DIW BERLIN

Weekly Report

A Summer Break for the Unemployment Rate: Google-Assisted Forecasting Signals Easing

To date, the Great Recession has only had a mild impact on the German labor market. In view of the uncertainties surrounding future economic growth, the low utilization of the workforce in firms, and the prevalence of working hour reductions, many observers are anticipating a dramatic rise in unemployment in the fall, with the total number of unemployed rapidly surpassing the four-million mark.

Yet according to forecasts based on Google search statistics, in all likelihood the unemployment rate will remain relatively stable in August and through the end of September, when elections for the German Bundestag will be held. The seasonally adjusted unemployment rate is actually falling. Given this fact, the danger that the total number of unemployed will exceed four million during this year seems increasingly unlikely.

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Economic conditions typically play a key role in important elections.[1] In the 1992 American presidential campaign, Bill Clinton won decisive points among voters with his often-repeated observation that "It's the economy, stupid!" Considering the severity of the current economic crisis, we should therefore expect economic issues to shape the Bundestag election debate and the prospects of the various parties. However, this has failed to occur. On the contrary, all parties have conspicuously refrained from focusing on economic questions; in general, it has not been possible to mobilize the public with controversial issues. A greater emphasis on the economy could result, however, from a dramatic rise in the unemployment rate in weeks leading up to the Bundestag elections on September 27, 2009, or by the expectation of such a rise immediately thereafter.[2]

Since it was last at the center of public discussion, the condition of the labor market has seemed to improve. The recession in Germany appears to have reached bottom, while Asia and the United States—important export markets—are showing signs

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[1] During the last presidential election in the US, the economic crisis had a decisive impact in favor of the candidate who appeared more competent on economic issues, Barack Obama, as opposed to John McCain, whose competency was considered to lie primarily in the area of national security. This phenomenon was demonstrated even prior to the election through the use of Google search statistics; see Constant, A., K. F. Zimmerman: Im Angesicht der Krise: US-Präsidentschaftswahlen in transnationaler Sicht. DIW Berlin Wochenbericht 44/2008.

[2] DIW Berlin's summer projections, for example, foresaw a significant worsening of labor market conditions starting in the fall. See Dreger, C. et al.: Tendenzen der Wirtschaftsentwicklung 2008/2010. DIW Berlin Wochenbericht 31/2009.

of economic improvement. However, the nature of crisis, which has primarily affected export-oriented capital-goods industries and their skilled employees, suggests that a significant growth in demand for German capital goods will only appear after economic recovery takes place in Western and Eastern Europe. Thus, the central question that will extend well into next year concerns to what degree firms in these key branches will be able to hold onto their massively underutilized employees. Factors favoring retention include the federal government's short-time work program and the self-interest of firms, who would prefer to hold onto their core workforce for as long as they possibly can, given the pre-crisis and future expected skilled-labor shortages.

The number of employees forced to work reduced hours has shown barely any additional increase during the past few months. In June the number of short-time workers stood at 1.4 million. This represents 5 percent of all employees subject to social insurance contributions. In the industrial sector, this figure is as high as 20 percent. The number of short-time workers is decreasing at this time—primarily because of the summer holidays—but without leading to increased lay-offs. Unemployment only increased marginally in July (by 0.1 percentage point), the summer month in which, following the end of the second quarter, increased lay-offs and a rising employment rate are usually witnessed. There are no indications at present that firms will change their policy of attempting to hold onto workers. Additional factors suggesting the fall months will only be marked by a moderate increase in unemployment include: (1) the average required period of notice of three months when an employee is let go; (2) the long-term job guarantees that exist in many companies; and (3) the employment agreements signed in some quarters during the crisis.

In order to confirm this prognosis of relative stability in the employment rate, it is important to know how the critical months of August and September will play out. Using Google data regarding online search activity, we've developed a forecast for the months of August and September. The volume of online searches conducted regarding the federal employment office, jobs, and short-time work are used to explain the employment rate. This estimation model is then used to conduct forecasts. The use of Google data in these econometric models leads us to predict further decreases in the unemployment rate during August. When the Internet data are carried forward with econometric methods, it is possible to obtain an early view of the following month. In this "crystal ball" we can also forecast further decreases in the unemployment rate for September.

Figure 1

Official Unemployment Rate

In percent
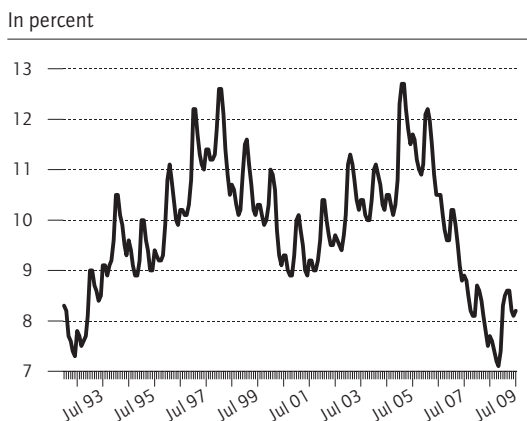
Source: German Federal Unemployment Office. **DIW** Berlin 2009

This is a sign of an encouraging summer hiatus in the unemployment rate trend.

Seasonal Patterns in the Actual Unemployment Rate

The actual unemployment rate oscillates considerably. Today's unemployment levels are actually quite low—even setting aside the fact that we are still in the midst of the most serious economic crisis in decades.

The unemployment rate is marked by seasonal fluctuations. Unemployment is particularly high during the winter months, especially during the first quarter of the year. It then falls by degrees with each passing month. In July, before the summer holidays, the unemployment rate tends to rise briefly due to the fact that many work contracts end with the conclusion of the business quarter. The unemployment rate then typically remains stagnant over the next few months before dropping in the fall. During the summer holiday months, unemployment normally recedes slightly, as lay-offs are limited and new seasonal hires occur. From September on, the unemployment rate usually falls somewhat more sharply as hiring picks up and the new academic year begins. Between 1994 and 2008, the month of the year with the lowest unemployment rate has usually been October or November, and sometimes September.[3] From the beginning of winter on, the unemployment rate rises, since there is a seasonal reduction in labor demand—for example, in the

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3 Only in 1992 and 1993 did the unemployment rate rise in October.

tourism-dependant hospitality industry. During the first winter months of the new year, construction is often limited by poor weather conditions, which causes unemployment figures to rise.

Figure 1, however, does not allow one to fully recognize the seasonal fluctuations necessary for estimating the course of unemployment over the following three months. Therefore, annual fluctuations independent of any particular year are presented in Figure 2. For better visualization, every monthly value is divided by the July value for the respective year, and the July value is set at zero. This generates a swarm of lines. The figure makes clear that with only one exception, there has never been a year when the unemployment rate fell during July.

From a seasonal perspective, a fall in unemployment is to be expected in the month of August. As shown in Figure 3, which is normalized based on the month of August, the unemployment rate falls between July and August and between August and September regardless of overall economic conditions during the year observed. In both months, a reduction in the unemployment rate is to be anticipated with a high probability based upon seasonal considerations. Beginning in October, the seasonal picture is more diverse—in the past, there have been both increases in unemployment between September and October (1992 and 1993) as well as reductions (in all other years) (Figure 4).

Historical experience with seasonal fluctuations, however, does not permit by itself a reliable forecast. The fact that unemployment has always fallen in August and September during the period under consideration does not represent a natural law. It only means that this course of events is rather probable. If a forecast were to deviate from this pattern, a predicted increase in unemployment would be a major sign of a potential crisis. This would not come as a complete surprise, however, in light of the catastrophic predictions made concerning the labor market. An actual rise in unemployment would certainly be ill portentous for the labor market.

In view of the complexity of seasonal structures in the labor market, would it not make sense to use seasonally adjusted unemployment rates? The most obvious argument against the use of adjusted figures is that the general public is interested in the unadjusted numbers, because they are comprehensible. The actual unemployment figures are the ones that mobilize voter sentiment. Yet there are also diverse technical reasons for using unadjusted figures. The forecasting techniques are sensitive to seasonal adjustment. One can rapidly construct an artificial stochastic process which one then attempts

Figure 2

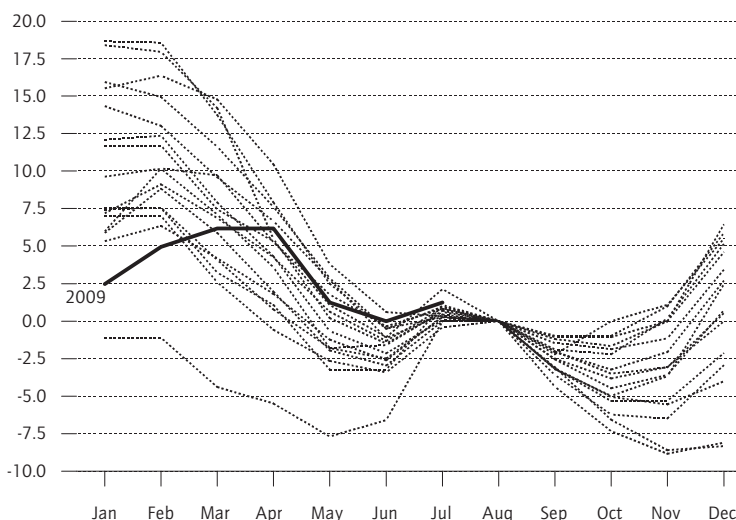**Unemployment Rate Centered on the Month of July, 1992 – 2009**

Deviation in percent
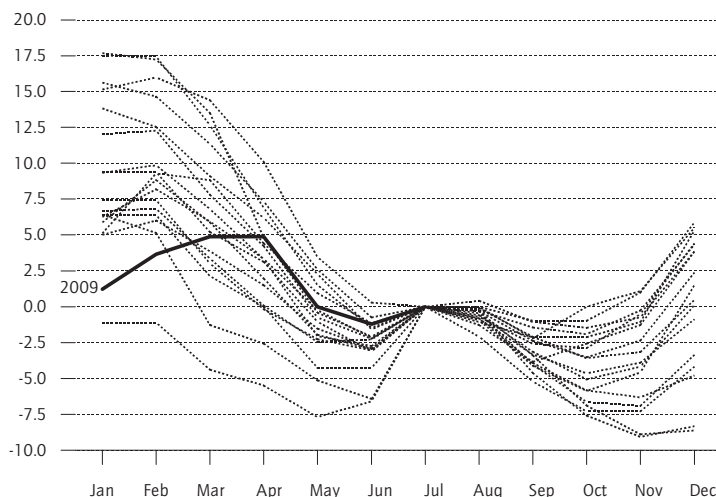
Source: German Federal Unemployment Office; calculations by DIW Berlin.　　**DIW** Berlin 2009

Figure 3

Unemployment Rate Centered on the Month of August, 1992 – 2008

Deviation in percent

Source: German Federal Unemployment Office; calculations by DIW Berlin.　　**DIW** Berlin 2009

to model. Additional issues include the availability of only short time series, which are further complicated by constant changes in the definition of the unemployment rate, by labor market intervention

programs as well as by the modifying effects of instruments such as short-time work, and not least of all, the current especially severe economic crisis. It can scarcely be assumed that these factors would not influence the seasonal adjustment. Therefore, it is always preferable to use unadjusted figures when modeling the unemployment rate.[4]

Google Models and Alternatives

In a number of different studies we have shown that economically meaningful behavioral models based on Google search statistics can be calculated and employed in forecasting.[5] Prior to conducting this study, we revised and updated our techniques. In this regard, all Google variables were tested and several changes to our selection methods were made. As a reference model for Google search statistics, we used the DAX stock market index, which had proved to be superior when compared to other labor market indicators.[6] DAX values used here are from consecutive periods (i.e. the first available value for each month). This has proven to be a fundamentally strong reference point. The analysis covers the period from January 2005 through July 2009.

The overall performance of the model is good, as can be seen from the ex-post forecasts in Figure 5. The models are fundamentally capable of representing the unemployment rate trend. For the onset of the crisis late in 2008, the growth in unemployment is overestimated. Furthermore, the table contains the certainty measure (R2) and Bayesian Information Criterion (BIC) of the best specifications found within the analysis period that qualitatively agree with earlier findings. Google data using solely the regressors "employment office," "job search," and "short-time work" significantly outperform the DAX-model, as these measurements demonstrate.[7] It is also clear, however, that a combined regression, in which the DAX replaces the short-time work variable (Google@DAX), offers significant additional possibility for improvement.

To evaluate the quality of single step predictions, the table presents mean absolute forecasting errors

Figure 4

Unemployment Rate Centered on the Month of September, 1992 – 2008

Deviation in percent

Source: German Federal Unemployment Office; calculations by DIW Berlin.   **DIW** Berlin 2009

Figure 5

Official Unemployment Rate and Model Results

In percent
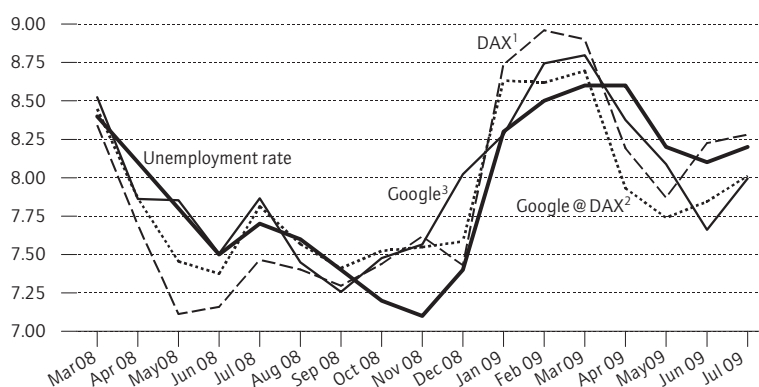
1 Calculated based on the DAX index trend.
2 Calculated based on the DAX index trend and Google search statistics.
3 Calculated based on Google search statistics.

Source: German Federal Unemployment Office; Google; calculations by DIW Berlin.   **DIW** Berlin 2009

(MAE). For purposes of comparison, it is normalized such that the given DAX value equals 100. First of all, it is apparent here that the DAX model appears to be superior to the pure Google model. This is only the case, however, because in February of 2009 the Google model was unusually mistaken.[8] When one

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4 For econometric modeling purposes, twelfth difference methods are used, thereby taking seasonal variation into account.

5 Askitas, N., K. F. Zimmermann: Google Econometrics and Unemployment Forecasting. Applied Economics Quarterly 55 (2009), 107-120; Askitas, N., K. F. Zimmermann: Prognosen aus dem Internet: Weitere Erholung am Arbeitsmarkt erwartet. DIW Berlin Weekly Report 25/2009; Askitas, N., K. F. Zimmermann: Googlemetrie und Arbeitsmarkt. Wirtschaftsdienst 89 (2009), 489-496.
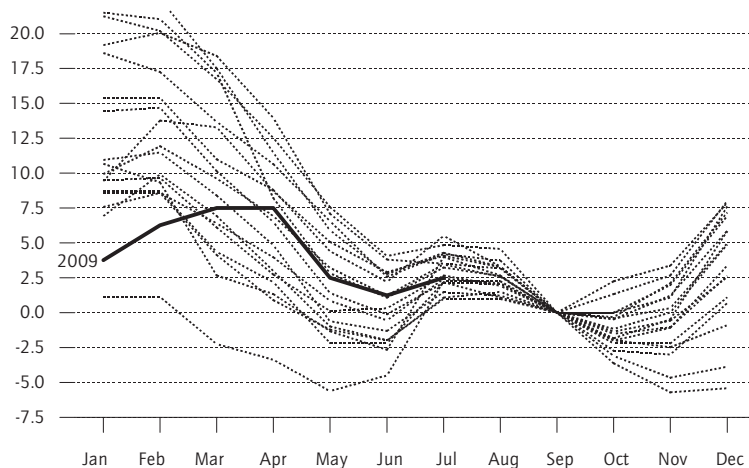
6 The DAX has a higher predictive value than the employment barometer released by the Institute for Economic Research, Munich (Ifo), for example, although the DAX model is one period delayed. The BAX of the German Federal Employment Office is not yet usable for this purpose.

7 A model is better when R2 is larger and the BIC is smaller.

8 See also Figure 6. A more precise analysis of error showed that this was primarily due to the fact that, despite a massive expansion in short-time work in February 2009, the job searches on the part of Internet users had significantly intensified.

employs Google and DAX in a regression (Google@ DAX), the level of error is reduced by 24 percent. If one simply relies on DAX & Google—that is, if one simply averages the forecasts from the DAX regression and the Google regression (with "employment office," "job searches" and "short-time work")—then the error is reduced by 37 percent.

Forecasts for August and September

We then applied these procedures to the next two months, August and September. We limited ourselves to the two alternative models, DAX and Google, and their averaged variant. Clearly, Google@DAX—the joint econometric model using Google and DAX data—has a greater predictive power than the separate models. However, the average forecasts from the two separate models during the investigated time period are superior to the forecasts from Google@ DAX. The forecasts for August are derived from the Google data available for the second half of the month of July and the DAX index value on August 3. For the September forecast, no information for the regressors was available from the month of August. Therefore, we projected the regressors forward for the months of August using time series methods. For the DAX, this is known to be problematic, since the DAX value is primarily determined by the error term (so-called innovations). Therefore, the DAX forecasts presented below are exploratory in nature. This must be taken into consideration, especially in evaluating the September forecast.

Figure 6 contains the single-step forecasts for the models that were employed and their realizations as well as the results at the current margin.

The forecasts with the pure Google model systematically fall below actual values from November onward, whereas the forecasts using the DAX model generally lie above the actual values. On average, these errors largely cancel each other out, leaving a residual tendency for underestimation.

Forecasting errors are part and parcel of all economic methods. Contrary to pure barometer models, in which no direct quantitative relationship is sought with respect to a criterion variable, here we can take direct readings of forecasting errors. This is the litmus test that other approaches tend to avoid. In any event, the ex-post explanatory power of the Google data is very good. What is most important for us here is the forecast pattern: the Google data accurately reflect the falling trend from March through November, track the rise in unemployment through March 2009 (with the exception of the erroneous prediction in February related to short-time work)

Table

Forecast Quality of Unemployment Models

Model	Certainty Measure (R^2)	Bayesian Information Criterion (BIC)	Average absolute forecasting error[1]
DAX[2]	0.91	47	100
Google[3]	0.94	33	115
Google @ DAX[4]	0.97	4	76
Google and DAX average	–	–	63

1 Normalized based on the DAX model value = 100.
2 Calculated with the first DAX index value of each month.
3 Calculated based on Google search statistics for "employment office," "job search," and "short-time work."
4 Calculated based on Google search statistics for "employment office" and "job search" as well as the first DAX index value of each month.
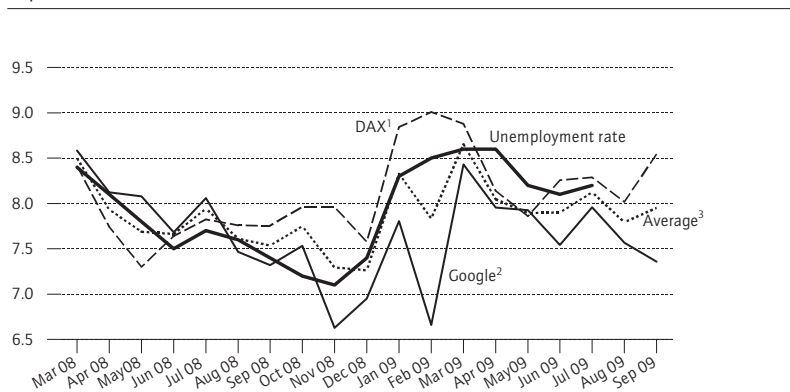
Sources: Calculations by DIW Berlin. **DIW** Berlin 2009

Figure 6

Official Unemployment Rate and One-Step Forecast Results

In percent

1 Calculated based on the DAX index trend.
2 Calculated based on Google search statistics.
3 Calculated based on the average of both models.

Source: German Federal Unemployment Office; Google; calculations by DIW Berlin. **DIW** Berlin 2009

and also mirror the subsequent drop in unemployment.

The necessary data were available for the August forecasts (two half-months of Google statistics for July and the initial August value for the DAX). Both indicators point to a significant drop in the unemployment rate, which stands in accordance with the usual seasonal pattern. It would represent a major sign of crisis if the forecast were to fluctuate from this pattern. The fact that it does not indicates a period of respite ahead.

The analyses for September are somewhat differently situated. Here, uncertainty increases, as the Google and DAX data themselves had to first be

forecast. The Google indicators signal—once again in accordance with the seasonal pattern—a further decrease in unemployment. The DAX, for its part, points to an upward trend. By contrast, a stagnant unemployment rate is predicted when both measures are averaged. Forecasting the DAX itself is, however, problematic. For this reason the forecast does not carry the weight it otherwise would. In addition, the markets are currently in an upswing, which should have a positive effect upon employment. Thus, the forecast remains that September will be also be marked by further calm on the labor market.

Conclusion

We assessed expectations regarding the development of the unemployment rate leading up to the Bundestag elections in September of this year with forecasts based on Google search statistics and the DAX stock market index. No evidence was found for the onset of a dramatic or even significant increase in unemployment or a rise in the number of unemployed above the four-million mark, as has been expected by many observers. According to these estimates, a small reduction in unemployment will be witnessed in August. For September, initial estimates allow us to conjecture that the unemployment rate will not rise above its August level, but more likely will stay below it. The early indicators do not signal that the economic crisis will have such strong effects as to disrupt the traditional seasonal pattern. They suggest a small seasonally determined decrease in unemployment in the months of August and September. In other words: a summer break for the unemployment rate.

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