HAWAII'S

ECONOMY

A Report from the Department of Business, Economic Development & Tourism

In This Issue

A New Leading Economic Indicator for Hawaii

Leading Indicator Rose in Latest Period

DBEDT's new *Leading Economic Indicator* (LEI) took an upward turn in the latest (November 1998) period, following several previous months of up and down movement. This alternating up and down movement may suggest that the indicator is bottoming out after a long, persistent decline from June 1997 to July 1998. However, it is too early to tell if a sustained upward trend in the Indicator is in

Monthly Leading Indicator Report November 1998		
Indicator	Direction	% Contribution to Total Change in LEI
HAWAII		
Oahu real estate transactions (number):	❻	-11.4%
Initial unemployment claims:	❻	-59.4%
Construction permit value:	❻	-2.9%
Oahu residential real estate prices:	❼	+138.0%
Average work hours:	❼	+35.1%
NATIONAL		
National leading index:	❻	-28.8%
Pacific region consumer confidence:	❻	-38.7%
Interest rate spread:	❼	+16.1%
INTERNATIONAL		
Trade-weighted exchange rate:	❼	+64.4%
Japanese labor earnings:	❻	-12.5%
LEADING ECONOMIC INDICATOR (LEI)		
12-month moving average:	❼	=100.0%

Source: DBEDT.

Introducing the DBEDT Leading Economic Indicator

This issue of *Hawaii's Economy* introduces a new forecasting tool developed by the Department to help business, government and the public better plan for the future. The DBEDT *Leading Economic Indicator* (LEI), to be released quarterly, is meant to provide an advance indication of potentially significant changes in either the direction or rate of growth of the state's economy. While the tool is not able to pinpoint the magnitude of potential changes, tests show that it would have successfully predicted the ups and downs of the state's economy, as measured by changes in the job count, since the early 1990s.

Origins of the DBEDT Index

The DBEDT LEI is a successor to the First Hawaiian Bank (FHB) Leading Economic Indicator series. Development of that series in the late 1980s was considered by many in the business community as a valuable addition to the indicators of Hawaii's economy. However, the project was terminated in 1998 with the closing of the FHB Economic Research Department. The Bank of Hawaii terminated a similar project for much the same reasons.

Recognizing the usefulness of a leading indicator in anticipating economic conditions, DBEDT undertook to continue a leading

Leading Indicator Rose in Latest Period

the offing.

The LEI is a 12-month moving average of 10 component indicators, which together have shown some ability to predict future changes in the rate of growth of jobs in Hawaii's economy. DBEDT uses an adjusted measure of jobs growth as a gauge of overall economic performance. Each component has equal weight in determining the overall direction of the Leading Indicator. A sustained change in the direction of the Leading Indicator could signal a change in the direction of economic growth in the following 5 to 10 months.

In the box on page 1, each of the components are listed with directional arrows indicating how much each component contributed to the total change in the Leading Indicator. The largest contributions to the most recent upturn in the Leading Indicator came from the components measuring Oahu real estate prices and the trade-weighted exchange rate. The components for selected average working hours and interest rates also made positive contributions to the rise in the Indicator.

Six of the ten components had negative impacts on the Leading Indicator in November. These components include initial unemployment claims, the Pacific Region consumer confidence index, the national leading economic index, Japanese monthly earnings, the number of Oahu real estate transactions, and the value of construction permits.

Several months of generally positive changes in the LEI are needed in order to reliably establish that an improving economy is being signaled. However, if the recent stability in the Indicator proves to be the beginning of an upward trend, analysis of the Indicator's past performance would suggest that a measurable improvement in economic performance could follow within 6 to 10 months. Given the three or four months delay in obtaining data for several of the components, any improvement being signaled by the November 1998 indicator would likely be noticed between May and September of this year.

Interpreting the DBEDT LEI

DBEDT's new Leading Economic Indicator (LEI) series adds to the tools available for analyzing and interpreting Hawaii's economy. But how close is the relationship between the new LEI and the reference indicator for Hawaii's economy—growth in wage and salary jobs—which is used as a current measure of the overall direction of the economy?

Figure 1 shows the relationship between the DBEDT LEI and the change in wage and salary jobs. The jobs-growth statistic is used as a proxy measure of the overall direction of the State's economy. It can be referred to as the reference indicator, to differentiate it from the leading indicator.

Jobs growth is measured as the percentage change in the number of wage and salary jobs in a given month relative to the same month in the previous year. Both the reference indicator (jobs) and the leading index have been smoothed with a 12-month moving average ending in the latest month.

Figure 1 shows that, in general, turning points in the Leading Indicator anticipate turning points in the reference indicator by 5 to 10 months.[1] Four distinct periods appear in the Figure. Period 1 starts with the 10 months between a turning point in the LEI (from a low point in August 1993) and an increase in job growth from its low point in June 1994. In period 2, the LEI peaks in December 1994 and 6 months later, job growth also peaks and declines

continued on next page

Figure 1. Historical Performance of the DBEDT Leading Indicator.

Source: DBEDT.

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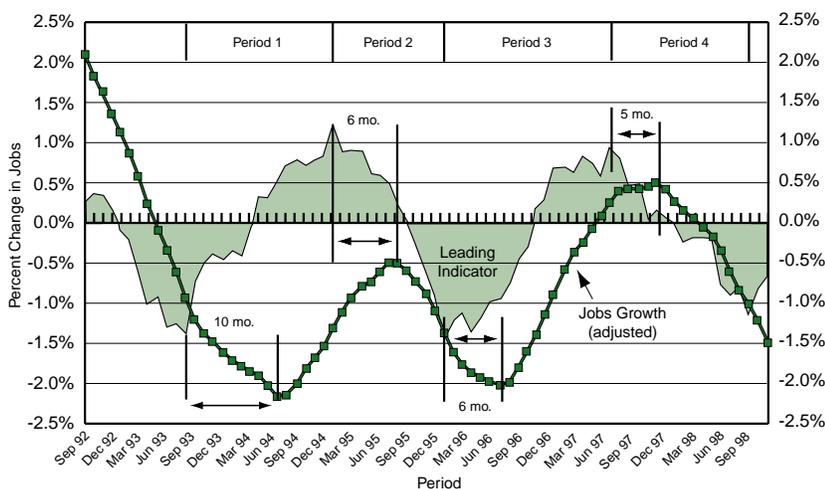
[1] A normal delay in the availability of some component data means that the indicator will be reported about 3 months *after* the time period to which the data apply. Thus, the period between the *reporting* of a significant change in the indicator and a corresponding change in the economy will be in the range of 2 to 7 months.

Interpreting the DBEDT LEI *continued from page 2*

thereafter. Period 3 represents another movement from the trough in the LEI in December 1995 to the trough in jobs in June 1996. Finally, period 4 shows the peak in the LEI in June 1997 to a peak in job growth in November 1997.

For period 1, the LEI reached a trough in August 1993 and rose to a peak in December 1994. Figure 2 indicates the direction and magnitudes of the LEI component changes for this period. Most of the growth in the LEI was due to growth in Pacific Region consumer confidence, increases in average working hours and higher growth in construction permits. There were also positive movements in the growth of Japanese earnings, the number of real estate transactions, and the national leading indicators index. On the other hand, negative interest rate movements, higher initial unemployment claims, and slower growth in housing prices worked in the opposite direction.

In December 1994, the LEI reached a peak then began to decline to a low point in December 1995. Virtually all of the LEI components declined in this period, led by slower growth in the national leading index and negative interest rate swings (Figure 3). Declines were also experienced in consumer confidence, construction permits, Japanese earnings growth and in both the number and value of real estate sales. During this period, the only positive movements came from slower growth in initial unemployment claims and a small improvement in the exchange rate (appreciation of foreign currency in terms of dollars).

After December 1995, the LEI began to rise again, reaching another peak in June 1997. During this period, most of the growth was attributable to Mainland-related components: the national leading index, interest rate movements, and some improvement in consumer confidence (Figure 4). Growth in the number of construction permits and in Japanese earnings also helped raise the indicator. On the other hand, negative exchange rate movements (appreciation of the dollar) and lower growth in housing prices tempered the rise in the indicator.

Source: DBEDT.

Figure 2. Change in Index & Components from 8/93 to 12/94.
Period 1: Trough to Peak

| Component	Value
Index	3.4
Consumer Confidence	1.8
Average Working Hours	1.0
Construction Permits	0.9
Japanese Earnings	0.4
Number of Real Estate Sales	0.3
National Leading Index	0.2
Trade-Weighted Exchange Rates	0.0
Real Estate Prices	-0.2
Initial Unemployment Claims	-0.4
Interest Rates	-0.6
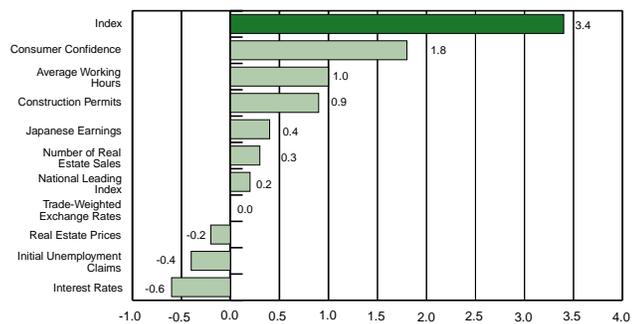
Figure 3. Change in Index & Components from 12/94 to 12/95.
Period 2: Peak to Trough

Component	Value
Index	-3.4
Initial Unemployment Claims	1.4
Trade-Weighted Exchange Rates	0.1
Average Working Hours	-0.1
Real Estate Prices	-0.2
Number of Real Estate Sales	-0.3
Japanese Earnings	-0.5
Construction Permits	-0.6
Consumer Confidence	-0.7
Interest Rates	-1.1
National Leading Index	-1.4
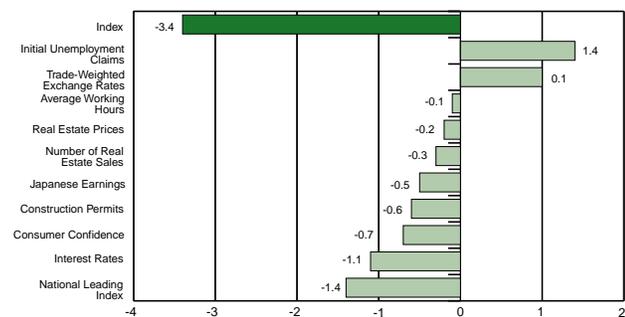
Figure 4. Change in Index & Components from 12/95 to 6/97.
Period 3: Trough to Peak

Component	Value
Index	3.1
National Leading Index	2.2
Interest Rates	1.9
Construction Permits	0.8
Japanese Earnings	0.4
Consumer Confidence	0.4
Number of Real Estate Sales	0.2
Initial Unemployment Claims	-0.2
Average Working Hours	-0.2
Trade-Weighted Exchange Rates	
Real Estate Prices	-1.9
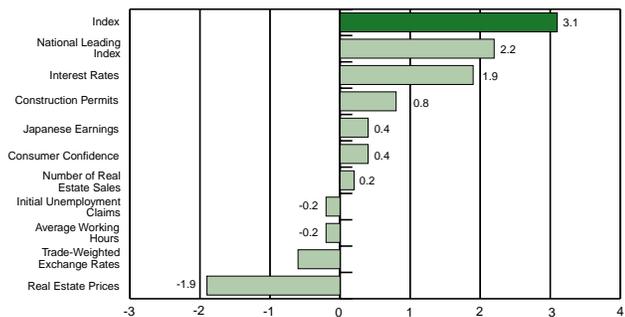
Figure 5. Change in Index & Components from 6/97 to 10/98.
Period 4: Peak to Current Low Point

Component	Value
Index	-2.7
Number of Real Estate Sales	0.2
Initial Unemployment Claims	0.1
National Leading Index	0.1
Trade-Weighted Exchange Rates	0.0
Average Working Hours	-0.2
Real Estate Prices	-0.2
Construction Permits	-0.5
Consumer Confidence	-0.5
Japanese Earnings	-0.5
Interest Rates	-1.1
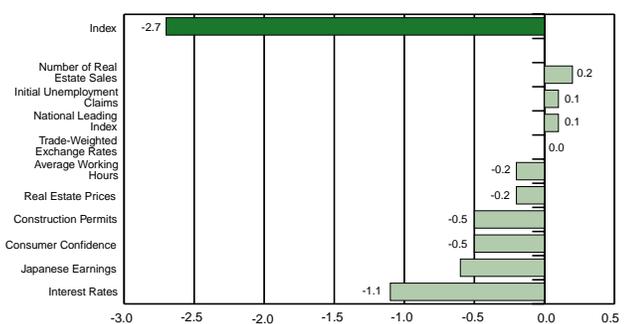
Designing a Regional Leading Economic Index

Several states besides Hawaii have constructed their own leading economic indicator. How does one proceed in such a project? The national leading index is a useful starting point, but the biggest hurdle is finding comparable state-level data or reasonable substitutes. Here is one recipe.

1. Define a Reference Cycle. An indicator called a reference cycle must be constructed to measure the actual ups and downs of the economy during the business cycle, which is what the leading index is supposed to predict. Measures like Real Gross State Product and Total Personal Income would be good candidates. Unfortunately, these data are only available on an annual or quarterly basis. Payroll employment is the most logical single choice to define a state reference cycle, since the data are available monthly. For some states where the industrial structure warrants, this measure might be supplemented with statewide power usage in industrial production or other measures that mirror the direction of the overall economy.

2. Select a Component Data Series. Next, potential data series for the leading indicator must be identified. The national index contains ten variables, but ten local variables that meet all the criteria for inclusion may not be available. A large number of relevant variables in the indicator can provide a good mix of components for testing. These variables should include indicators taken from the national or international level based on knowledge about how closely the state economy is linked to various national and international indicators. In recent years, the linkage between the Hawaii and the national U.S. economies has not been as strong, while our linkage with Japan has been greater. Nevertheless, some national variables—interest rates, for example—are always a natural for inclusion as components.

Because the world economy is becoming more linked globally, a foreign exchange rate variable may also be appropriate.

Local statistical series that mirror the national series are also good candidates in developing a leading economic indicator. Initial unemployment claims and the average work week are examples. It might also be appropriate, and usually possible, to consider stock prices of local firms, as long as those prices do not disproportionately reflect those firms' exposure outside the local economy. Other local variables might be considered for testing that do not have direct counterparts in the national leading index.

3. Test and Weight the Components. After determining which variables to include in creating the leading indicator component series, the next step is to choose those components that best reflect future changes in direction of the economy. Then the importance or weighting that each component should have in the composite index must be determined. While all of the candidates could be used and weighted equally, some variables may be found to be more important than others and some may not be important at all.

Linear regression techniques are helpful in choosing and weighting the components. Regression analysis can provide an empirical way to determine which components are statistically significant in predicting turning points in the economy.

Once the leading indicator is constructed, tests to determine the time period for which it leads the economy can be undertaken. Experience with such leading indicators usually shows the lead time to be highly variable.

A Concluding Caution

There is one final note on the use of leading indicators to predict turning points of an economy. While economists are usually aware of the limitations in using such techniques to predict the future, sometimes observers of the indicator—including the media, management, and policymakers—give the outcomes too much credence.

Publication of results should always be accompanied with several caveats. These include: (1) the leading indicator should always be used only in conjunction with other analysis, (2) lead times are always variable, and (3) placing too much weight on any given monthly change is misleading. While a change in the leading indicator could signal the beginning of a trend, it could also be a statistical "wiggle" that will be reversed by the next month's data.

Interpreting the DBEDT LEI *continued from page 3*

The LEI turned down after June 1997 and may have reached a trough in September 1998 (Figure 5). It is too soon to know whether a new upturn has been reached. However, over this period, the largest sources of decline were negative movements in long- versus short-term interest rates, slower Japanese earnings growth, and lower growth in consumer confidence and construction permits. Reduced growth in real estate prices and lower average working hours also shrank the indicator. On the positive side, the number of real estate sales, lower initial unemployment claims, and improvement in the national leading index moderated the decline in the LEI.

As this discussion indicates, the sources of movements in the LEI vary from one phase of the economic cycle to another. In the months ahead, further experience with the LEI and changes in its components will help deepen our understanding of Hawaii's economy.

Introducing the DBEDT Leading Economic Indicator *continued from page 1*

economic indicator series for Hawaii by building on FHB's experience. The Department is indebted to Dr. Leroy O. Laney, former chief economist for First Hawaiian Bank and currently Professor of Economics and Finance at Hawaii Pacific University, for his knowledge and assistance in helping to develop the new DBEDT index and for preparing much of the material for this report. The new index was finalized and tested by the Research and Economic Analysis Division (READ) through the efforts of Dr. Christopher Grandy, DBEDT economist. The Leading Indicator will be updated by the division's Statistics Branch.

Development of the Indicator Series

A leading economic indicator strives to signal a change in the direction of economic activity several months in advance. There is a national Leading Indicator series maintained by the Conference Board which consists of ten variables thought to "predict" or "lead" changes in the U.S. economy. The discontinued FHB Leading Indicator also contained ten components. In general, a desirable leading indicator anticipates the main turning points of the economy with a fairly stable lead time. It should also minimize the number of "false" indications of economic changes. Of course, no index perfectly meets all of these criteria.

Reference Series

In developing the DBEDT Leading Indicators series, it had to be determined what, precisely, the leading indicator would be leading. Thus, a concurrent indicator of economic activity, or reference cycle, was developed to provide reference points for changes in either the direction of the economy or significant changes in its rate of growth.

The standard measure of economic activity is Gross State Product (GSP), which is the value of goods and services produced by the state's economy over a period of time. Unfortunately, data on GSP are available only on an annual basis, which is not frequent enough for a meaningful leading indicator series.

Personal income was a potential candidate as a reference indicator. The measure is

Components of Hawaii's Leading Economic Indicator

COMPONENT	SOURCE OF DATA
Hawaii	
Number of Oahu Real Estate Transactions Change in the growth of the number of transactions measures the volume of real estate activity and can reflect relative consumer and investor confidence.	Honolulu Board of Realtors
Oahu Real Estate Prices Growth in average residential real estate prices also measure consumer and investor confidence and the movement of an important component of Hawaii wealth.	Honolulu Board of Realtors
Initial Unemployment Claims Growth in initial unemployment claims catches the early signals of strength or weakness in the labor markets.	Department of Labor and Industrial Relations
Construction Permit Value Change in the value of construction permits and government contracts indicate future levels of construction activity.	F.W. Dodge and Bid Service Weekly
Average Working Hours Working hours in hotels, retail, and construction are often adjusted before employment levels and thereby indicate changes in the economy.	Department of Labor and Industrial Relations
National	
National Leading Economic Index Change in the national leading index summarizes the variables deemed to lead the total U.S. economy—a critical component of Hawaii's economic health.	The Conference Board
Pacific Region Consumer Confidence Growth in the index of consumer sentiment in the western U.S., where most of Hawaii's westbound visitors originate, should precede changes in visitor activity.	The Conference Board
Interest Rate Spread Changes in the difference between 30-year and 3-month U.S. Treasury rates often precede changes in economic activity in the U.S.	Economic Time Series Page http://bos.business.uab.edu/browse/
International	
Trade-Weighted Exchange Rate Change in an index of exchange rates, weighted by their share of trade with Hawaii, alter the cost of Hawaii exports—including tourism-related goods and services.	International Financial Statistics; Massachusetts Institute for Social and Economic Research (MISER) University of Massachusetts
Japanese Monthly Labor Earnings Change in the growth of Japanese wage and salary earnings can signal income shifts affecting Japanese demand for Hawaii products, including tourism-related goods and services.	International Financial Statistics, International Monetary Fund

Source: DBEDT.

quarterly. However, since the leading indicator will be calculated on a monthly basis it would be preferable to also have a monthly reference cycle indicator. Moreover, the reporting delay for personal income is nearly a half-year. Thus, it is not a very contemporary measure of economic activity, regardless of the basis for the data period.

The next most likely candidates for a reference indicator became State General Excise Tax (GET) Revenue and total wage and salary jobs. GET revenue is a natural candidate since virtually all sales in Hawaii are subject to some form of the GET. The total job count is also a good candidate because most people view providing jobs as one of the main purposes of economic activity. In fact, the job count was the reference series used for the FHB leading economic indicator series. Both the GET and job statistics are available on a monthly basis with a relatively short reporting delay.

By comparing both of these series on an annual basis with GSP, it was found that the jobs indicator performed better than the GET revenue indicator. Changes in GET revenue tended to lag changes in GSP, while changes in jobs were contemporaneous with changes in gross state product. For this reason, the year-to-year percent change in the job count was chosen as the reference series for DBEDT's Leading Indicators Project. The jobs series was filtered and smoothed with a 12-month moving average.

Selecting Component Indicators

The next step was to select components that would make up the overall Leading Indicator. Ten components, the same number as found in both the national and former FHB leading indicator series, were considered to be a sufficient number for an adequate cross-section of indicators, but not so many as to make maintenance of the indicator series too costly. In choosing the ten components, the components of the FHB indicator series were reexamined along with some additional indicators reflecting coverage of important economic sectors (such as real estate) and additional influences on Hawaii's economy (such as Japanese economic activity). The complete set of economic indicators that were considered is shown in Table 1.

Choice of Components and Weighting

For each component, the data series was analyzed for its statistical properties using time-series analysis techniques. Then each series was individually "tested" with respect to its ability to explain the course of the reference series (change in wage and salary jobs) over time. Those series that helped explain future variations in jobs (that is, those that led the reference indicator) were retained for further analysis; those series that did not meet the test of adding explanatory power to jobs were rejected. Column 2 of Table 1 indicates which of the initial set of variables helped explain variations in jobs and those that did not.

The final components were chosen on the basis of the magnitude of their effect on jobs and each was given an equal weight. The equal weighting procedure required a further transformation of the components to put them in similar units. This was accomplished by "standardizing" the variables. This procedure involves subtracting the series mean (average) from each data point in a component and dividing that result by the standard deviation of the series (a measure of the series' variability). In column 3 of Table 1, the ten indicators ultimately chosen to make up the composite indicator are indicated with an asterisk (*).

As a result of the statistical "standardizing" process, the resulting numerical series is somewhat abstract. In addition, the process results in a data series that is completely, although only slightly, revised each period as the mean and standard deviation change with additional months of new data. As a result, the reporting and analysis of the LEI will focus on whether the movement for the period has been positive or negative rather than a numerical representation of the movement.

Table 1: Candidate and Final LEI Components		
Component	Helps Explain Jobs?	Final Component (*)
Construction Permits	Yes	*
Average Working Hours (construction, retail, hotels)	Yes	*
Initial Unemployment Claims	Yes	*
Number of Oahu Real Estate Sales	Yes	*
Real Oahu real estate sales	Yes	*
National Leading Index	Yes	*
U.S. Pacific Region Consumer Confidence	Yes	*
Yield Curve (30 year less 3 month Treasury yield)	Yes	*
Trade-weighted Exchange rate	Yes	*
Japanese Earnings	Yes	*
Civilian Employment	Yes	
Number of days on market for Oahu real estate	Yes	
Visitor Arrivals	Yes	
Average Daily Visitor Census	Yes	
AAA corporate bond rate less 30-year Treasury bond rate	Yes	
Federal Funds Rate	Yes	
Japanese Exports	Yes	
Japanese Industrial Production	Yes-marginally	
Hawaii Stock Prices	Yes-marginally	
Hawaii Bank Credit Demand	Yes-marginally	
Japanese Manufacturing Employment	No	
Japanese Stock Prices	No	
Real Billed Electricity Sales	No	

Source: DBEDT.

The components, on the other hand, will be reported with information about their contribution to the total positive or negative change in the overall indicator. This will make it easier to see what components had the dominant impact on the LEI for a particular period.

Conclusions and Extensions

DBEDT's new Leading Economic Indicator series extends and updates the leading economic indicator series that was produced for many years by the First Hawaiian Bank. DBEDT has benefited from FHB's experience in producing the index and hopes the new Leading Indicator will be found equally useful by those monitoring the economy.

Forecasting the Economy with Leading Economic Indicators

While many economic forecasting efforts try to determine *how much* the economy will grow (or decline) in the future, a leading economic indicators series, tries to determine *when* the economy might be expected to change direction, be it up or down.

Forecasting Techniques

One of the most basic methods of forecasting is *extrapolation*. This simply involves projecting current trends into the future, whether it be through the use of moving averages, or seasonal patterns of the available data. While these techniques may seem overly simple, in some situations, they may yield sufficient answers and may be as accurate a forecast as those resulting from more complicated approaches.

Opinion surveys represent another forecasting technique. This technique amounts to asking businesses and consumers what they *think* is going to happen. The trouble with this approach is that good surveying can be expensive the larger the sample gets and it sometimes takes a large sample to achieve the desired degree of accuracy.

More sophisticated *econometric techniques* can also be used to forecast economic conditions. These can range from single-equation forecasts to huge macro-models.

Barometric Forecasting Methods

One forecasting approach that is well suited to the leading indicator's job of signaling changes in direction is *barometric forecasting*. This approach rests on the logic that key current developments can serve as a barometer of the future, if the key developments can be identified and put into the form of a statistical time series.

The barometric, leading indicators approach is often traced to work done at the National Bureau of Economic Research from the 1920s through the 1940s. Since then, there have been a number of applications of the leading indicator approach at the national, international, and regional levels. From 1961 until 1995, the U.S. Department of Commerce published leading, coincident, and lagging indicators in its *Business Conditions Digest*. This was taken over by The Conference Board, a private non-profit group in New York, which publishes these indicators in its monthly *Business Cycle Indicators*.

A leading indicators series is usually constructed using several carefully chosen statistical time series. When a leading indicators series is working correctly, the significant upward and downward movements in the indicator lead the ups and downs of the real-world phenomenon it is supposed to measure by some period of time. Statistical techniques are often used to verify that the leading economic indicator series is, in fact, leading the economy, and sound theoretical reasoning should underlie the choice of the variables.

Leading Versus Reference-Cycle Indicators

The leading indicators approach requires a coincident or reference cycle indicator that describes the current state of the economy, so as to judge the accuracy of the predictions. Good candidates for reference cycle indicators might be a series on payroll employment, personal income less transfer payments, an index of industrial production, and retail sales. Leading indicators are supposed to begin a downtrend before the peak of the reference cycle indicator, and turn upward before the trough in the reference cycle is reached. Time series data of variables that may be used as leading indicators for the economy include stock prices, changes in business inventories, consumer expectations, building permits, and new orders for goods and materials—just to name a few.

Combining Component Indicators

A very simple and straightforward way to combine individual indicators into a composite, leading indicator is through a diffusion index. The diffusion index is based only on the percentage of the indicators that are rising in any given period. For example, if there are 10 separate indicators in a diffusion index and 6 are rising in a given month, the value of the

diffusion index for that month is 60. Thus, the diffusion index changes value only when one or more series changes direction, rather than when one or more components accelerate or slow. While this helps the composite series anticipate trend reversals, diffusion indexes are usually more volatile. Thus, diffusion indexes should be used in combination with the composite approach.

A more complicated way of combining several distinct time-series indicators into a single, composite indicator series, is to develop a scheme for *weighting* the individual time series. Components may be equally weighted—for example, 10% each if there are ten time series components, 20% if there are five components, etc. Alternatively, they may be weighted according to their importance, as determined by theory or empirical evidence.

Caveats about Leading Indicators

Like all forecasting techniques, the leading indicator method has its limitations. For instance:

• While the leading indicator may warn us about a change in the *direction* of the business cycle, they do not provide us with very reliable information about the *magnitude* of that change.

• Moreover, the magnitude of change of the indicator in any one direction is not necessarily a measure of how good or bad the economy is likely to get. It is only when the indicator clearly reverses direction that its value as a forecasting tool is relevant.

• The component indicators of the overall leading indicator often are not consistent with one another in their predictions. Rarely do all indicators signal a change in direction at the same time.

• It is hard to decide when a leading indicator is signaling a true turn in the cycle or is showing a variation that will be reversed in subsequent observations. Rules of thumb like "three consecutive downturns during an expansion signal a recession" and "three consecutive upturns during a recession indicate an end to that recession" are not always reliable.

• Ironically, the widespread use of a reasonably reliable leading indicator may, in itself, lead to less reliability in the indicator over time. This can happen if players in the economy act on the forecast and alter either the economic outcome or the "lead" time between the indicator and the economy.

Despite its drawbacks, a leading indicator series, in conjunction with other forecasting results, can help economists, business and government predict and prepare for significant changes in the economic environment.

The U.S. National Index of Leading Economic Indicators

By far the most well-known leading economic indicator is the U.S. Index of Leading Economic Indicators, developed and published by the U.S. Commerce Department until the end of 1995. The Commerce Department's index accurately predicted most U.S. recessions from 1958 on. However, it did not predict the nation's last recession in 1990, and it sounded a few false alarms, including five consecutive down readings in 1995.

In 1996, the federal government bequeathed the project to The Conference Board, a private non-profit group based in New York. At that time, The Conference Board dropped and added a few components.

The most innovative change made by The Conference Board was the addition of the interest rate spread. Research has shown that the spread between long- and short-term interest rates is a better predictor of the national business cycle and inflation than most other measures.

Tests show that the current Conference Board index would have predicted, from 3 to 15 months in advance, all six U.S. recessions from 1958 to 1990. It would have also predicted emergence from those recessions, from 2 to 8 months in advance.

Ten Components in the Current U.S. Leading Index

• Average weekly hours in manufacturing
• Initial claims for unemployment insurance
• New orders, consumer goods and materials
• Vendor performance, slower deliveries
• New orders, non-defense capital goods
• Building permits
• Stock prices, 500 common stocks
• Money supply, M2
• Index of consumer expectations
• Interest rate spread, 10-year Treasury bonds less the Federal Funds rate

The new DBEDT Leading Economic Indicator Series draws heavily from the experience of the First Hawaiian Bank (FHB) Index, discontinued in 1998. In this article, the former director of the FHB Research Department, Dr. Leroy Laney, describes the development and performance of that index.

Predecessor Indicator Series:
The First Hawaiian Bank Index of Leading Economic Indicators

By Leroy O. Laney, Ph.D.
Professor of Economics
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Hawaii Pacific University

One local Hawaii application of the leading Indicator forecasting technique was the Index of Leading Economic Indicators published by FHB from 1987 to 1998. The index enjoyed wide media coverage, and over most of its life, it provided reasonably accurate readings on the future of the state economy.

The original FHB leading index was computed from 1987 to 1991. It had ten components, three of national origin and seven of local origin. Because the index was published monthly, the choice of components making up the index was limited by availability of monthly data.

While the FHB composite index gave false signals on occasion, it was a fairly reliable predictor of overall Hawaii economic activity. For example, it correctly forecasted Hawaii's 1982 recession, which corresponded to a prolonged, national recession.

1991–1998 Version of the FHB Leading Index

In 1990, it was concluded that the index should be revised, mainly because it became evident that the structure of Hawaii's economy had changed. Designing and testing the revised leading index required choosing a coincident economic variable, or reference cycle, against which the new index could be evaluated. To define this reference cycle, the monthly non-farm payroll employment series— published by Hawaii's Department of Labor and Industrial Relations—was chosen. This data series is often used by regional analysts as a proxy for local economic activity. It is a comprehensive number computed from a relatively large sample, and it requires no inflation adjustment.

The FHB leading index came in five different versions—one for the state and one for each of Hawaii's four counties. Generally speaking, because less data are available at the county than the state level, the state index was a more accurate predictor than the county indexes. The ten index components of the revised statewide index are listed in the accompanying box.

Forecasting Record of the FHB Leading Index

The revised version of the FHB leading economic index performed well on balance, from its inception in 1991 to its discontinuation. The index did reasonably well in predicting rates of change in job creation, even though it did so with sometimes long and variable lags. However, its performance generally was better in its first years than toward the end, suggesting that the time was probably ripe for yet another revision.

Components of the First Hawaiian Bank Leading Indicator Index

- *Expected Consumer Purchasing Power.* (6%) Difference in yield between the 3-year and the 3-month Treasury securities.
- *Monetary Policy.* (6%) Federal Funds rate.
- *National Leading Economic Index.* (10%)
- *Trade-Weighted Exchange Rate.* (10%)
- *Hawaii Stock Index.* (12%)
- *Average Work Week Hours.* (10%)
- *Total Visitor Count.* (14%)
- *Credit Demand.* (14%) Changes in the loan portfolio of First Hawaiian Bank.
- *Construction Contracts.* (12%) Residential and non-residential plus public contract awards.
- *Labor Market Conditions.* (6%) Initial intrastate unemployment claims.

Economic Conditions & Outlook

Measures of activity continue to paint a mixed picture of Hawaii's economy. Some indicators, such as real personal income and gross state product, have performed better than expected while others, such as tourism and jobs, continue to lag.

Labor market indicators, in particular, are sending mixed signals. While civilian employment grew by 0.2 percent from 1997 to 1998, the number of nonagricultural wage and salary jobs fell by 0.3 percent. The dichotomy may indicate a change in the structure of employment in Hawaii toward more self-employment.

Personal income grew 1.6 percent from the third quarter of 1997 to the third quarter of 1998 (the latest data available). For the year, the rate of growth was on course for a 2.1 percent increase over 1997. However, because the

> *While overall measures of economic activity remain mixed, the Neighbor Islands are outperforming Oahu.*

price level, as measured by the Honolulu consumer price index, actually fell for 1998, inflation-adjusted personal income is estimated to have grown by a slightly higher, 2.3 percent.

The visitor industry continues to suffer indirectly from the Asian economic crisis. Total visitor arrivals declined by 1.9 percent in 1998. All of the reduction came from eastbound tourism, which was 10.8 percent lower in 1998 than in 1997.

On the other hand, westbound visitor arrivals have been strong. The number of westbound arrivals increased 4.1 percent for 1998. Moreover, both eastbound and westbound lengths of stay have been rising in recent months.

Private construction activity may be starting to pick up on Oahu. The value of private building authorizations rose by 11.0 percent in the City and County of Honolulu from the fourth quarter of 1997 to the fourth quarter of 1998.

County Economic Conditions

The Neighbor Island counties generally outperformed Honolulu in 1998. The preliminary count of nonagricultural jobs grew in Kauai County (2.4 percent) and Maui County (1.2 percent) in 1998.[1] Hawaii County and the City and County of Honolulu both experienced job losses for the year.

On Kauai, the largest percentage increase in jobs came in construction (11.1 percent for the year). But the largest numerical increase came in services, followed by retail trade. For 1998, Maui County experienced some increase in construction jobs (2.5 percent), but larger increases in transportation, communications, and utilities (3.9 percent) and a larger numerical increase in services (460 jobs).

The largest percentage increases in visitor arrivals occurred in Hawaii and Kauai Counties (at 6.6 percent and 3.1 percent, respectively, for 1998 over 1997). However, only Hawaii County experienced higher eastbound traffic for 1998 (12.2 percent).

Maui County experienced a small, 0.1 percent, increase in total visitor arrivals in 1998 over 1997. Eastbound arrivals fell over the period by 13.8 percent, but westbound arrivals were up by 3.6 percent. The City & County of Honolulu experienced a 5.5 percent decline in total visitors for 1998, all of which came from the eastbound market segment. Westbound visitors to Honolulu increased 0.6 percent in number for the year.

Economic Outlook

Except for jobs and tourism, economic activity was stronger than expected in 1998. But concerns about continuing problems in Asia, and a potential easing of growth on the Mainland, have led the Department to leave its forecast for the next several years essentially unchanged from late 1998.

DBEDT's 1998 forecast for real personal income growth was 1.8 percent, but the actual growth rate is estimated to have been about 2.3 percent. Real gross state product growth should be about 2.2 percent when final data are compiled, about 0.5 percentage points above DBEDT's earlier projection. On the other hand, visitor arrivals fell slightly more than expected in 1998-by 1.9 percent, rather than by the 1.6 percent decline forecast earlier.

U.S. and Japan

Some of the strength in Hawaii's recent income growth is probably due to growth on the Mainland. The U.S. economy grew by a robust 3.9 percent in real terms in 1998. The March 10, 1999, Blue Chip Economic Indicators reported a consensus forecast of 3.3 percent growth in 1999 and 2.2 percent growth in 2000. Inflation, as measured by the Consumer Price Index, is expected to be 1.9 percent in 1999 and 2.3 percent in 2000.

Yet problems remain in Japan. The Blue Chip Economic Indicators reports a consensus forecast of a 0.8 percent decline in real Japanese gross domestic product in 1999 and 1.0 percent growth in 2000. By comparison, Consensus Forecasts-USA expects a real decline in Japan's GDP of 1.1 percent in 1999 and a 0.2 percent increase in 2000.

The value of the yen, an important factor for Japanese visitors to Hawaii, currently stands at about 118 per dollar. The latest Blue Chip forecast for 1999 is 123.0 and 118.4 for 2000. For comparison, the Consensus Forecasts-USA projected rate is 117.2 in May 1999 and 120.4 in February 2000. Although a stronger yen would help strengthen Hawaii's economy, it is some comfort that prevailing forecasts do not see a significantly weaker yen.

Outlook for Hawaii

DBEDT currently expects visitor arrivals to increase a modest 0.7 percent this year and 1.1 percent in the year 2000. Due to the uncertainty of economic conditions beyond that point, tourism growth is assumed to remain at 1.1 percent for 2001.

The recent period of deflation (falling consumer prices) is not expected to continue. Last year's 0.2 percent decline in the Honolulu CPI-U will likely give way to a 0.5 percent increase in 1999, building to a 1.3 percent yearly rate by 2001. DBEDT therefore anticipates a lower, 1.6-percent growth for both real

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[1] All county jobs data are preliminary and subject to change. Please see note following table on page 12.

Very modest growth with somewhat more inflation is expected for Hawaii over the next two years.

personal income and gross state product in 1999. The rate for the two measures will continue declining gradually to about 1.0 percent by 2001 as inflation edges up and cuts into real growth.

Wage and salary jobs should begin to grow very modestly this year with a 0.1 percent increase over 1998. This pace should increase to 0.6-percent growth rates for both 2000 and 2001.

Selected Economic Indicators: State

Series	Period (calendar year basis)		Percent change from same period of previous year	
	1998 (12 mo.)	January 1999	1998	January 1999
Civilian Labor Force (persons)[1]	597,050	600,500	0.1	1.2
Civilian Employment	559,750	564,250	0.2	1.4
Civilian Unemployment	37,300	36,250	-2.4	-1.0
Unemployment Rate (percent)[2]	6.2	6.0	-0.2	-0.2
Total Wage & Salary Jobs (number)	537,650	532,000	-0.2	-0.2
Total Non-Agr. Wage & Salary Jobs	530,000	524,650	-0.3	-0.3
Contract Construction	21,250	20,600	-4.7	-1.9
Manufacturing	16,300	16,100	-1.5	-1.5
Trans., Comm., Utilities	41,000	40,300	-0.7	-2.4
Trade	131,750	130,450	-1.9	-1.6
Retail	110,750	109,500	-2.3	-2.1
Finance, Insur. & Real Estate	35,500	35,100	-1.8	-0.3
Services & Miscellaneous	171,950	171,700	1.6	1.8
Hotels	37,750	37,300	-1.6	-2.7
Government	112,200	110,400	0.4	-0.6
State	64,950	63,800	1.1	-0.7
Federal	30,400	30,200	-0.8	-0.7
Agriculture Wage & Salary Jobs	7,650	7,350	6.3	0.7
Taxes ($thousands)				
Total State Tax Collections	3,367,700	309,032	3.6	-2.5
State General Fund Tax Revenues[3]	2,889,291	276,579	4.8	-1.9
Selected Taxes				
Trans. Accom. Tax Revenue	125,882	7,443	-0.8	-7.2
General Excise & Use Tax[4]	1,436,654	108,049	0.3	-7.3
Individual Income Tax Collections	1,093,241	101,247	11.0	-24.7
Corporate Income Tax Collections	50,113	6,333	-9.9	-5.4
Visitor Arrivals (persons)	6,743,140	545,040	-1.9	-1.8
Westbound Visitors	4,246,610	355,180	4.1	5.5
Eastbound Visitors	2,496,530	218,320	-10.8	-13.0
Hotel Occupancy Rates (percent)[2]	72.0	71.2	-2.0	-2.3

[1] Labor force and jobs averages are based on monthly rounded data. Labor force data were also rebenchmarked in March 1998. Self-employed data are no longer published by DLIR.
[2] Change is expressed in percentage points rather than actual percent change of the rates shown.
[3] If tax period ends on a weekend some of the collections may be shifted to the next period.
[4] Components may not reflect true collections due to unallocated net collections.
Note: Most data are preliminary and subject to revision.
Sources: State DLIR, HVCB, PKF-Hawaii. Compiled by EPIS/READ, DBEDT.

Selected Economic Indicators by County, October to December 1998 (value and percent change from same 1997 period)								
	C&C of Honolulu		Hawaii		Maui		Kauai	
Indicator	Value	Percent Change	Value	Percent Change	Value	Percent Change	Value	Percent Change
Unemployment Rate[1]	5.1	0.0	8.5	-0.5	6.1	-0.7	8.8	-1.6
Non-Agr. Wage & Salary Jobs[3]	400,900	-0.9	48,950	-0.9	55,600	1.3	24,350	4.1
Construction	15,650	-9.5	1,650	-19.5	2,200	4.8	1,150	27.8
Manufacturing	12,600	-1.2	1,450	-6.5	1,750	2.9	400	0.0
Retailing	79,350	-3.8	11,450	2.2	13,550	-0.7	6,450	4.0
Services & Miscellaneous	124,700	2.3	16,600	-3.8	22,200	2.1	9,100	7.1
Hotels	16,550	-4.6	6,450	-2.3	10,700	-0.9	3,600	5.9
Government	90,950	0.2	10,500	1.9	7,500	0.0	3,950	-1.3
State	51,000	0.7	7,350	2.1	5,150	-1.0	2,550	-1.9
Federal	28,750	-0.3	900	0.0	550	10.0	400	0.0
Agriculture Wage & Salary Jobs	2,350	11.9	2,500	-13.8	2,050	13.9	850	0.0
Visitors, Total Number[3]	1,127,780	-7.1	326,290	12.2	562,560	-0.6	262,990	9.8
Westbound	571,680	3.8	243,910	7.5	473,100	6.2	228,490	9.7
Eastbound	556,100	-16.2	82,380	29.0	89,460	-25.6	34,500	9.9
Room Occupancy Rate (%)[1]	68.9	-5.8	62.0	1.2	69.6	2.4	63.5	-3.1

Please Note: County wage and salary jobs data reported in this table are preliminary and subject to change. Revised data should be available on or about April 30, 1999. They may be acquired at the following web site: http://www.state.hi.us./dlir/rs/loihi/.
[1] Measured in change in percentage points rather than percent change in rates.
[2] Labor force and jobs averages are based on monthly rounded data. Labor force data were rebenchmarked as of March 1998.
[3] Preliminary data.
Note: Data for 1995 and 1996 were rebenchmarked by DLIR.
Sources: State DLIR, HVCB, PKF-Hawaii. Compiled by EPIS/READ, DBEDT.

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