to obtain the dynamics of the output as sum of the input growth rates, weighted by their elasticities, and the increase in the technological progress. The elasticities can be measured as the proportions of the factors in the income distribution. Thus, once the growth rates in the inputs are known, that for technological progress can be computed as a residual.

[23] It is assumed that the labour input coincides with the total hours worked.

Table 2 - Growth accounting - Total economy
Average logarithmic annual change %

	Value added	Capital stock	Labour (*)	Capital/ labour ratio	Labour productivity
1981-85	1.7	3.7	-0.1	3.8	1.8
1986-90	3.0	3.6	0.6	3.0	2.4
1991-95	1.3	2.1	-1.1	3.2	2.5
1996-00	2.1	2.5	1.1	1.4	1.0
2001-06	0.7	1.8	0.8	1.0	-0.1

Contributions to value added growth

	Capital stock	*ICT capital*	*Non ICT capital*	Labour	TFP
1981-85	1.1	0.3	0.8	-0.1	0.6
1986-90	1.1	0.3	0.8	0.4	1.5
1991-95	0.6	0.1	0.5	-0.8	1.5
1996-00	0.8	0.2	0.6	0.7	0.6
2001-06	0.6	0.0	0.6	0.6	-0.5

(*) worked hours
REF. elaborations on ISTAT data

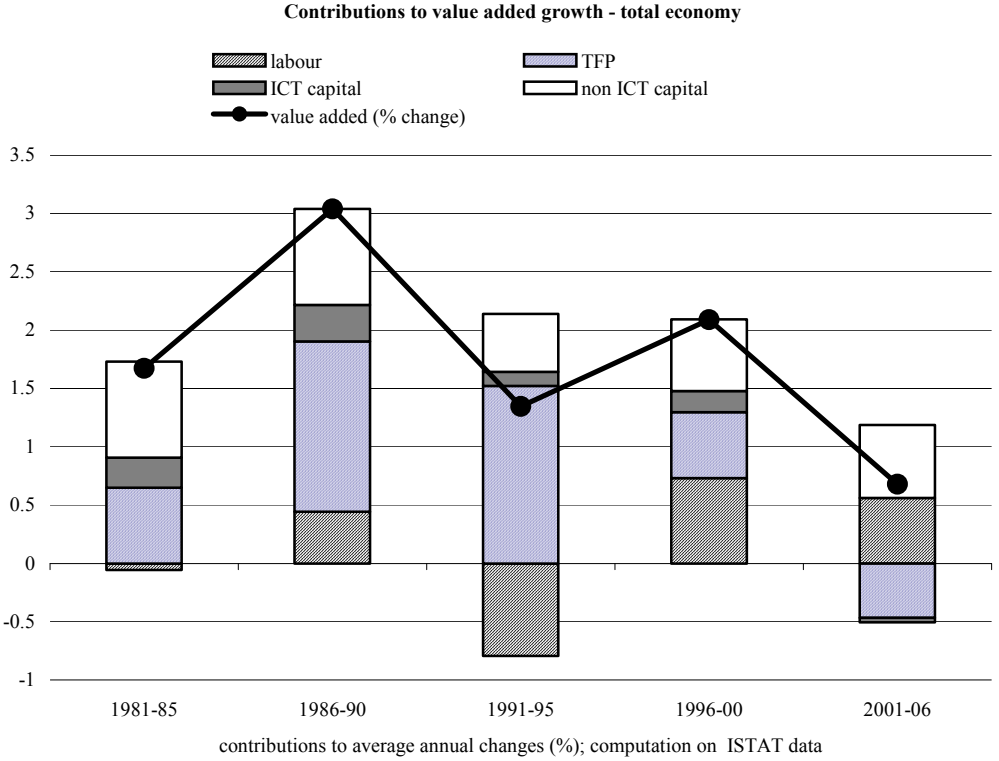
The contribution to growth in value added from capital is quite stable, with a slight decrease. However, as shown in the following graph, breaking down the capital according to its characteristics, it can be seen that, while the contribution of the non-ICT capital remains substantially unchanged (it is only marginally lower than that observed in the eighties), the contribution from ICT-capital, has turned negative in recent years. An opposite trend is observable for labour input (expressed as hours worked); while its contribution to output growth was almost negligible in the eighties and even negative in the first part of the last decade, it became more in important second half of the nineties, helping to explain a significant part of the increase in output. However, it is the TFP contribution that has definitely dropped, passing from a positive and large value to a negative value in the first half of the new decade. Some cyclical factors have probably arisen in addition to the weakness in the trend. In fact, looking at annual trends, it may be noticed that the negative contribution by TFP was concentrated in the first years of the period considered (2001-2003), while in the last part there is a sort of recovery.

There are some methodological caveats to be taken into account when considering the results of the estimate of the TFP contribution, but the suggestion from the data is quite clear and is confirmed also by other, more sophisticated, studies on the Italian economy.

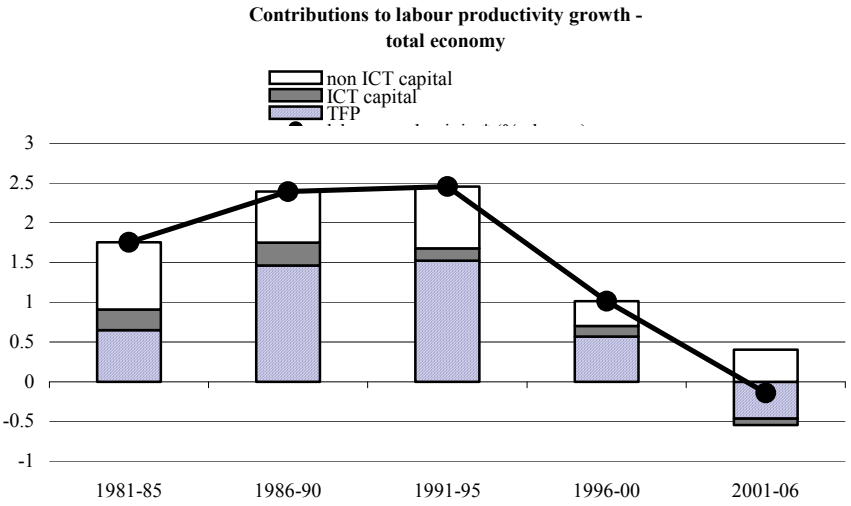
The analysis by sectors shows that the stagnation in TFP is shared by the main sectors. In manufacturing industry, the sector most exposed

to international competition and for which as a consequence growth in productivity very important if competitiveness is to be maintained, the break in the growth trend that occurred from the second half of the 1990's onward is quite marked, passing from a contribution of around 2 percentage points to a negative value. In the services market the trend for TFP is disappointing too. It is only for the trade, transport and communication sector that the contribution of productivity is still positive, even if not very large.

The drop in TFP plays an important role in explaining the fall in labour productivity growth. From an average annual increase rate around or above 2%, this latter has in fact fallen from the second half of the 1990's, reaching negative values at the beginning of the new decade. The first years of the last period (2001-2003) were particularly negative. TFP contributed negatively, while the contribution from the ICT capital has fell to zero. Furthermore, the non-ICT capital contribution was not enough to compensate for this erosion and the final effect is the observed deterioration in the growth of labour productivity.



contributions to average annual changes (%); computation on ISTAT data



contributions to average annual changes (%); computation on ISTAT data

5.2. Research, innovation and FDI

The debate about the factors that have determined the fall in trend is not at an end. There is a number of elements to be taken into account. One of these is the limited innovation performed in Italy in recent years, with respect to other countries.

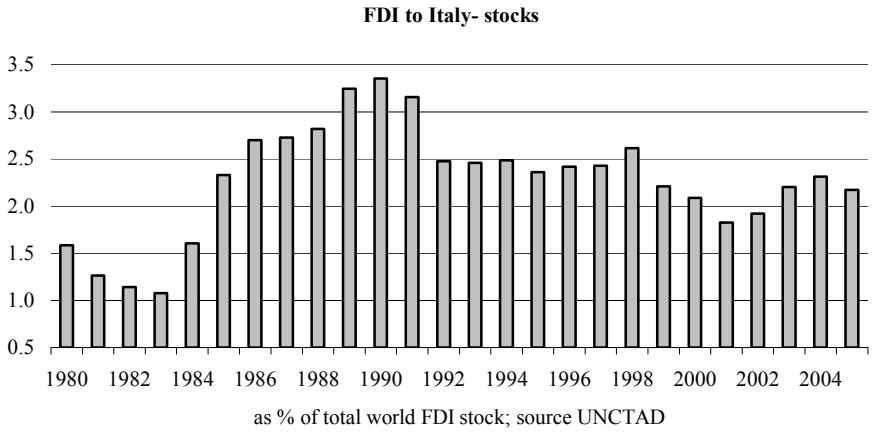
Total factor productivity reflects technological and organisational progress, which determines the gains in efficiency. The slowdown in this variable may be a consequence of the partial substitution of capital with labour observed since the second half of the 1990's, when the pace of growth of the capital/labour ratio clearly decelerated, given the strong growth in employment. If technological progress is incorporated in the marginal capital, a lower capital accumulation will transfer into a slowdown in progress. The partial substitution of capital with labour, in turn, has been determined by the change in the structure of the relative costs of the factors: the implicit labour costs (i.e. those not signalled by statistics) have probably decreased as a consequence of the reduction in rigidities of the labour market realised by the reforms described previously, making the labour less costly.

It has been highlighted in the analysis of technological progress how innovation in the last ten years has been achieved particularly in the sectors that produce and use ICT. The former are almost absent in the Italian economy, given its specialisation. The computer producers disappeared in the second half of the 1990's as a result of the

transformation of the activity of the main company, Olivetti, from computer production to telecommunications. For this reason, some gains in terms of productivity have been precluded. Furthermore, Italian ICT user sectors have probably innovated less than the corresponding sectors abroad given the lower competitive pressure they are exposed to, since they are less receptive to the structural changes induced by the technological transformation. In general, when comparing the trends observed internationally, it is pointed out that the lower openness of continental European markets and the higher rigidity of labour markets than those observed in the Anglo-Saxon countries explains the poor growth of productivity in those sectors, such as financial services or trade, which are large users of ICT.

The limited innovation in Italy is also related to lags in the field of R&D. The share of GDP destined to research activity is poor when compared with other European countries, well below the EU average. Part of the difference can be explained by the particular structure of the Italian economy with a wide dispersion of production in a large number of small firms, which are therefore less disposed to invest in R&D and have less resources to assign to it. Also the still low average level of education of workers limits both R&D activity and the use of the results.

Another factor which limits innovation is the scarce attractiveness of FDI. The Italian share of total inward FDI is only marginally above 2%, while in the second half of 1980's it was around 3%. This is also an effect of the appearance of new players, but for the aggregate of the European developed economies, as well as for some important cases (France, Spain) the trend is in the opposite direction.



5.3. The role of marginal workers: a composition effect?

In addition to this explanation of the slowdown in the productivity, there is another which refers to the characteristics of the labour market. Considering the structural changes observed in the last decade, it seems that the new forms of contract have fostered the entry into the labour market of "marginal" workers, i.e. the weakest ones, with lower productivity (since they have low education, or are inexperienced). This has been made possible by the reduction in the cost of labour and therefore in the charges for companies, the result of more flexibility, i.e. lower risks than a permanent employment contract.

It should be also remembered that, in some cases, the creation of employment has been concentrated in sectors characterised by a low level of value added per labour input (i.e. low level of productivity) and poor opening to future improvements, as the construction or the domestic services sector. These are sectors where the room for a growth in productivity is particularly limited and where the human capital endowment is less important.

Thus, there has been also a composition effect. The enlargement of the size of the less productive sectors affects average productivity negatively. On the other hand, the sectors that in other countries have allowed a strong increase in average productivity, such as the ICT producer sectors are absent in Italy (as pointed out in the previous section).

6. Conclusions

The Italian case, as shown, has been characterised in recent years by an upsurge in employment in a context of limited growth in the economy, while in the previous period employment was weak. One of the possible explanations of this phenomenon can be found in the reforms brought about in the labour market since the second half of the nineties with the purpose of increasing the flexibility. This has been achieved by the introduction of new forms of contract that now exist alongside the main segment (i.e. the one with high protection for workers, but also high rigidity), which is unchanged.

The new forms of contract have made a substantial contribution to the observed increase of employment. But another important aspect to take into account is the "regularisation" of immigrants, that has affected the labour force statistics. Anyway, immigrant employment is making an important contribution to the overall increase.

Furthermore, the Italian unemployment rate is falling and it has reached record low levels. In some areas of the country (the North), the unemployment rate is now at a level that could be defined as "frictional", i.e. signalling a situation of full employment. Part of the observed drop reflects structural changes in the labour market.

The elasticity of employment to growth in GDP has increased by comparison with recent decades: a debate has developed from this observation about the apparent paradox of "employment without growth" and the fall in productivity. Some explanations can be put forward. Growth accounting has shown that the falling trend originated with the fall in total factor productivity, which summarises technological and organisational progress. This is partly because there has been a substitution of capital with labour, since the latter has become less costly thanks to the labour market reforms that have reduced its (implicit) cost and partly because the innovation is scarce and the use of the ICT (where productivity gains have been concentrated) is still modest. The reasons are in the limited competitive pressure the ICT user sectors are exposed to, which means there is less incentive to resort to new technologies and in the small average size of Italian firms, which diminishes the probability of investing in R&D and the resources available for it. The limited innovation depresses the TFP growth.

There are also some composition effects which help explain the fall in productivity: marginal workers, characterised by low productivity,

have gained access to the labour market as a result of reform; growth in employment has been concentrated in those sectors where the value added per worker is small. This has reduced the average productivity level, at least in the short run.

A recovery in productivity is essential to the solidity of growth in the medium and especially in the long run. In recent years the (modest) pace of growth has been sustained by employment growth. However, this will not be possible in the future, or at least not at this order of magnitude. On the basis of the demographic and labour force projections produced by the European Commission[24] it is possible to forecast a decrease in the size of the working age population from 2010 onwards. This clearly negatively affects the labour force's dimension, even if with a lagged effect since it is assumed there will be some gains in terms of activity and employment rates, especially for women and older workers. In any case, according to these hypotheses the labour force and employment will decrease from 2018 onwards. Moreover, the latest trends for activity and employment rates suggest some caution in assuming large increases in the near future. Italy is still far from the Lisbon targets (that should be attained in 2010) and there are some worrying signals such as the reduction in the female activity rate in the South, where the fall in unemployment is partially determined by a shift to inactivity.

It is therefore unlikely that potential growth in Italian output will be very high; in the medium and long run, at least, what is needed is a strong increase in activity and employment rates and a recovery in productivity.

[24] European Commission (2006) The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050).

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