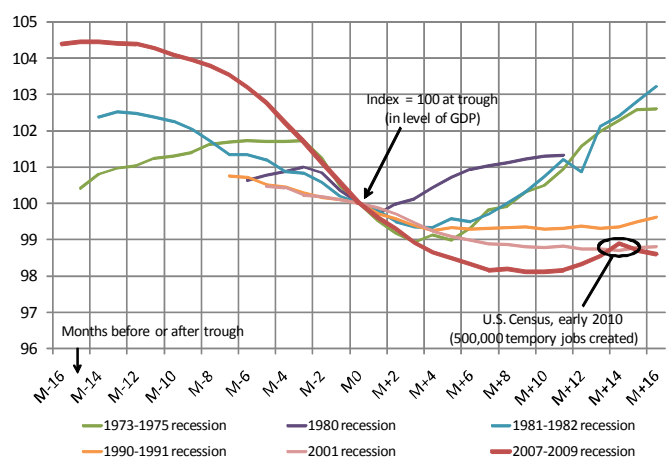


The employment content of growth in the current U.S. recovery

This study was prepared under the authority of the Directorate General of the Treasury (DG Trésor) and does not necessarily reflect the position of the Ministry for the Economy, Industry and Employment.

- The National Bureau of Economic Research has dated the end of America's "Great Recession" to June 2009, but the very nature of the current U.S. recovery remains uncertain. Growth is fragile; the situation on the labor market remains poor; and any improvement will depend on the strength of economic activity and the job content of the recovery. Historically, throughout the post-war period until the 1980s, a pickup in economic activity was followed by a strong rebound in the labor market; but the periods following the 1990 and 2001 recessions were especially weak in terms of job growth, raising the hypothesis of a long-term shift in the labor market's response to changes in economic activity.
- The 2008-2009 recession differs from the previous two recessions by the extent of job losses; this argues for a strong rebound in the labor market during the subsequent recovery. An econometric analysis, however, seems to confirm the hypothesis of a structural shift in the response of employment to changes in GDP, as the current period look like previous "jobless" recoveries more than "classical" recoveries.
- The low level of hiring, even after job destructions ended-a characteristic of the post-1990 and 2001 recession recoveries-appears to confirm this diagnosis. The first explanation is the sharp decline in hours worked and the rise in involuntary part-time work during the recession, even if those factors are not specific to the current episode; companies can have their existing employees work more before hiring additional workers.
- More fundamentally, weak job creations-to date and in the future-during a recovery appear to be linked to structural changes in the U.S. economy, which reduce the response of employment to GDP growth. A breakdown of employment trends by sector shows that every U.S. recession since 1945 has registered an acceleration in the decline in the share of manufacturing employment in total employment, notably due to high productivity in the manufacturing sector and the outsourcing of certain activities. This gradual deindustrialization has left the services sector-which has a slower response to changes in GDP-as the main source of job creation during recoveries.
- Other factors specific to the current recession/recovery are probably also at work, e.g., especially strong uncertainty regarding the economic outlook and the magnitude of the housing crisis which, in addition to the job destructions it entails, also tends to reduce workers' mobility and thus aggravates the problem of matching worker skills to job vacancies.

Changes in employment in U.S. recessions and recovery



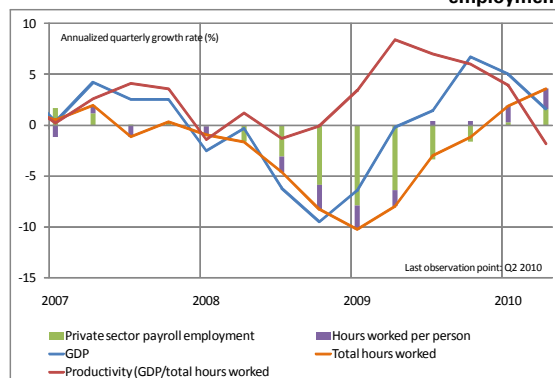
Source: BLS, NBER, DGT calculations

1. Identifying a "jobless" recovery

1.1 "Jobless" recoveries are characterized by particularly slow labor-market response to GDP growth...

It is normal to observe a slow labor market during a post-recession recovery, as there is always a lead-time between the pickup in growth and the pickup in employment (as observed in the productivity cycle). Thus the strong productivity growth observed in 2009 is due in part to employment and hours worked lagging behind GDP growth (see Chart 1).

Chart 1: The productivity cycle and private sector payroll employment



Source: BEA, BLS

A "jobless" recovery refers to an expansion phase with particularly low employment content, in other words, very low response by the labor market to GDP growth. In the U.S., jobless recoveries have been observed since the 1990-1991 recession.¹ The response of employment to changes in GDP is not linear, and seems to have shifted over the past twenty years. An econometric analysis was conducted in which three employment equations were estimated for the periods 1975-2008, 1970-

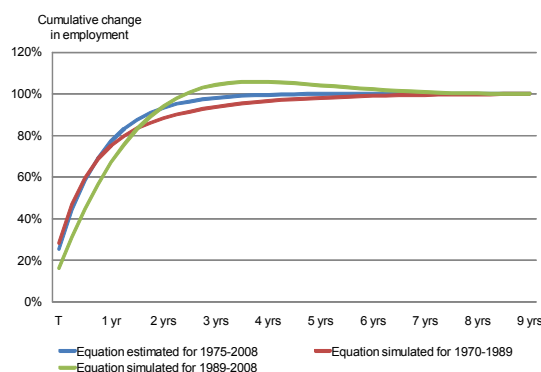
1989 and 1990-2008. The equations model the long-run response of payroll employment to GDP and average per-capita income, and the short-run response of payroll employment to differences in GDP (growth or contraction) and lagged employment, via an error-correction model (see Appendix 1).

In these three equations, the short-run response of employment to changes in GDP was tested for a rise and a fall in GDP. A first result is that in the short run, for all three estimation periods, employment responds more strongly to a fall in GDP than to GDP growth. However, the sensitivity of employment to changes in GDP growth has evolved over time.

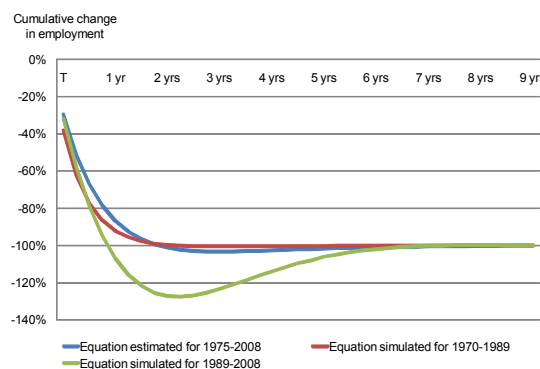
Accordingly, since the 1990s, the short-run response of employment to a drop in GDP has been significantly greater than before. Employment "overreacts" to a drop in GDP at a one-year horizon,² with employment responding with 110% of the fall in GDP (and the "over-reaction" is even greater after two years, reaching 130% of the fall in GDP). Jobless recoveries thus follow recessions that were extremely destructive of jobs (and this explains the productivity gains reported during those periods).

On the other hand, measuring the short-run response of employment to an increase in economic activity, employment rose by only about 65% of the GDP growth in the short-run in the equation estimated for the 1989-2008 period (at a one-year horizon), compared with 75% in the equation estimated for 1970-1989. The lower short-run response of employment to GDP growth is a good illustration of what occurs in a jobless recovery.

To a positive GDP shock



Graphiques 2 : Labor market response functions
To a negative GDP shock



Source: DGT calculations

- (1) The expansions following the 1990-1991 and 2001 recessions are identified as "jobless" recoveries, unlike the recoveries after the recessions in 1973-1975, 1980 and 1981-1982 (NBER dating).
- (2) What is examined here is the dynamic of a recovery in employment at a two-year horizon. The medium-term response is not examined here due to the lack of sufficient historical evidence on productivity changes during a recession and (especially) during the subsequent recovery; a retrospective study is proposed in Appendix 1. Note that in the long run (at a 7-year horizon), the employment response to a change in GDP is the same for all the equations. This result arises from the error correction model used, which, for economic reasons, assumes long-term unit elasticity of changes in employment with respect to changes in GDP (see Appendix 1 for more details on the econometric model).

1.2 ... and a rebound in labor productivity

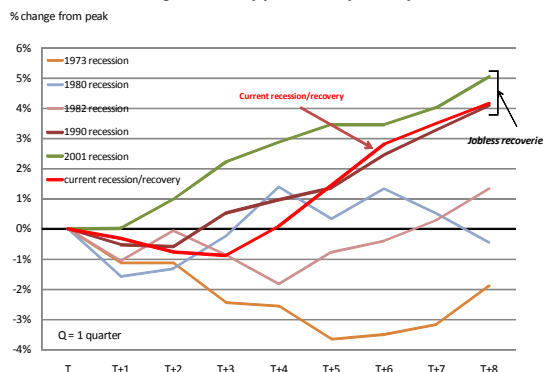
During a classical recession-and-recovery sequence, productivity declines at the beginning of recession; economic activity slows but companies do not immediately dismiss workers, as they start adjusting using other means, e.g., a shorter workweek; later, during the recovery, productivity increases rapidly at first, then more slowly as hiring resumes.

Productivity changes are different in the periods identified as jobless recoveries. Productivity increases sharply in the short term (see Chart 2, which shows the response function of employment from zero to two years after a negative shock to GDP), as employment remains severely depressed during the period.

If productivity gains prove to be sustained, they generally reflect a more efficient economy, and in the long term they can have a positive effect on employment, as confirmed in the equations by the stronger response in the medium term. A likely inference is that the reallocation of jobs from less productive sectors of the economy to more productive sectors, which is initially highly destructive of

jobs, has often resulted in an overall improvement in the American production structure and higher employment in the longer run (but significantly after the turning point). For this process of long-term job creation to resume after the current recovery, however, the U.S. economy will almost certainly have to find new sectors-after technology and real estate-capable of high net job creations in the coming years.

Chart 3: Changes in hourly productivity in the postwar recessions



Source: BLS, NBER

2. The U.S. recovery is projected to be "jobless"...

2.1 Recent labor market developments point to a jobless recovery

The econometric analysis presented above suggests that the current trend in employment is in line with those of the earlier jobless recoveries. The response of employment growth to GDP growth for the current period appears similar to the previous episodes (and the econometric equation that most closely explains the current developments is the equation estimated for the period 1989-2008). This pledges for a similar trend in the coming quarters.

The data available on labor market inflows and outflows, and the indicators on the underutilization of production factors, tend to confirm the diagnosis. Traditionally, flows of job creations and job losses vary cyclically: with the decline in output, job losses increase (via dismissals or resignations), and new hiring falls; and the opposite occurs during recoveries. But the relationship between these two phases is not constant over time. Unlike the recessions and subsequent recoveries from 1970 to 1980, rising unemployment in the 1990-1991 and 2001 recessions can be explained largely

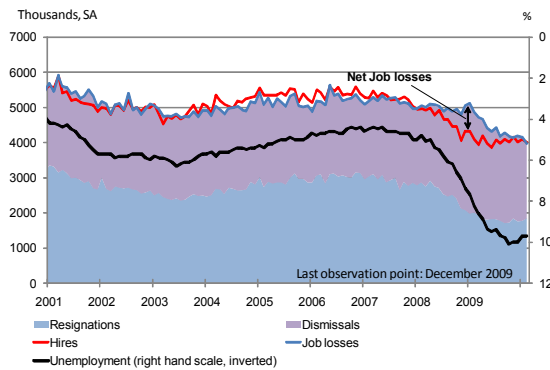
by lower hiring in a recession, rather than by massive job losses.³ This, along with weak hiring during the recovery phase-the characteristic of a jobless recovery-usually reflects structural changes in the economy,⁴ resulting, at least in part, from a change in the U.S. production structure, characterized by the structural decline of manufacturing and the emergence of new sectors that will drive growth, e.g., financial services, information technology, and real estate.

The pattern of flows into and out of employment in the current period is intermediate between the previous two patterns: the 2007-2009 recession combined high job losses and low job creations. However, the data available for the start of the recovery show that while job losses have fallen significantly since early 2009, job creation remains very depressed. Despite the magnitude of job losses during the recession, the current pattern therefore appears similar to what was observed in the recessions that were followed by jobless recoveries (with sustained weak hiring weighing on the unemployment rate).

(3) See "Jobless Recovery Redux?" Mary Daly, Bart Hobijn, Joyce Kwok, *FRBSF Economic Letter*, June 5, 2009. In this study, the authors reconstruct inflow rates (the pace at which workers move into unemployment) and outflow rates over a long period, from 1948 to 2009 (the publicly available data are valid only from 2001 onward).

(4) See "Has Structural Change Contributed to a Jobless Recovery?" *FRBNY*, August 2003, Volume 9, Number 8. This study shows there were significant structural changes during the "jobless recovery" of 2002. The authors establish a methodology that allows them to distinguish between cyclical and structural adjustments in employment changes. They identify the structural decline of employment in a number of industries during the 2001 recession and subsequent recovery (e.g., structural losses in railroad transportation).

Chart 4: Monthly unemployment inflow and outflow rates, 2001-2009



Source: BLS

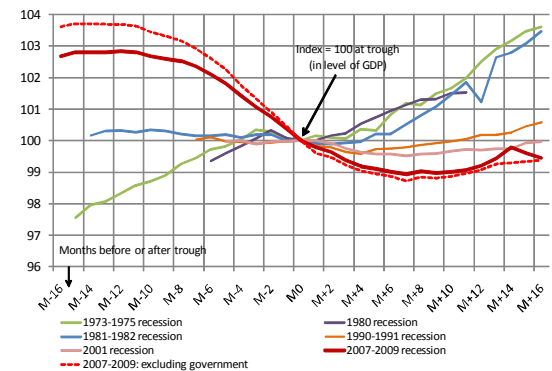
Finally, **the current recession is marked by sharp decline in labor force utilization.** The recession has seen not only a decline in hours worked and a vast increase in involuntary part-time work; but also particularly high numbers of discouraged workers have also left the labor force altogether. A pickup in economic activity will therefore be reflected first in increased use of existing workers, and a return of discouraged workers to the labor force that will weigh on any improvement on the unemployment rate during the recovery.

2.2 The labor market may be somewhat more responsive to a pickup in economic activity than in previous jobless recoveries

While virtually all the points above argue in favor of a jobless recovery, there is a possible sign pointing in the other direction, that is, the very high net job destructions observed in the recent period, especially in the services; this might suggest that companies overreacted during the contraction, which could be followed by a more pronounced rebound than in the previous jobless recoveries.

Indeed, while they seem more in line with previous jobless recoveries, net job losses in the services were significantly greater in 2007-2009 than in the previous contractions. All in all, over four million jobs were lost in the services sector, or far more than in any other recession since 1945. The 1973 and 1980 recessions, for instance, saw significant net job creations in the services, even though the overall economy was in recession.

Chart 5: Employment in services in U.S. recession and recovery



Source: BLS, NBER, DG Trésor calculations

In the current recession, high job losses have occurred in business services. Because the business services sector is a priori less affected structurally, and especially as it serves as a variable of adjustment during contractions, the corresponding job losses could turn out to be temporary adjustments.⁵ **Broadly speaking, temporary layoffs are higher in the current recession than in the 1990 and 2000 recessions. This seems to confirm the presence of significant cyclical unemployment, which (by definition) is more readily reversible when economic activity picks up.**

Beyond the structural change in the coefficients of the response of employment to a change in GDP, total job losses (in all sectors) were slightly higher in the most recent episode than the results calculated using the employment equation for recent period (1989-2008). This would indicate that job losses overreacted to the fall in GDP in the current recession, compared to the corresponding periods in the 1990-1991 and 2001 recessions. If we assume that employment levels will catch up with the level simulated by the equation, then the recovery in employment could be slightly stronger over the first few years following the trough than in the previous recessions.⁶

These factors appear capable of moderating the "joblessness" of the coming recovery, but are not projected to change its nature from a recovery with sustained low job content. While the recovery could bring significant net job gains in the services sector (though the pace will be limited so long as GDP growth is low), the manufacturing sector should continue to weigh on the labor market, because the decline of employment in manufacturing appears to be structural.

(5) Job losses in the financial services sector were also especially high in the latest recession, but the sector accounts for only 7% of total employment in the services, and the structural nature of the job losses is a function of medium-term restructuring in the sector, which had experienced particularly strong growth since the 1980s.

(6) This property is related to the approach used for modeling employment and thus to the error-correction models. In the long run, there is a unit elasticity of employment with respect to GDP; this is consistent with economic theory. Short-run deviations from the long-run relationship tend to be corrected by the error-correction mechanism (ECM).

3. ... due to structural changes in the U.S. economy and factors specific to the current recession/recovery

Recoveries can be "jobless" because of reallocations across industries, if some sectors are in decline and few alternatives available in the short term for dismissed workers—either because growth sectors have not emerged, or because workers require an adjustment period, e.g., if new skills are needed, or if appropriate measures for the unemployed are lacking. These shifts between industries typically have a negative impact on employment in the short term, while the medium-term impact depends on the dynamic at work in the remaining industries and the retraining of workers concerned.

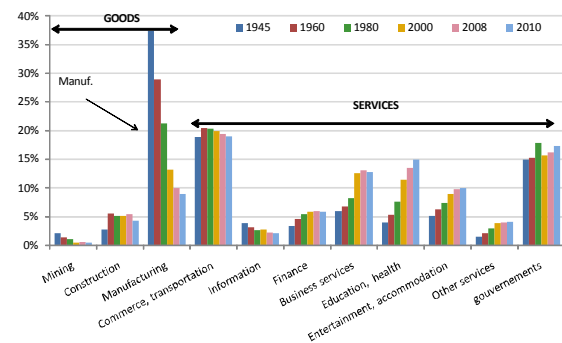
This raises the issue of the mismatch between workers' skill levels and job vacancies, and a rightward shift of the Beveridge curve.⁷ Groshen et al. find that the 1990 and 2001 recessions were associated with structural changes in the economy.⁸ Structural changes can be explained by innovation (process, technology or organizational change) that makes some technologies and industries obsolete in relation to innovative industries; by the country's new position in international competition and the organization of production; and more recently by the collapse of asset bubbles.

In the current period, the U.S. economy appears to face a combination of these factors: because of the continuing long-term trend of manufacturing decline, the services sector will provide the bulk of new jobs created during the recovery; in addition, the collapse of the financial and real estate bubbles should have a lasting impact on financial services and construction.

3.1 A structural change in the economy: the decline of manufacturing and of some labor-intensive industries

The deindustrialization of the U.S. economy (notably illustrated by the declining share of manufacturing employment in total employment) has accelerated since the early 1980s, and could explain the "jobless" character of recent recoveries (after 1990-1991 and 2001). Until the 1980s, manufacturing employment picked up during recoveries and then contributed to net job creations (see Charts 6 and 7).

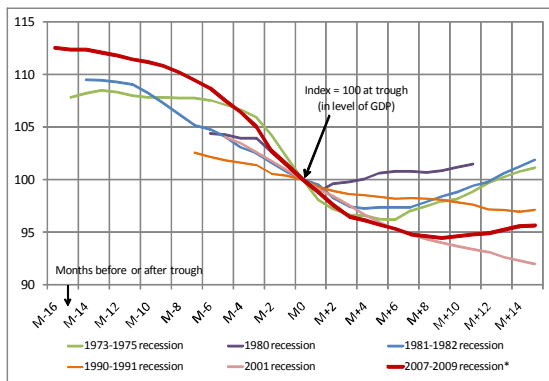
Chart 6: Employment by sector (% of total employment): 1945-2010



Source: DG Trésor calculations

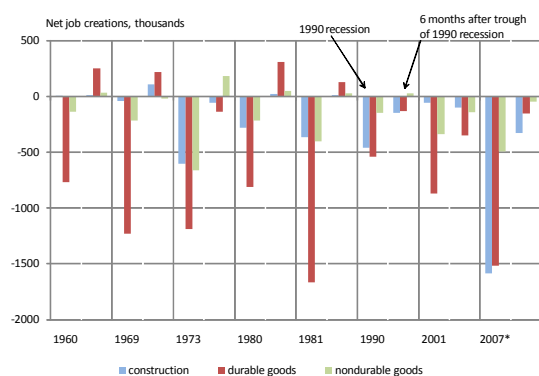
Starting with the 1990-1991 recession, the continuing deindustrialization of the U.S. economy has seen very low net job creation in manufacturing during recoveries,

In manufacturing



Note: At the time of writing, the end of the 2007-2009 recession had not been officially dated by the National Bureau of Economic Research (NBER).

During recessions and recoveries



Note: Net job creations across sectors are compared, for each recession since 1960 and for the first 6 months of recovery.

Sources: BLS, NBER, DG Trésor calculations

- (7) The Beveridge curve is a graphical representation of the relationship between unemployment and the job vacancy rate. It illustrates the efficiency of the labor market in matching supply and demand.
- (8) Their methodology consists in studying changes in jobs during and after the recession; if an industry's job losses (or gains) during recessions are quickly offset during an upturn, the labor-market adjustments are considered cyclical. However, if the industry's losses (or gains) persist or even intensify during the recovery, the labor market adjustments are considered structural. They find that in recessions from 1970 to 1980, approximately half of the labor market adjustment was structural, and the other half cyclical; they report that the structural component of the change subsequently rose to 57% in 1990 and 79% in 2001. "Has Structural Change Contributed to a Jobless Recovery?" E. Groshen, S. Potter, Current Issues in Economics and Finance, Volume 9, No. 8, August 2003, FRBNY.

The services sector was thus the initial locus of employment growth during these jobless recoveries, as manufacturing job losses continued to weigh on overall employment for a long time after the 2001 recession. This seems to confirm the rise in a more "structural" form of unemployment, related to changes across industries. In the current recession, job losses were also especially high in the construction sector (see Chart 7, Net job creations) and more generally in areas that experienced strong growth during the housing bubble. Most of the job losses in these areas will be permanent, because any upturn in construction—which remains uncertain at present—should be moderate given, e.g., the size of the vacant housing stock, and the deteriorated financial situation of households.

The "ratchet effect" in manufacturing and the housing-related sectors should be especially strong.

3.2 Factors specific to the current recession/recovery: particularly strong uncertainty regarding growth prospects and the depth of the housing crisis

Another factor that could explain and aggravate the jobless recovery is the uncertainty surrounding growth prospects. Businesses' uncertainty regarding final demand is a powerful brake on hiring,⁹ which can be manifested, e.g., by a sharp increase in financial market volatility, greater job destructions during recessions, and lower hiring during recoveries. Many authors have demonstrated, with VAR (SVAR) models, that, other things being equal, a shock to stock market volatility can have a negative impact on real GDP and employment.¹⁰

Finally, the current real-estate crisis, which is affecting different parts of the U.S. in different

ways and creating strong regional disparities, may also restrain the labor market by reducing geographical mobility (e.g., home sellers can have trouble finding a buyer at what is considered a reasonable price, and could face potential capital losses when moving); the mismatch between labor supply and demand, combined with low mobility across regions, can reduce labor market flexibility.¹¹

The difficulties on the U.S. labor market thus raise fears of higher structural unemployment; and economic policy measures to stimulate employment appear necessary, at least in the short term. Proposals include increased worker training to match skills with vacancies in expanding sectors of the economy,¹² or reinforcing measures to adjust and renegotiate mortgages in order to forestall defaults and facilitate housing-market adjustments.

Conclusion

While post-recession employment recoveries typically lag behind the pickup in GDP, remarkably few jobs were created in the wake of the 1990-1991 and 2001 recessions. Models of employment changes in the recent period indicate that the situation is likely to recur; this is also suggested by the principal data available on the labor market (composition of employment, job inflows and outflows, duration of unemployment, and labor force participation). The current "jobless" recovery could be explained by the trend of deindustrialization of the U.S. economy, which leaves the burden of creating jobs to the services sector, and also by the characteristics of the current recession/recovery (the real estate and financial bubbles).

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(9) See, e.g., Dixit and Pindyck (1994).

(10) See Daly and Hobijn (2010), Kruger (2010), IMF (2010).

(11) See, e.g., IMF (2010): United States: Selected Issues Paper, "The Great Recession and Structural Unemployment."

(12) See, e.g., OECD (2010), *Economic Survey of the United States 2010*.

Box 1: Econometric equations

The econometric equations used are error correction models. The long-run employment equation follows from the firm profit maximization condition^a.

Thus, with a Cobb-Douglas production function, we have: $W = \alpha \times \frac{Y}{L}$ where α is the wage share in GDP. To take account of the change in the share over time, the observed wage bill relative to GDP is smoothed using a Hodrick-Prescott filter, rather than setting it to a constant. This first-order condition is thus the error-correction mechanism of the equation.

In the short run, labor demand adjusts in a nonlinear fashion to changes in economic activity (with a distinction between the response of employment to a rise or fall in GDP).

$$z(1) + c(2) \times \left(\log \left(\frac{L(-1) \times W(-1)}{Y(-1)} \right) - \alpha(-1) \right) + c(3) \times \Delta(\gamma < 0) + c(4) \times \Delta(\gamma > 0) + c(5) \times \Delta(l)$$

L = Employment

l = Log of employment

W = Nominal wages

Y = Nominal GDP

γ = Real GDP

Estimation of the coefficients in the equations

Coefficient Related variable	$c(2)$ ECM	$c(3)$ $\Delta(\gamma < 0)$	$c(4)^a$ $\Delta(\gamma > 0)$	$c(5)$ $\Delta(l(-1))$
1989-2008	-0.04	0.32	0.16	0.74
1970-1989	-0.05	0.39	0.28	0.54
1975-2008	-0.04	0.30	0.25	0.65

a. Coefficients $c(3)$ and $c(4)$ are significantly different at the 5-percent level in the three estimations

- a. The long-run relationship is written here in nominal terms (which amounts to normalizing prices to unity in the profit maximization equation), primarily for reasons relating to statistical series; the U.S. national accounts are published in chained indices, making it impossible to consider the ratio of two quantities in real terms (with the danger of non-stationary in the real ratios while the nominal ratios are stationary). For details, see "Guide pratique des comptes chaînés," *DG Trésor Working Paper No. 2007/04*, July 2007 (in French).

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