



# Idaho Economic Forecast

Brad Little, Governor

DIVISION OF FINANCIAL MANAGEMENT

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Executive Office of the Governor

October 2024

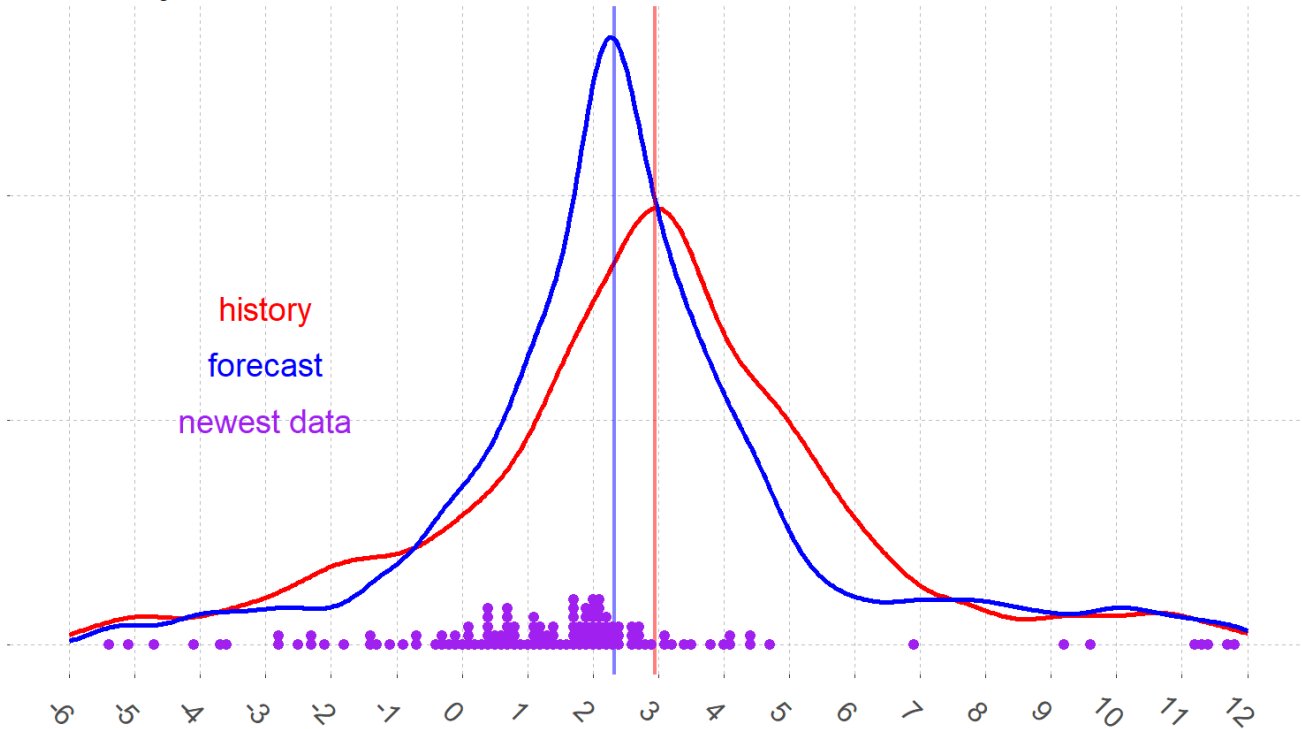
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- Forecast begins the third quarter of 2024
- Baseline outlook
- Alternative forecasts
- Analysis

## Density plots: growth rates for Idaho nonfarm employment

annualized growth: vertical lines show medians, 129 of 144 measures of new 2024h1 data shown



History ID DoL: 2013-2023. Forecast DFM: 2024-2029.

**Idaho  
Economic  
Forecast  
2024–2029**

State of Idaho  
BRAD LITTLE  
Governor

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## Introduction

This document summarizes Idaho’s economic forecast for 2024 through 2029. The primary national forecast in this report is the October baseline forecast for the US economy by Moody’s Analytics. The Idaho economic model takes the national forecast as an input.

Idaho Department of Labor provides monthly historical employment data. Employment data is now used at the monthly frequency, and seasonal adjustment is not performed perfunctorily. Data is complete through 2024m6. Wage data is also supplied by the Idaho Department of Labor. This data is only collected at the quarterly frequency. This is adjusted by DFM to monthly data consistent at the quarterly level.

Historical and forecast data for Idaho are available. These are now provided via [this link](#). The linked xlsx file includes data for broad sectors of the Idaho economy at the monthly frequency, and data for narrower sectors of the Idaho economy at the half-year frequency.

**Cover.** The cover graph is an illustration of typical annualized growth of the nonfarm jobs count in Idaho. It is very similar to the cover shown on the [April](#) and [July](#) editions. As in July, we show the accumulation of additional data. With six months of data in 2024, we now have  $6 \cdot 24 = 144$  points to add.<sup>1</sup> Of these 144 measurements, 129 result in points displaying on our graph. The remaining 15 would be outside of the range shown here; 9 would be to the left (so representing contractions steeper than 6% at an annual rate) and 6 would be to the right (so representing expansions steeper than 12% at an annual rate).

Notice how the preponderance of these points are accumulating between 0 and 4 on the horizontal axis, and that the most common placements are close to 2. Compare that with the median forecast growth of about 2 and 1/4 percent. Finally, note that the bulk of the points seem to fall within the range where the blue curve is highest, and that in terms of centering, they are left of where the red curve is highest. In all these ways we see that the newest data is conforming to the expectation communicated by the blue forecast curve.

It is our hope that by repeating the same type of graph three times and incrementally illustrating the discrete computations occurring behind its construction, part of the unfamiliarity of such graphs within the context of this publication series is overcome.

Housing is investigated in this edition of the report, so a recent Federal Reserve Bank of San Francisco publication on housing could provide context for that discussion. The [article](#) “When is shelter services inflation coming down?” by Òscar Jordà and Aren S. Yalcin of the FRBSF looks at the relationship between various measures of housing activity and household formation in the context of rent prices. Increase in those rent prices are the “shelter services inflation” of the title. The article also provides a good introduction to the data available on housing.

The FRBSF provides many publications, and other research letters can be found at their [website](#). Overall views of the economy are also published by the FRBSF. Those are published in their [fed views](#) series.

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<sup>1</sup> Each month’s data point leads to 24 measures of annualized growth by looking back across the prior 24 months; that is the method we have used partly because we are using not seasonally adjusted data and partly because looking back that far produces relatively smooth distributions.

Readers with any questions should contact Greg Piepmeyer at (208) 334-3900 or via email using [greg.piepmeyer@dfm.idaho.gov](mailto:greg.piepmeyer@dfm.idaho.gov).

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# Overview

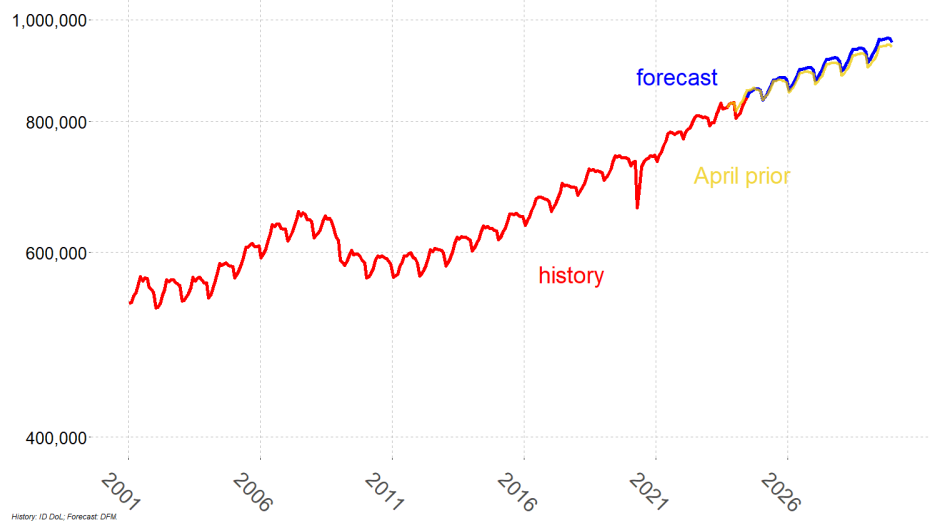
Our prior two editions indicated reasons for us adopting not seasonally adjusted data as the primary workhorse in our economic modeling. Our aim is to forecast revenue for the general fund; that revenue comes to the state in a not seasonally adjusted manner. Seasonal adjustment also is partly responsible for implying that the economy as a whole — and even in its parts — functions as a smoothly evolving machine. In reality, there are many swings back and forth across a year and from year to year. Not seasonally adjusted data informs us about those swings.

There are also statistical reasons to use not seasonally adjusted data. Some of these come simply from the switch to monthly frequency from the quarterly frequency. We get the full benefit of a larger data set. That allows us more opportunity to find stronger explanatory variables for the measures we seek to explain,

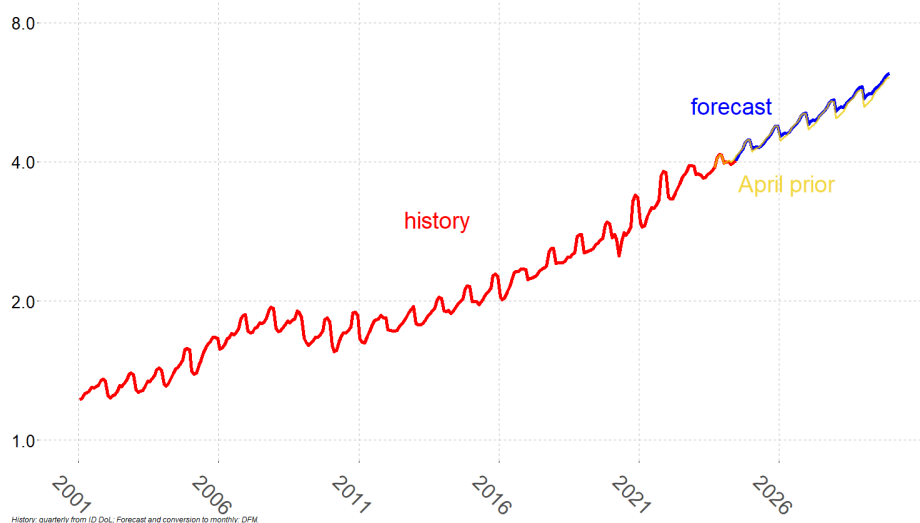
such as jobs counts and personal income components, and to use those to a fuller extent to further our final goal: getting a robust forecast for monthly general fund revenue.

**Modeling.** The data for 2023q4 was only slightly revised between the April edition and the July edition. New preliminary data was available in July for 2024q1, and now that 2024q1 data has been finalized and preliminary data is newly available for 2024q2 in this October edition.

**Idaho nonfarm jobs**  
not seasonally adjusted, log vertical scale



**Idaho wage bill**  
not seasonally adjusted, in billions of dollars per month, log vertical scale



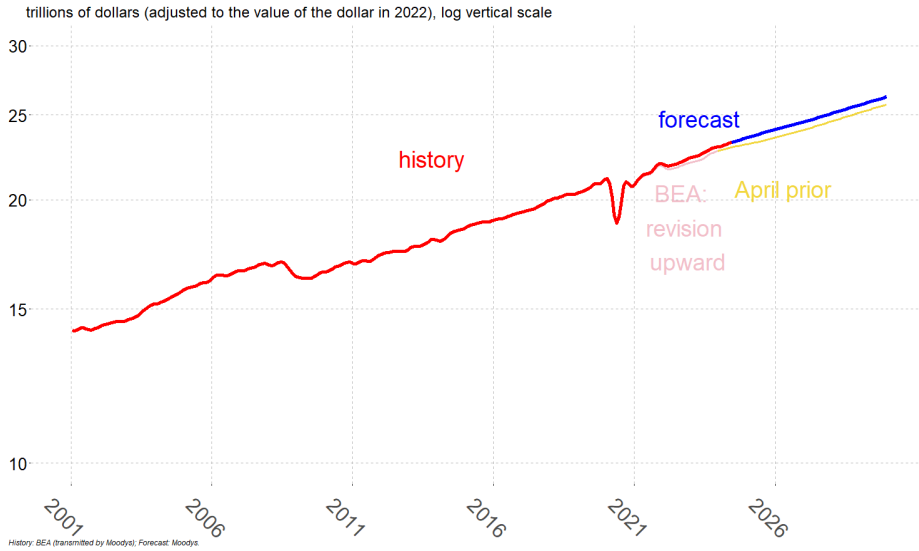
In accompanying graphs, we show the April forecast in comparison with the current October forecast, both for total nonfarm jobs in the state and total wages paid. The outlook remains stable. In this comparison, we see that there is an upward revision to expected jobs.

In a like manner we now have (finalized) quarterly wage data for 2024q1 and (preliminarily) 2024q2. By



examining the period where the gold and red portions of the wage bill graph overlap, we see that the expectations set out in the April forecast have largely been met. While that, at some level, suggests that the April forecast need not be revised, at another level it gives greater confidence that wage bills are coming in strongly. Our aim, with the baseline forecast, is to produce an outlook which is middle-of-the-road, or perhaps said another way, 50–50, meaning that it is quite conceivable that we will overestimate growth.

### US real GDP



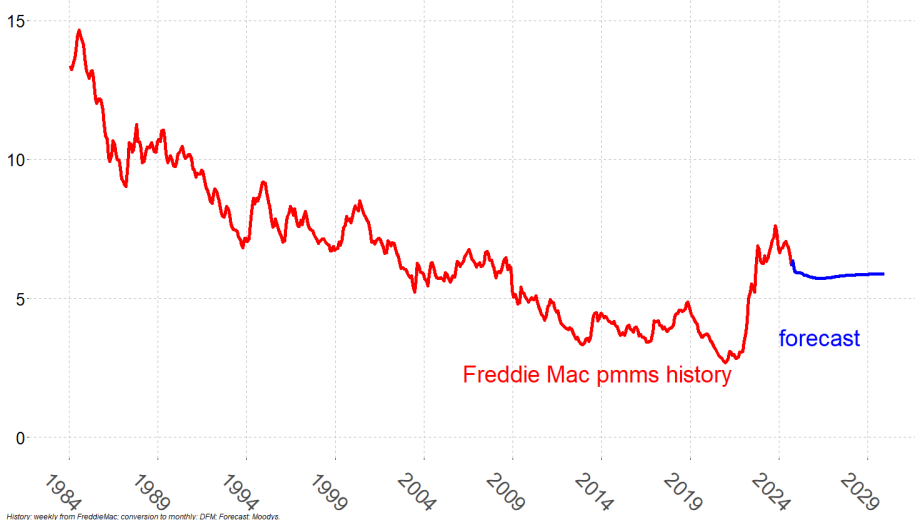
Much of the revision in the Idaho forecast can be attributed to an upward revision in data available at the national level. Part of that reflects more complete data from the Bureau of Economic Analysis, and part of that reflects the action that the Federal Open Market Committee took when it lowered short-term interest rates by half of a percentage point in September.

**Summary.** We find that the following data tables quickly describe a lot about the national and state economies. The first records variables key to the national economy. All of the data here is due to Moody’s.

US	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
inflation, CPI measure	1.3	4.7	8.0	4.1	2.9	2.4	2.4	2.3	2.3	2.2
real GDP growth	-2.2	6.0	2.5	2.9	2.7	2.3	2.1	2.1	2.3	2.3
Federal Funds rate	2.2	0.4	0.1	1.7	5.0	5.1	3.9	3.1	3.0	3.0
mortgage rates	3.9	3.1	3.0	5.3	6.8	6.6	5.8	5.7	5.8	5.9
employment growth	-5.8	2.9	4.3	2.3	1.6	0.9	0.5	0.4	0.4	0.4

Housing output for Idaho is summarized in our next table. The data is recording “thousands of units” per year, and the measure record activity from July of the prior year until July of the named year; that is the way the Census studies housing.

**National 30-year mortgage rates**  
not seasonally adjusted, vertical scale percents



The housing outlook is most strongly controlled by the forecast for mortgage rates. That forecast is a fairly steady one from Moody’s, and it has been so since the April edition.

Housing remains one of the key drivers of the revenue forecast, and that is why we include a substantial table of housing in this summary section; see page 11. An update to the revenue forecast will be published just after the state-of-the-state address by the Governor in January.

As is discussed further in the analysis section of this report, housing remains one of the main focuses for improving the modeling of the Idaho economy. It also remains one of the most difficult to get consistent measures across time.

Other summary tables for this publication can be found on pages 16 and 16.

<b>ID housing units</b>	2003	2004	2005	2006	2007	2008	2009	2010	2011
permits	13.9	15.8	19.2	20.6	14.8	9.8	5.2	5.6	3.7
starts	12.6	14.5	17.8	20.3	15.9	10.8	6.3	5.5	4.1
completions	11.7	14.2	16.6	19.9	17.0	13.1	8.4	6.3	4.6
Census: stock change	14.3	16.0	18.9	21.9	17.2	12.4	6.8	5.1	4.1
IEM: stock change	13.0	14.6	16.5	20.0	20.8	16.4	11.1	6.6	4.8

<b>ID housing units</b>	2012	2013	2014	2015	2016	2017	2018	2019	2020
permits	5.5	7.5	9.1	9.2	10.5	11.8	14.6	14.5	16.7
starts	4.8	6.8	8.4	8.6	9.6	10.9	13.5	14.0	15.5
completions	4.6	6.0	7.5	8.3	9.5	10.7	12.4	14.0	14.4
Census: stock change	3.9	6.2	8.5	8.5	9.7	11.8	13.9	15.6	5.1
IEM: stock change	4.0	4.4	6.7	8.4	8.7	10.1	12.2	14.5	12.8

<b>ID housing units</b>	2021	2022	2023	2024	2025	2026	2027	2028	2029
permits	19.0	21.2	15.3	18.6	20.7	23.3	24.7	25.9	26.8
starts	17.2	19.3	15.7	17.6	19.9	21.3	22.8	23.8	24.8
completions	17.3	17.7	17.3	17.2	18.1	19.4	20.9	22.0	23.1
Census: stock change	18.8	21.6	18.6						
IEM: stock change	8.8	19.3	20.8	18.0	18.6	20.4	21.9	23.1	24.2

## Current economic conditions

**Economic Watch.** The new release of real GDP (October 29, [first](#) estimate) came in at 2.8%. This compares favorably with the already released view of the first half (1st quarter was 1.6% and 2nd quarter stands at 3.0%). The estimate by Moody’s Analytics for the full calendar year (2024) is 2.7% in its October edition.<sup>2</sup>

The latest reading of inflation was released at the close of October. This was for personal consumptions expenditures; it is one of two widely cited inflation indices, and it happens to be the one that the Federal Reserve targets for its 2% inflation aim. The September reading was for 2.1% for the headline (broadest) measure, and 2.7% for the core measure, which excludes food and energy prices, which tend to be the most volatile and least predictive of where overall inflation is heading.

**International.** The International Monetary Fund (IMF) released its October edition of its [World Economic Outlook](#) (WEO). The IMF raised its outlook for the US and affirmed a growth outlook for the world overall, in particular for the next two years. However, the medium-term<sup>3</sup> global growth outlook from the IMF is “lackluster, at 3.1 percent” average annual growth.

Assumptions the IMF used in its two-year outlook include

- An average price of oil of just over \$81/barrel in 2024, and then \$72/barrel in 2025. Moody’s oil price outlook is for an average just under \$80/barrel in 2025.
- 10-year treasury yields for the US at 4.1% in 2024 and 3.5% in 2025.<sup>4</sup>

Currently, West Texas Intermediate oil traded just under \$70/barrel to close October. The 10-year treasury rate increase from about 3.7% to about 4.2% through October.

The major headline within the WEO is that inflation across the globe has successfully been contained, and that by the end of 2025, inflation will be below the average rate observed across two decades: 2000–2019. Progress seems to favor the advanced economies: the IMF sees “advanced economies returning to their inflation targets sooner than emerging market and developing economies.” The decline in the rate of inflation<sup>5</sup> has remarkably occurred without the economy entering a recession. The IMF calls the economy resilient for this achievement. Inflation’s rise was triggered by the shocks of 2019–2022: the pandemic and the shutdown, which cascaded to supply-chain disruptions and logistics problems, which were then exacerbated by wars and conflicts. Not all of these have abated, but “[m]uch of the disinflation can be attributed to the unwinding of the shocks themselves, followed by improvements in labor supply, often linked to immigration.”

The IMF notes

- population aging
- weak productivity

<sup>2</sup> For estimates using the latest available data, the Atlanta Federal Reserve Bank and the New York Federal Reserve Bank produce nowcasts of real US GDP growth. Those are available: [GDPnow](#) and [Nowcast](#).

<sup>3</sup> 5 years hence

<sup>4</sup> Moody’s 10-year treasury yield forecast is for 4.2% in 2024 and 4.1% for 2025 (and all the way through 2028).

<sup>5</sup> this is disinflation (i.e., slower price rises), not deflation (i.e., outright price declines)

are holding back world economic growth. Aging is pronounced in Japan, Korea, China, and in much of Europe, but it affects the US as well. Weak productivity is sometimes reinforced by protectionist policies. Adoption of new technologies can sometimes aid productivity. The US has recently shown greater productivity growth than other advanced economies, and “in the United States, wage growth has reflected productivity gains lately.” That last feature is helping the US achieve its 2% inflation target sooner.

As to risk, the IMF says:

Risks to growth are currently considered moderately tilted to the downside. The risk of global growth falling below 2 percent — an outcome that has occurred only five times since 1970 — in 2025 is now assessed at 17 percent, compared with 12 percent in April, in part because the risk of a recession in the United States has increased moderately.

The moderate rise in the risk of recession in the US is largely attributed to the gradually slowing labor market.<sup>6</sup>

**Monetary policy.** The Federal Reserve lowered its benchmark interest rate by 0.5 percentage points at its September meeting. The accompanying “dot-plot” summary of economic predictions indicated that the Federal Open Market Committee (FOMC),<sup>7</sup> the rate setting body within the Federal Reserve, is likely to lower rates further this calendar year.<sup>8</sup> As always this year, the FOMC reiterated in their statement accompanying the rate cut that the committee remains data-dependent and that future rate decisions will be made at the future meetings. This language is often interpreted as countering typical financial market narratives.

That September interest rate cut brought the federal funds rate down from 5.0–5.25% to 4.75–5.0%.<sup>9</sup>

Moody’s view of monetary policy going forward is for the federal funds rate to be cut in early November and again in December, with each of those cuts being 0.25 percentage points. The firm then expects further rate cuts across 2025–2026, with mid-2026 showing rates near 3%, with short-term rates eventually settling near 2.7% going into 2030.

**National.** In the summer, Moody’s position on the US economy was summarized by the firm as:

A full-employment economy is one with an unemployment rate around 3.5% to 4%, a 62.5% labor force participation rate, and a prime-age employment-to-population ratio in the range of 80%. The economy is at that level now. . . . Inflation seems to be slowing as needed for the Federal Reserve to implement its first cut in September.

<sup>6</sup> Moody’s October forecast “still calls for stability in the unemployment rate and a gradual slowdown in job growth over the next year.

<sup>7</sup> The FOMC is the rate-setting body within the Federal Reserve; it is composed of the Federal Reserve Board of Governors as well as the heads of the regional Federal Reserve Banks.

<sup>8</sup> Materials such as the dot-plot are available via <https://www.federalreserve.gov/monetarypolicy/materials/>. To obtain the most recent dot-plot, filter using “Chairman’s FOMC Press Conferences” and then select the relevant Projection Materials, either in HTML or in PDF.

<sup>9</sup> The FOMC has had a practice of setting a target range for the federal funds rate.

... A slowdown in growth remains the expectation for the remainder of the year.  
 ... We still expect job growth to cool to about 100,000 [jobs/month for the US]  
 by the end of the year.

Much of that view remains the firm's outlook. However, there are minor wording changes in their writing. Much like FOMC statements, it is possible to interpret nuance in the change of wording the firm employs. In the October release, the firm change from "The economy is at that level now" to "the economy is close to that level now"; the firm also replaced "unemployment rate around 3.5% to 4%" with simply "around 4%". These changes reflect that the US unemployment rate has now been at or above 4% for some months, but the first change may also indicate that the below-4% unemployment rates are now unlikely in the future.

**Local.** The local economy remains tied to the national economy, and even the global economy. Idaho exports commodities: agricultural and food products, minerals, lumber and paper, and memory. Idaho also benefits from the national economy, not only for the market it provides, but also for development. Here are a few recent news items indicating the scope of that intervention.

Federal money headed to Idaho:

- \$453m for transportation due to the 2021 Bipartisan Infrastructure Law.
- Two farms in Canyon County and a dairy in Twin Falls collectively are awarded \$2.5m from the US Dept. of Agriculture's Rural Energy for America Program
- \$80k to Shoshone County from the US Dept. of Agriculture for a broadband study.
- \$23m for two-year project to build a readiness center and vehicle maintenance shop for the Idaho Army National Guard in Jerome County.
- \$30m is to be spend by the Coeur d'Alene Work Trust for restoration at the Bunker Hill Superfund Site this year. Those funds come from the trust's balance and earnings on a 2009 settlement. The Trust uses at least 80% local construction employees.
- \$17m from the American Rescue Plan Act is being put to use by Bannock County on a variety of projects, including making the county's courthouse ADA accessible.
- \$5.5 million to 27 Idaho projects from the US Dept. of Agriculture's Marketing Service to improve resilience in Idaho's food system. 21 are to be used for equipment, and 6 go to infrastructure developments. Areas of grantees include Montpelier, Idaho Falls, Bonner's Ferry, Hagerman, Filer, Wilder, and Parma.
- \$1m to Nampa for urban forestry from the Urban and Community Forestry Inflation Reduction Act of 2022 administered by the U.S. Forest Service.

While October news provided a theme of US investment in Idaho, it also provided a theme of Idaho investment in healthcare within its own boundaries. Healthcare, as many editions of this report have indicated, is among the largest employment sectors for Idaho, with over 110k employees now and an expected additional 23k by the end of 2029.

New healthcare facilities and expansions and opportunities:

- East Idaho Mental Health in Rexburg opened in late summer.

- Kootenai Member Health and Wellness Clinic opens for Kootenai County employees in Coeur d'Alene. It has a staff of 4, and it opened its doors open in the summer, but an official opening ceremony took place in early October.
- An adaptive sports grant from the US Dept. of Veterans Affairs (\$690k) will provide sporting and other activities for veterans with disabilities in the Wood River Valley.
- A partnership between College of Southern Idaho in Twin Falls, Idaho State University, and St. Luke's Magic Valley Medical Center will offer an accelerated BSN program (nursing bachelor's degree). Other ISU ABSN programs are in the Treasure Valley, Coeur d'Alene, and in Pocatello/Idaho Falls.
- Center for Community Health opened in Twin Falls. This is a collaboration between many healthcare providers and other entities: Strategic Financial Group, St. Luke's, Family Health Services, the College of Southern Idaho, South Central Public Health District, City of Twin Falls, and the Twin Falls School District.

These snapshots of recent activity are just two sets of contributors to the growth already shown (see the graphs on page 8) and expected across Idaho's economic forecast.

## Economic outlook

The large employment gain reported in September did not alter Moody’s labor market outlook. They characterize the US situation as one in which “monthly job growth will slow to below 100,000 per month by the middle of 2025 and will be around 50,000 by the middle of 2026. The unemployment rate will remain at or near 4% for the next few years.

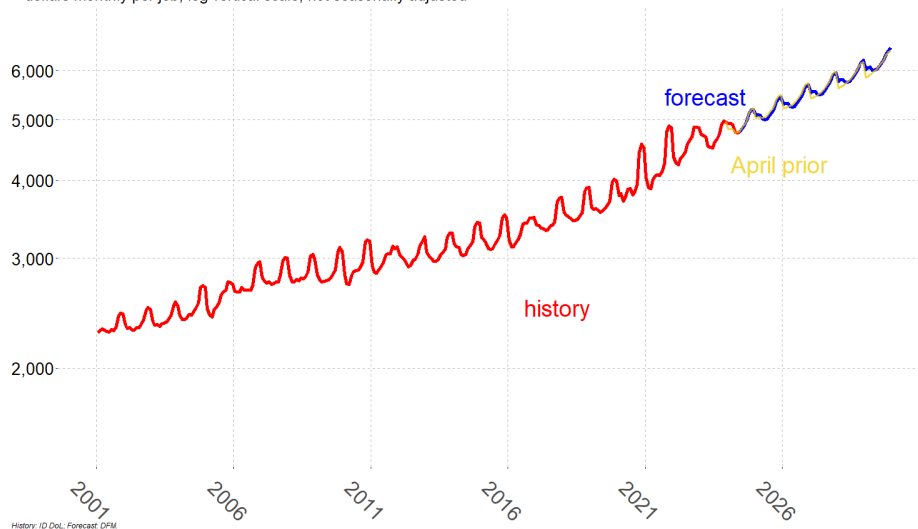
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inflation, CPI measure	1.3	4.7	8.0	4.1	2.9	2.4	2.4	2.3	2.3	2.2
real GDP growth	-2.2	6.0	2.5	2.9	2.7	2.3	2.1	2.1	2.3	2.3
Federal Funds rate	2.2	0.4	0.1	1.7	5.0	5.1	3.9	3.1	3.0	3.0
mortgage rates	3.9	3.1	3.0	5.3	6.8	6.6	5.8	5.7	5.8	5.9
employment growth	-5.8	2.9	4.3	2.3	1.6	0.9	0.5	0.4	0.4	0.4

The labor market looks to be returning to pre-pandemic calm. Moody’s indicates that the JOLTS data<sup>10</sup> together with UI claims indicate that “mass layoffs are non-existent”. The JOLTS data also shows that hiring and quitting have descended from the stratosphere.

As we indicated in the July edition, the expected slowdown in job formation is partly reflecting the demography of the US. Baby-boomers are either already exiting the workforce, or likely to do so very soon. The youngest baby-boomers are turning 60 this year; the average retirement age has been often reported to be 62–63 years.<sup>11</sup>

### Idaho average wage rate

dollars monthly per job, log vertical scale, not seasonally adjusted



This graph puts together the two presented on page 8.

The outlook for Idaho is for more robust growth. As we have often mentioned, this remains tied to population moving into Idaho. Those moving to Idaho are often moving for work; this has aided the state in keeping a younger median age.<sup>12</sup> The outlook for average wages is a bit more aggressive than it was in the April edition, which may aid the state in recruiting future workers if that forecast proves prescient.

<sup>10</sup> Job openings and labor turn-over survey: this is a Bureau of Labor Statistics survey gives another view of the US labor market. It is accessible via <https://www.bls.gov/jlt/>.

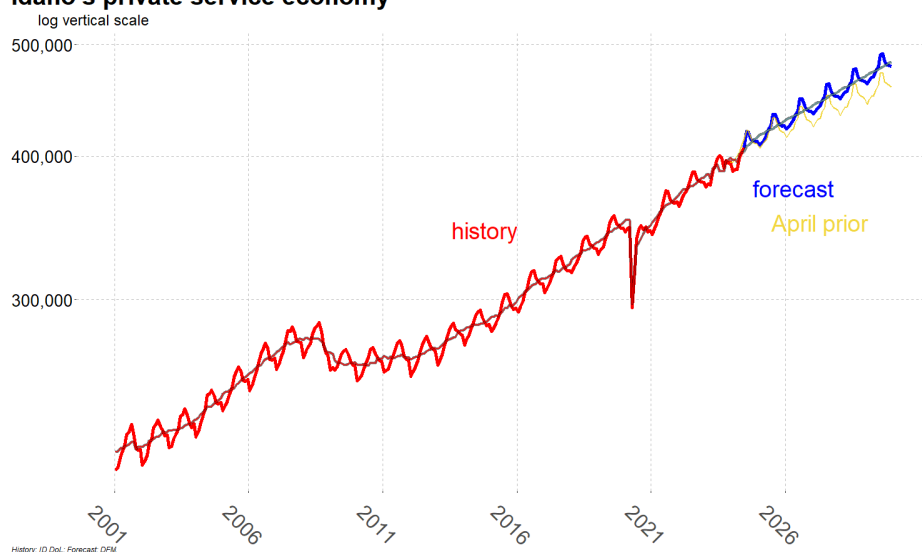
<sup>11</sup> Other context is provided by figure 1 on page 2 of a [congressional research service](#) report. The oldest baby-boomers, born in 1946 turned 64 in 2010. Note the steady increase in the percentage of people in the workforce (16 and older is the workforce) who are retired (so out of the labor force, though still in the workforce).

<sup>12</sup> A local discussion of this was provided by the Department of Labor: <https://idahoatwork.com/2022/03/22/idaho-is-6th-youngest-state-census-data-shows/>.



ID growth rates	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
ID nonfarm jobs	-0.6	5.8	4.0	2.6	2.6	3.2	2.2	2.1	2.1	2.1
ID population	3.4	3.0	1.8	1.3	1.4	1.4	1.4	1.4	1.4	1.4
Total personal income	10.6	15.2	4.9	5.3	7.0	7.2	6.0	5.8	6.1	6.3
... inflation adjusted ...	9.4	10.6	-1.6	1.5	4.4	5.0	3.7	3.5	3.8	4.0
Wage & salary payments	7.2	12.6	11.1	6.4	7.6	7.8	6.9	6.8	6.8	6.8
... average ID wage ...	7.7	6.4	6.9	3.8	4.9	4.4	4.6	4.5	4.6	4.6

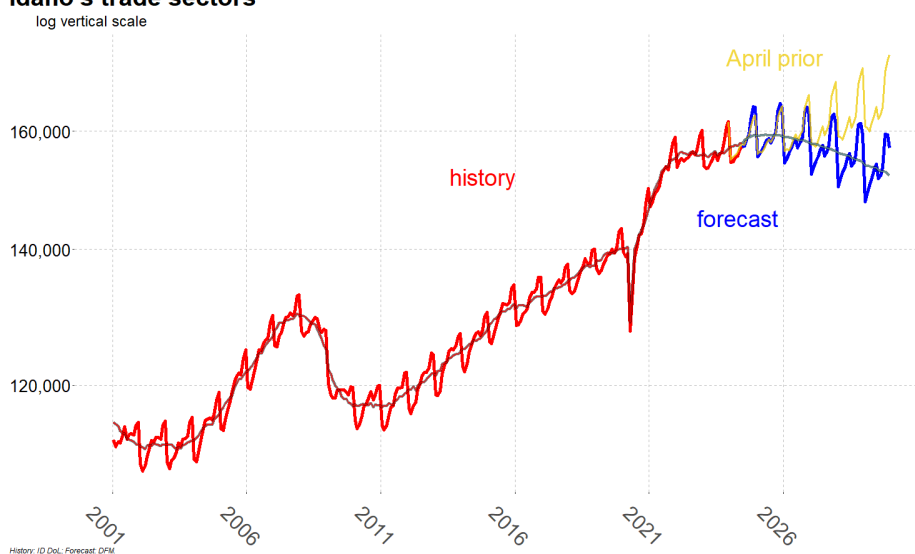
### Idaho's private service economy



**Labor market data.** The Idaho labor market is most quickly summarized by a few super-sectors. The private services super-sector is most important. It includes healthcare, private education, hospitality and leisure, as well as finance and management, among others. Here we see that the outlook has strengthened a bit since the April edition.

is notably differently compared with April. Trade includes the retail sector, the wholesale sector behind that, as well as warehousing and transportation. For the short end of the forecast period, the October outlook does not appear to be too great of a change. Towards the long end of the forecast period, though, this forecast may be reflecting the lull which has been present since late-2021 in this sector. We will revisit the trade outlook when we consider two alternative scenarios provided by Moody's.

### Idaho's trade sectors



*Trade.* The trade forecast

Within the retail sector, there are two NAICS<sup>13</sup> categories. There was a recent reclassification between the two, resulting in an abrupt shift on the most disaggregated data we provide in the linked [xlsx](#).

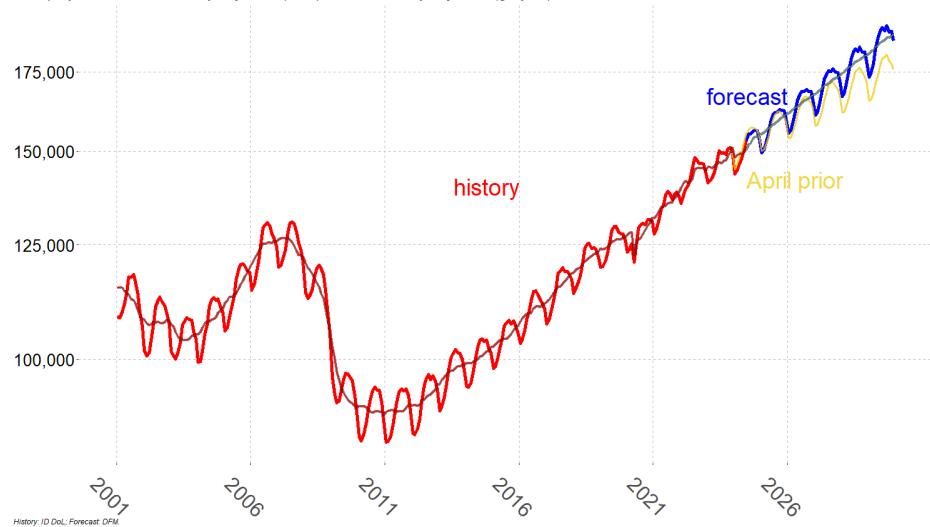
When considering the trade sector, it is worth pointing out again that our historical data is through 2024m6. Consequently the switch from history (red) to forecast (blue) in the graph begins with July. Retail trade typically has a hiring boost for the holiday season. That is observed through the spikes throughout history, and it is expected via the spikes throughout the forecast.

*Basic industries.* The counterpart to the forecast in trade is the forecast in basic industries. We wrote in the July edition of this report:

For the basic industries, those needed in order to have a service economy, the outlook in April saw a regular seasonal drop in employment occurring at the start of 2024. Preliminary data indicate that the drop was deeper than expected. This translates across the forecast horizon to a slight downward revision.

The outlook here is also fairly stable compared with the April forecast, at least through 2026. Thereafter, the revision upwards does become more substantial. Regularly seeing 5–7.5k more jobs in this sector in the current forecast will align the expected growth with the historical growth present since about 2014. This is easily visible through the seasonally adjusted data shown in the grayish colors.

**Idaho's basic industries: ag., mining, utilities, construction**  
employment: not seasonally adjusted (bold) and seasonally adjusted (grayish)



*Agriculture and food processing.* Several new food processing facilities are opening and others are being announced. A potato chip manufacturer, Teton Valley Brands, moved to a larger facility in Caldwell. Rupert is also getting a new facility for the The Mart Group company; this plant will be processing whole frozen potatoes, called “OH!Tatoes”, for domestic consumption and for export to Japan. That facility has been expected to be up and running this month, with eventual employment around 80 jobs, and with the Oh!tatoes on US grocery store shelves before the close of the year. The Mart Group began in the 1950s in the state. Idaho Milk Products broke ground

<sup>13</sup> North America Industrial Classification System — the reporting nomenclature for nonfarm jobs used by the BLS.

on an ice cream production facility in Jerome; at full tilt the plant will process 14 m gallons of ice-cream mix each year. While that is a formidable amount of ice-cream mix, the company already does the following:

Idaho Milk Products currently processes 1.6 billion pounds of raw milk annually and produces 60 million pounds of milk protein concentrate and milk protein isolate, 155 million pounds of cream and 55 million pounds of milk protein permeate annually.<sup>14</sup>

Of course, there are many other companies operating in the Idaho dairy space. As many agricultural economists have noted, Idaho is famous for its potatoes, but it is also a dairy state.

*Other developments.* While we wait on the outcome of the Krogers/Albertsons proposed tie-up, and details of the Vista Outdoor's ammunition manufacturing sale to the Czechoslovak Group<sup>15</sup>, an engineering firm from Hailey, Power Engineers, sold for \$1.78 b to WSP Global. The firm expects it will retain its Idaho footprint (over 650 employees) as it integrates with the Montreal based engineering and design firm WSP Global.

Google Fiber (high-speed internet service) began operations in Pocatello. The Gate City is the first town in Idaho to receive Google's fiber service. At the other end of the state, Coeur d'Alene learned that it would be the site of a new Latter Day Saints Temple. Building these are often multi-year endeavors. When complete, it will be Idaho's 10th LDS Temple.

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<sup>14</sup> "Idaho Milk Products breaks ground on ice cream facility" by Carol Ryan Dumas in the Capital Press

<sup>15</sup> A special meeting of Vista Outdoor stockholders is scheduled for late November.

## Forecast analysis

**Forecast comparison.** The forecast from Moody’s continues to evolve modestly.

*US forecasts.* We wrote the following to indicate the changes between April and July:

The outlook for the US is for slightly less employment than envisioned in April.

This takes into account an indicated revisions by the Bureau of Labor Statistics.<sup>16</sup>

By the end, real GDP is in between what was forecast in January and later in April.

The October outlook maintains the fairly flat trajectory envisioned by Moody’s for the US labor market. As we have indicated, demographics plays quite a roll in that outlook. The US is fortunate to be a country in which many of its people, upon reaching “retirement age” can in fact step out of the labor force.

Oct. '24 forecast		2023	2024	2025	2026	2027	2028	2029
GDP	b (2017) \$	22,671	23,278	23,804	24,296	24,818	25,384	25,958
P. income	b \$	23,010	24,080	25,070	26,170	27,360	28,610	29,890
Population	m	335	337	338	339	341	342	343
Nonfarm	m ct.	156	157	158	158	159	160	160
Wages	b \$	11,830	12,480	13,010	13,530	14,070	14,630	15,210
Jul. '24 forecast		2023	2024	2025	2026	2027	2028	2029
GDP	b (2017) \$	22,377	22,896	23,286	23,719	24,239	24,813	25,388
P. income	b \$	22,961	24,043	25,072	26,150	27,316	28,582	29,887
Population	m	335	337	338	339	340	342	343
Nonfarm	m ct.	156	159	160	160	161	161	162
Wages	b \$	11,798	12,388	12,956	13,469	14,001	14,559	15,136
Apr. '24 forecast		2023	2024	2025	2026	2027	2028	2029
GDP	b (2017) \$	22,380	22,960	23,340	23,780	24,300	24,870	25,440
P. income	b \$	22,980	24,110	25,130	26,210	27,380	28,630	29,920
Population	m	335	337	338	339	340	342	343
Nonfarm	m ct.	156	158	159	160	161	161	162
Wages	b \$	11,820	12,470	13,030	13,550	14,090	14,650	15,230
Jan. '24 forecast		2023	2024	2025	2026	2027	2028	2029
GDP	b (2017) \$	22,340	22,710	23,100	23,620	24,180	24,770	25,340
P. income	b \$	23,010	24,080	25,070	26,170	27,360	28,610	29,890
Population	m	335	337	338	339	341	342	343
Nonfarm	m ct.	156	157	158	158	159	160	160
Wages	b \$	11,830	12,480	13,010	13,530	14,070	14,630	15,210

*ID forecasts.* Idaho’s forecast is showing resilience. Population forecasts have consistently shown that Idaho should be crossing the 2 m person level late this calendar year.

<sup>16</sup> [May](#) revised down March and April; [June](#) revised down April and May; [July](#) revised down May and June. Despite these downward revisions, all months thus far in 2024 show net jobs gains.

Oct. '24 forecast		<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>
P. income	\$ m	116,676	124,832	133,868	141,921	150,097	159,283	169,290
Wages	\$ m	50,513	54,076	58,025	61,838	65,825	70,094	74,668
Population	ct	1,964,726	1,991,348	2,019,872	2,047,359	2,075,422	2,104,274	2,133,907
Nonfarm	jobs	818,518	840,033	867,123	886,606	905,587	924,950	944,596
Jul. '24 forecast		<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>
P. income	\$ m	115,750	120,575	126,639	134,344	142,160	150,626	159,616
Wages	\$ m	50,843	54,349	58,040	61,309	64,526	67,761	71,207
Population	ct	1,964,726	1,991,425	2,018,403	2,044,996	2,072,399	2,100,652	2,129,620
Nonfarm	jobs	818,518	840,373	860,568	876,062	892,089	908,773	925,438
Apr. '24 forecast		<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>
P. income	\$ m	115,989	119,352	127,203	134,696	142,130	150,133	158,693
Wages	\$ m	51,051	54,567	58,339	61,798	65,347	69,056	73,105
Population	ct	1,964,726	1,992,911	2,019,231	2,045,836	2,073,301	2,101,656	2,130,765
Nonfarm	jobs	818,458	846,999	864,081	879,665	896,095	913,435	931,017
Jan. '24 forecast		<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	
P. income	\$ m	114,900	122,776	129,867	137,495	145,156	153,868	
Wages	\$ m	51,170	55,026	58,604	61,994	65,546	69,379	
Population	ct	1,988,810	2,008,714	2,038,713	2,062,648	2,081,655	2,098,946	
Nonfarm	jobs	843,117	877,558	901,856	920,909	936,845	952,591	

That near-term achievement is consistently expected to be followed by crossing 2.1 m Idahoans near the middle of 2028. This occurs under the newer modeling, employed for the April–October forecasts, as well as the older modeling under the January 2024 forecast. Population data only becomes available once per year. In contrast, the jobs and personal income data becomes available periodically, and in particular, in January 2024, not all of 2023 was known; indeed, that forecast was finalized with the analogous data on jobs to what this October forecast has now. There will be some anecdotal evidence accumulating, but another batch of UI program-derived jobs counts will not be available before the next publication.<sup>17</sup> We can see that the latest forecast has more jobs expected by 2029 than earlier forecasts. This is partly a reflection of a stronger basic-industries forecast, particularly a strong forecast for construction. This sector of the Idaho economy has been one which our modeling has struggled to match its pace.

Through 2026 and even 2027, the wage outlook is quite similar to recent forecasts. The pick-up in wages in 2028–2029 is visible over the July forecast, though it is not all that different from the April forecast. Of course, before we arrive there, there will be more forecasts, and as we saw with the GDP readings in this report, there will likely be data revisions as well.

<sup>17</sup> The unemployment insurance program helps to collect the nonfarm jobs data through the BLS/ID Dept. of Labor quarterly Census of Employment and Wages program. This data is closer to census data than the monthly jobs survey data that make newspaper headlines.

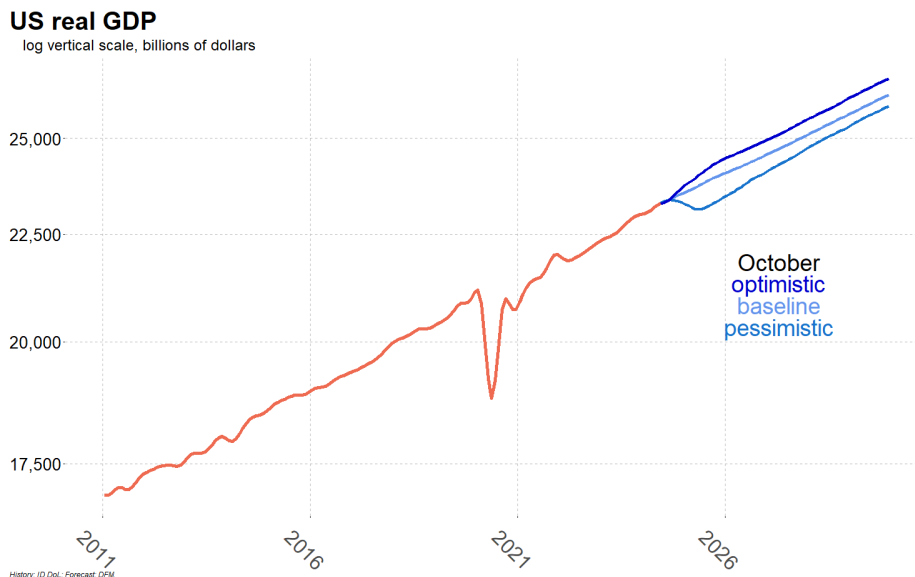
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Baseline is the median forecast for Moody's. We discuss an upside as well as a downside case.

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### Alternative forecasts.

*US trajectories.* We give an indication of the range of real GDP scenarios envisioned by Moody's as the most likely scenarios on which to plan. As is typical of these two scenarios, the divergence is rather immediate, and then the disturbance settles down and either a parallel growth trajectory takes hold, or else there is a convergence between two or three of these scenarios (back to the baseline).



Typically, to achieve a downside, a mild recession is envisioned by the firm. As is often the case, this (with a delay) causes the Federal Reserve to react through interest rates, lowering them to counter the downturn. Typically, to achieve an upside, enhanced productivity is envisioned. Root causes for that enhancement are often left ambiguous. An understanding, though, can come from better matching of employers and employees, and greater acceptance and use of technologies by industry.

In their October forecasts, Moody's downside 25 percentile case does not quite catch up with the baseline, at least as measured by real GDP, through the end of 2029. The catch-up which does occur is indeed brought about by the Federal Reserve lowering interest rates: "Fed lowers the fed funds rate below the baseline starting in the fourth quarter of 2024". Indeed, this is reflective of the immediate nature of the divergence between the scenarios.

Perhaps one of the more important aspects of this alternative is that at the national level, "[h]ouse prices decline by 5.7% from the third quarter of 2024 to the third quarter of 2025, compared with an increase of 1.6% in the baseline." Indeed, the median house price is expected to be \$393k in 2026 in the downside scenario, having been at an estimated \$408k in 2024 according to Moodys.

In the other alternative, median house prices appreciate further, and again that effect begins immediately. Rather than \$408k for the median existing home price in 2024, the firm sees that at \$411k in the upside scenario. That then grows to \$455k in 2026.

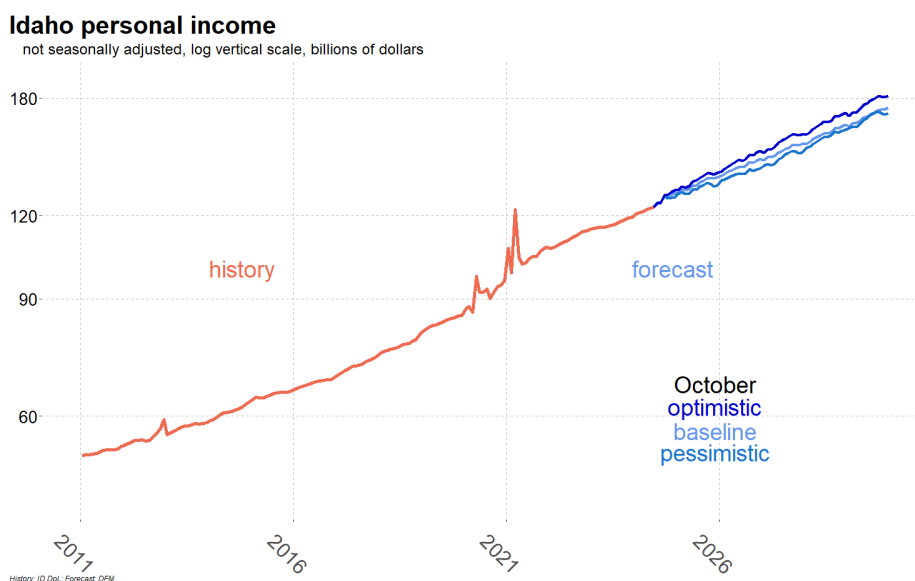
Partly that is aided by a bit more inflation elsewhere in the economy. Moody's says of its upside scenario:

The stronger economy results in unemployment declining below the baseline and inflation slightly above the baseline. As a result, long-term interest rates rise a bit more than in the baseline.

Thus in this case, a story which has been familiar the past couple of years would be continuing: higher home prices and higher mortgage rates (although the difference in mortgage rates is not huge: 10-year yields, which closely associate with them, differ by 0.1 percentage points.)

*Idaho trajectories.* In considering the baseline, upside 10th percentile, and downside 75th percentile national forecasts within the Idaho economic model, we have the following. In this latest forecast is that the baseline income trajectory hews closer to the optimistic income trajectory for the first few years of the outlook. Recent history in Idaho suggest that this is most often the case.

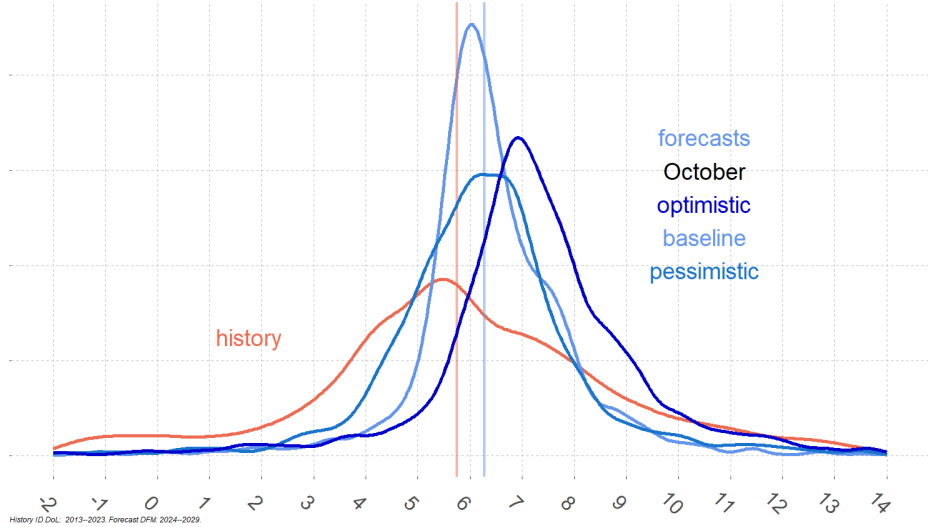
However, the October pessimistic scenario is one in which Idaho's personal income is expected to eventually (2027 and after) converge with the baseline outlook for personal income.



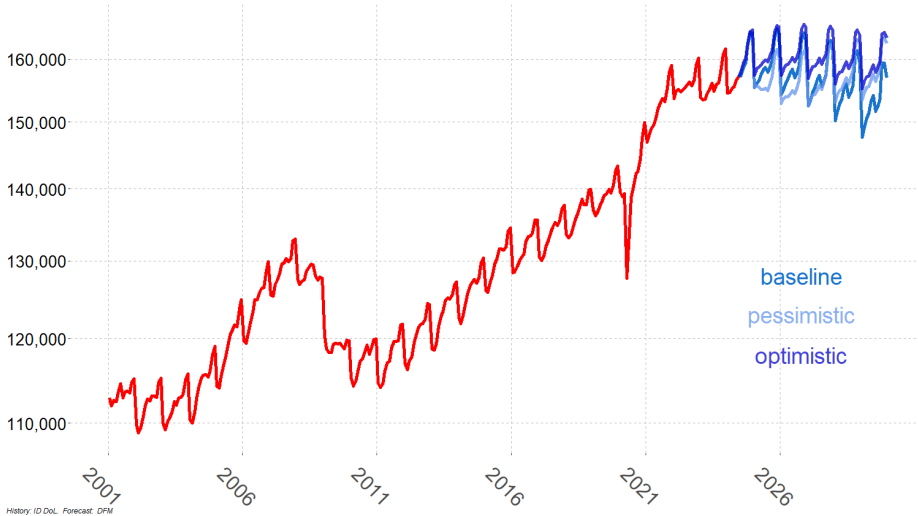
<b>Idaho</b>		2022	2023	2024	2025	2026	2027	2028	2029
Nonfarm jobs	baseline	798,120	818,520	840,030	867,120	886,610	905,590	924,950	944,600
	optimistic	798,120	818,520	841,810	876,430	900,410	921,530	941,330	961,510
	pessimistic	798,120	818,520	839,820	851,840	868,610	890,650	912,670	933,560
wages, m \$ (ID DoL)	baseline	43,521	46,317	49,852	53,731	57,441	61,325	65,493	69,962
	optimistic	43,521	46,317	50,138	55,102	59,726	64,435	69,409	74,779
	pessimistic	43,521	46,317	50,013	54,102	58,057	62,439	67,089	72,095
Housing stock	baseline	782,660	803,470	821,490	840,080	860,500	882,420	905,550	929,740
	optimistic	782,660	803,470	821,490	840,080	860,550	882,730	906,310	931,210
	pessimistic	782,660	803,470	821,490	840,020	860,300	882,170	905,160	929,300

The outlook in terms of personal income growth rate is captured by the associated density plots. Here we see that the portion of the historical record (above the horizontal axis between the measures -2 and 0) which did record some contractions is quite unlikely in any of the scenarios envisioned by Moody's. Growth is expected to often be higher than the median observed through history. However, the most typical growth in both the baseline and the pessimistic cases fall well within the typical ranges observed through history (growth between 4 and 8 percent is most common). The optimistic scenario may, as viewed from this density perspective, be a bit too optimistic to be catalyzed by the mild assumptions in Moody's forecast.

**Density plots: growth rates for Idaho personal income**  
annualized growth: history & baseline median shown via vertical lines, three future scenarios



**Idaho's trade sector**  
baseline and alternative scenarios



*Trade.* As we remarked earlier in this report, the outlook for trade has changed from the prior edition. It has notably slowed subsequent to 2026. Looking at the sector again under the three main alternatives by Moody's, we see some further peculiarity. The line-up of alternatives is all for a flat to declining employment, with a high degree of seasonality. The optimistic and the pessimistic

both outlast the baseline in terms of employment at the close of the forecast window in late 2029. The pessimistic alternative does have a lower trough in 2025 than the baseline; that reflects the mild recession in Moody's 25-percentile downside scenario.



**Housing.** As we have remarked in the prior editions, the test we have of our housing forecast’s reasonableness is the fit of the housing stock estimates of the Census Bureau based upon the schematic

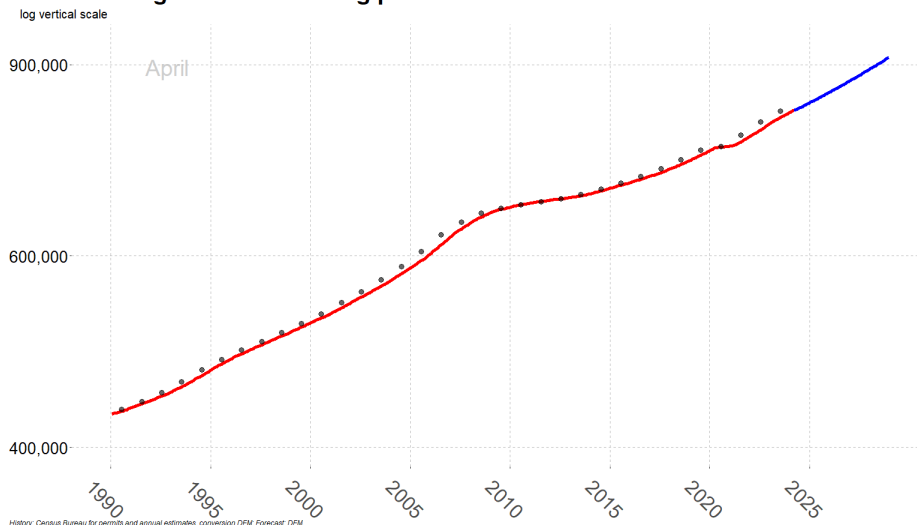
housing permits → housing starts → housing completions

where we begin with a historical housing stock value and update that value across the intervening years through the final values we compute for the housing completions. This

reasonableness test is purely historical; housing estimates are only provided by the Census Bureau after the fact. They are July 1 estimates typically released in late December. The scheme also currently ignores housing stock loss. Loss of housing can occur through demolition of obsolete units

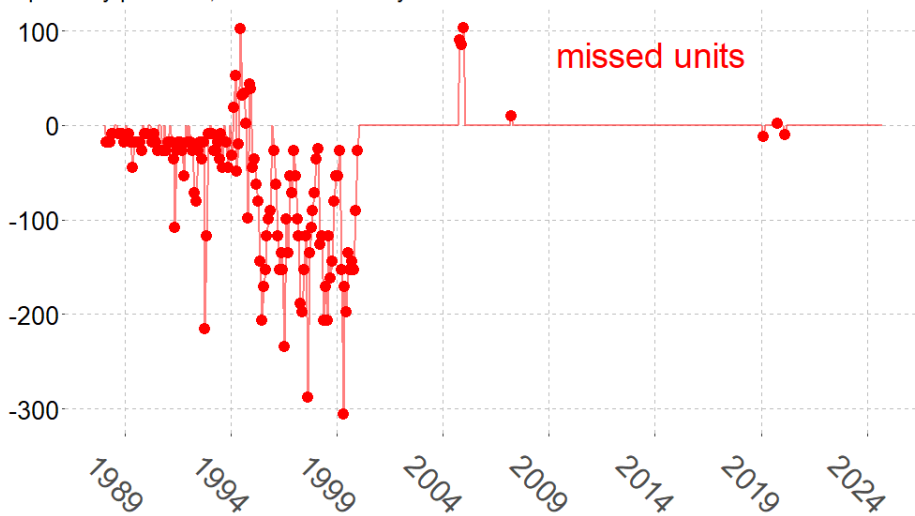
or loss to natural disasters such as fires or floods. Because of this blind side, if the modeling of permits through starts to completions were perfect, the housing stock through our modeling should come in above the values estimated by the Census Bureau.

**Idaho housing stock: translating permits into units**



**Missed housing permits in historical data**

primarily pre-2000, but not exclusively



However, modeling is never perfect, and in fact we typically show an underestimate compared to the Census. In our April edition, this was the state of affairs.

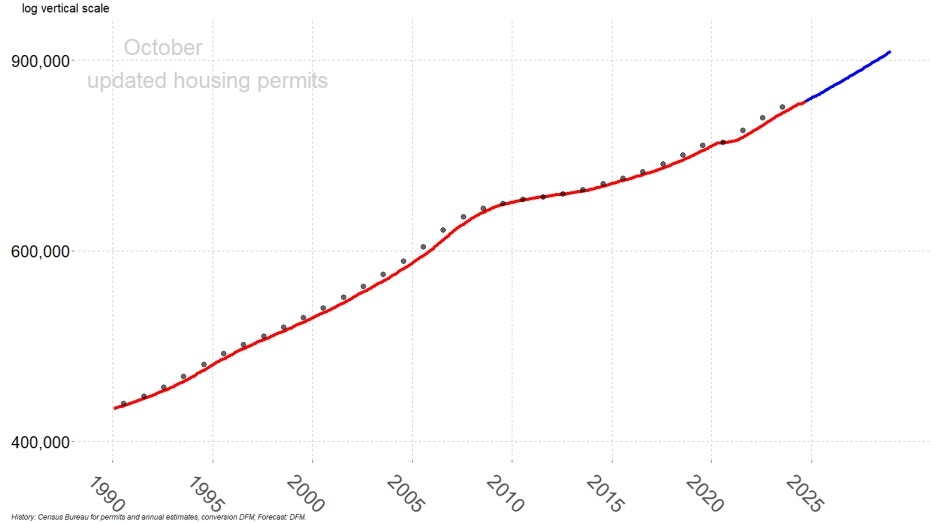
Note that the translation of permits through starts to completions seems to be falling behind the estimated counts of housing units within the state. Consequently, our aim was to revisit our estimation methods to see if we could

find better fits within the same basic, logical framework.

In seeking to condition the translation of permits to starts and starts to completions via evolving equations (with evolution anticipated to be measured at the half-decade interval), we discovered a discrepancy in our historical record of the permits counts. This discrepancy is largely contained in the history prior to 2000. The method DFM used for acquiring its permits data was manual data entry each month from individual text (or since 2023, xlsx files) posted by the Census Bureau. As seen here, the discrepancy was largely an underestimate of permits.

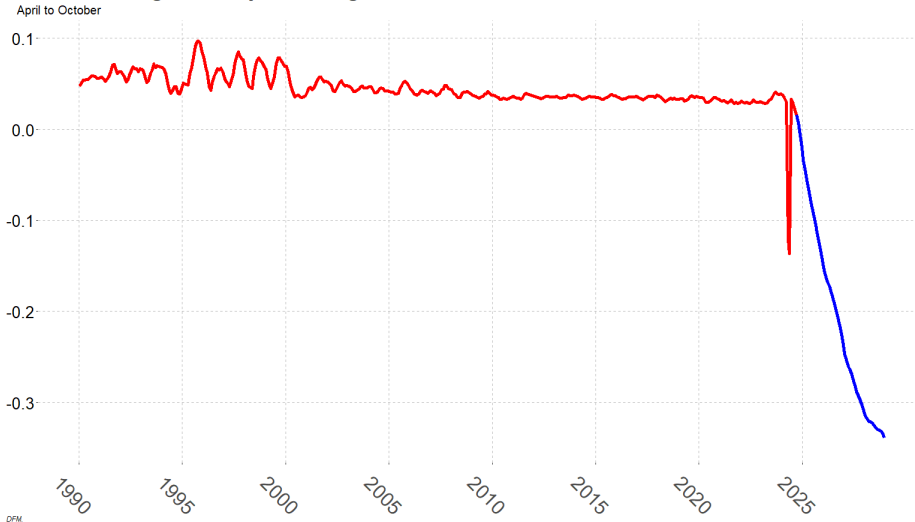
Updating the data to what is currently available, and re-running our existing schema for housing stock estimates produced a similar figure to that produced in April, though in our view, it represents a setback in terms of historical fit. More of the history shows an underestimate via our model compared to the Census Bureau's estimates. Again, a perfectly operating schema *should* produce overestimates.

**Idaho housing stock: translating permits into units**



We examined the difference, and admittedly, it is tough to note the differences between the housing stock graphs for April and October. The accompanying graph shows that indeed the housing stock was estimated to be about 0.1 percentage points higher across almost all of the forecast period (so 500 to 900 units higher across history), and that the current forecast shows less addition to the forecast housing stock than what was envisioned in April. Partly that is due to the new estimate for the housing stock existing at the moment is lower.

**Idaho housing stock: percentage difference**



However, it should be noted that the forecast portion is structurally very similar to that produced in April even if the re-examined historical fit is not quite as good as we had believed. Both produce trajectories which are continuations of the historical fit, which from the line-graph perspective appear consistent and reasonable.

Another view of the reasonableness of a forecast comes from distributional considerations: how consistent is the historical

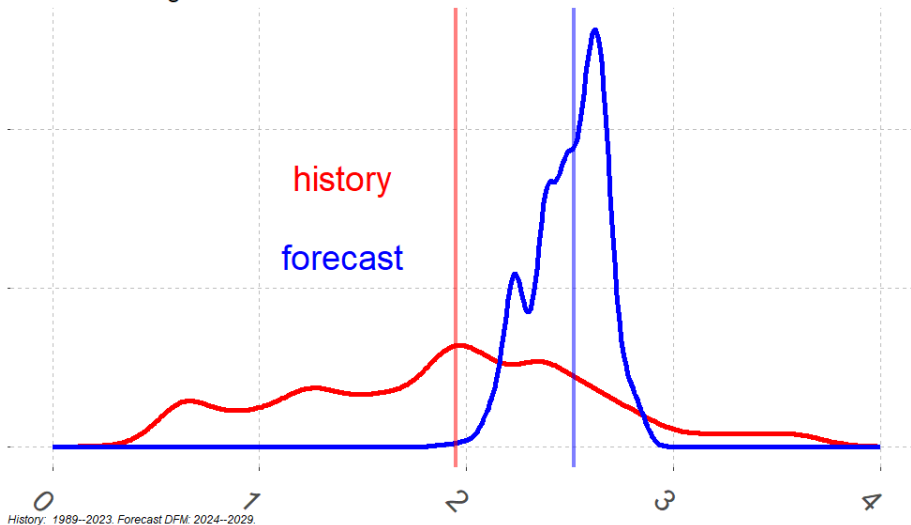
growth distribution versus the forecast growth distribution. In that manner, it is a consideration much like that illustrated by our cover graph.

In this view, the housing stock forecast is tilted to the aggressive side. While it is not outside of the realm fairly likely of historical growth rates, it does show a median growth substantially above there median growth realized across history. It should be noted, though, that the history contains the recovery from the Great Recession, also known as a recession tied to housing. That recovery was marked by an exodus

of construction workers during the long period after the housing bust when homes were not selling well and many people were conserving money. Thus the history certainly has a substantial set of measurements where growth was very weak. As the Moody's mainline forecasts do not call for such an anemic period of economic growth, some aspects of that recovery period may reasonably be discounted. Looking at the distribution, that is the portion of the red hill rising between 0 and 1 measurements on the horizontal axis. Ignoring that portion of the red hill would only move the red vertical (median) bar from 1.95 to 2.05. The blue vertical (median) bar for the forecast portion sits at 2.52. Thus, even with that discounting, the forecast remains aggressive from a distributional perspective.

### Density plots: Idaho housing stock

annualized growth: vertical lines show medians



**Look ahead.** Only one survey report is likely to be available on the Idaho job market between this publication and finalization of the January forecast edition. The other indicators on the economy will include another reading on inflation just subsequent to Veteran's Day courtesy of the BLS, and another couple of months of local tax collection data. As the January edition is the basis for a revised revenue forecast, that last data will be of primary focus, particularly the refund activity being recorded subsequent to the October 15 tax deadline for filing extensions.

## Appendix

### US Macroeconomic Model by Moody's Analytics

Moody's model is a structural model based upon the IS-LM demand model and the Phillips curve for supply. It has about 2,300 variables forecast in their macroeconomic model, with more than 9 in 10 determined within the model (i.e., endogenously, rather than exogenously, or external to the model.) The firm also characterizes the model as a Keynesian model, with short-term fluctuations largely driven by demand. The firm indicates that substantial shocks can take up to two years to unwind back to an equilibrium path.

There are some particular variables which are central in the model. Moody's says:

The federal funds rate's effect in the model is systemic. It affects the yield curve, which is critical to consumer spending and business investment. Therefore, it affects real GDP growth, the labor market, and inflation.

To illustrate why shocks may take time to dissipate in the model, Moody's also indicates:

Monetary policy operates with a lag in the model. Eventually the model's inflation and unemployment rate forecasts return to equilibrium, and the federal funds rate follows.

Monetary policy includes setting and adjusting the federal funds rate, but it also includes other tools that the Federal Reserve has. A recent example of this has been both Quantitative Easing (during the acute phase of the pandemic), and its opposite, Quantitative Tightening (during 2022–present).

Moody's organizes its model into blocks: These include

- (1) Consumption through consumer spending
- (2) Investment
- (3) International trade<sup>18</sup>
- (4) Fiscal policy
- (5) Supply (labor force potential, for example)
- (6) Inflation
- (7) Monetary policy and its transmittal
- (8) Personal Income
- (9) Corporate income
- (10) Labor markets (actual employment by sector)
- (11) Housing

Moody's provides a detailed look at parts of each of these blocks in their model. Doing so takes the firm 25+ pages. To not extend the length of this publication, we will take only a couple of these for further discussion. The few we do are quite parallel to the Idaho economic model.

Moody's indicates that their model is anything but static, much as the US economy.

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<sup>18</sup> Moody's emphasises trade in their model.

Rarely does a month go by when no changes are made to the model. Equations that are no longer performing well are re-specified, and variables are occasionally added to the model as more data become available or the dynamics of the economy change.

Their wording here also applies to the Idaho economic model.

5 Supply means the long-term economic potential of the US. It is governed by innate parts of the economy, including population forecasts. As we have learned, it is difficult to find labor without having a population of workers appropriate for the labor, in location, age, skill, and desire to work. Moody's says;

Labor force supply is a key determinant of potential GDP, which largely depends on demographics. Population is estimated based on Census Bureau birth and death rates and immigration rates that are determined by the economic performance of the U.S. relative to the rest of the world.

Here we see a couple of potential exogenous variables in the Moody's model, namely the data coming from Census Bureau estimates. We also see that each block can and does interact with other blocks in the Moody's model: here international trade interacts with the population portion of the supply block though the strength of the immigration draw that the US economy represent, or will represent in the future.

Another input in the potential labor force is an estimate of what is called the Non-Accelerating Inflation Rate of Unemployment (NAIRU). This concept is a Phillips curve one: if unemployment rates are too low, inflation is expected to not only be present, but to increase in rate. Such a situation is one that the Federal Reserve works to prevent. One of its two charges by Congress is stable prices; that is, the Fed must not allow accelerating inflation to persist. Thus the NAIRU is important for understanding potential labor force; it is not as simple as computing the 16-64 year-olds in the US. NAIRU is another example of an exogenous variable. In this case:

We use the [Congressional Budget Office] CBO's long-term NAIRU forecast and make that variable exogenous in our model. We then specify an error correction model to predict the value of short-term NAIRU.

This also indicates that parts of Moody's model may have equations of varying types. We have already seen that Moody's employs demographic models to estimate population. These are different from the Ordinary Least Squares (OLS) equations, which dominate the Labor block 10 of Moody's model.

8 The Personal Income block is illustrative of the pervasiveness of Bureau of Economic Analysis data organization across almost all economic forecasts. Principal parts are wage and salaries, supplements to wages and salaries (that is the BEA name; largely this is benefits such as health insurance), dividends, interest, and rent (modeled separately), and proprietors' income.

Individual wage and salary categories are modeled as functions of industry employment, industry average hourly earnings, and a broad measure of hours worked.

The personal income block certainly interacts with the labor market block 10. Another interaction is present with the Inflation block 6. While industry average hourly earnings are used for each industry, behind the scenes is average hourly earnings in all private industries. Forecasting that broad measure is “the most important wage equation in the macroeconomic model,” though Moody’s makes this statement within their discussion of the Employment Cost Index, in order to understand CPI inflation.

**Idaho Economic Model.** The Idaho Economic Model (IEM) is an income and employment-based model of Idaho's economy. The Model consists of a simultaneous system of linear regression equations.

These have historically been estimated at the quarterly frequency as that is the frequency of data provided by IHS Markit (our prior provider of the US forecast) as well as Moody's (our current provider of the US forecast). Some of the source data is available at the monthly frequency. Examples of this include personal income for the US (source: BEA), inflation as measured by the Consumer Price Index (CPI inflation, source: BLS), and local employment (source: Idaho Department of Labor — available in quarterly batches of monthly measurement). We are now running parallel monthly frequency level. Where source data is available at the monthly level, it is used<sup>19</sup> and where it is not readily available for our own collection, the monthly version from Moody's is used. We have indicated<sup>20</sup> an example where the monthly Moody's data is available as is the original source data, and it is visible that there is a slight distinction between the two.

The primary exogenous variables are obtained from the national forecast provider (now Moody's). Endogenous variables are forecast at the state level.

The focal point of the IEM is Idaho personal income, which is given by the identity:

$$\text{personal income} = \text{wage and salary payments} + \text{other labor income} + \text{farm proprietors' income} + \text{nonfarm proprietors' income} + \text{property income} + \text{transfer payments} - \text{contributions for social insurance} + \text{residence adjustment}.$$

Except for farm proprietors' income and wage and salary payments, each of the components of personal income is estimated stochastically by a single equation. Farm proprietors' income and wage and salary payments each comprise sub-models containing a system of stochastic equations and identities.

The farm proprietor sector is estimated using a sub-model<sup>21,22</sup> consisting of equations for crop marketing receipts, livestock marketing receipts, production expenses, inventory changes, imputed rent income, corporate farm income, and government payments to farmers. Farm proprietors' income includes inventory changes and imputed rent, but this component is netted out of the tax base.

At the heart of the IEM is the wage and salary sector, which includes stochastic employment equations for North American Industry Classification System employment categories (NAICS). Conceptually, the employment equations are divided into basic and domestic activities. The basic employment equations are specified primarily as functions of national demand and supply

<sup>19</sup> the quarterly values recorded by the US forecast provider have always been the average values for the corresponding months

<sup>20</sup> see the graph on page ??

<sup>21</sup> As the exogenous variables for the farm model are only available at the annual frequency, the farm model is now computed at that frequency, and monthly values are interpolated from these. The source for the exogenous regressors in the farm model is the FAPRI institute of the University of Missouri, Columbia.

<sup>22</sup> The US Bureau of Economic Analysis has a note indicating that farm income data at the state level is likely to be discontinued; see [BEA discontinuation of SAINC45](#) .

variables. Domestic employment equations are specified primarily as functions of state-specific demand variables. Average wage rates are estimated for each of these employment categories and are combined with employment to arrive at aggregate wage and salary payments.

The demographic component of the model is used to forecast components of population change and housing starts. Resident population, births, and deaths are modeled stochastically. Net migration is calculated residually from the estimates for those variables. Housing starts are divided into single and multiple units. We model housing starts on permits based upon equations estimated for the Western US, and for completions upon starts in a similar manner. These are then used to forecast housing stock, which is also estimated by the US Census Bureau. In this last step, we have a check on our housing model.

The output of the IEM (i.e., the forecast values of the endogenous variables) is determined by the parameters of the equations and the values of exogenous variables over the forecast period. The values of equation parameters are determined by the historic values of both the exogenous and endogenous variables. IEM equation parameters are estimated using the technique of ordinary least squares. Model equations are occasionally re-specified in response to the dynamic nature of the Idaho and national economies. Parameter values for a particular equation (given the same specification) may change as a result of revisions in the historic data or a change in the time interval of the estimation. In general, parameter values should remain relatively constant over time, with changes reflecting changing structural relationships.

Like in Moody's US economic model, most equations are specified in log form. This is generically

$$\log(y) = c_0 + c_1 \cdot \log(x_1) + \cdots + c_n \cdot \log(x_n)$$

which means that

$$y = e^{c_0} \cdot x_1^{c_1} \cdots x_n^{c_n} .$$

These mathematical forms are sufficient to enable good fits of the data without overly complicated equations. This helps to avoid "over-fit", which can precipitate small changes of the inputs redirecting the output in unreasonable directions.

While the equation parameters are determined by structural relationships and remain relatively fixed, the forecast period exogenous variable values are more volatile determinants of the forecast values of endogenous variables. They are more often subject to change as expectations regarding future economic behavior change, and they are more likely to give rise to debate over appropriate values. As mentioned above, the forecast period values of exogenous variables are primarily obtained from Moody's US macroeconomic models.

Since the output of the IEM depends in large part upon the output of the US model, an understanding of the US model, its input assumptions, and its output is useful in evaluating the results of the IEM's forecast. The assumptions and output of the US model are discussed in the National Forecast section, and a discussion of the details of the IEM build and of the Moody's follows.



**Idaho Time Series Model.** The Idaho Time Series Model (ITS)<sup>23</sup> is a new numeric model of Idaho’s economic activity. The model consists of sequential equations solved in modules with dependencies such that downstream modules can rely on data forecasted in earlier modules. The regression equations are estimated using time series forecasting techniques covered by the R ‘seasonal’ package. The package uses the X-13 ARIMA-SEATS method to understand the typical monthly or quarterly trend from data before creating a forecast. The method is a joint development by the US Census Bureau, Stats Canada, and the Bank of Spain. ARIMA models are time-series models, which means they look to prior measurements of a variable in order to understand subsequent measurements of that *same* variable.<sup>24</sup>

The guiding principal of the time series model is to let the data speak for itself and involve exogenous regressors sparingly. Several equations in the model, such as the adult share of the population, are computed exclusively as ARIMAs with no exogenous regressors. Fewer than five equations in the model use more than two exogenous regressors. Time series models tend to produce accurate forecasts, but without the linkages of multiple regression models like the IEM. For time series forecasts it can be difficult to explain why a forecast is evolving in a particular way.

The first module estimates monthly values for Idaho births, deaths, and net migration and combines these to get a measure for monthly change in population. This contrasts with the IEM which treats migration as a residual. The only exogenous regressors used in this portion of the ITS model are mortgage rates, the US unemployment rate, a dummy for COVID-19, and Idaho housing completions, which are provided by Moody’s.

The population estimate feeds into the second module, which then estimates values for the monthly adult population, labor force, and employed persons before estimating monthly levels of employment across the standard employment sectors into which the BEA divides the US economy. To do so, this second module begins by using the population number to create forecasts of the total number of adults, the size of the labor force, and then the number of employed persons.<sup>25</sup> These forecasts rely on Local Area Unemployment Statistics (LAUS, a BLS program) numbers.

Once the labor force is understood, the second module continues by using separate regressions for each major NAICS sector, this time using data from the quarterly Current Employment and Wages (QCEW, another BLS program). An “other” category trues these values up to the total number of employed (since LAUS and QCEW use different definitions). This portion of the

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<sup>23</sup> The ITS was pioneered by Matthew Hurt; it has been used for the past year+ in forecasting revenue in a blended model with the IEM. Further integration with this report is the next aim.

<sup>24</sup> An example may be illustrative: an ARIMA forecast of housing would look at prior housing permit activity to predict future housing permit activity; a general regression analysis might look towards population trends to predict future housing permit activity. Both can have merits, and a combination of the methods is often used, though one or the other may be the dominant driver in any particular equation analysis, say the equation analysis of housing permits. The population trends in the second approach are an example of an exogenous regressor for housing starts — they are variables which can be supplied externally from the internal computations of the housing permit equation.

<sup>25</sup> Once the employed number and the labor force number are known, the unemployment rate is easily found: the difference between these gives the unemployed count, and dividing by the labor force number gives the unemployment rate.

second module, focusing on employment categories, uses mortgage rates, the US unemployment rate, the US labor force participation rate, the federal funds rate, and CPI as exogenous regressors. However, each individual regression relies at most on two of these exogenous regressors.

The third model estimates wage rates and wagebills for each of the NAICS categories. The IEM and ITS dis-aggregate labor markets in a similar manner, although the ITS has a finer breakdown. One example is the commonly grouped categories such as 22, 48, and 49 (utilities, and transportation sectors), which the ITS keeps fully separate. The principal data for employment and wages come from the Quarterly Census of Employment and Wages (QCEW). The total QCEW wagebill is the ultimate target, as it is a vital exogenous regressor used in the subsequent personal income and GDP modules.

To get to that total QCEW wagebill, separate wagebills for each NAICS category are computed. These wagebills come about as the product of wage rates and employment numbers. Wage rates are estimated via time-series regression for each NAICS category using the unemployment rate in Idaho and the corresponding national wagherates for each NAICS sector.

The first modules all run on monthly data. If exogenous data come from Moody's on a quarterly basis, the ITS first smooths these data to monthly values and then performs the forecast. The personal income and GDP modules rely on quarterly data. When data is imported from earlier modules in the ITS, these data are monthly, so both the personal income and the GDP modules average the monthly data to obtain quarterly data, and these two modules are run. Currently the GDP module is only for state-level real GDP and only uses the total wagebill as an exogenous regressor. The personal income module forecasts many components of personal income and uses the total wagebill in addition to some of the previously described exogenous regressors.

**Variables.** It is likely that the choice of variables will change slightly across the next two years. Partly this may reflect removal of what amount to essentially duplications. Partly this may reflect better integration of the components of the model; like Moody's US model, the Idaho economic model is structured in modules or blocks.

*Endogenous variables:* These are computed within the Idaho economic model.

id_pi	Idaho personal income
id_supp	Idaho supplementary income
id_dir	Idaho dividends, interest, and rent
id_nonfarm_prop	Idaho nonfarm proprietors' income
id_transfer	Idaho transfer payments
id_ra	Idaho residence adjustment
id_si	Idaho social insurance
id_e1133	Idaho employment in wood products industries
id_mwr1133	Idaho monthly wage rates in wood products industries
id_mwb1133	Idaho monthly wage bill in wood products industries
id_e21	Idaho employment in mining
id_mwr21	Idaho monthly wage rates in mining
id_mwb21	Idaho monthly wage bill in mining
id_e22	Idaho employment in utilities
id_mwr22	Idaho monthly wage rates in utilities
id_mwb22	Idaho monthly wage bill in utilities
id_e23	Idaho employment in construction
id_mwr23	Idaho monthly wage rates in construction
id_mwb23	Idaho monthly wage bill in construction
id_e31	Idaho employment in food manufacturing
id_mwr31	Idaho monthly wage rates in food manufacturing
id_mwb31	Idaho monthly wage bill in food manufacturing
id_e32	Idaho employment in other nondurable manufacturing
id_mwr32	Idaho monthly wage rates in other nondurable manufacturing
id_mwb32	Idaho monthly wage bill in other nondurable manufacturing
id_e33	Idaho employment in durable manufacturing
id_mwr33	Idaho monthly wage rates in durable manufacturing
id_mwb33	Idaho monthly wage bill in durable manufacturing
id_e42	Idaho employment in wholesale trade
id_mwr42	Idaho monthly wage rates in wholesale trade
id_mwb42	Idaho monthly wage bill in wholesale trade
id_e44	Idaho employment in retail trade
id_mwr44	Idaho monthly wage rates in retail trade
id_mwb44	Idaho monthly wage bill in retail trade

id_e45	Idaho employment in other retail trade
id_mwr45	Idaho monthly wage rates in other retail trade
id_mwb45	Idaho monthly wage bill in other retail trade
id_e48	Idaho employment in transportation
id_mwr48	Idaho monthly wage rates in transportation
id_mwb48	Idaho monthly wage bill in transportation
id_e49	Idaho employment in delivery and warehousing
id_mwr49	Idaho monthly wage rates in delivery and warehousing
id_mwb49	Idaho monthly wage bill in delivery and warehousing
id_e51	Idaho employment in information
id_mwr51	Idaho monthly wage rates in information
id_mwb51	Idaho monthly wage bill in information
id_e52	Idaho employment in finance and insurance
id_mwr52	Idaho monthly wage rates in finance and insurance
id_mwb52	Idaho monthly wage bill in finance and insurance
id_e53	Idaho employment in real-estate
id_mwr53	Idaho monthly wage rates in real-estate
id_mwb53	Idaho monthly wage bill in real-estate
id_e54	Idaho employment in professional services
id_mwr54	Idaho monthly wage rates in professional services
id_mwb54	Idaho monthly wage bill in professional services
id_e55	Idaho employment in management
id_mwr55	Idaho monthly wage rates in management
id_mwb55	Idaho monthly wage bill in management
id_e56	Idaho employment in administrative services
id_mwr56	Idaho monthly wage rates in administrative services
id_mwb56	Idaho monthly wage bill in administrative services
id_e61	Idaho employment in private education
id_mwr61	Idaho monthly wage rates in private education
id_mwb61	Idaho monthly wage bill in private education
id_e61gsed	Idaho employment in state education
id_mwr61gsed	Idaho monthly wage rates in state education
id_mwb61gsed	Idaho monthly wage bill in state education
id_e61gled	Idaho employment in local education
id_mwr61gled	Idaho monthly wage rates in local education
id_mwb61gled	Idaho monthly wage bill in local education

id_e62	Idaho employment in private healthcare
id_mwr62	Idaho monthly wage rates in private healthcare
id_mwb62	Idaho monthly wage bill in private healthcare
id_e62gshl	Idaho employment in state healthcare
id_mwr62gshl	Idaho monthly wage rates in state healthcare
id_mwb62gshl	Idaho monthly wage bill in state healthcare
id_e62glhl	Idaho employment in local healthcare
id_mwr62glhl	Idaho monthly wage rates in local healthcare
id_mwb62glhl	Idaho monthly wage bill in local healthcare
id_e62gvfhl	Idaho employment in federal healthcare
id_mwr62gvfhl	Idaho monthly wage rates in federal healthcare
id_mwb62gvfhl	Idaho monthly wage bill in federal healthcare
id_e71	Idaho employment in hospitality
id_mwr71	Idaho monthly wage rates in hospitality
id_mwb71	Idaho monthly wage bill in hospitality
id_e72	Idaho employment in arts
id_mwr72	Idaho monthly wage rates in arts
id_mwb72	Idaho monthly wage bill in arts
id_e81	Idaho employment in other services
id_mwr81	Idaho monthly wage rates in other services
id_mwb81	Idaho monthly wage bill in other services
id_e92gsad	Idaho employment in state administration
id_mwr92gsad	Idaho monthly wage rates in state administration
id_mwb92gsad	Idaho monthly wage bill in state administration
id_e92glad	Idaho employment in local administration
id_mwr92glad	Idaho monthly wage rates in local administration
id_mwb92glad	Idaho monthly wage bill in local administration
id_e92gvf	Idaho employment in federal administration
id_mwr92gvf	Idaho monthly wage rates in federal administration
id_mwb92gvf	Idaho monthly wage bill in federal administration
id_etribes	Idaho tribal employment
id_mwrtribes	Idaho monthly wage rates for tribal employment
id_mwbtribes	Idaho monthly wage bill for tribal employment
idp_sf	Idaho single-family housing permits
idp_mf	Idaho multi-family housing permits
ids_sf	Idaho single-family housing starts
ids_mf	Idaho multi-family housing starts
idc_sf	Idaho single-family housing completions
idc_mf	Idaho multi-family housing completions

wp_sf	western single-family housing permits
wp_mf	western multi-family housing permits
ws_sf	western single-family housing starts
ws_mf	western multi-family housing starts
wc_sf	western single-family housing completions
wc_mf	western multi-family housing completions
m_idhstk	monthly Idaho housing stock
id0npt	Idaho population
id0nb	Idaho births
id0nd	Idaho deaths
id0nmg	Idaho net migration
id_cow	Idaho income from cattle
id_crop	Idaho income from crops
id_dairy	Idaho income from dairy
id_farm_chem	Idaho farm expenditures on chemicals
id_farm_exp	Idaho farm expenditures
id_farm_gvt	federal transfers to Idaho farms
id_farm_other	other farm income
id_farm_petro	Idaho farm expenditures on fuels
id_farm_prop	Idaho farm proprietors' income
id_farm_receipts	total Idaho farm receipts
id_feed	Idaho farm expenditures on feed
id_hay	Idaho income from hay and related feeds
id_lvstk	Idaho income from livestock
id_seed	Idaho farm expenditures on seed
id_veg	Idaho farm income from vegetables
id_wheat	Idaho farm income from wheat
id_farm_corp	corporate farm income in Idaho
id_farm_inv	Idaho farm inventory change
us_farm_corp	corporate farm income in the US
us_farm_inv	US farm inventory change
us_cow	US farm income from cattle
us_farm_exp	US farm expenditures
us_farm_other	other US farm income
us_farm_petro	US farm expenses on fuel
us_farm_prop	US farm proprietors' income
us_farm_receipts	total US farm receipts
us_hay	US farm income from hay and related feeds
us_lvstk	US farm income from livestock
us_veg	US farm income from vegetables
us_wheat	US farm income from wheat

*Exogenous variables:* These are imported into the Idaho economic model from outside sources.

cpi	consumer price index
dum_id_e1133_a	employment dummy for wood products
dum_id_e21	employment dummy for mining
dum_id_e23	employment dummy for construction
dum_id_e44	employment dummy for retail trade
dum_id_e45	employment dummy for other retail trade
dum_id_e48	employment dummy for transportation
dum_id_e49	employment dummy for delivery and warehousing
dum_id_e53	employment dummy for real-estate
dum_id_e56	employment dummy for administration
dum_id_e61gled	employment dummy for local education
dum_id_e61gsed	employment dummy for state education
dum_id_e62gshl	employment dummy for state healthcare
dum_id_e71	employment dummy for hospitality
dum_id_e72	employment dummy for arts
dum_id_farm_other	employment dummy for other farm income
dum_id_farm_prop	employment dummy for farm proprietors' income
dum_id_farm_receipts	employment dummy for total farm receipts
dum_id_lvstk	employment dummy for farm income from livestock
dum_id_mwr1133	employment dummy for woods products wage rates
dum_id_mwr23	employment dummy for construction wage rates
dum_id_mwr33	employment dummy for durable manufacturing wage rates
dum_id_mwr62	employment dummy for healthcare wage rates
dum_shift_id_farm_corp	employment dummy for corporate farm income
dum_shift_id_farm_inv	employment dummy for farm inventories
dum_shift_us_farm_corp	employment dummy for corporat farm income
ffr	federal funds rate
gdp_farm	GDP from the US farm sector
gdpr	real US GDP
hhaf	household financial assets
hhao	other household assets
ip321	industrial production index for wood products
ip322	industrial production index for paper manufacturing
ip334	industrial production index for semi-conductor industry
ip335	industrial production index for electrical equipment
jpc	personal consumption expenditure inflation

lfpr	US labor force participation rate
mf_farm_pi_af	Moody's farm personal income from all products
mf_farm_pi_lp	Moody's farm personal income from livestock
mf_gdp_farm	Moody's farm GDP
mf_idp_sf	Moody's Idaho single-family permits
mf_idp_mf	Moody's Idaho multi-family permits
mf_ppi_farm	Moody's producer price index for farm products
mf_ppi_food_feed	Moody's producer price index for farm foods and feeds
mf_ppi_metals	Moody's producer price index for metals
mf_us_mwr23	Moody's monthly wage rates in construction
mf_us_mwr42	Moody's monthly wage rates in wholesale trade
mf_us_mwr44_45	Moody's monthly wage rates in retail trade
mf_us_mwr51	Moody's monthly wage rates in information
mf_us_mwr52	Moody's monthly wage rates in finance
mf_us_mwr53	Moody's monthly wage rates in real-estate
mf_us_mwr54	Moody's monthly wage rates in professional services
mf_us_mwr55	Moody's monthly wage rates in management
mf_us_mwr56	Moody's monthly wage rates in administration
mf_us_mwr61	Moody's monthly wage rates in private education
mf_us_mwr62	Moody's monthly wage rates in healthcare
mf_us_mwr71	Moody's monthly wage rates in hospitality
mf_us_mwr72	Moody's monthly wage rates in arts
mf_us_mwr81	Moody's monthly wage rates in other services
mf_us_mwrndmf	Moody's monthly wage rates in nondurable manufacturing
mf_us_mwrwtw	Moody's monthly wage rates in transportation and warehousing
mf_us_mwrgvsl	Moody's monthly wage rates in state and local government
minwage	Moody's forecast for the minimum wage
month	1–12
pmms	average 30-year mortgage rates
productivity	Moody's index for productivity
trend	an increment increasing by 1 each month
u3_nsa	the US U-3 unemployment rate, not seasonally adjusted
us_crop	US crop income
us_dairy	US dairy income
us_div_int	US dividends, interest, and rent income
us_e1133	US employment in wood products
us_e22	US utilities employment
us_e23	US construction employment
us_e42	US wholesale trade employment
us_e44_45	US retail trade employment
us_e52	US finance employment
us_e53	US real-estate employment
us_e56	US management employment



us_e61	US private education employment
us_e62	US healthcare employment
us_edmf	US durable manufacturing employment
us_egvf	US federal government employment
us_egvsl	State and local government employment across the US
us_endmf	US non-durable manufacturing employment
us_etw	US employment in transportation and warehousing
us_farm_chem	US farm expenditures on chemicals
us_farm_gvt	government transfers to US farms
us_feed	US expenditures on farm feeds
us_nonfarm_prop_mf	Moody's forecast of US nonfarm proprietors' incomes
us_pop_tot	US population
us_rent	US income from rent
us_seed	US farm expenses for seed
us_si	US social insurance
us_supp	US supplementary income
us_transfer	federal transfer payments
us_wb_tot	total wages in the US