The Goldilocks economy of the United States in comparison with Europe: an analysis with EUROMON

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The economic development in the United States has been very successful over the past decade, with high economic growth being accompanied by relatively low inflation. This article explores this development, comparing the economy of the United States with that of the EMU. In addition, it considers the contrasts between the large and small EMU countries as regards the correlation between inflation and unemployment. Analyses based on simulations using the Bank's multicountry model EUROMON show how the economy in the United States would have developed in circumstances more typical of a 'standard economy', to which the traditional Phillips curve applies. Subsequently, also drawing on simulations, this article discusses several aspects of the new economy in the United States and the EMU, i.e. spending impulses in combination with more scope for market forces, and in combination with technological progress, for example, in the field of computers and information.

Introduction

For some time now, attention has on all sides been focussed on 'the new paradigm' of the 'new economy', which applies to the United States in particular.[1] The American economy is characterised by prolonged, high economic growth concurrent with low inflation. This practically 'recession-less and inflation-less' period started in 1991 and has not come to a halt since.

One significant cause underlying these flourishing developments is the high pace of developments in the field of information and communication, which so far have had a tremendous impact on the American economy. As Europe, too, is becoming acquainted with the possibilities of the new technologies, it is not unlikely that sooner or later 'the new world' will also gain ground in Europe.

The contrasts between small and large countries in Europe are striking. Compared to Ireland, Denmark or the Netherlands, for example, in recent years the great powers Germany, France and Italy have registered a markedly lower economic growth attended by high unemployment as well as by a relatively low inflation. As of old, this development may still be ascribed to traditional economic patterns.

In some smaller European countries, including the Netherlands, economic growth has exceeded the trend growth for some years now, being accompanied by a noticeable decrease in unemployment. Inflation, on the other hand, has slightly risen to or above 2%. Consequently, the term 'new economy', defined as a sustained above-trend growth combined with a relatively low inflation, does not (yet) apply to these countries.

Just like Japan, Europe trails behind the United States when it comes to investment in research and development. Figures show that in 1998 expenditure on information technology as a percentage of GDP in the euro area amounted to just slightly over 5%, against 8% in the United States. Compared to Europe, the use made of the Internet in the United States is higher by a factor of five. Together with ongoing integration, continuing globalisation, more scope for market forces and the positive economic growth anticipated for the coming period, a further advance of information and communication technology might be conducive to a favourable economic development.

The following paragraphs discuss the development in the United States in comparison with the Economic and Monetary Union (EMU), on the basis of simulations using the Bank's multicountry model EUROMON as an analysis instrument. The outcomes of these simulations give an impression of the effects produced in the event of a traditional economy, and are compared with cases assuming a freer play for market forces or a more advanced technological progress. The simulations were performed for the United States and the EMU.

The traditional economy as represented by the Phillips curve

In the fifties, the economist A.W. Phillips (1958) studied the trade-off between inflation and unemployment. Phillips concluded that high-inflation periods were attended by low unemployment and vice versa. This trade-off is referred to as the 'Phillips curve'.[2] Implicit in the Phillips curve is the assumption that monetary policy may influence unemployment. According to this view, a broad monetary policy promotes domestic spending in the short term, resulting in increased production and employment, which, in turn, feeds through into higher prices. If price stability is pursued, this calls for a tighter monetary policy. The reverse applies in the case of a tight monetary policy.

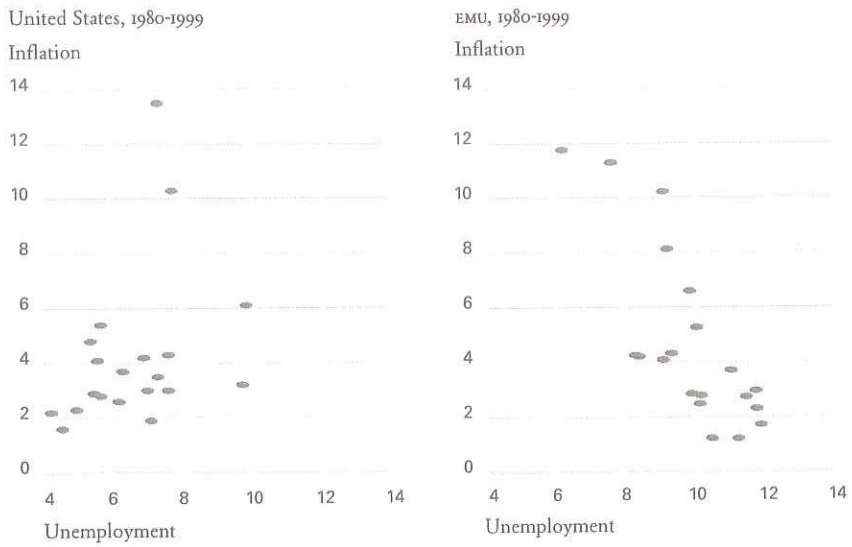
The effect of the Phillips curve is disputed. Milton Friedman and Edmund Phelps were the first to query openly the premise of a trade-off between unemployment and inflation, arguing that, all other things being equal, higher prices would cause domestic spending and, consequently, employment to decrease. In other words: the economy will return to its baseline. In their view, monetary policy cannot influence employment in the long run, since it cannot produce real effects. Some equilibrium theories assume that unemployment reverts to an equilibrium level or the 'NAIRU'.[3] The Phillips curve also got out of favour in periods of stagflation, cf. the seventies, in which low economic growth went hand in hand with relatively high inflation.

Data for some countries clearly suggest a trade-off between unemployment and inflation. This is illustrated by Chart 1, which reflects the unemployment and inflation figures for the United States and the EMU on the basis of the annual figures for the period 1980-1999.

For the EMU, the relation between unemployment and inflation is negative; high (low) unemployment did not coincide with high (low) inflation. For the United States, however, the nature of the relation between the said factors is less evident, since several times inflation was relatively low – i.e. approximately 1 to 3% – while at the same time unemployment did not rise above 6%.

Chart 2 covers unemployment and inflation in the

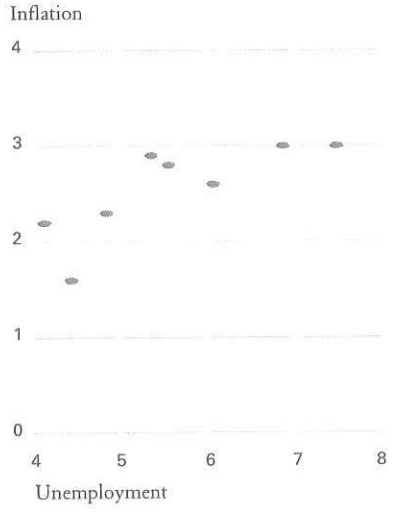
Chart 1 Unemployment and inflation



Source: OECD.

United States in the shorter time span of 1992-1999. From this chart it appears that, instead of being negative, the trade-off between inflation and unemployment is even positive. This suggests that during the period under consideration, there was no trade-off as assumed by Phillips.

Chart 2 Unemployment and inflation in the United States, 1992-1999



Source: OECD.

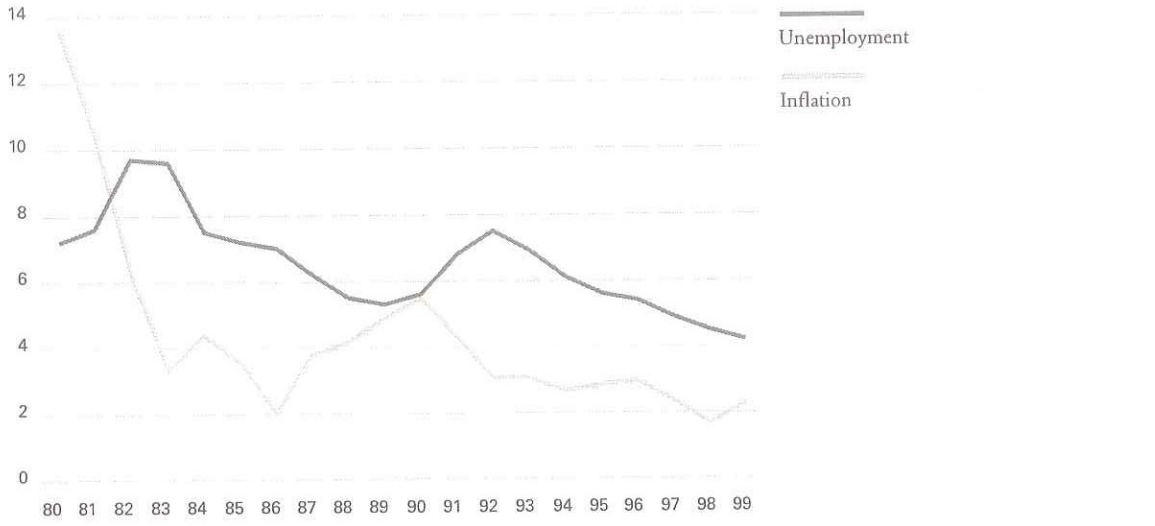
The new economic development in the United States

The unemployment and inflation developments in the United States as reflected in Chart 3 for the period 1980-1999 show how during the eighties times of high (low) inflation were attended by low (high) unemployment. From 1992, however, both unemployment and inflation diminish. In 1995, unemployment dropped below 5.5% – by some regarded as the NAIRU level – and in 1999 to as little as 4% even. Despite this low unemployment figure, inflation dropped to an average of 1.6% in 1998. Strikingly, the period in which both unemployment and inflation dropped covers as many as eight years, from 1992 up to and including 1999.

It is hard to account for the changing relation between unemployment and inflation. Labour productivity growth is often adduced as the principal cause. Between 1992 and 1999, this growth varied between 0.9 and 2.8% on an annual basis (for the entire economy). This signifies that production per worker in the United States continued to rise and, at the end of the nineties, at a considerable pace. This is exceptional after a boom of several years. Often, the increased production capacity is mentioned in this connection. The potential production, being the maximum production of goods that can be realised given the available capital goods supply and the labour potential, is said to have expanded considerably. This explanation appears to be plausible. A higher potential production may have absorbed the

Chart 3 Unemployment and inflation in the United States

In percentages



Source: OECD.

increased demand and also resulted in a higher GDP or employment growth.

However, this explanation fails to account for the new paradigm. Usually, this phenomenon is attributed to two factors[1], the first being the ongoing globalisation and deregulation, and the second, the accelerated advance of information and computer technology (briefly: ICT). Globalisation results in an increase in international trade because borders and trade barriers are lifted. Furthermore, deregulation and increased competition lead to narrower profit margins and, possibly, also greater cost efficiency. In the case of the United States, the second factor may well be considered even more essential. The use of the Internet, mobile phones and other means of communication has grown at a super-fast pace. These means enable users to select, at little cost, the least expensive products world-wide as well as selling their products in the shortest possible time. Making for greater efficiency, the said advantages help cut the cost of inventory control. Both trends, i.e. globalisation and ICT, promote electronic commerce, facilitate production, reduce costs and reach the majority of the sectors in the economy.

Consequently, the fact that inflation in the United States has continued to be moderate despite continuing high growth should be attributed to developments on the production side and to price and cost competition having grown fiercer. On the other hand, neither higher import prices, nor nominal wage claims or foreign or domestic financial crises have exerted serious pressure on inflation in the United States.

Macro-economically, the prolonged high economic growth, the low unemployment and the moderate inflation have led to fewer expenditure cuts and boosted interest in equity investments. As a consequence, share prices have jumped considerably. Profits on investments have meanwhile become a mainstay of the sustained growth in spending. It may justly be wondered how long a boom of this magnitude can be sustained.

Supporters of the 'new economy' more and more often project that the American economy has turned into a higher trend growth path. Formerly – it is assumed – the trend growth fluctuated between 2 to 2.5%, whereas now it varies between 3 to 3.5%. On this higher path, the cycle would be able to develop further with alternating periods of slumps and booms, like before. The question whether this high growth is here to stay, or whether the past decade of a booming economy in the United States was nothing but an incidental, be it prolonged, interlude, will not be answerable until after a great many years.

Table 1 The United States and the EMU
Growth rates in percentages, unless indicated otherwise

	1992	1993	1994	1995	1996	1997	1998	1999
United States								
Real GDP	3.3	2.4	4.0	2.7	3.7	4.5	4.3	4.0
Real private consumption	3.2	3.0	3.8	3.1	3.3	3.7	4.9	5.3
Real investment	3.4	8.4	8.9	9.8	10.0	10.7	12.7	8.3
Consumer prices	3.0	3.0	2.6	2.8	2.9	2.3	1.6	2.2
Unemployment (in percentages)	7.5	6.9	6.1	5.6	5.4	4.9	4.5	4.2
Labour productivity for the overall economy	2.7	0.9	1.6	1.2	2.2	2.2	2.8	2.5
Unit labour wage bill for the overall economy	2.1	2.2	1.2	1.9	0.9	1.8	2.8	2.5
EMU								
Real GDP	1.4	-0.9	2.4	2.2	1.4	2.3	2.8	2.1 [1]
Real private consumption	1.8	-0.9	1.4	1.9	1.4	1.6	2.9	2.4 [1]
Real investment	0.5	-6.3	2.6	2.5	0.9	2.1	4.3	4.9 [1]
Consumer prices	4.4	3.7	3.0	2.9	2.3	1.7	1.2	1.2
Unemployment (in percentages)	9.2	10.9	11.7	11.4	11.6	11.6	10.9	10.0
Labour productivity for the overall economy	2.3	1.0	3.3	1.7	1.6	2.4	1.9	0.7 [1]
Unit labour wage bill for the overall economy	5.0	4.3	0.2	2.2	1.4	0.3	0.2	1.7

1 Provisional EU projection figures.
Source: De Nederlandsche Bank and OECD.

Some key figures for the United States and the EMU

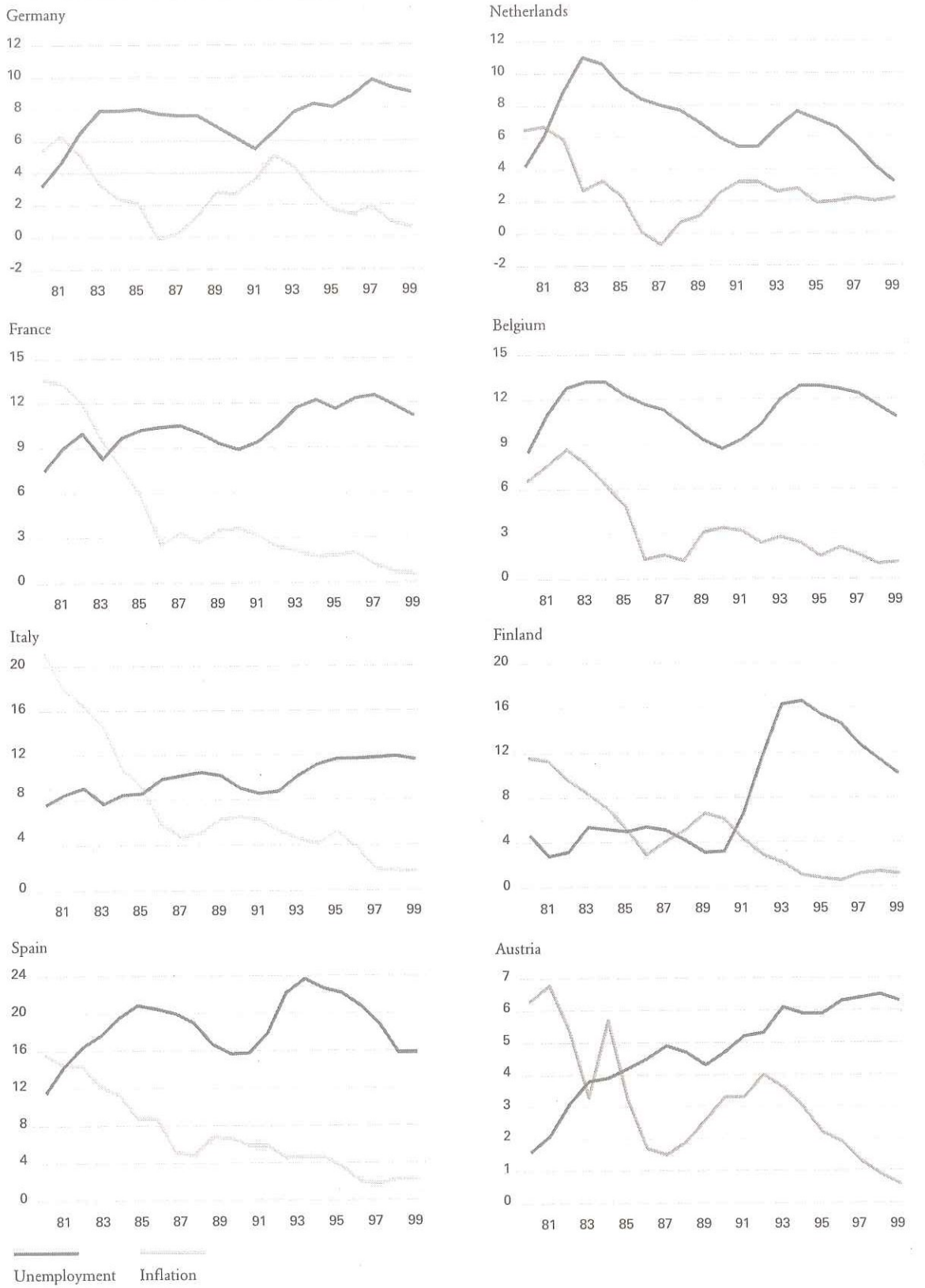
The economic situation in most European countries differs from that in the United States in many respects. The American capital market, for example, is much better developed than its European counterpart and the American labour market typically has a higher mobility, also because of the relatively simple hiring policies and dismissal procedures. In most European countries, labour mobility is lower, even during periods of an economic boom. These differences have existed for a long time already. The other important differences are related to investment in software and computers and, more generally, expenditure on research and development, which are all higher in the United States. Furthermore, while in Europe the Internet and other means of communication are yet to be introduced on a large scale, the United States has a network economy in which these tools play a prominent role.[4]

Within Europe, the advent of the EMU made for new dynamics. Interest rates and inflation in the euro area have meanwhile converged appreciably. Besides, in the run-up to the EMU, inflation has dropped to a much lower level. The common European market has brought a rise in mergers and take-overs, both national and international. Also, many sectors have made headway in the field of deregulation and liberalisation.

To afford more insight into the differences, several macro-economic figures applying to the United States and the EMU for the period 1992-99 are presented in Table 1. The most striking difference is in economic growth. The tremendous increase of domestic consumption and investment in the United States has resulted in GDP growth of at least 4% for each of the past three years. In addition, in 1998 inflation in the United States declined to 1.6%. Economic growth for the EMU as a whole was evidently lower and inflation in the period prior to EMU, which started in 1999, dropped to a very low level. One aspect to strike the eye is that unemployment dropped despite inflation in 1998 and 1999 staying low. A comparison of labour productivity figures in itself does not show exorbitant differences

Chart 4 Unemployment and inflation in eight EMU countries

In percentages



Source: OECD.

between the United States and the EMU.[5] Another difference standing out is that the growth of the American labour productivity in 1996-1999 accelerated to approximately 2.5%, even after several years of a booming economy.

Germany, France and Italy carry much weight in the EMU. These countries largely account for, e.g., the relatively moderate rise in consumer prices in the period 1997-1999. While having dropped these past three years, the level of unemployment is still relatively high (10-11.6%). Again, this is primarily attributable to the large three countries.

The differences between the EMU countries are large, as is illustrated by Chart 4, which shows the individual unemployment and inflation figures for Germany, France, Italy, Spain, the Netherlands, Belgium, Finland and Austria, also for the period 1980-99. In the large three countries, unemployment is high and persistent – approximately 11% in 1997, but diminishes appreciably in Germany and France as of 1997. Inflation declined sharply across the entire period. In Italy it even reached its lowest level in 1999. The smaller countries, but also Spain, on the other hand, present a different picture. Besides a stable or sometimes slightly rising inflation at the end of the period, these countries are marked by a sharp decline of unemployment. This is the result of higher GDP growth. Because of, among others, interest rates being low in the run-up to the EMU, these economies have profited in terms of economic growth, whereas Germany, France and Italy were experiencing more difficulty stimulating economic growth. In exchange for growth, these smaller countries have had to pay a price in terms of slightly rising inflation. Spain is the most remarkable EMU member, since this country clearly profited by the new developments, with unemployment dropping by almost 8 percentage points in the period 1996-1999.

The other EMU countries, Ireland, Luxembourg and Portugal show economic pictures that resemble those of small countries rather than those of the large countries, owing to a combination of decreasing unemployment and slightly rising inflation (save for Luxembourg).

An analyses with EUROMON

To gain more insight into aspects of the 'new economy', a number of simulations were performed using the Bank's macro-economic model, EUROMON.[6] EUROMON is a multicountry model for eleven European countries, the United States and Japan. Aspects of the 'new economy' are analysed on the basis of a number of impulses that each influence wage and price developments, assuming that the pursued monetary policy is not changed. The simulations were first performed for the United States, showing the effects of the American inflation, unemployment and labour productivity. Similar simulations followed for the EMU.[7] Of these, the effects of inflation, unemployment and labour productivity in the EMU are presented.

The *first* simulation shows the consequences of a spending impulse that increases GDP growth by one percentage point during five years. Assuming that GDP growth in the baseline projection is 2.5%, this simulation represents the additional GDP growth, i.e. economic growth of 3.5%. This simulation may be interpreted as a prolonged period in which GDP growth exceeds trend growth. The United States have known such a period of prosperity in the past few years. The simulation will first be performed for the United States. After that, however, it will also be performed for the EMU, to enable an analysis of the possible differences between the United States and the EMU. The *second* simulation shows the effect of higher GDP growth in combination with a freer market mechanism. This is simulated by means of a spending impulse that, just like in the previous simulation, leads to a GDP growth increase by one percentage point during five years, together with a once-only decrease of consumer prices by one percentage point. The consumer price cut may be interpreted as a reduction of profit margins. Many supporters of the 'new economy' consider globalisation, with effects like lower profit margins, one of the causes of the recent economic development in the United States. This simulation may therefore be regarded as one aspect of the 'new economy'.

In the third simulation, higher economic growth is attended by an equally high rise in production capacity. This time, a spending impulse which, just like in the first simulation, leads to GDP growth by one percentage point in five years, is combined with a production capacity increase by one percentage point. This increase may be regarded as a rapidly implemented new development in the field of ICT, which makes for a higher output at the same labour force. So, just like the previous simulation, this one sheds light on one aspect of the 'new economy'.

Table 2 Effects of a GDP growth increase by one percentage point during five years
Effects in percentages, unless indicated otherwise

	United States			EMU		
Year	1	2	5	1	2	5
Inflation	0.0	0.3	1.9	0.1	0.2	1.1
Unemployment	-0.4	-1.0	-3.5	-0.1	-0.5	-1.7
Labour productivity market sector (in percentages)	0.5	0.8	0.7	0.9	1.6	3.0

The effects of higher economic growth in combination with a spending impulse: simulation one

Table 2 presents the simulation results for the United States and the EMU in the event of a domestic spending impulse leading to a GDP growth exactly 1 percentage point above trend growth for five years. Assuming that the monetary policy is not changed, it may be expected that during such a period employment and inflation increase significantly.

And that is what Table 2 shows. In the United States, inflation has been gradually rising by 1.9 of a percentage point in five years' time. The rise in domestic spending is boosting employment. Assuming that labour supply does not change, unemployment in the United States will fall relative to the basis by 0.4 of a percentage point in the first year and 3.5 of a percentage point in the fifth year.

These employment effects may appear considerable, even for a prolonged period of boom. From Table 1, for example, it follows that during the period of boom in the United States, actual unemployment declined by 1.9% in 1992-1997, i.e. from 7.5% to 4.9%. One of the principal factors contributing to the effects on unemployment in the simulations is the constant level of labour supply. In reality, though, an economic boost and rise in employment have an impact on labour supply. This phenomenon was also perceived in the United States in the past decade. In addition, the United States has seen an increase in mergers and labour productivity, which, during the period of boom, also led to labour shakeouts. Labour-saving new technologies have rendered jobs redundant and created new jobs alike. On the labour market, the shed labour potential was largely absorbed by new jobs.[8]

According to the simulation results listed in Table 2, which are not based yet on the 'new economy', unemployment and inflation interact. The spending impulse directly results in extra employment. The rise in labour productivity and the fall in unemployment exert an upward pressure on wages. As a consequence, unit labour costs increase, if slowly, in the longer term, causing consumer prices to rise. Besides, the output gap, representing the tension on the commodity market, exerts an upward pressure on consumer prices.

The results for the EMU show a similar development, be it that the effects are more modest. While, driven by the spending impulse, employment picks up, labour demand within the EMU responds less quickly to the rise in domestic demand. This is to be attributed to rigidities in the labour market, which in EUROMON translate into a more persistent demand for labour. Compared to the American labour market, staffing adjustments in Europe are more expensive and time-consuming due to dismissal and hiring procedures being more complex. This not only accounts for the comparatively slow pace at which unemployment in the EMU declines, but also explains why in the EMU inflation rises more gradually than in the United States. After all, the nominal wage bill increases at a later stage due to the slower decline of unemployment. As the employment recovery pace in the EMU is slower than in the United States, labour productivity in the EMU is higher. After five years, inflation in the EMU has risen by 1.1 of a percentage point. In the fifth year, unemployment in the EMU has dropped by 1.7 of a percentage point, against 3.5 of a percentage point in the United States.

Table 3 Effects of a consumer price decline by one percentage point in the first year and a GDP growth increase by one percentage point during five years
Effects in percentages, unless indicated otherwise

	United States			EMU		
Year	1	2	5	1	2	5
Inflation	-1.0	-0.7	0.8	-0.9	-0.8	-0.0
Unemployment	0.0	-0.6	-3.7	0.0	-0.1	-1.6
Labour productivity market sector (in percentages)	0.8	1.6	0.6	1.1	2.1	3.1

The effects of a freer market mechanism and higher economic growth: simulation two

Globalisation and more deregulation enhance competition. It is generally held that the United States has succeeded in benefiting a great deal from this 'new economy'. To show the effects of a freer market mechanism, Table 3 presents the effects of a positive domestic spending impulse in combination with falling consumer prices. The decline of consumer prices may be interpreted as narrowed profit margins for the domestic producers. It remains confined to the first year, amounting to 1% precisely. The domestic spending impulse does not differ from that of the previous simulation in terms of extent and duration: a 1 percentage point higher GDP growth in five years.

In the United States, the decline of consumer prices reduces inflation by 1% in the first year. The increase of domestic spending has a positive effect on employment. In the first year, however, this increase is offset by the effect of real wages, which rise as a result of the sharp drop in consumer prices. As a result, unemployment does not change. After the first year, however, unemployment starts to decline, since GDP continues to grow and consumer prices have ceased their decline, causing labour demand to pick up.

A similar simulation performed for the EMU yields the same pattern. Employment develops favourably as of the second year, but – just like in the previous simulation – at a slower pace than in the United States. Initially declining sharply, inflation rises in the long term, while unemployment decreases uninterruptedly in the first year.

So, unlike the previous simulation, in which only spending impulses were given, in this simulation, which proceeds from a freer market mechanism, both inflation and unemployment decline in the short term.

Effects of a technological shock and higher economic growth: simulation three

Besides the effect of globalisation, the term 'information and communication technology is also frequently being heard in discussions about the 'new economic paradigm'. It is said to increase the production capacity, since the new form of networking it has brought facilitates the production process by reducing the costs of inventories, enhancing the transparency on labour and commodity markets, etc. To afford insight into the consequences of such a positive shock on the supply side,

Table 4 Effects of a potential production increase by one percentage point and a GDP growth increase by one percentage point during five years

Effects in percentages, unless indicated otherwise

	United States			EMU		
Year	1	2	5	1	2	5
Inflation	0.0	0.0	0.1	0.0	0.1	0.1
Unemployment	-0.4	-0.9	-2.6	-0.1	-0.4	-1.3
Labour productivity market sector (in percentages)	0.6	0.9	1.9	1.0	1.7	3,4

an increase of the potential production capacity is simulated. This may be interpreted as a positive technology shock. This impulse, too, is combined with a positive shock on the demand side. Both impulses being equated, the simulation gap does not change. This implies that GDP growth is precisely equal to the growth of the potential production. Furthermore, it being assumed that the shocks last five years, the output gap will not change during that period.[9] Again, the simulation is first performed for the United States and, subsequently, for the EMU.

The positive impulse on the demand side directly boosts labour demand. In the United States, unemployment declines by as much as 0.4 of a percentage point in the first year, in the EMU by 0.1 of a percentage point. This does not have a depressing effect on prices on the commodity market, though, since the new demand can be met immediately, owing to the production capacity expansion. As the output gap does not change, inflation does not rise through this channel. And since production growth rate outpaces that of employment, labour productivity increases.

This does not fail to exert pressure on wages, though. However, unit labour costs rise only gradually. This is the corollary of the relatively slow growth of employment. On the one hand, employment picks up because of extra expenditure; on the other hand, the pace of this process is stunted by the rise of real wages. As a consequence, the total wage bill relative to GDP does not increase rapidly. Unit labour costs may have a modest inflationary effect in the long run. Just like in the previous simulation with more scope for market forces, here, too, it holds that unemployment declines without

inflation increasing in the short term. It follows that there is no clear interaction between inflation and unemployment.

Summary and conclusions

- ***It is assumed that globalisation and deregulation have contributed to the positive economic development in the United States these past few years, without raw material prices and crises elsewhere in the world having had any significantly adverse effects on economic growth. Naturally, an adequate monetary policy plays an important role in this context.***
- ***According to traditional economic theories, an above-trend growth rate by one percentage point irrevocably causes high inflation for a number of years. The relatively modest rise of prices in the United States this past decade is bound to be related to major changes in production methods and price development. However, it will not be possible until after a great many years to determine whether these changes have raised economic growth to a higher growth path.***
- ***The level of inflation within the EMU has dropped considerably. In the process, especially the smaller countries, but also Spain, have managed to benefit from higher economic growth as well as from recovering employment. The large EMU countries – Germany, France and Italy – appear to continue to follow the traditional patterns the most, having registered persistently high levels of unemployment for a long time. Unemployment in these countries does not start to decline until early 1997.***
- ***Simulations with the macro-economic model EUROMON provide insight into the effects on inflation and unemployment if during a prolonged period spending impulses are combined with more scope for market forces and stepped-up investment in technology. The simulation outcomes show that unemployment declines without inflation rising appreciably, if at all. They confirm that the developments in the United States in the past decade may be ascribed to a combination of spending impulses, a free play for market forces and investment in potential production capacity expansion, leaving aside all other factors, such as import prices and the dollar exchange rate.***
- ***The EUROMON simulations are performed for both the United States and the EMU to show the difference between both economies. It follows that comparable impulses would in particular have a stronger effect on unemployment in the United States than in the EMU.***
- ***For Goldilocks to visit Europe, more drastic investment in information technology will be required. After all, compared to the United States, Europe is at a serious disadvantage in this field. In addition, it appears that markets in Europe will need to become more flexible. An acceleration in computer and information technology may yield cost reductions, a 'knowledge' economy and a higher production capacity in Europe. However, without more radical deregulation and privatisation these new technologies will most likely not be able to bring about a reproduction of the golden development in the United States.***

1 See R.J. Gordon, 1998, 'Foundations of the Goldilocks Economy: Supply Shocks and the Time-Varying NAIRU', *Brookings Papers on Economic Activity*, pp. 279-346 and the address by Mr. H.J. Brouwer, the Nederlandsche Bank, 1999, entitled '2010: De Oude, de Nieuwe en een Betere Economie', delivered at the 10th EFV Congress at Groningen.

2 The Phillips curve is in fact a simplified wage equation in which unemployment is the explaining factor and wage inflation is interpreted as the only source of inflation. Also see the *Journal of Monetary Eoncomics*, 1999, 'Special Issue: The Return of the Phillips Curve', which comprises a number of studies of the Phillips curve.

3 The 'Non-Accelarating Inflation Rate of Unemployment' is the rate of unemployment at which inflation neither increases nor decreases.

4 See 'Wo ist Goldilocks?', *The Economist*, February 5, 2000, pp. 73-74. It has been estimated that in 1998 the United States invested 8% of GDP in IT, the United Kingdom 7% and the EMU only slightly over 5%.

5 Interestingly, the differences in labour productivity growth between EMU countries are relatively large. Labour productivity in the period 1991-95 is low in the Netherlands in particular, and also obviously lower than in previous periods. Also see H.P. van der Wiel, 1999, 'Sectoral labour productivity growth: A growth accounting analysis of Dutch industries, 1973-95,' *Onderzoeksmemorandum*, Centraal Planbureau, Den Haag.

6 An older version of EUROMON was reported in G.J. de Bondt, P.J.A. van Els and A.C.J. Stokman, 1997, 'EUROMON: a macro-econometric multi-country model for the EU', *DNB Staff report, No. 17*, De Nederlandsche Bank. In a more recent version, EUROMON has been extended to include Japan and the United States.

7 The 'EMU' consists of Belgium, Germany, Finland, France, Italy, the Netherlands, Austria and Spain, which together are practically representative of the entire EMU. Simulations are performed using the entire model, i.e. including all international effects. Furthermore, it is noted that the GDP shocks carried out in EUROMON do not lead to distorting effects for the variables shown; labour demand and prices are dependent on GDP and not on one of the GDP components.

8 See 'Remarks by Chairman Alan Greenspan, Technology and the economy', speech for the Economic Club of New York, 13 January 2000.

9 For the construction of the output gap in EUROMON; see W. Bolt and P.J.A. Van Els, 2000, 'Output gap and inflation in the EU', *DNB Staff report, No. 44*.