The Godot-DaLEI
A Daily Leading Economic Index for the US-Economy
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Wall Street indices predicted nine out of the last five recessions!
Paul A. Samuelson in Newsweek, Science and Stocks, 19 Sep. 1966

I) Introduction:

The best known Leading Economic Index for the US-economy is The Conference Board’s LEI (see [1]). Another well known index is the CLI (Composite Leading Indicators) of the OECD. These indicators are published monthly.

The components of the LEI (and CLI) are monthly, weekly and in recent time also daily data. The problem of mixing different frequencies is simply solved by aggregating the weekly and daily data. Instead of 4 weekly or 20 daily data, the mean of the last month is used. This throws away valuable information (see [2]). It would also be nice to have an up-to-date indicator.

Aggregating to monthly frequency is very simple. Converting monthly, weekly and daily data to a daily index is a harder task. The only daily index I am aware of is the Aruoba-Diebold-Scotti Business (ADS) Index of the Philadelphia FED (see [3] and http://www.philadelphiafed.org/research-and-data/real-time-center/business-conditions-index/)

The ADS is a Coincidence index. It measures the current state of the economy. In fact the border between leading and coincident is blurred. The LEI and the ADS index have some components in common. The ADS is furthermore an exercise in (over-)sophisticated econometric methods.

II) The purpose and limitation of a leading index:

One has to select components which had in the past some track record of leading the economy. But one can not know if they will lead in the future. Most components lead – also in the past – only in certain situations. The LEI has behaved better at peaks than at troughs. This seems to be the case also for the DaLEI.

The Indicator Handbook ([1]) clearly defines the general limitations of the approach: “Indicator systems were not designed, nor can they be expected to fully reflect exogenous factors. This is not their function. What indicator systems are mainly designed to do is to shed light on the endogenous aspects of economic instability”. An indicator can of course not predict the Japanese earthquake and it’s economic implications.

The purpose of the DaLEI is the same. It’s a general indicator for the expected economic climate. The performance of trading strategies depend on the overall economic situation.
The DaLEI can be used to select the appropriate strategy mix. But the details – e.g. the timing of buy/sell decisions, the strikes for options … must be handled by the strategy-specific model.

III) Speeding it up:

There are basically 2 ways to use lower-frequency data in a daily index. One can use the stale-values (the latest release) or one can forecast the low-frequency data. The stale approach is most frequently used in so called Nowcast models (see [2]). But the latest econometric-fashion is the State-Space approach. One uses the Kalman-Filter to estimate the parameters of these mathematically complex models. The monthly (or weekly) data are interpreted as missing values. The Aruoba-index is a State-Space model. Practically this approach is a mixture of using stale-values and doing a forecast. The Kalman-Filter forecasts the low frequency values, but it gives a lower weight to the forecasted innovation (because the actual data are missing). Econometricians consider State-Space models as superior. But this is not so clear from the practical point of view.

“Where state space methods have been used in forecasting competitions, they have produced mixed results” (see [4]).

The DaLEI uses a simple forecasting approach. In a previous version (see [5]) forecasting is done with the Holt-Damped method (see [6]). The Holt-estimator is very simple and robust. It has an excellent practical track record (see [7]). The new Godot-version uses an even simpler exponential-smoother. I have compared the two methods and there was no significant performance difference. Actually the forecasting quality of all methods is rather low. This is an intrinsic behavior of economic and financial time-series. Using an exponential-smoother is similar to the classical approach of the LEI and CLI. One transforms the higher-frequency daily and weekly data to a monthly mean. But the exponential-smoother reacts faster to recent changes. Recent data have a higher weight. There is also not a sharp on-off transition when outliers move out of the monthly window. With the exponential-smoother the effect fades out.

In a first step each component is exponentially smoothed. The smoothing factor alpha depends on the frequency of the data. Alpha = 0.09 for daily, 0.33 for weekly- and 0.5 for monthly-data. So even monthly data are slightly smoothed. The smoothed time-series are in the next-step normalized. The mean of the normalized series is 0, the standard-deviation is 1. In this way the different series can be compared with each other. Otherwise a series with large values and/or big swings would dominate the final index. For most components higher-values mean a better economic situation. For 2 series – Financial-Stress and Initial Jobless Claims - it is the other way round. These series are hence multiplied by -1. The DaLEI is simply the mean of the normalized components plus the constant of 100. A DaLEI of 100 is the average economic situation in the considered time-frame.

Due to the complicated structure it takes a considerable amount of time to recalculate the ADS-index. The number of components is restricted by computational-limits (the effort grows exponentially with the number of components). In contrast it takes a few
microseconds to calculate the DaLEI. Sending the result from the server to the client and displaying the chart in the browser is the main computational burden. The user can try any combination he likes and has immediately a new index available. Theoretically one could compute the DaLEI from 1 million components. Alas there are not 1 million reasonable time-series available.

IV) The DaLEI components:

The LEI consists of 10 components. These were the starting points for constructing the DaLEI. Some components were replaced by similar ones which showed a better leading-performance. Additionally with the SEA-(Claymore Global Shipping) ETF a component for the global economic situation was added. Information about the state of the global economy is missing in the LEI.

Another requirement was: All data must be (easily) public-available. Were appropriate there is always the seasonally adjusted time-series used.

The following lists the 9 DaLEI components.
L the component is also part of the LEI, A of the ADS Index.
The first expression is the abbreviation used on the selection-buttons of the DaLEI-Chart (see Graphic-1).

2) SEA: Claymore Global Shipping-ETF. D.
3) DrblGdOrdr: New Orders for Durable Goods. M.
4) EmplNFrm: Employees on nonagricultural payrolls. M (A).
5) BldPrmts: Building permits for new private housing units. M (L).
7) IndPrdMtrls: Industrial Production Materials.
8) FinStress: Federal Reserve of St.Louis Financial Stress Index W.
9) AvgWklyHrs: Average Weekly Hours in Manufacturing. M (L).

The LEI uses instead of the Financial Stress Index the interest-rate-spread between 10-years US-Treasuries and the Federal-Funds-Rate. FinStress is a considerably more sophisticated measure. The spread was before 2007 a generally agreed measure. But I could not identify any useful purpose thereafter. The construction of the Financial Stress Index by the Federal-Reserve of St. Louis is a reaction to this situation.

The ^GSPC and SEA are downloaded from yahoo-finance, the other time-series are from wikiposit [http://wikiposit.org/w](http://wikiposit.org/w)
The standard DaLEI contains all 9 components. But the user can select any subset of these components to create his favorite index. It is also straightforward to add in the future additional components. A very good general book about economic indicators is [8]. The interested reader should consult this book for further information.
Graphic-1: Standard DaLEI from 2007-01-03 to 2012-06-22 (current).

Graphic-2: DaLEI compared with ^GSPC between 2007-01-01 to 2012-06-22

Graphic-2 shows the comparison of the DaLEI with the ^GSPC. One can see on the left, that the DaLEI is indeed ahead of the S&P. The forthcoming economic and financial problems are “seen” somewhat earlier. But the DaLEI is slightly lagging in the 2009 recovery.
Graphic-3 shows a very important leading-component: New Private Housing Building Permits. A new housing permit triggers a whole series of economic activities. The housing permits were already falling in 2007 (and before). At this time the stock market still went up. But like the DaLEI in general it only excels as a danger-ahead signal. The recovery is in comparison to the ^GSPC delayed. People must gain confidence again before they start to think about building a new house.

Graphic-3: New Building-Permits.

Graphic-4: The St. Louis Financial-Stress-Index.
The Financial-Stress-Index excels in both directions. It senses the problems quite early, but it is also leading in the recovery phase. It's in the considered time-range the best indicator. But such indicators are susceptible to changes in the financial system or to changes of the FED-policy. Before 2007 the yield between long and short term treasuries was also a good indicator. But when the FED set the funds-rate to (almost) zero, this indicator lost it's predictive power. Maybe that's also the fate of the St.Louis Stress index. In contrast, new housing permits will always have an economic significance.

Graphic-5: Initial Jobless Claims.

Initial Jobless Claims are published every Thursday at 8:30 (ET). The market reacts very sensitive on the release. In my view one can even speak of a severe overreaction. The series has – like every weekly economic series – a high level of noise. An up- or down-of a few thousand has no economic significance. The figures are seasonally adjusted. The adjustment procedure adds an additional level of noise. The time-series is therefore smoothed before it enters the DaLEI computation. The Jobless-Claims has a similar behavior than most leading-indexes. It's good at signaling danger-ahead, but it is late of seeing the end of the tunnel. But there is general agreement, that the series is an important economic indicator. It's main advantage is the short measurement-delay. One gets already on Thursday a sensible economic measurement of the last-week. It's the fastest index in town. Jobless-Claims are therefore also part of the LEI and the ADS index.

Jobless-Claims are of course inverse to the economic situation. The time-series is therefore multiplied by -1 before it enters the DaLEI.

The SEA-ETF (Graphic-6) tracks the price and yield performance of the Delta Global Shipping index. More than 2/3 of the world's goods are delivered by sea. The index provides a direct exposure to international trade, commodities and global infrastructure.
It's an overall measure of global economic activities. Another popular index is the Baltic-Dry-Index. But I found no source for automatic historic downloads.

A previous version of the DaLEI used the weekly Harpex-Shipping index. There is no automatic download interface. I updated the values by hand. The Harpex is also sometimes published with a considerable delay. The Harpex is probably a better indicator. But the SEA data are daily available from yahoo-finance. SEA started at 2010-06-11. For the dates before the DaLEI uses the initial value at 2010-06-11. The line on the chart is therefore on the left side flat. SEA did a good leading-job in the 2011 summer crash. It declined already early in 2011.

New Durable Goods Orders (Graphic-7) is another widely used economic leading index. It's behavior is similar to the other components. A good sense for danger, but somewhat late in the recovery phase.
One could ask, why one uses several indexes with the same characteristic? Economic time-series are always quite noisy. The contain measurement errors. Using a combination of them reduces the overall noise of the DaLEI.

Employees Nonfarm (Graphic-8) is another widely used indicator. It is published monthly on the first Friday at 8:30 a.m. (ET) and covers the month just concluded. Markets react very sensitive to this indicator. It's the most accurate measurement of the job-situation. It's role as a leading-indicator can be questioned. It is probably more a Coincidence Index. It is therefore not a component of the LEI, but of the ADS. The employment-statistics is usually the first in the series of the monthly-releases. It is the first important measurement of the previous month. The other monthly-data are usually highly correlated with this index. That's the reason why the markets react so sensitive.
Graphic-7: New Durable Goods Orders.

Graphic-8: Employees Nonfarm.

Industrial Production Materials in Graphic-9 is yet another indicator with the usual behavior. Good early warning, somewhat late in the recovery phase. It is a monthly index. The same can be said about Average-Weekly-Work-Hours in Manufacturing in Graphics-10.
Conclusion:
The DaLEI gives an overall condensed picture of the forthcoming economic situation. It's worth to have a look at it. But it is certainly no silver bullet.
References: