



CHARLES UNIVERSITY IN PRAGUE
FACULTY OF EDUCATION
EDUCATION POLICY CENTRE

Case study

Comparing US and Cedefop projections

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Task 8

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CEDEFOP

European Centre for the Development
of Vocational Training

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Introduction

This text presents a detailed comparison of the Cedefop latest projection results (published in March 2010 and in October 2012) for the EU27 with the latest projection results from the Bureau of Labor Statistics (BLS) made in 2007 (the projection 2006-2016), in 2009 (the projection 2008-2018) and in 2012 (the projection 2010-2020) and of some Cedefop previous employment projections (from March 2010) and macroeconomic projections (from October 2009 and December 2010). They cover the three crucial periods: the first one preceding the crisis; the second one during the initial global financial crisis in 2008; and the third one during the present ongoing crisis. To policy makers they also offer some substantial insights into the overall impact of the recession and the crisis on changing skill demands and on projections of qualification requirements.

1. Classification used for comparison

One of main problems of comparing different projections is that different classifications are used. In the CEDEFOP projection, there are 41 sectoral groups (based on the NACE classification Revision 1) and 27 occupational groups, corresponding to the ISCO-88 2nd digit level.

In the BLS projection, there are about 200 sectoral groups. They are based on the NAICS classification (North American Industry Classification System). It was developed jointly by the U.S. Economic Classification Policy Committee, Statistics Canada, and Mexico's Instituto Nacional de Estadística y Geografía, to allow for a high level of comparability in business statistics among the North American countries. As for occupations, there are about 750 occupational groups in the BLS projection. They are based on the SOC classification (Standard Occupational Classification). It is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating the data.

	CEDEFOP projection	BLS projection
Industry	41 groups (NACE 1.1)	cca 200 groups (NAICS)
Occupation	27 groups (ISCO88 - 2D level)	cca 750 groups (SOC)

Because of the need to compare the results of the three projections, it was necessary to convert their output into a uniform Sectoral and Occupational Classification. The Education Policy Centre has created two correspondence tables: for sectors (from NAICS to NACE, revision 1, 2 digit classification), and for occupations (from SOC to ISCO-88 3 digit classification).

Unfortunately, both correspondence tables have some problems:

- They cannot be applied to about 7 % of workers of three untransferable sectoral groups:
 - Non-agricultural self-employed and unpaid family worker
 - Secondary jobs as a self-employed or unpaid family worker
 - Secondary wage and salary jobs in agriculture and private household industries
- In occupational groups, it is not possible to separate skilled and unskilled workers in the Agriculture sector. They are all classified in the group ISCO 600 whereas the group ISCO 920 is empty.
- In the BLS projection there are no data about the Armed Forces (ISCO 0)

Irrespective of these limitations, both correspondence tables between US and European classifications are quite unique and allow us to compare US data with European projections.

1.1 Industry classification

Both projections have been combined in order to create a common sectoral classification. It contains 25 sectoral groups altogether.

01 Agriculture, Forestry and Fishing (NACE 01-05)	14 Manufacturing n.e.c. (NACE 36-37)
02 Mining and Quarrying (NACE 10-14)	15 Electricity, Gas and Water (NACE 40-41)
03 Food, Beverages and Tobacco (NACE 15-16)	16 Construction (NACE 45)
04 Textiles, Wearing Apparel and Leather (NACE 17-19)	17 Wholesale, Retail Trade and Repair (NACE 50-52)
05 Wood, Paper and Printing & Publishing (NACE 20-22)	18 Hotels and Restaurants (NACE 55)
06 Coke, Petroleum, Nuclear Fuel (NACE 23)	19 Transport and Communication (NACE 60-64)
07 Chemicals (NACE 24)	20 Financial Intermediation (NACE 65-67)
08 Rubber and Plastic Products (NACE 25)	21 Real Estate, Business Services (NACE 70-74)
09 Non Metallic Mineral Product (NACE 26)	22 Public Authorities (NACE 75)
10 Basic Metals, Metal Products (NACE 27-28)	23 Education (NACE 80)
11 Machinery Equipment (NACE 29)	24 Health and Social Work (NACE 85)
12 Electrical Equipment (NACE 30-33)	25 Social and Personal Services and Private Households (NACE 90-99)
13 Transport Equipment (NACE 34-35)	

1.2 Occupational classification

For occupations the classification used in the CEDEFOP projection has been applied with one minor change: instead of 27 only 26 occupational groups are contained because the occupational group Armed Forces is missing.

01 Legislators and senior officials (ISCO 11)	14 Personal and protective services workers (ISCO 51)
02 Corporate managers (ISCO 12)	15 Models salespersons and demonstrators (ISCO 52)
03 Managers of small enterprises (ISCO 13)	16 Skilled agricultural and fishery workers (ISCO 61)
04 Physical mathematical and engineering science professionals (ISCO 21)	17 Extraction and building trades workers (ISCO 71)
05 Life science and health professionals (ISCO 22)	18 Metal machinery and related trades workers (ISCO 72)
06 Teaching professionals (ISCO 23)	19 Precision handicraft craft printing and related trades workers (ISCO 73)
07 Other professionals (ISCO 24)	20 Other craft and related trades workers (ISCO 74)
08 Physical and engineering science associate professionals (ISCO 31)	21 Stationary plant and related operators (ISCO 81)
09 Life science and health associate professionals (ISCO 32)	22 Machine operators and assemblers (ISCO 82)
10 Teaching associate professionals (ISCO 33)	23 Drivers and mobile plant operators (ISCO 83)
11 Other associate professionals (ISCO 34)	24 Sales and services elementary occupations (ISCO 91)
12 Office clerks (ISCO 41)	25 Agricultural fishery and related labourers (ISCO 92)
13 Customer services clerks (ISCO 42)	26 Labourers in mining construction manufacturing and transport (ISCO 93)

2. Cedefop labour market projection

Full details of the Cedefop forecast methodology are given in various technical reports that have been produced as part of the project and it is not necessary to repeat them here. An overview of methods underpinning the project can be found in the publication “Skills supply and demand in Europe – Methodological framework” to be downloaded at the address:

<http://www.cedefop.europa.eu/EN/publications/20612.aspx>

3. USA labour market projection by Bureau of Labor Statistics

3.1 Introduction

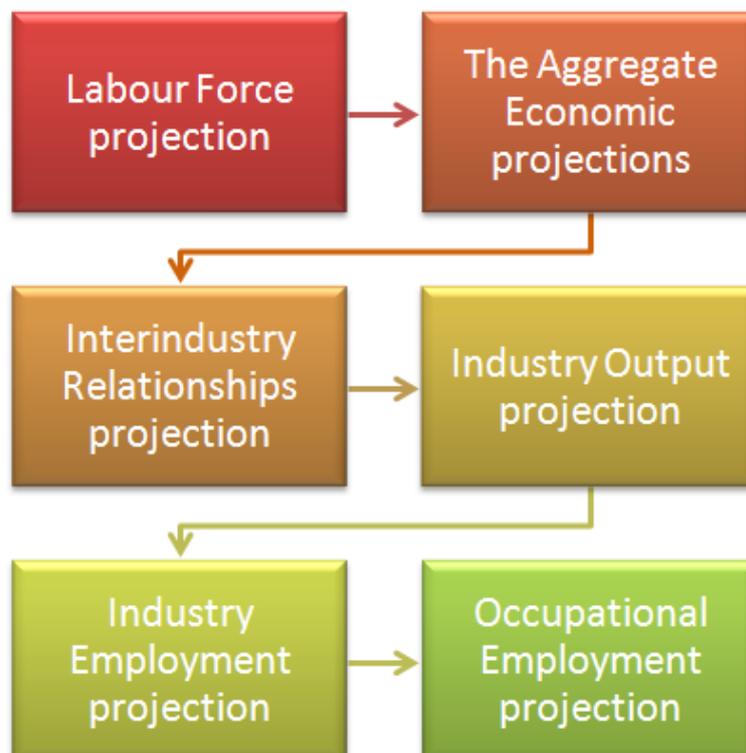
The Bureau of Labor Statistics (BLS) of the U.S. Department of Labor is the principal Federal agency responsible for measuring labour market activity, working conditions, and price changes in the economy. Its mission is to collect, analyse, and disseminate essential economic information to support public and private decision-making. As an independent statistical agency, the BLS serves its diverse user communities by providing products and services that are objective, timely, accurate, and relevant.

The Bureau of Labour Statistics has been publishing projections every second year with a time horizon 10 years. As the last version, published in November 2009, is based on the 2008 data, the projected year is 2018.

3.2 Projection structure

The BLS develops its projections in a series of six steps described below. Each step is based on separate projection procedures, models, and related assumptions. Each component of the projection is developed in sequence, with the results of each used as the input for successive components, and with some results feeding back to earlier steps. Each step is repeated a number of times to ensure internal consistency as assumptions and results are reviewed and revised.

Methodology of BLS Occupational Employment Projections



Labour force

Labour force projections are based on assumptions about the future size and composition of the current population, as well as on the trends in labour-force participation rates of different population groups. Projections are made for more than 136 separate age-sex-race-and-ethnic groups.

The Census Bureau prepares population projections. The BLS develops participation rate projections using data from the Current Population Survey (CPS) conducted for the BLS by the Census Bureau. The size and composition of the population are affected by the interaction of three variables: births, deaths, and net immigration. The Census Bureau makes different assumptions for each variable – preparing various combinations of these assumptions. More information about population projections is available from the Bureau of the Census web site.

For the latest round of projections, the interim population projections of the resident population of the U.S. published by the Census Bureau in 2009 was used as the base for the labour force and other projections. The BLS selected the middle population scenario as the base for the labour force and other projections. The size and composition of the population affect not only labour force projections, but also the projected composition of the GDP and the levels of employment in various industries and occupations.

The BLS currently disaggregates various race and ethnicity categories into 5-year age groups by sex. Participation rates for these groups are smoothed, using a robust-resistant nonlinear filter and then transformed into logits. The logits of the participation rates are then extrapolated linearly by regressing against time and then extending the fitted series to or beyond the target year. When the series are transformed back into participation rates, the projected path is nonlinear.

After the labour force participation rates have been projected, they are reviewed from the perspectives of the time path, the cross section in the target year, and cohort patterns of participation. The labour force level resulting from the projection is also compared with the labour force derived from an econometric model that projects only the total civilian labour force.

Projected participation rates for each age-sex-race-and-ethnic group are multiplied by the corresponding projection of the civilian non-institutional population to obtain the labour force projection for that group. The groups are then summed to obtain the total civilian labour force.

Aggregate economy

Aggregate economic projections are developed using a commercially provided econometric model of the U.S. economy – the Macroeconomic Advisers, LLC WUMMSIM Model of the U.S. Economy (MA model). The MA model comprises 134 behavioural equations, 409 identities, and 201 exogenous assumptions (variables) for a total of 744 variables which describe all facets of aggregate economic performance. Estimates for exogenous variables are provided to the model and a solution of the behavioural and identity equations is generated. Finally, the results are evaluated with regard to previously formulated targets for various key indicators of economic behaviour.

The principal exogenous assumptions underlying the MA model fall into the categories of monetary policy, fiscal policy, government spending, energy prices and supply, and demographic assumptions. Primary targets, or variables used to assess the behaviour of a given set of projections, include the rate of growth and demand composition of the real GDP, the Labour productivity growth rate, the inflation rate, the level of the unemployment rate, and the international trade related issues. Many solution rounds may be necessary to arrive at a balanced set of assumptions which yield a believable and defensible set of results.

Final demand

Personal consumption expenditures are projected in the MA model at an aggregate level. Consumption expenditures for 88 national income and product account categories are estimated for the forecasted

period by regressing each of the 88 categories against aggregate consumption and relative prices. These 88 category estimates are then aggregated to the level of total PCE from the macro model and adjusted as necessary to insure consistency between aggregate PCE and the detailed estimates. A bridge table is then used to distribute consumption spending for each of the 88 categories among the 202 producing industries for the forecasted period.

Gross private domestic investment is initially projected by the MA model for private investment in equipment and software (PIES), non-residential and residential structures, and business inventories. The PIES categories are estimated in greater detail using a system of regression equations that sets GDP, capital stock, and the cost of capital as explanatory variables. In all, projections are made for 28 categories of private investment in equipment and software. The estimates are then aggregated to the level of the macro model control and adjusted as necessary to ensure consistency between the macro model aggregate and the detailed estimates. Business inventories, on a commodity basis, are extrapolated, based on lagged values of commodity output. These are also aggregated and adjusted to conform to the macro model aggregate of the change in inventories. The controls for non-residential and residential structures are taken directly from the macro model. All the category controls, with the exception of business inventories, are then distributed to producing sectors using projected bridge tables.

Foreign trade is initially projected by the MA macro model for export goods and services, and import goods and services. Distributional models are used to allocate the forecasted macro model data to a commodity basis. For both exports and imports, these commodity estimates are controlled back to the MA macro model aggregates and are adjusted as necessary to ensure consistency between the detailed estimates and the macro model. Other factors are also considered, including energy forecasts, existing and expected shares of the domestic market, expected world economic conditions, and known trade agreements.

Government demand is projected by the MA model for three major government categories: Federal defence, Federal non-defence, and State and local government. Projections for each major category include estimates for four categories: compensation, consumption of general government fixed capital, gross investment, and all other consumption expenditures. These are further disaggregated, based upon past trends and expected government political and policy changes. Finally, each of the twelve expenditure categories is allocated to the appropriate industry sector or sectors, such as electric utilities or hospitals.

Industry output

Projected industry output is derived using a set of projected input-output tables. One of these tables, projected final demand, results from the preceding step. In addition, the projected market share and direct requirements tables must be created. The projected market share table (derived from the MAKE table) is initially based on the last historical table. The projected direct requirements table (derived from the USE table) is initially extrapolated based on historical trends. Both tables are adjusted through the projections process to ensure consistency with previous-step projections. These two tables are then used to create the total requirements table. These requirements tables yield the projected levels of industry and commodity output required to satisfy projected final demand.

Industry employment

The next step is to project industry employment necessary to produce the projected output. To do so, the projected output is used in a regression analysis to estimate hours worked by industry. The regression model utilizes industry output, industry wage rate relative to industry output price, and time. Additionally, average weekly hours are derived as a time trend for each industry. From these hours' data, projected wage and salary employment by industry is derived.

For each industry, the share of self-employed and unpaid family workers is extrapolated using historical data. These data are derived from the ratio of self-employed and unpaid family workers to

total employment and extrapolated, based on time and the unemployment rate. The ratio, along with the projected level of wage and salary employment is then used to derive the projected number of self-employed and unpaid family workers and total employment by industry. Projected average weekly hours and total hours for self-employed and unpaid family workers also are derived from these data.

Implied output per hour (productivity) is calculated for each industry for both the total and for wage and salary employees. These data are used to evaluate the projected output and employment.

As for factors affecting industry employment, many assumptions underlie BLS projections of the aggregate economy and of industry output, productivity, and employment. Often, these assumptions bear specifically on econometric factors, such as the aggregate unemployment rate, the anticipated time path of Labour productivity, and expectations regarding the Federal budget surplus or deficit. Other assumptions deal with factors that affect industry-specific measures of economic activity.

Detailed industry employment projections are based largely on econometric models, which, by their very nature, project future economic behaviour on the basis of a continuation of economic relationships that held in the past. For the most part, the determinants of industry employment are expressed both in the structure of the models' equations and as adjustments imposed on the specific equations to ensure that the models are indeed making a smooth transition from actual historical data to projected results. However, one of the most important steps associated with the preparation of the BLS projections is a detailed review of the results by analysts who have studied recent economic trends in specific industries. In some cases, the results of the aggregate and industry models are modified because of the analysts' judgment that historical relationships need to be redefined in some manner.

Occupational Employment

To allocate projected industry employment to occupations, a set of industry-occupation matrices are developed. These include a base-year employment matrix and a projected-year employment matrix. These matrices, referred to collectively as the National Employment Matrix, constitute a comprehensive employment database. For each occupation, the Matrix provides a detailed breakdown of employment by industry and class of worker. Similarly, for each industry and class of worker, the Matrix provides a detailed breakdown of occupational employment.

Base-year employment data for wage and salary workers, self-employed workers, and unpaid family workers come from a variety of sources, and measure total employment as a count of jobs, not a count of individual workers. This concept is different from that used by another measure familiar to many readers, the Current Population Survey's total employment as a count of the number of workers. The Matrix's total employment concept is also different from the BLS Current Employment Statistics (CES) total employment measure. Although the CES measure is also a count of jobs, it covers nonfarm payroll jobs, whereas the Matrix includes all jobs.

4. Development of GDP and employment

The following text shows how BLS experts commented the current situation in the US when the forecast was made (i. e. in 2007, 2009, and 2012).

4.1 Year 2007 - The U.S. economy to 2016: slower growth as boomers begin to retire

As of late 2007, the U.S. population is aging, with baby boomers approaching their retirement years. The high productivity growth of the late 1990s and early 2000s appears to be slowing. Globalization marches on. In this context, the Bureau of Labor Statistics (BLS) has projected economic trends for the U.S. economy to 2016. Under the assumptions used in developing these projections, gross domestic product (GDP) is expected to reach \$17.0 trillion in chained 2000 dollars by 2016, an increase of \$4.1 trillion over the 2006–16 projection span. Rising by an average annual rate of 2.5 percent, GDP is projected to grow at a slower pace, less than the 2.7 percent posted over the preceding 10-year period.

Demographic factors are a primary driving force in determining the growth potential of the economy over the long term. The BLS anticipates that, as the 77 million baby boomers begin to retire in the next few years, the pace of labour force growth will slow down over the projection horizon. Other factors, such as capital input and productivity growth, also will contribute to the slower growth. As regards employment prospects in the next decade, a slower growth in civilian household employment is expected, from a rate of 1.3 percent per year during the 1996–2006 period to 0.8 percent annually between 2006 and 2016. The latter percentage translates into an employment increase of 11.5 million over the projection horizon, less than the increase of 17.7 million across the 1996–2006 decade. The BLS employment projection is accompanied by an assumed unemployment rate of 5.0 percent in 2016, up from 4.6 percent in 2006. Reflecting the increased globalization of the U.S. economy, international and foreign trade activities are expected to continue their fast-growing trend over the projection period. Personal consumption expenditures are expected to grow along with GDP, and business investment in new equipment and software will continue to play a major role in the economy over the projection span. On the government side, a projected increase in defence spending reflects long-term efforts to fight global terrorism and to ensure U.S. domestic security.

4.2 Year 2009 - The U.S. economy to 2018: from recession to recovery

In the summer of 2009, U.S. payroll employment continued to fall as a result of the recession that began more than a year and a half earlier in December 2007. The recession has been one of the most severe since World War II, with the unemployment rate jumping from 4.7 percent in November 2007 to 10.2 percent in October 2009. However, as with other business cycles, the Bureau of Labor Statistics (BLS) projects that the economy will return to a path of a long-run growth over the next decade.

Although the recession has had a short-run impact on the economy, the BLS expects that the accompanying slowdown in the growth of both productivity and the labour force also will have an important long-run impact on the economy over the projection period. During the next decade, the massive baby-boomer generation will be leaving the labour force, moving from the prime working-age years to retirement age. As a result, the BLS projects a 0.8-percent average annual growth of the labour force from 2008 to 2018, a 0.3 percentage point lower than the historical rate of 1.1 percent posted from 1998 to 2008. The primary factors constraining faster GDP growth are the expected slowing of both the labour force and productivity growth. Productivity, as measured by output per hour, is projected to grow at 1.8 percent annually during 2008–18, lower than the exceptionally high 2.6-percent growth from 1998 to 2008, but consistent with the average annual growth since 2004 and the 1.7-percent growth rate between 1988 and 1998. These levels of productivity and labour force growth contribute to BLS projections of real growth in the U.S. gross domestic product (GDP) from

\$13.1 trillion in 2008 to \$16.7 trillion in 2018, the annual growth rate of 2.1 percent over the 2008–18 period.

4.3 Year 2012 - The U.S. economy in 2020: recovery in uncertain times

More than two-and-a-half years after the official end of the longest and deepest recession since World War II, the United States is continuing to undergo a slower-than-average recovery, similar to the experience of other countries facing financial crises. The recovery started strong, with growth in the nation's GDP averaging 3.0 percent over the first six quarters after the official end of the recession, but slowed considerably in the first half of 2011. Many analysts have referred to the recovery to date as “modest” or “disappointing.” The unemployment rate fell from a peak of 10.0 percent in late 2009 to 8.5 percent by December 2011. The slow recovery of the unemployment rate has been accompanied by a 2-percentage-point decline in the labour force participation rate since the onset of the recession. The long-term unemployed, those out of work for 27 or more weeks, account for an unprecedented share of the unemployed. Home prices, as measured by the Case-Shiller Home Price Indexes, declined by more than 30 percent from their peak in early 2006, and housing starts remain at or very near record lows. The recovery is expected to take a stronger hold over the coming decade, with GDP growth registering 3.0 percent annually from 2010 to 2020, faster than the 1.6-percent annual growth over the 2000–2010 period, but slower than the 3.4-percent growth experienced from 1990 to 2000. The projected growth rate reflects both the relatively low starting point of GDP in 2010, still below its 2007 peak, as well as the projected behaviour of the labour force and the assumption of a full-employment economy in 2020, the projection year. The real GDP is projected to increase by nearly \$4.4 trillion, reaching \$17.5 trillion in 2020. Recovery in the housing market, increased consumer confidence, renewed business investment in both capital and labour, and expansion of exports are expected to support the projected GDP growth.

The U.S. economy is recovering from one of the longest and deepest recessions since the end of World War II. Virtually no area of the economy remained unscathed from the December 2007–June 2009 recession, particularly the labour market. Nonfarm payroll employment, measured by the Current Employment Statistics (CES) program, peaked in January 2008, one month after the peak in the business cycle. After relatively modest job losses in early 2008, the losses increased sharply in the latter half of the year, and declines spread beyond traditionally cyclical industries.

The already-weak economy was jolted by financial market turmoil in fall 2008. The impact on employment was immediate and severe, with monthly job losses spiking to among the highest on record. At its lowest point, February 2010, U.S. employment had declined by 8.8 million from its prerecession peak (see the figure below) The breadth and depth of the recession, particularly in comparison with recent recessions, has led some to label it “The Great Recession.” In 2010, the labour market stabilized as employment grew modestly. Despite recent improvements, the labour market continues to struggle from the aftermath of a historic employment downturn that is notable for its breadth, depth, and length.

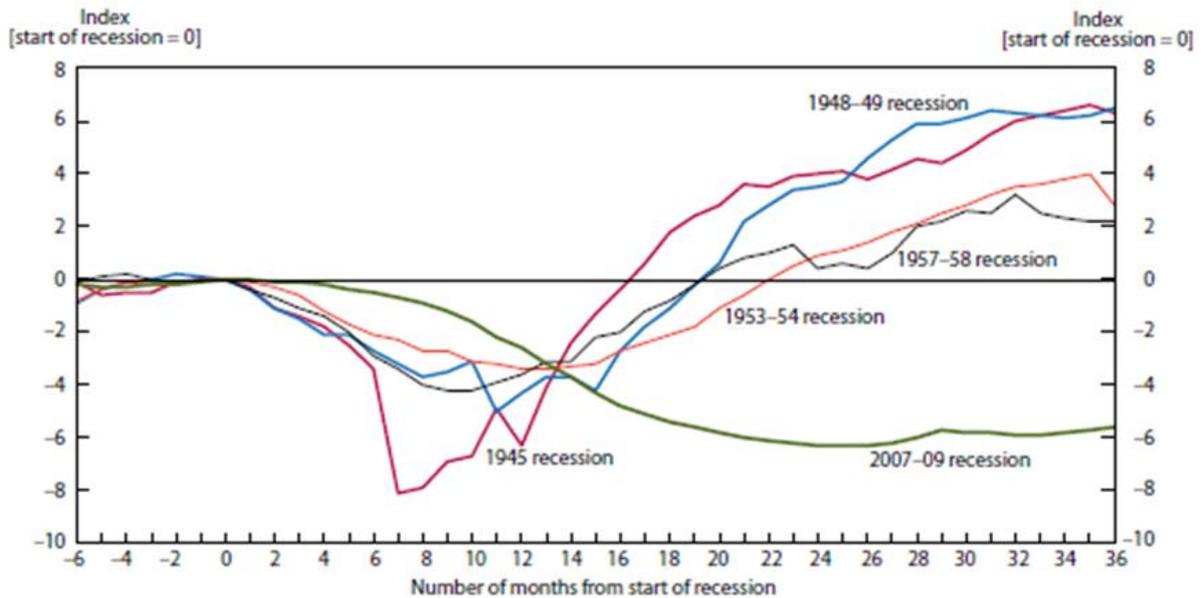
Total nonfarm employment, monthly data, seasonally adjusted, 2000–10



NOTE: Shaded areas denote recessions as determined by the National Bureau of Economic Research.
 SOURCE: Bureau of Labor Statistics, Current Employment Statistics survey.

The United States has experienced 11 periods of sustained employment declines since the inception of the CES survey in 1939. Large declines in employment tend to be associated with recessions. However, peaks and troughs in employment generally do not directly align with the official starting points and endpoints of recessions. Between January 2008 and February 2010, employment fell by 8.8 million—the largest absolute decline in the series’ history. The previous record was 4.3 million net jobs lost from November 1944 to September 1945.

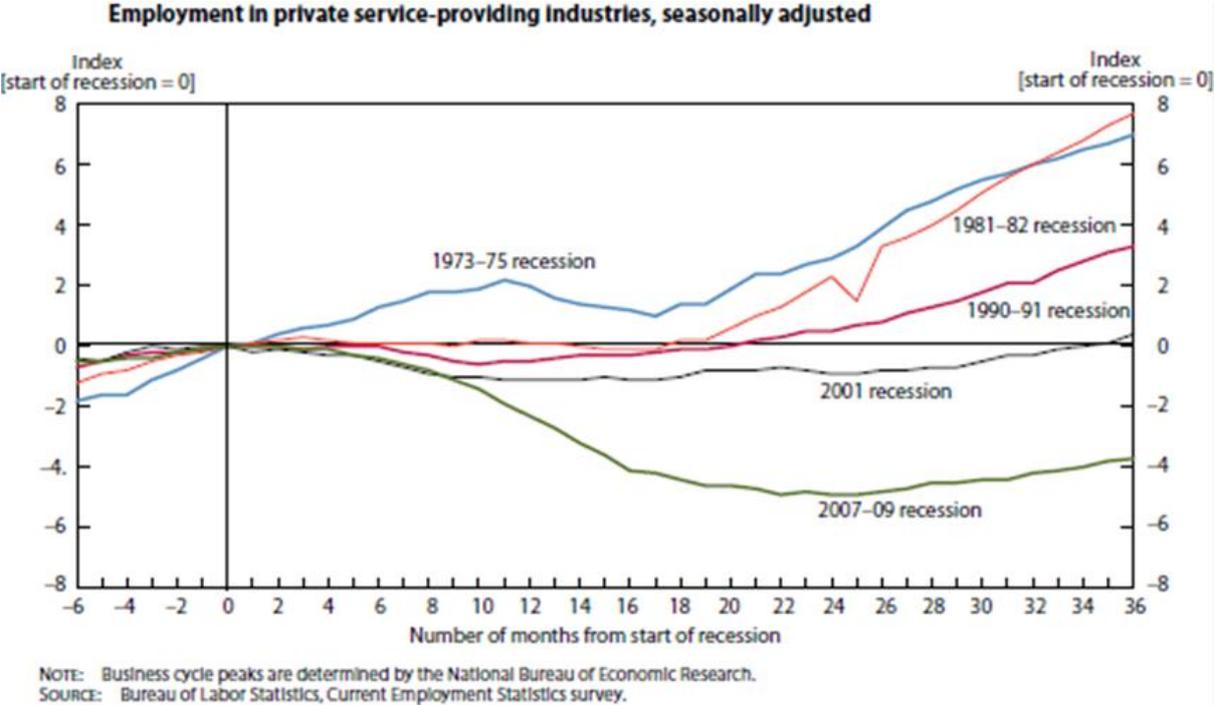
Total nonfarm employment, seasonally adjusted, selected recessions, 1945–58, and the 2007–09 recession



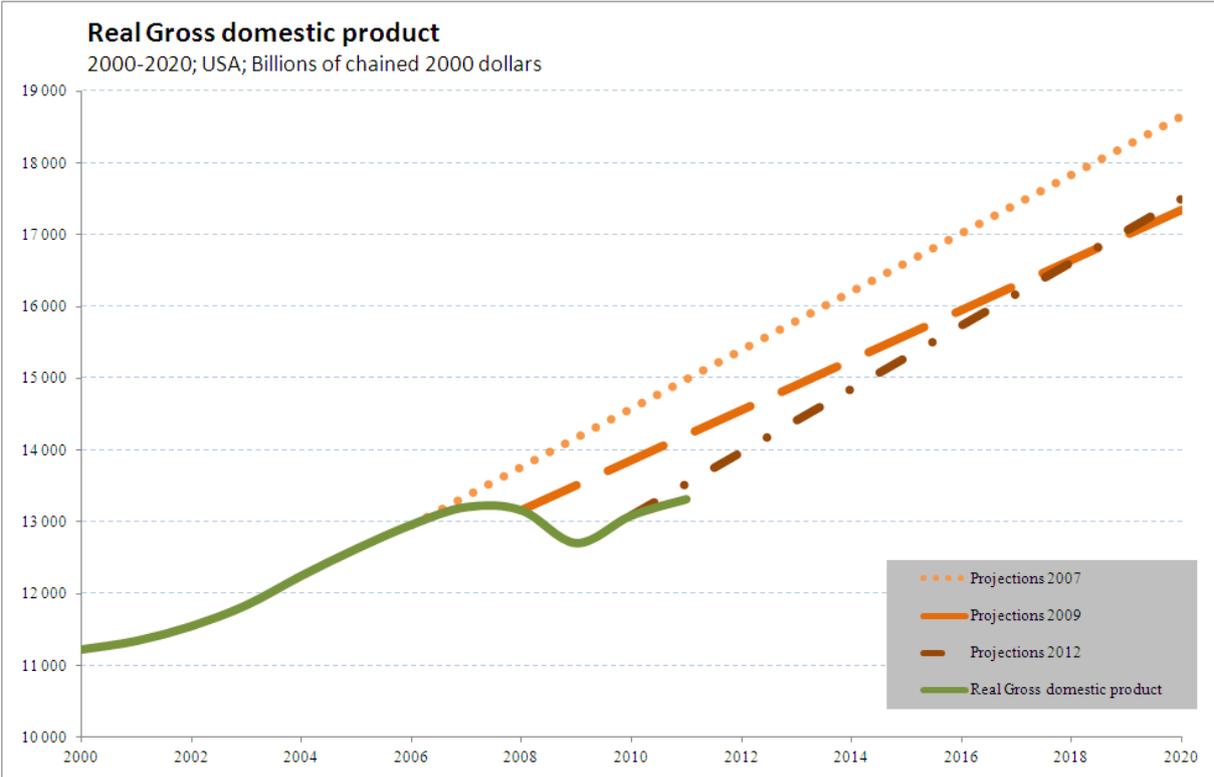
NOTE: Business cycle peak as determined by the National Bureau of Economic Research.
 SOURCE: Bureau of Labor Statistics, Current Employment Statistics survey.

The most recent recession was unique with regard to the breadth and depth of the employment decline in private service-providing industries. Collectively, private service-providing industries have accounted for the majority of job growth over the past 20 years and had previously avoided large job

losses during recessions. As the downturn began in late 2007, employment losses spread beyond the housing-related and goods-producing industries to affect the private service-providing industries on the whole. After peaking in January 2008, employment in private services declined for the next 21 months. Virtually all private service-providing industries were affected, particularly those related to housing and autos. Financial activities, retail and wholesale trade, transportation and warehousing, information, temporary help, and leisure and hospitality all experienced their largest sustained job losses on record.

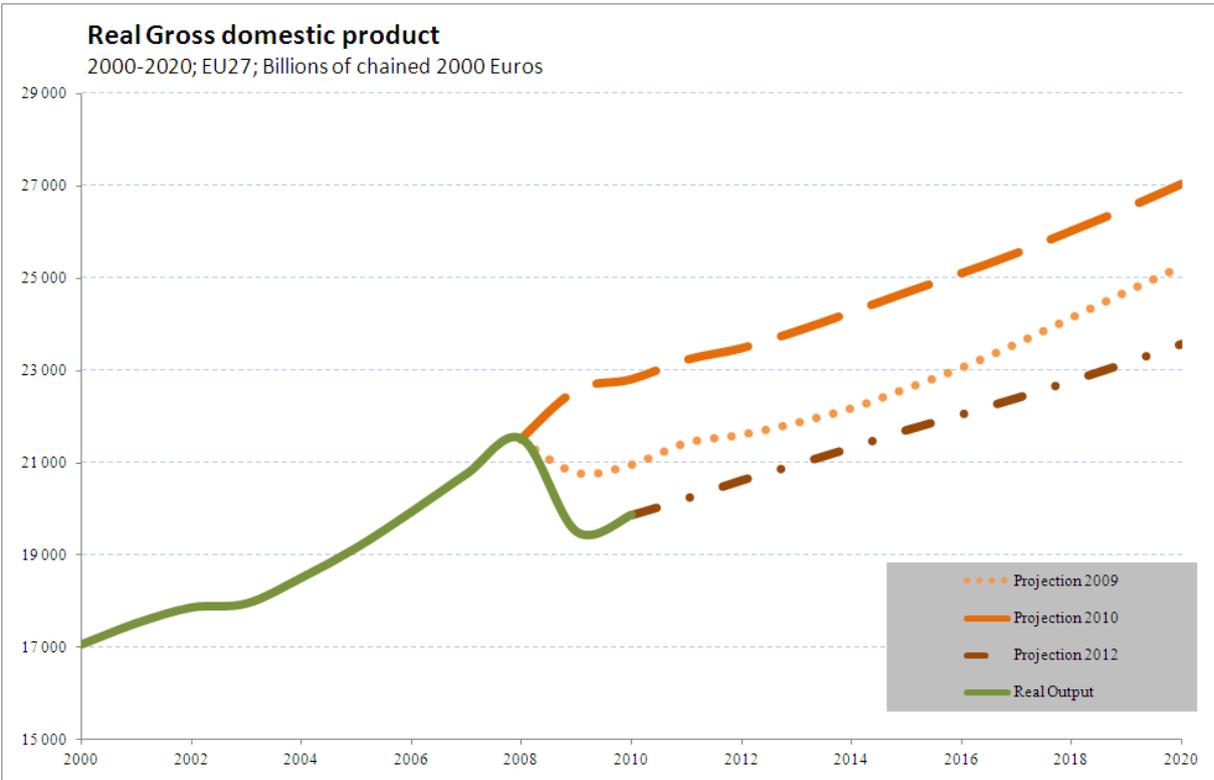


The figure below presents three variations of BLS projections. It is easy to compare how economic crisis has changed forecasts of GDP.



(Note: The BLS projects specific data only for the first and the final years of the forecast, i. e. 2006 and 2016, 2008 and 2018, and 2010 and 2020. Other data are derived from them.)

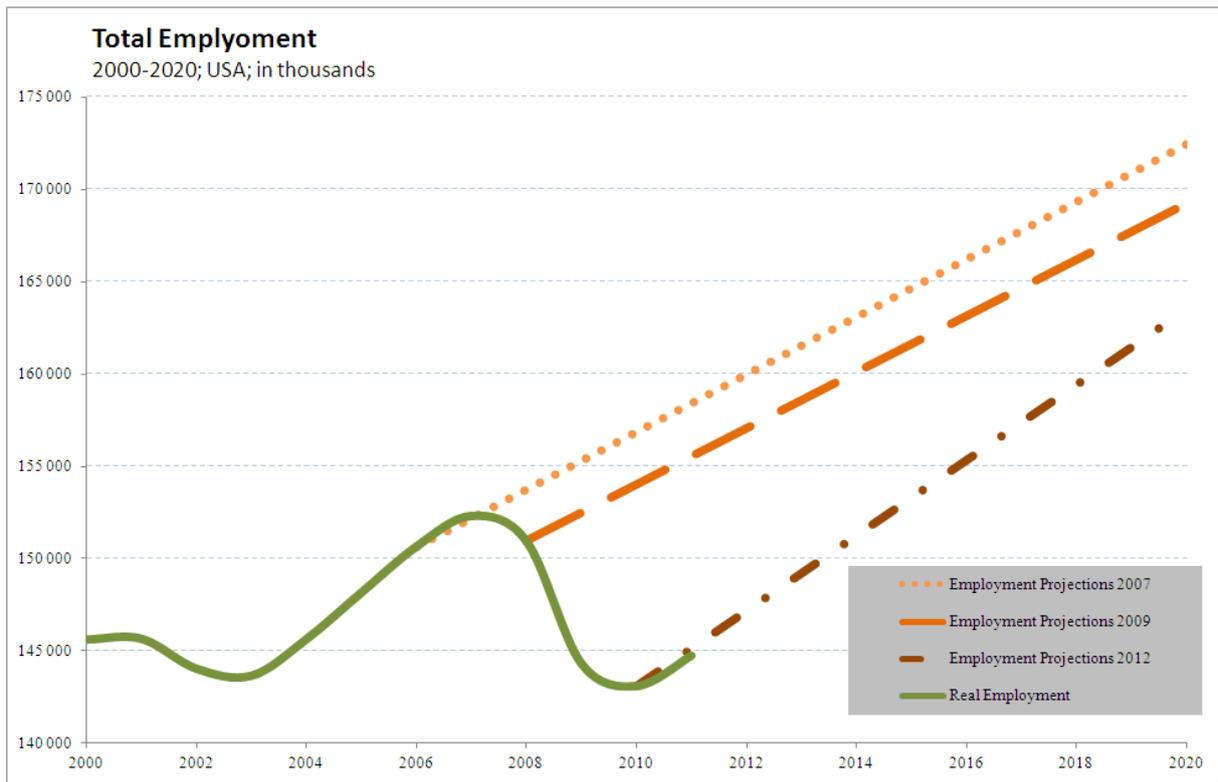
The figure below shows the same situation for the EU 27 forecast. The three variants of the forecast were prepared by Cambridge Econometrics.



The table below summarises main trends of the six forecasts:

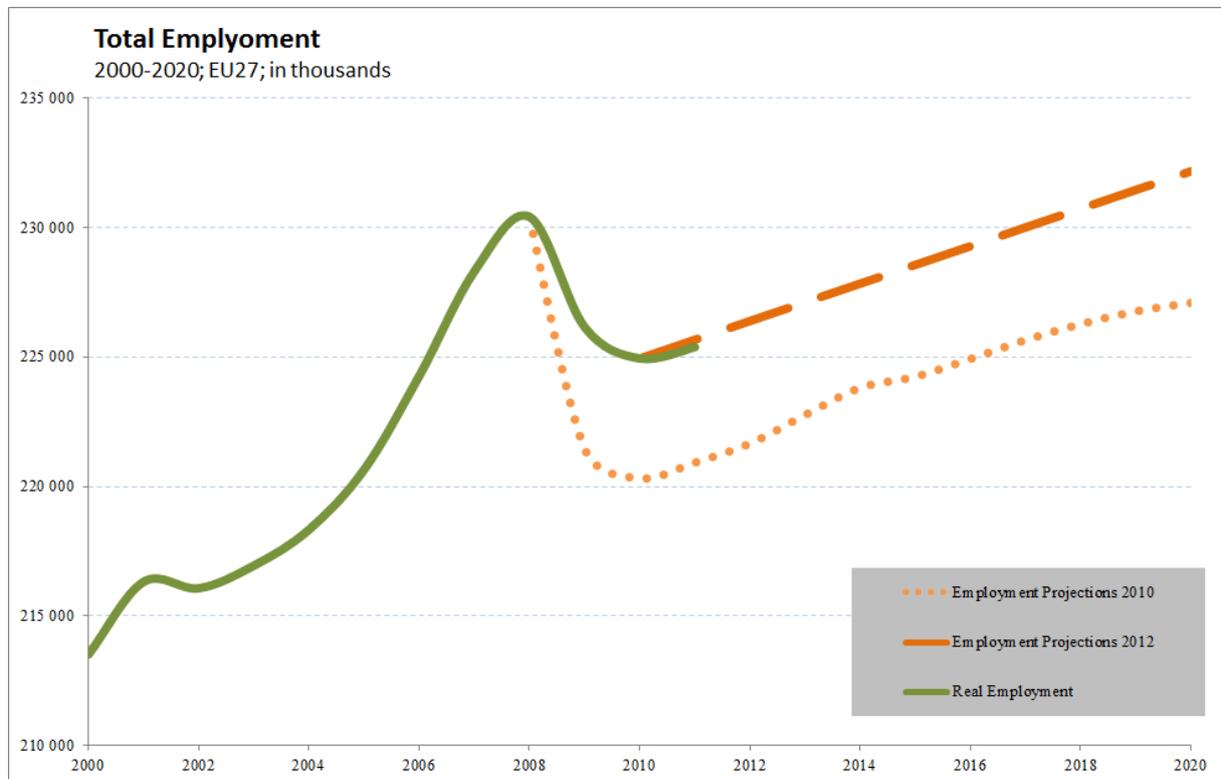
GDP - Average annual change		
	2000-2010	2010-2020
BLS 2007	2.66%	2.49%
BLS 2009	2.14%	1.75%
BLS 2012	1.56%	1.85%
CEDEFOP 2009	2.08%	1.88%
CEDEFOP 2010	2.94%	1.72%
CEDEFOP 2012	1.53%	1.72%

After analysing the development of GDP, changes in Total Employment will be analysed. The figure below illustrates three variants of forecasting the development of employment in the USA.



It is evident that the Employment projection 2012 expects a much faster increase of the Total Employment than the two previous projections.

The figure below illustrates two variants forecasted for the Total Employment in the EU27.



The Employment projection made at the beginning of 2010 expected a more pronounced loss of employment than it was in reality.

The table below concluding this chapter summarises all five presented forecasts.

Total Employment - Average annual change		
	2000-2010	2010-2020
BLS 2007	0.75%	0.95%
BLS 2009	0.56%	0.95%
BLS 2012	-0.17%	1.35%
CEDEFOP 2010	0.31%	0.30%
CEDEFOP 2012	0.52%	0.32%

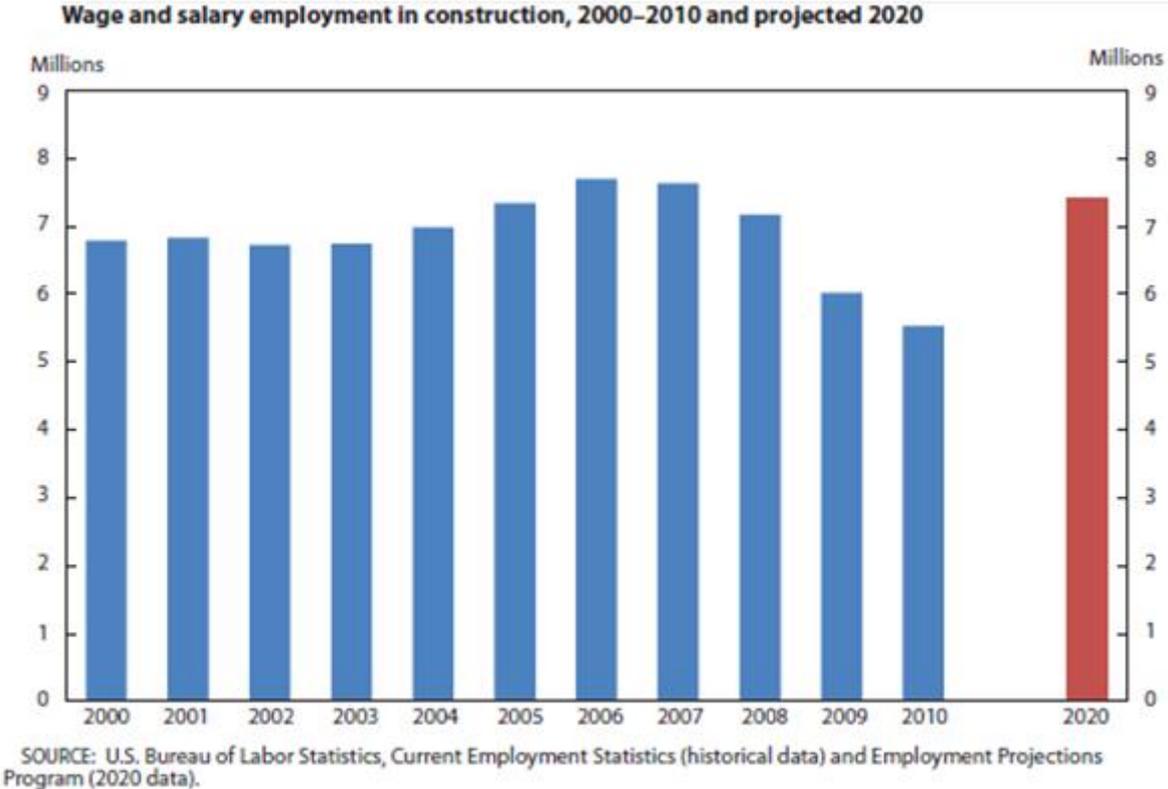
5. Development of sectoral structure

First table in this chapter compares three US projections. In this table ten Industries with the largest employment growth (10 years horizon) for each projection is displayed. Detailed NAICS classification was used for it. In the table there is industry name firstly than in the brackets the name of the sector is listed.

	BLS 2007	BLS 2009	BLS 2012
Industries with the largest employment growth	Food services and drinking places (Leisure and hospitality)	Construction (Construction)	Construction (Construction)
	Offices of health practitioners (Health care and social assistance)	Offices of health practitioners (Health care and social assistance)	Retail trade (Retail trade)
	Construction (Construction)	Management, scientific, and technical consulting services (Professional and business services)	Offices of health practitioners (Health care and social assistance)
	Management, scientific, and technical consulting services (Professional and business services)	Food services and drinking places (Leisure and hospitality)	Hospitals (Health care and social assistance)
	Individual and family services (Health care and social assistance)	Computer systems design and related services (Professional and business)	Home health care services (Health care and social assistance)
	Hospitals, private (Health care and social assistance)	Retail trade (Retail trade)	Food services and drinking places (Leisure and hospitality)
	Employment services (Professional and business services)	Local government educational services (State and local government)	Individual and family services (Health care and social assistance)
	Retail trade (Retail trade)	Nursing and residential care facilities (Health care and social assistance)	Nursing and residential care facilities (Health care and social assistance)
	Residential care facilities (Health care and social assistance)	Employment services (Professional and business services)	Wholesale trade (Wholesale trade)
	Local government educational services (State and local government)	Hospitals (Health care and social assistance)	Local government educational services (State and local government)

Someone could be surprise that Construction, one of the industries most affected by the recession is as the industry with the largest employment growth. But it is right. Employment in the construction sector is projected to increase from more than 5.5 million in 2010 to nearly 7.4 million in 2020. The increase of 1.8 million jobs, an annual rate of growth of 2.9 percent, is the largest increase in employment among all industries. In 2006, the construction industry had 7.7 million wage and salary jobs. While the number of jobs projected to be added in the industry between 2010 and 2020 is large, the

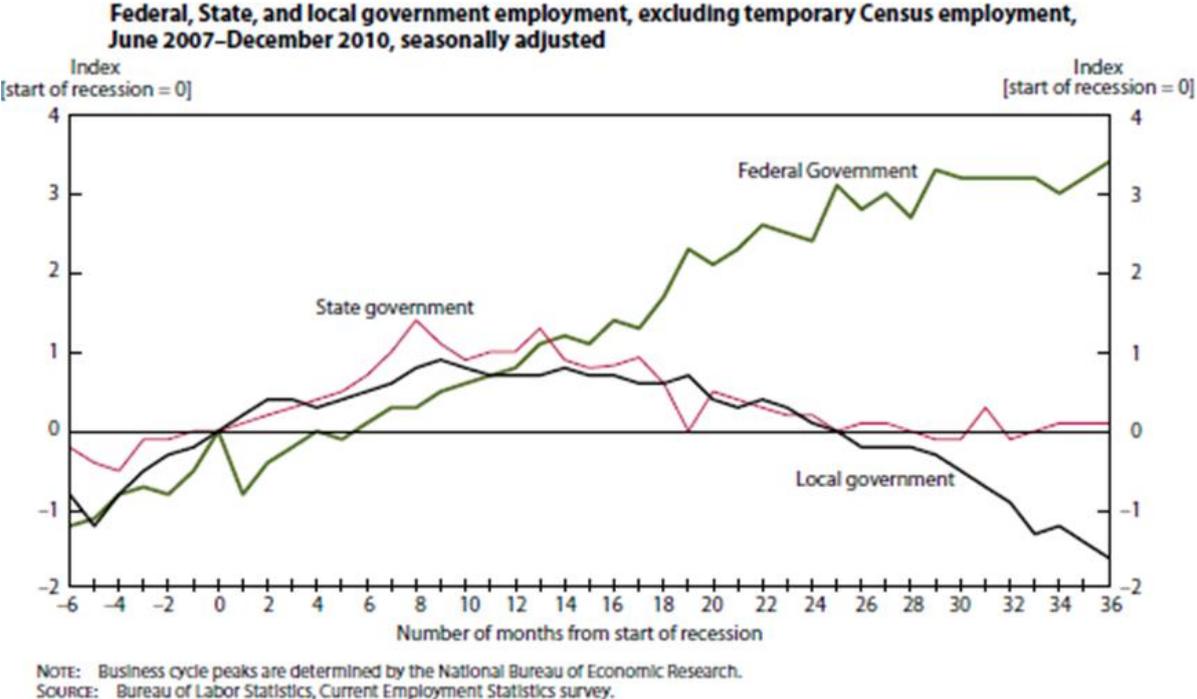
number still is projected to be below that held in 2006. The construction industry was hit particularly hard by the recession, causing the annual employment for the wage and salary workers to fall by 2.1 million jobs for the 2007-2010 period. This fall represents a 10-percent annual rate of decline. The relatively low starting point for 2010 contributes to the large change and relatively fast growth rate of employment projected for 2010-2020. During the earlier 2000-2010 period, the share of total employment held by construction fell from 4.6 percent to 3.9 percent. Because the employment rate in the construction industry is expected to grow faster than the overall employment rate, the percentage of all employees in the construction industry is expected to rise to 4.5 percent in 2020.



The construction industry is projected to experience one of the largest increases in real output, with the measure expected to rise by \$368.7 billion, to reach almost \$1.2 trillion in 2020. This increase contrasts sharply with that seen in the 2000-2010 period, in which real output in construction fell from \$1.2 trillion to \$814.7 billion.

Most of the loss in output during 2000-2010 can be attributed to the recession that started in December 2007. The increase in residential investment and nonresidential structures investment during 2010-2020 will spur employment and output in the construction sector. Investment in nonresidential structures is expected to grow 3.2 percent per year between 2010 and 2020, contrasting with the 3.5-percent decrease experienced during the 2000-2010 period. Improving existing and aging infrastructure will play a large role in this increase. Residential investment is projected to grow at 7.0 percent per year over the 2010-2020 period, faster than the 5.5-percent decline seen during the previous period. Most of the growth in residential construction can be attributed to its low starting point due to the recession.

Next table shows Industries with the largest 10 years employment declines. Very interesting in this table is position industries from Federal government sector in BLS 2012 projection. Three of six (1st, 2nd and 6th) of industries with the largest employment declines are from this sector, although in projection from 2009 there was only one industry (4th place) in top ten. This is caused by late reaction of Federal government sector to financial crisis. Overall, government employment grew during the 2007–09 recession. Federal Government employment (excluding temporary Census workers) grew by 48,000 from December 2007 through June 2009. State and local governments added jobs during the first several months of the recession, but after employment reached a high point in August 2008, they shed 68,000 jobs through the end of the recession—a decline of about 0.3 percent. Employment in State and local government tends not to fall during recessions, and job growth in these areas actually accelerated during the 1990–91 and 2001 recessions. State and local governments have less flexibility than the Federal Government to run deficits; nearly all State governments have some form of a balanced-budget requirement. State tax revenues—received primarily from income, sales, and gross receipts taxes—are sensitive to the business cycle, and they began to fall on an annual basis after September 2008. Falling revenues put pressure on States to cut employment, which they began to do after August 2008. In order to shore up State budgets, nearly 60 billion dollars of fiscal relief was given by the Federal Government to the States in 2009 as part of the American Recovery and Reinvestment Act. This stimulus package was also intended to help local governments stave off job cuts. Local governments, unlike State governments, did not see a drop in tax revenue. Local government tax revenues come mostly from property taxes, which continued to grow throughout the recession despite declining home values. But, according to the National League of Cities, revenue growth was outpaced by spending growth in 2008 and 2009, and local governments began reducing employment after September 2008 in order to cover budget shortfalls.



After explanation, why Federal government is in last forecast the sector with the largest employment declines, here is the promised table.

	BLS 2007	BLS 2009	BLS 2012
Industries with the largest employment declines	Crop production (Agriculture)	Semiconductor and other electronic component manufacturing (Manufacturing)	Postal Service (Federal government)
	Printing and related support activities (Manufacturing)	Newspaper, periodical, book, and directory publishers (Information)	General federal nondefense government compensation (Federal government)
	Motor vehicle parts manufacturing (Manufacturing)	Motor vehicle parts manufacturing (Manufacturing)	Apparel knitting mills (Manufacturing)
	Cut and sew apparel manufacturing (Manufacturing)	Postal Service (Federal Government)	Newspaper, periodical, book, and directory publishers (Information)
	Machine shops; turned product; and screw, nut and bolt manufacturing (Manufacturing)	Printing and related support activities (Manufacturing)	Other miscellaneous manufacturing (Manufacturing)
	Computer and peripheral equipment manufacturing (Manufacturing)	Telecommunications (Information)	General federal defense government compensation (Federal government)
	Semiconductor and other electronic component manufacturing (Manufacturing)	Cut and sew apparel manufacturing (Manufacturing)	Computer and peripheral equipment manufacturing (Manufacturing)
	Converted paper product manufacturing (Manufacturing)	Support activities for mining (Mining)	Navigational, measuring, electromed. and control instruments manufact. (Manufacturing)
	Federal defense government (Federal government)	Crop production (Agriculture, forestry, fishing, and hunting)	Crop production (Agriculture, forestry, fishing and hunting)
	Other miscellaneous manufacturing (Manufacturing)	Converted paper product manufacturing (Manufacturing)	Drycleaning and laundry services (Other services)

The federal government is expected to be the only sector to experience a decrease in real output over the 2010–2020 period, with real output expected to fall by \$73.2 billion, from \$1.0 trillion in 2010 to \$938.9 billion in 2020. The decline contrasts with the \$267.7 billion rise in real output for the sector, from \$732.3 billion in 2000 to \$1.0 trillion in 2020. Employment in the federal government is projected to fall from almost 3.0 million jobs in 2010 to nearly 2.6 million jobs in 2020. The expected loss of 372,000 jobs is larger than that of any other sector. The increased pressure to reduce the government budget deficit will be one of the major contributors to the loss of employment and output.

The Postal Service is expected to be responsible for almost half of the decrease in employment in the federal government sector. The agency is projected to lose 181,800 jobs, to fall to 474,600, an annual decline of 3.2 percent, over the 2010–2020 period, the third-fastest and the largest decline in employment of any industry. The Postal Service also is projected to decrease by \$4.6 billion in real output, down to \$57.5 billion, a rate of decline of 0.8 percent, making this industry one of the fastest declining ones. With the more widespread use of email, online payment of bills, and a decrease in the circulation of magazines, consumers are moving away from services that the Postal Service industry provides. General federal nondefense government compensation, which is government spending to produce goods and services by federal nondefense civilian employees, is projected to shed 121,800 jobs between 2010 and 2020, an annual rate of decline of 0.8 percent. This loss of employment is the second-largest for all industries. Pressure to reduce the budget deficit and curb government spending, as well as to shrink the government workforce, will decrease employment in the industry. Real output in general federal nondefense government compensation is expected to decrease slightly, from \$147.0 billion in 2010 to \$128.7 billion in 2020, an annual rate of decline of 1.3 percent.

Next table shows comparison of three BLS and 2 Cedefop projections. For this comparison the common industry classification (as described in Chapter 1.1) were used.

	BLS 2007	BLS 2009	BLS 2012	CEDEFOP 2010	CEDEFOP 2012
Industries with the largest employment growth	Real Estate, Business Services (NACE 70-74)	Real Estate, Business Services (NACE 70-74)	Health and Social Work (NACE 85)	Real Estate, Business Services (NACE 70-74)	Real Estate, Business Services (NACE 70-74)
	Health and Social Work (NACE 85)	Health and Social Work (NACE 85)	Real Estate, Business Services (NACE 70-74)	Wholesale, Retail Trade; Rep (NACE 50-52)	Wholesale, Retail Trade; Rep (NACE 50-52)
	Wholesale, Retail Trade; Rep (NACE 50-52)	Education (NACE 80)	Wholesale, Retail Trade; Rep (NACE 50-52)	Social and Personal Services and Private Households (NACE 90-99)	Health and Social Work (NACE 85)
	Hotels and Restaurants (NACE 55)	Construction (NACE 45)	Education (NACE 80)	Health and Social Work (NACE 85)	Hotels and Restaurants (NACE 55)
	Social and Personal Services and Private Households (NACE 90-99)	Social and Personal Services and Private Households (NACE 90-99)	Construction (NACE 45)	Hotels and Restaurants (NACE 55)	Social and Personal Services and Private Households (NACE 90-99)
	Education (NACE 80)	Hotels and Restaurants (NACE 55)	Hotels and Restaurants (NACE 55)	Transport and Communication (NACE 60-64)	Financial Intermediation (NACE 65-67)
	Construction (NACE 45)	Wholesale, Retail Trade; Rep (NACE 50-52)	Transport and Communication (NACE 60-64)	Education (NACE 80)	Construction (NACE 45)
	Financial Intermediation (NACE 65-67)	Public Authorities (NACE 75)	Social and Personal Services and Private Households (NACE 90-99)	Construction (NACE 45)	Machinery Equipment (NACE 29)
	Transport and Communication (NACE 60-64)	Financial Intermediation (NACE 65-67)	Financial Intermediation (NACE 65-67)	Financial Intermediation (NACE 65-67)	Transport and Communication (NACE 60-64)
	Non Metallic Mineral Product (NACE 26)	Transport and Communication (NACE 60-64)	Public Authorities (NACE 75)	Manufacturing n.e.c. (NACE 36-37)	Rubber and Plastic Products (NACE 25)

There are not any significant differences among forecasts. Five industries are on the top in all these forecast regardless of the projection were made before or after financial crisis.

These industries where the largest employment growth is (or were) expected are Health and Social Work (NACE 85), Real Estate, Business Services (NACE 70-74), Wholesale, Retail Trade and Repair (NACE 50-52), Education (NACE 80) and Construction (NACE 45).

Industries with the largest employment declines shows next table.

	BLS 2007	BLS 2009	BLS 2012	CEDEFOP 2010	CEDEFOP 2012
Industries with the largest employment declines	Wood, Paper and Printing & Publishing (NACE 20-22)	Wood, Paper and Printing & Publishing (NACE 20-22)	Electrical Equipment (NACE 30-33)	Agriculture, Forestry and Fishing (NACE 01-05)	Agriculture, Forestry and Fishing (NACE 01-05)
	Basic Metals, Metal Products (NACE 27-28)	Electrical Equipment (NACE 30-33)	Agriculture, Forestry and Fishing (NACE 01-05)	Textiles, Wearing Apparel and Leather (NACE 17-19)	Public Authorities (NACE 75)
	Textiles, Wearing Apparel and Leather (NACE 17-19)	Textiles, Wearing Apparel and Leather (NACE 17-19)	Textiles, Wearing Apparel and Leather (NACE 17-19)	Public Authorities (NACE 75)	Textiles, Wearing Apparel and Leather (NACE 17-19)
	Electrical Equipment (NACE 30-33)	Basic Metals, Metal Products (NACE 27-28)	Coke and Chemicals (NACE 23-24)	Basic Metals, Metal Products (NACE 27-28)	Basic Metals, Metal Products (NACE 27-28)
	Machinery Equipment (NACE 29)	Transport Equipment (NACE 34-35)	Wood, Paper and Printing & Publishing (NACE 20-22)	Food, Beverages and Tobacco (NACE 15-16)	Wood, Paper and Printing & Publishing (NACE 20-22)
	Agriculture, Forestry and Fishing (NACE 01-05)	Machinery Equipment (NACE 29)	Electricity, Gas and Water (NACE 40-41)	Electrical Equipment (NACE 30-33)	Mining and Quarrying (NACE 10-14)
	Transport Equipment (NACE 34-35)	Mining and Quarrying (NACE 10-14)	Transport Equipment (NACE 34-35)	Wood, Paper and Printing & Publishing (NACE 20-22)	Electricity, Gas and Water (NACE 40-41)
	Manufacturing n.e.c. (NACE 36-37)	Coke and Chemicals (NACE 23-24)	Machinery Equipment (NACE 29)	Transport Equipment (NACE 34-35)	Non Metallic Mineral Product (NACE 26)
	Coke and Chemicals (NACE 23-24)	Electricity, Gas and Water (NACE 40-41)	Food, Beverages and Tobacco (NACE 15-16)	Mining and Quarrying (NACE 10-14)	Food, Beverages and Tobacco (NACE 15-16)
	Rubber and Plastic Products (NACE 25)	Rubber and Plastic Products (NACE 25)	Mining and Quarrying (NACE 10-14)	Electricity, Gas and Water (NACE 40-41)	Manufacturing n.e.c. (NACE 36-37)

Most of these industries belong to Manufacturing sector. Agriculture, Forestry and Fishing is next sector which is on top in this table.

6. Development of occupational structure

From an occupational point of view, there are two main factors that impact employment growth or decline:

- the growth of industries that employ the occupation, and
- changes in the way those industries use the occupation.

Looking at the latter, if occupations A and B are both employed in one industry but the demand for occupation A is increasing, we would expect occupation A to grow faster than B. Without such a change to the staffing pattern, occupations A and B would both grow at the same rate as the industry in which they are employed. On the other hand, if occupation C is employed in a different industry that is growing faster, then occupation C will grow faster than either occupation A or B. Even when changes to occupational utilization are factored in, industry growth still has a major impact on occupational growth rates. Occupations concentrated in fast-growing industries such as health care tend to grow faster or larger than occupations in slower growing or declining industries such as mining.

As in the Chapter 5, first table in this chapter compares three US projections at detailed classification level. In this table ten Occupations with the largest employment growth (10 years horizon) for each projection are displayed. Detailed SOC classification was used for it.

	BLS 2007	BLS 2009	BLS 2012
Occupations with the largest job growth	Registered nurses	Registered nurses	Registered nurses
	Retail salespersons	Home health aides	Retail salespersons
	Customer service representatives	Customer service representatives	Home health aides
	Combined food preparation and serving workers, including fast food	Combined food preparation and serving workers, including fast food	Personal care aides
	Office clerks, general	Personal and home care aides	Office clerks, general
	Personal and home care aides	Retail salespersons	Combined food preparation and serving workers, including fast food
	Home health aides	Office clerks, general	Customer service representatives
	Postsecondary teachers	Accountants and auditors	Heavy and tractor-trailer truck drivers
	Janitors and cleaners, except maids and housekeeping cleaners	Nursing aides, orderlies, and attendants	Laborers and freight, stock, and material movers, hand
	Nursing aides, orderlies, and attendants	Postsecondary teachers	Postsecondary teachers

These are generally larger occupations that will account for many new jobs even though some of these occupations are projected to grow at average rates. The expected growth in healthcare will drive the demand for the six the occupations on the list of 30 occupations with the largest projected numeric job increases from 2010 to 2020. In either the healthcare practitioner and technical occupations or healthcare support occupations groups, including registered nurses, which are projected to add the most new jobs. Six office and administrative support occupations appear on this list as well, primarily because they are large occupations that are employed across many industries. Five of these six had more than a million jobs in 2010, while the sixth occupation, medical secretaries, is expected to grow rapidly because of its concentration in the fast-growing health care industry. In contrast with the fastest growing occupations, the occupations with the largest numeric increases tend to have lower education needs. A high school diploma or less is sufficient to enter 23 of the occupations, while a bachelor’s or higher degree is the typical level needed to enter only 4 of the occupations on this list of 30 occupations with the largest projected numeric job increases from 2010 to 2020.

The fastest growth is expected in occupations related to healthcare, personal care, and community and social services, fields that remained relatively strong during the recession. However, there will also be substantial job gains among certain occupations that were severely affected by the recent recession,

such as construction occupations and transportation and material moving occupations. Overall, job growth will be faster for occupations that typically need some form of postsecondary education.

On the other hand, there are, of course, occupations where large decrease is (or were) expected.

	BLS 2007	BLS 2009	BLS 2012
Occupations with the largest job declines	Stock clerks and order fillers	Farmers and ranchers	Farmers, ranchers, and other agricultural managers
	Cashiers, except gaming	Sewing machine operators	Postal service mail sorters, processors, and processing machine operators
	Packers and packagers, hand	Order clerks	Sewing machine operators
	File clerks	Postal service mail sorters, processors, and processing machine operators	Postal service mail carriers
	Farmers and ranchers	File clerks	Switchboard operators, including answering service
	Order clerks	Shipping, receiving, and traffic clerks	Postal service clerks
	Sewing machine operators	Telemarketers	Cooks, fast food
	Electrical and electronic equipment assemblers	Office and administrative support workers, all other	Miscellaneous agricultural workers
	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	First-line supervisors/managers of production and operating workers	Data entry keyers
	Telemarketers	Packers and packagers, hand	Word processors and typists

Five of the occupations listed are for textile, apparel, or furnishings workers, concentrated in apparel- and textile-manufacturing industries that are declining rapidly due to increased imports, and four are Postal Service occupations. Farmers, ranchers, and other agricultural managers are expected to lose 96,100 jobs, more than any other occupation, as productivity gains continue to reduce the number of workers needed despite projected output growth in the agriculture sector.

Next table shows again comparison of three BLS and two Cedefop projections. For this comparison the common occupational classification (as described in Chapter 1.2) were used.

	BLS 2007	BLS 2009	BLS 2012	CEDEFOP 2010	CEDEFOP 2012
Occupations with the largest job growth	51 Personal and protective services workers	51 Personal and protective services workers	51 Personal and protective services workers	34 Other associate professionals	34 Other associate professionals
	32 Life science and health associate professionals	32 Life science and health associate professionals	32 Life science and health associate professionals	24 Other professionals	24 Other professionals
	34 Other associate professionals	24 Other professionals	34 Other associate professionals	51 Personal and protective services workers	93 Labourers in mining, construction, manufacturing and transport
	24 Other professionals	34 Other associate professionals	41 Office clerks	12 Corporate managers	21 Physical, mathematical and engineering science professionals
	42 Customer services clerks	23 Teaching professionals	23 Teaching professionals	91 Sales and services elementary occupations	12 Corporate managers
	21 Physical mathematical and engineering science professionals	21 Physical mathematical and engineering science professionals	24 Other professionals	93 Labourers in mining construction manufacturing and transport	42 Customer services clerks
	41 Office clerks	41 Office clerks	13 Managers of small enterprises	21 Physical mathematical and engineering science professionals	91 Sales and services elementary occupations
	91 Sales and services elementary occupations	42 Customer services clerks	42 Customer services clerks	31 Physical and engineering science associate professionals	32 Life science and health associate professionals
	22 Life science and health professionals	13 Managers of small enterprises	83 Drivers and mobile plant operators	52 Models salespersons and demonstrators	71 Extraction and building trades workers
	52 Models salespersons and demonstrators	91 Sales and services elementary occupations	52 Models salespersons and demonstrators	42 Customer services clerks	33 Teaching associate professionals

Although in case of occupations the changes among the forecasts are slightly more significant, also there are some occupational groups which are among the largest growing in all forecasts.

Other associate professionals (ISCO 34) and Other professionals (ISCO 24) are presented both in BLS and Cedefop forecasts. Personal and protective services workers (ISCO 51) and Life science and health associate professionals (ISCO 32) are on top in all BLS forecasts. On the other hand Labourers in mining, construction, manufacturing and transport (ISCO 93) and Physical, mathematical and engineering science professionals (ISCO 21) are on top in both Cedefop forecasts.

Occupations with the largest job declines are shown in next table.

	BLS 2007	BLS 2009	BLS 2012	CEDEFOP 2010	CEDEFOP 2012
Occupations with the largest job declines	82 Machine operators and assemblers	82 Machine operators and assemblers	11 Legislators and senior officials	61 Skilled agricultural and fishery workers	41 Office clerks
	81 Stationary plant and related operators	81 Stationary plant and related operators	73 Precision handicraft craft printing and related trades workers	41 Office clerks	72 Metal, machinery and related trades workers
	73 Precision handicraft craft printing and related trades workers	73 Precision handicraft craft printing and related trades workers	81 Stationary plant and related operators	72 Metal machinery and related trades workers	23 Teaching professionals
	11 Legislators and senior officials	11 Legislators and senior officials	74 Other craft and related trades workers	74 Other craft and related trades workers	74 Other craft and related trades workers
	74 Other craft and related trades workers	74 Other craft and related trades workers	82 Machine operators and assemblers	23 Teaching professionals	61 Skilled agricultural and fishery workers
	93 Labourers in mining construction manufacturing and transport	33 Teaching associate professionals	61 Skilled agricultural and fishery workers	82 Machine operators and assemblers	83 Drivers and mobile plant operators
	33 Teaching associate professionals	61 Skilled agricultural and fishery workers	33 Teaching associate professionals	73 Precision handicraft craft printing and related trades workers	73 Precision, handicraft, craft printing and related trades workers
	61 Skilled agricultural and fishery workers	12 Corporate managers	12 Corporate managers	92 Agricultural fishery and related labourers	22 Life science and health professionals
	12 Corporate managers	93 Labourers in mining construction manufacturing and transport	22 Life science and health professionals	13 Managers of small enterprises	11 Legislators and senior officials
	31 Physical and engineering science associate professionals	22 Life science and health professionals	21 Physical mathematical and engineering science professionals	32 Life science and health associate professionals	82 Machine operators and assemblers

As in previous cases, here can be concluded that financial crisis didn't change forecasted occupational structure significantly.

7. Key results

- Global financial crisis affected all compared forecasts in terms of the number of employed, not in terms of sectoral and occupational structure.
- For 2010 – 2020 average annual growth for GDP is expected 1.85 % for the U.S and 1.72 % for EU27. It is faster growth than in 2000-2010.
- For 2010 – 2020 average annual growth for Employment is expected 1.35 % for the U.S and 0.32 % for EU27. For the U.S. it is faster growth than in 2000-2010, for EU27 it is slower.
- There is five industries where the largest employment growth is (or were) expected in all forecast. They are Health and Social Work (NACE 85), Real Estate, Business Services (NACE 70-74), Wholesale, Retail Trade and Repair (NACE 50-52), Education (NACE 80) and Construction (NACE 45).
- Most of industries with the largest employment declines belong to Manufacturing sector. Agriculture, Forestry and Fishing is next sector which is on top in this.
- The largest growth is expected in occupations related to healthcare, personal care, and community and social services, fields that remained relatively strong during the recession. However, there will also be substantial job gains among certain occupations that were severely affected by the recent recession, such as construction occupations and transportation and material moving occupations.
- Overall, job growth will be largest for occupations that typically need some form of postsecondary education.

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