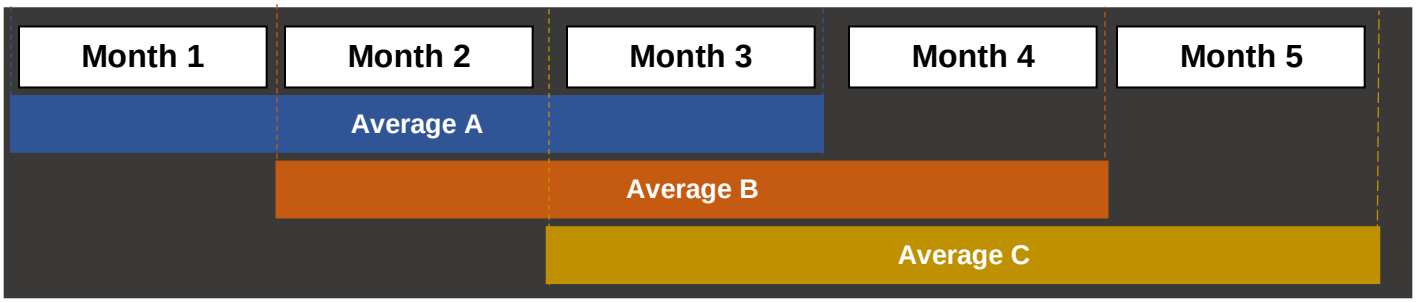
The Nebraska Economic Release by the Nebraska Department of Economic Development

TECHNICAL NOTE

The Nebraska Economic Release by the Nebraska Department of Economic Development (NDED) is a report released monthly that centralizes reported economic data relevant to Nebraska stakeholders. Moreover, the reported data is taken from several reputable sources such as the U.S. Bureau of Labor Statistics (BLS) and the Nebraska Department of Revenue (NDOR). It presents values of measures that describe current and future economic expectations, price-levels, general well-being of labor, productivity, and entrepreneurial conditions. The Nebraska Economic Release should only be used for informative purposes and is not an encyclopedia of economic data.

Description of Reported Data

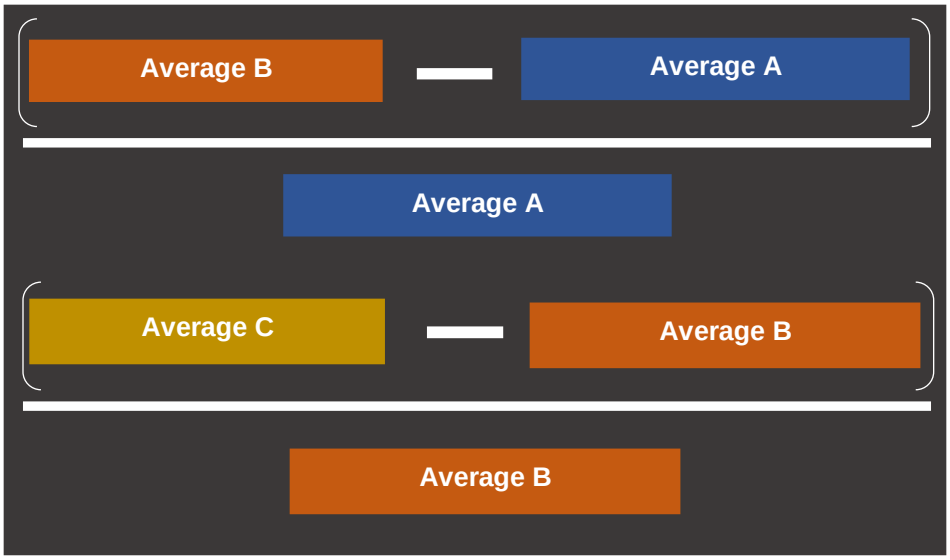
The Nebraska Economic Release reports the three-month rolling average of the reported measure as well as the *change* in it from month-to-month. We have diagramed how we calculate the reported value and change below.



Let's say we have five generic months to report. The first step in our process of calculation is to find the average value for every three adjacent months. In our diagram, we have done so as indicated by the colored boxes. More specifically, the value for *Month 3* is *Average A*, the value for *Month 4* is *Average B*, and the value for *Month 5* is *Average C*.

Why do we use the value of the three-month average rather than the value reported? Economics is complex, as any reported value is usually the sum and/or product of several demand and supply functions compounded together. One consequence of economics being complex is its ability to return values that have some sort of *randomness* baked into it. That pattern of randomness, which is usually the result of short-run changes and reactions to those changes, can be eliminated by averaging any value with the values of adjacent time periods. The value that is returned by the averaging will than only describe effects that all the months have in common. If we were to take the reported values as is, we may be reporting a value that entails uninformative information about the relevant future. Such may misinform the reader that the economy is doing much better or worse than reality.

The second step in our process is to subtract the past time period's average from the current time period's average to find the monthly change. We can than find the percent change by dividing the difference by the value of the previous time period. This step can be found in the diagram below



Furthermore, we offer the most recent 18-month history of a measure as an unlabeled line graph below the reported values and changes. The graphs come in various forms dependent on what geographic-level the measure is reported and if more than geographic-level is reported, the scale in values of reported measures. A singular line graph will be present if only one geographic level is reported (e.g., U.S. Yield Curve). A compound line is present if both national- and state-level measures are reported and their values are close in scale (e.g. U.S. and Nebraska Coincident Index). Lastly, side-by-side graphs will be presented if both national- and state-level measures are reported, and their values are not close in scale (e.g. U.S. and Nebraska GDP).

Description of Reported Measures

The reported economic measures in the Nebraska Economic Release attempt to provide a basket of measures that provide a holistic picture of the current and past economy to the reader. To do this, sixteen economic indicators that cover five general 'groups' of the economy were chosen.

Group 1 – Indicators

How do economists choose which measures to report to best portray the current state of the economy and the future? Unfortunately, simple statistics like the unemployment rate or inflation rate do not offer a complete picture. However, the goal to achieve an economic measure that completely describes the economy has been pursued

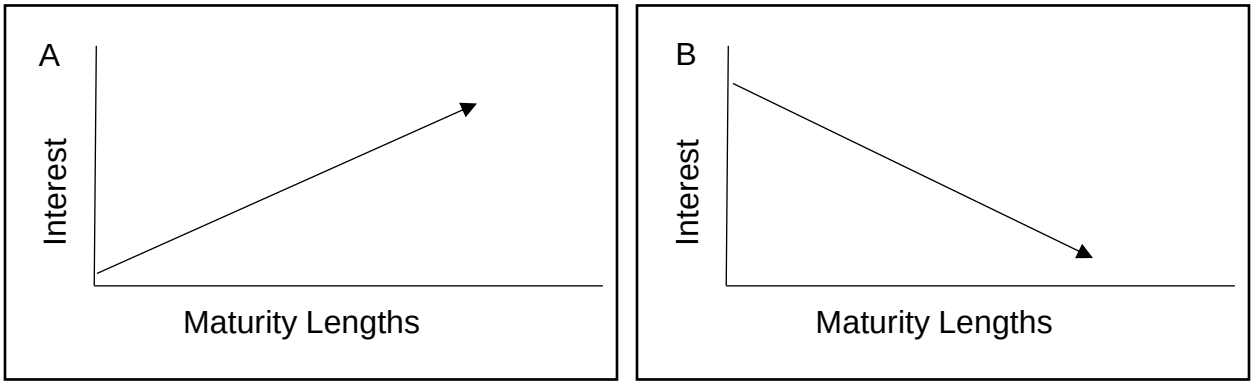
by many. These attempts often combine several economic measures into one index called an *economic indicator.* Economic indicators have been developed thoroughly enough to provide information about the current or future states of the economy; however, their number has grown to a point that taking all of them into account provides little to no information. Because of this, we have chosen three of the most trusted and used indicators to inform Nebraska stakeholders.

1. United States Treasury Bond Yield Curve

U.S. Department of the Treasury

The U.S. government offers investors treasury bonds with various lengths of maturity. In a market of growth, interest rates will rise as the length of maturity increases. This is because the longer one holds onto a treasury bond, the greater the risks are in receiving the bond's return. When graphed with maturity lengths on the *x*-axis and interest rates on the *y*-axis, a line with an upward (positive) slope will emerge (see *'Graph A'* below). Economists call this line the "yield curve".

One unique aspect of U.S. treasury bonds is their low risk when compared to other financial and/or investment instruments. Because of this, investors will invest relatively more in short-term treasury bonds when they perceive that there will be economic trouble in the coming future. Empirically, this behavior will cause interest rates for treasury bonds with lesser maturity lengths to rise relative to those with greater. Graphically, this will cause the yield curve to slope downward. Economists call this an "inversion" of the yield curve and have linked its occurrence in signaling recessions mere quarters before they occur (Benzoni, Chyruk, & Kelley, 2018). The greatest strength of the *U.S. Treasury Bond Yield Curve* as an indicator of the future economy is that it directly measures investor behavior rather than being the product or sum of several measures. In other words, we can place a general reason to behavior with a level of confidence that other indicators just don't have due to their convolution of variables.



Graphically, the yield curve usually adopts a positive slop (Graph A). However, behavior of investors often causes a yield curve inversion during the time prior to a recession as reflected in Graph B.

The values provided in the Nebraska Economic Release about the U.S. Treasury Bond Yield Curve is the interest rate difference between the 10-year and 1-year treasury bonds. The value that is returned can roughly be interpreted as the yield curve's slope. Positive values indicate positive perceptions (*Graph A)* while negative values indicate

negative perceptions (*Graph B*). Moreover, positive changes indicate increased confidence in the market while negative changes indicate the opposite.

2. Leading Economic Indicator for Nebraska

University of Nebraska-Lincoln

The Leading Economic Indicator for Nebraska (LEI-N) is a monthly indicator released by the Bureau of Business Research of the University of Nebraska-Lincoln that uses a standard approach for the creation of indicators but substitutes Nebraska-specific data. The data used that is unique to Nebraska include single-family home construction permits issued within the state, the number of passengers who use Omaha Eppley and Lincoln Municipal Airports, the U.S. dollar exchange rate, and survey responses from the *Survey of Nebraska Business*. Data used in the calculation of the LEI-N that is shared with the U.S. Leading Economic include initial unemployment claims and manufacturing hours worked. More information about LEI-N can be found in its' technical report.

3. United States and Nebraska Coincident Indices

The Federal Reserve Bank of Philadelphia

Since 2000, the Philadelphia Federal Reserve has released an index that reflects current economic conditions for the nation and each respective state. The reliability of these indices published by the Philadelphia Federal Reserve comes from borrowing methodology from Stock and Watson's formation of dynamic factor models (Stock & Watson, 1996). Put more simply, the researchers at the Philadelphia Federal Reserve found a way to create an index for all fifty states and the nation using the same methodology such that valid interstate comparisons could be made. The indices released by the Philadelphia Federal Reserve take into account state-level nonfarm employment, unemployment rates, average hours worked in manufacturing sectors, industrial electricity sales, and real personal income after transfer payments. Over the last twenty years since their development, the models have gone under tweaks of revision to increase their performance.

Group 2 – Prices

Price-levels have influenced economic stakeholders since the conception of markets. Often in the background, price-levels are experienced through every economic domain. Because of that, it is exceptionally important for an economic decision-maker to know the 'temperature' of prices at the time of a decision and where they may possibly go in the future. In the Nebraska Economic Release, we report three price-levels: the Producer Price Index, the Consumer Price Index for all urban customers, and the Federal Housing Finance Agency index.

1. United States Producer Price Index

An economic transaction can be perceived as having two sides: the producer and the consumer. Subsequently, price-levels can be examined the same way. The Producer Price Index (PPI) measures the average price producers receive for their products and is

one of the U.S. Bureau of Labor Statistics' oldest measures. The PPI encapsulates nearly all economic sectors in which tangible goods are produced; however, the PPI fails to capture a significant portion (~30%) of the U.S. service sector. This should be kept in-mind as the American economy increasingly becomes service-intensive. Moreover, it should also be noted how the PPI differs from the Consumer Price Index, also reported. When calculating the PPI, researchers of the U.S. BLS take into account *all variables* that affect price. For example, if a firm charges different prices for chairs made out of pine relative to cedar, than the calculation of the PPI will take into account the price differentials. Calculation of the Consumer Price Index would only include the price paid at the register for the chair, regardless of the wood that it is constructed of.

3. United States Consumer Price Index

The U.S. Consumer Price Index (CPI) covers the "consumer" side of transactions and measures the average price consumers pay at the register. More specifically, the Nebraska Economic Release reports the CPI for all urban consumers as reported by the U.S. BLS. Another aspect of the CPI that differentiates itself from the PPI is how its calculation integrates factors of geography. The first step that BLS researchers do to calculate the CPI is to calculate the costs of good-types (e.g., housing, apparel, etc.) according to geography. Because of this, the CPI is often used as a *cost of living* measure for comparison across geographies. Furthermore, the U.S. BLS calculates various forms of the CPI to describe the various contexts that a consumer may find themselves in. For example, the CPI-W is formed around the budgets of urban wage earners and clerical workers and the CPI-U (the measure we report) eliminates household budgets of rural areas, farming households, and the military from the analysis.

4. United States Federal Housing Finance Agency Price Index

As the cost of housing has risen through time to take up a larger proportion of household budgets, so has its inclusion in economic analyses when examining the behavior of Americans. According to the most recent data of the U.S. BLS Consumer Expenditure Survey (CEx), the average American spent about 1/3rd of their budget on housing. Furthermore, homeownership has been a staple to the American dream for decades. Because of this, the Nebraska Economic Release reports the U.S. Federal Housing Finance Agency's Price Index (HPI) to provide the reader with information of trends in the housing sector. More specifically, the Nebraska Economic Release reports the *Monthly Purchase-Only Index* from home purchases that are processed by Fannie Mae and Freddie Mac, federal agencies given the power to ensure a stable supply of mortgage funds within the U.S. HPI data is based on Census tract-level single-family home purchases; thus providing a robust measure of housing prices.

Group 3 – Labor Markets

Workers are foundational to the economy as they are the individuals directly adding value to inputs to create products. Because of that, examining the health of labor markets are essential to a growing economy. An issue that comes with that responsibility, however, is

selecting which measures to report out of the tens that are published. We have tried to provide a diverse set of measures that describe the current status of state and national labor markets. More specifically, we have made the decision to report state and national average annualized weekly private earnings, the unemployment rate, non-farm employment, and the hires-to-layoffs ratio.

1. United States and Nebraska Average Annualized Weekly Private Earnings

U.S. Bureau of Labor Statistics

The U.S. BLS reports the average hourly wage for all private workers based on earnings for the nation in the Current Employment Survey (CES) and states in the Local Area Unemployment Survey (LAUS). NDED takes these measures and annualizes them (for ease of understanding). One aspect of only analyzing private wages instead of wages of *all* workers is the fact that jobs in the private sector may be more reflective of market conditions. This is because a significant portion of wages for non-private sector jobs are set in law such that they cannot be changed according to the whims of the economy. On the other hand, private business does have the flexibility to adjust wages and hours (considering the number of weekly labor hours worked also affects average weekly earnings) in real-time that such could be observed in the data.

2. United States and Nebraska Unemployment Rates

U.S. Bureau of Labor Statistics

The unemployment rate has been one of the most reported measures in the history of economics and the tradition will continue in the Nebraska Economic Release. Although readers may be familiar with the measure, there is much nuance to unemployment rates than what meets the eye. The unemployment rate simply does not just measure the jobless as it makes an effort to filter out individuals who are not actively seeking a job, what the U.S. BLS calls *discouraged workers*. This is because discouraged workers are jobless not because the job market has been unreactive to their attempts to become employed but because they have made no recent effort to enter the job market. Economists have created the unemployment rate measure to be as reflective of current economic conditions as possible. In fact, they have made such an effort to create informative measures that they release several unemployment rates (U-1 through U-6) that are more restrictive in terms of who qualifies to be counted as their number decreases. The measure we report is the measure that the U.S. BLS classifies as the *official unemployment rate*, U-3.

3. United States and Nebraska Non-Farm Employment

U.S. Bureau of Labor Statistics

The most obvious way to measure the well-being of labor markets is to take an actual count of workers. Moreover, determinations about the economy can be made by simply observing how labor markets expand and contract. Like our reported measure of annualized weekly earnings, the U.S. BLS takes steps to filter out employment that is otherwise uninformative to current markets. More specifically, the U.S. BLS excludes

workers who could be perceived to be classified as having guaranteed employment such as farmers, military, etc. By removing these groups from the final non-farm employment count, the U.S. BLS is removing employed persons whose employment are not as sensitive to market forces. More specifically, their removal allows for changes in employment levels to be more confidently contributed to changes within the economy rather than non-economic factors.

4. United States and Nebraska Hires-to-Layoffs Ratio

U.S. Bureau of Labor Statistics

Another way to examine the health of labor markets is to analyze the patterns of change in employment that are out of the control of workers. More specifically, NDED takes state and national hires and layoffs as they are reported in the U.S. BLS's *Jobs Openings and Labor Turnover Survey* (JOLTS) to create a hires-to-layoffs ratio. The *JOLTS* survey makes an effort to collect counts and estimates of job openings, hires, firings, quits, and layoffs. One reason we chose to form a ratio with *hires* and *layoffs* rather than the other provided measures (i.e., firings, quits) is because the worker has relatively marginal control when compared to employers in these types of seperations. By analyzing the decisions of employers to pro-actively bring on or be forced to let go workers, we can indirectly get to how employers perceive the short-run economic state in response to real-time market signals. Another aspect is the sensitivity the measure is to short-run changes in either hiring or layoffs. For example, the stability of the U.S. hires-to-layoffs ratio has caused it to take on a value of about 2.5 hires for every 1 layoff since the year 2000. Indications of economic trouble in the measure have been indicated by significant, short-run decreases that bring the value below 2.0..

Group 4 – Productivity

Productivity examines the value of output of firms and workers and there are many ways to analyze it. *Do wages match productivity in terms of long-run growth? What is the average output per worker in the economy? How do firms behave when their expectations of future output are not met?* Each of the previous questions offers answers that provide nuance to economic analysis. The Nebraska Economic Release reports four productivity measures: state and national gross domestic product (GDP), national retail sales, state-level non-motor vehicle tax collections, and national manufacturing and trade inventories.

1. United States and Nebraska Gross Domestic Product (GDP)

U.S. Bureau of Economic Analysis

The most general measure of productivity is a geography's gross domestic product (GDP). The GDP of any area is the total market value of goods and services produced within it. Economists have used the measure for decades to describe the well-being and general success of certain geographies, as well as making comparisons between countries' economies. For the Nebraska Economic Release, we report the chained measure of GDP in 2012 dollars as reported by the U.S. Bureau of Economic Analysis

(BEA). More specifically, the U.S. BEA chooses a base year to transform annual measures of gross domestic product to account for inflation and then finds the average GDP for every adjacent year-pair. By averaging adjacent year-pairs, the BEA is removing marginal bias that is introduced to the GDP measure by seemingly random short-run effects. This process of transforming the GDP measure offers a more informative measure of productivity.

2. United States Retail Sales

U.S. Census Bureau

National retail sales are collected by the U.S. Census Bureau and can roughly be used as a measure of national consumption. More specifically, the Census Bureau collects sales information from firms that lie in the 'retail' range of NAICS codes that begin with either 44 or 45. Analysis of how national consumption changes over time can offer insight into how consumers perceive the economy. For example, a general increase of consumption after several quarters of inconsistent growth can indicate that consumers are more confident (in economic terms) to the point they are willing to spend a greater proportion of their income.

3. Nebraska Non-Motor Vehicle Sales Tax Collections

Nebraska Department of Revenue

State-level patterns of consumption can be examined by analyzing how the non-motor vehicle sales tax collections behaves over time. Factors of the sales tax, more specifically what is taxed, can offer some nuanced insights into the economy. For example, the Nebraska sales tax generally does not apply to necessities such as prescription medicines, gasoline, and food. Furthermore, sales tax collections from motor vehicles are removed from the measure. Because of these facts, we can perceive the level and changes in state-level non-motor vehicle sales tax collections to be representative of state-levels of consumption. This means that as sales tax collections expand, so does a household's willingness to expend their disposable income.

4. United States Retailors' Inventories

U.S. Census Bureau

Is there a way to evaluate vendors' expectations in real-time? Unfortunately, a real-time measure of vendor expectations is nearly impossible; however, one can use the levels and changes in U.S. inventories of retail to get a *hint* to how vendors expected their goods to sell over a monthly period and how their goods *actually* sold. The U.S. Census Bureau measures monthly the monetary value of manufacturing and retail inventories. Inventories are the amount of product a vendor has in-stock to sell to the customer and vendors periodically keep track of their value to ensure they have enough product to sell in the next period. Furthermore, vendors also don't want to order so much product that doesn't sell that their profits are negative. This balancing act can be informative if analyzed with care. If inventories rise over a period, then it can be roughly assumed that sales over that same period did not meet the expected sales of the vendor (a signal of a

market decreasing in confidence). On the other hand, if they contract, sales *did* exceed expectations (a signal of a market increasing in confidence). The Nebraska Economic Release reports *retailor* inventories (rather than manufacturers') as they are the first order of demand in the market. Retailors would not order from wholesalers if they did not have customers, and wholesalers would not order from manufacturer's if they did not receive orders from retailors. This fact allows us to examine inventory-levels based on the most fundamental form of demand that can be confounded when examining the inventories of wholesalers and manufacturers.

Group 5 – Entrepreneurship

A healthy economy is one that finds growth in new ideas, innovation, and nuanced business. When economists try to model economic growth, one variable that is often present is technology *or* technological advancement. Entrepreneurs are the economic agents that inject technological progress into economic growth by implementing new technologies into their production process. For example, the use of sewing machines in the clothing industry allowed producers of apparel to increase their output exponentially. The use of combustion engines in the logistics industry allowed inputs and outputs to reach their markets faster, reducing their shelf price. The use of computers, and generally the use of emerging communications technologies, has caused several aspects of the economy to increase in efficiency such as literal lightspeed trading and the ability to purchase inputs from a foreign producer at a significantly lower price.

1. United States and Nebraska New Business Applications

U.S. Census Bureau

The decision to file an application to form a new business takes into account a lot of market signals. With the risk of failure being salient, it is not an easy decision to risk one's livelihood to pursue such a venture. Because of that, the Nebraska Economic Release reports the amount of monthly new business applications filed by Nebraskans and Americans. We expect that when general market conditions are in the domain of growth, perspective entrepreneurs are more likely to file an application for a new business and we should be able to see that in the trend of new business applications. On the other hand, if there is a general sense of pessimism in the market, perspective entrepreneurs will be less likely to file a new business application and the monthly quantity should contract.

2. S&P 500

Standard and Poor's

Unfortunately, not all entrepreneurs have the ability to finance their idea. More than often not, individuals who desire to start their own business have to approach individuals or organizations with greater financial resources. Because of that, the Nebraska Economic Release reports the monthly average of the Standard & Poor's (S&P) 500 to tap the general market for investment funds. The S&P 500 is an index of carefully selected stocks

from companies that succeed in the general areas of market capitalization, liquidity, and country of operation. Furthermore, S&P makes an effort to diversify the basket of stocks in the index to ensure it is representative of the global economy. Because of this, the S&P 500 can be roughly used to “take the temperature” of investment funds. Moreover, we report the monthly average instead of the final value of the last relevant trading day in order to ignore changes in value caused by random market effects. For example, a one or two day rise in the S&P 500 can be the result of government action (e.g. interest rate change) rather than natural market developments. By averaging the daily values of the index, we are capturing only the changes in value of the S&P 500 that do not decay in the very short-run.

Benzoni, Luca., Chyruk, Olena., & Kelley, David. *(2018)* “Why does the Yield-Curve Slope Predict Recessions?” *Letter of the Federal Reserve Bank of Chicago.* 404:1.

Stock, JH., Watson, MW. *(1996)* “Dynamic Factor Models, Factor-Augmented Vector Autoregressions, and Structural Vector Autoregressions in Macroeconomics. *Handbook of Macroeconomics.* Chapter 8. pp415-525.