

Inflation and Manufacturing reflected in the U.S. Census Bureau's Economic Indicator Program

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MANUFACTURERS' SHIPMENTS, INVENTORIES, AND ORDERS SURVEY (M3)

The Manufacturers' Shipments, Inventories, and Orders survey (often referred to as the M3¹) has been conducted monthly since 1957 and is one of the 13 economic indicators produced by the Census Bureau. The "Advance" press release, also known as "Durable Goods", and the new accelerated Advance Total Manufacturing estimates are issued monthly on or about the 18th business day after the end of the survey month. Revised durable goods and detail information for both durable and nondurable industries are released one week later, or about the 23rd business day, in the "Full Report" or "Factory orders".

The M3 survey is an essential component of the current economic indicators and its data provide the necessary information for assessing the evolving status of the economy and formulating economic policy. The shipments and inventories data are essential inputs to the gross domestic product (GDP²), while the orders data are direct inputs to The Conference Board Leading Economic Index (LEI³), which is a composite index of ten key elements designed to monitor the business cycle. Orders for durable goods are an important leading economic indicator, as businesses and consumers generally place orders for durable goods when they are confident the economy is improving. Durable goods orders also tell investors what to expect from the manufacturing sector, a major component of the economy.

The data are used for analyzing short- and long-term trends, both in the manufacturing sector and as related to other sectors of the economy. The data on value of shipments, especially when adjusted for change in inventories, measure current levels of production. New orders figures serve as an indicator of future production commitments. Changes in the level of unfilled orders, because of excess or shortfall of new orders compared with shipments, are used to measure the excess (or deficiency) in the demand for manufactured products. Changes in the level of inventories and the relation of these to shipments are used to project future movements in manufacturing activity. These statistics are valuable for analysts of business cycle conditions, including members of the Council of Economic Advisers (CEA⁴), the Bureau of Economic Analysis (BEA), the Federal Reserve Board (FRB⁵), the Conference Board, business firms, trade associations, private research and consulting agencies, and the academic community.

For the M3 survey panel⁶, we request large, diversified companies to submit separate reports monthly for each division or "natural business unit" with significant manufacturing activity, and for which they

¹ Manufacturers' Shipments, Inventories, and Orders (M3) survey [Manufacturers' Shipments, Inventories, and Orders \(census.gov\)](https://www.census.gov/manufacturing/m3)

² Gross Domestic Product [GDP | U.S. Bureau of Economic Analysis \(BEA\)](https://www.bea.gov/gdp)

³ The Leading Economic Index [US Leading Indicators \(conference-board.org\)](https://www.conference-board.org/leading-indicators)

⁴ [Council of Economic Advisers | The White House](https://www.whitehouse.gov/economic-advisers)

⁵ Industrial production and Capacity Utilization, Federal Reserve Board - [Federal Reserve Board - Industrial Production and Capacity Utilization - G.17](https://www.federalreserve.gov/indicators/indprod.htm)

⁶ Composition of the Survey Panel [Manufacturers' Shipments, Inventories, & Orders - How the Data are Collected \(census.gov\)](https://www.census.gov/manufacturing/m3)

maintain monthly data for their own financial and managerial purposes. These reports generally correspond to the statistical industry categories for which we prepare estimates in the survey. However, the divisional structure of some companies does not correspond closely to our industry categories, thus we request additional allocations of data for industries in which there is a significant amount of manufacturing activity. For example, a company may compile financial records for one business unit, which corresponds to a combination of two or more of our industry categories. In this situation, we ask the company to allocate the data from their single-business unit to our multiple industry categories. Because some companies have more than one business unit, we request data for approximately 5,000 reporting units that represent roughly 3,000 unique companies.

The M3 presents nominal monthly shipments, inventories, and orders statistics on both a not seasonally adjusted basis and a seasonally adjusted⁷ basis, as well as month-to-month, year-to-year, and cumulative year-to-date trends for the manufacturing sector as defined by the North American Industry Classification System (NAICS). These estimates are price adjusted by the BEA and the FRB into their respective components within the GDP by industry and Gross Private Domestic Investment piece of the GDP.

The BEA, as part of the GDP calculation, does translate the nominal estimates generated from Census Bureau data in conjunction with the Consumer Price Index (CPI) and Producer Price Index (PPI) from the Bureau of Labor Statistics (BLS). This results in a comprehensive presentation of quarterly data on a real basis for use in understanding how the U.S. economy performed in any given quarter.

While the M3 data provide insights into the U.S. economy, data are presented on a nominal basis. That means there are no price adjustments applied to the economic indicator estimates. Without these adjustments, it can be challenging to identify the true underlying trend for manufacturing. The M3 data can be misleading if you do not acknowledge the role of inflation (or any price change). In certain cases, the price change can be the primary reason for a nominal increase or decrease and potentially obscure the underlying trend. With that in mind, we examined options to conduct some high-level price adjustment using M3 data and the corresponding PPI⁸ series as inputs.

Price Adjustment Approach for real estimates

As we look to price adjust the M3 estimates to shed light on underlying manufacturing trends, it's important to understand that this is an attempt to utilize high-level data from Census and BLS to roughly approximate real manufacturing data. This is not an attempt to approximate the real estimates that the BEA will show in their quarterly GDP release nor their monthly manufacturing data.

In the December 2023 PPI for Total Manufacturing Industries (PCUOMFGOMFG⁹) published by the BLS, the 1.5% decrease from November 2023, not seasonally adjusted, was the largest decline since December 2022. The price index for Total Manufacturing Industries reached a decline rate of 1.0% on a year-over-year basis. See Figure 1 below for a look at the last 25 month-to-month percentage changes in the PPI for Total Manufacturing Industries.

⁷ Seasonal Adjustment methodology [Manufacturers' Shipments, Inventories, & Orders - How the Data are Collected \(census.gov\)](https://www.census.gov/manufacturing/shipments-inventories-orders)

⁸ The Producer Price Index, U.S. Bureau Of labor Statistics [Producer Price Index Home : U.S. Bureau of Labor Statistics \(bls.gov\)](https://www.bls.gov/ppi/)

⁹ Producer Price Index by Industry: Total Manufacturing Industries, Index Dec 1984=100, Monthly, Not Seasonally Adjusted [Producer Price Index by Industry: Total Manufacturing Industries \(PCUOMFGOMFG\) | FRED | St. Louis Fed \(stlouisfed.org\)](https://fred.stlouisfed.org/series/PCUOMFGOMFG)

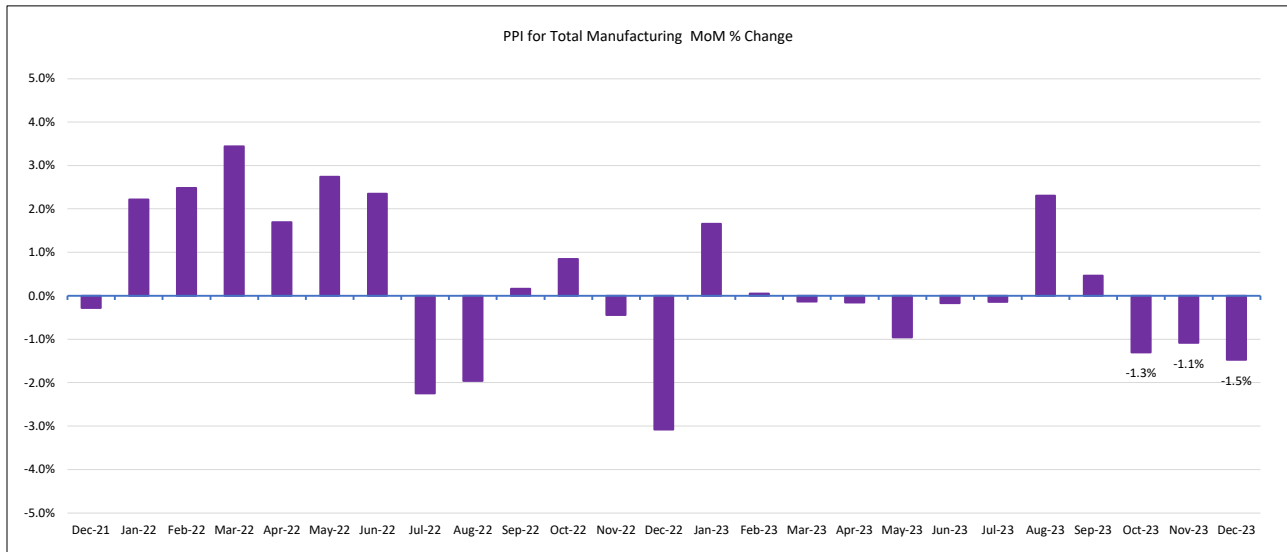


Figure 1: Month-to-month percentage changes, Producer Price Index (PPI) for Total Manufacturing Industries, January 12, 2024, U.S. Bureau of Labor Statistics, [Producer Price Index by Industry: Total Manufacturing Industries \(PCUOMFGOMFG\) | FRED | St. Louis Fed \(stlouisfed.org\)](https://fred.stlouisfed.org/series/PCUOMFGOMFG)

Utilizing PCUOMFGOMFG¹⁰ estimates from the BLS' PPI release in conjunction with the M3 related estimates, we can generate aggregate price adjustments.

A direct calculation can be done using these two series to price adjust the nominal M3 series. While these methods may not generate the most precise price adjusted data, they can serve as a measure for how prices are impacting the nominal trends published each month.

The process used to price adjust the estimates for each total manufacturing series was to divide the nominal new orders number for each total manufacturing series by the deflator. This deflator was developed by dividing the BLS price series by the 2012 average for that same price series to index it.

For simplicity, the BLS - PCUOMFGOMFG series, rebased to 2012, was used as the deflator for total manufacturing. This series was chosen as the closest representation of the coverage for manufacturing new orders.

This produces a real dollar series one can use to better understand the indicator estimates. This is a different approach from how this is normally done where weighted percentages would be used for each component price index to derive an aggregate fixed-weight deflator. Taking this more detailed approach could be an avenue pursued later, but for the purposes of this illustration of price impacts, this direct approach can be used as an approximation. See Figure 2 below for a look at the original nominal time series versus the real dollar time series using the fixed weight that results from this method.

¹⁰ Producer Price Index by Industry: Total Manufacturing Industries, Index Dec 1984=100, Monthly, Not Seasonally Adjusted [Producer Price Index by Industry: Total Manufacturing Industries \(PCUOMFGOMFG\) | FRED | St. Louis Fed \(stlouisfed.org\)](https://fred.stlouisfed.org/series/PCUOMFGOMFG)

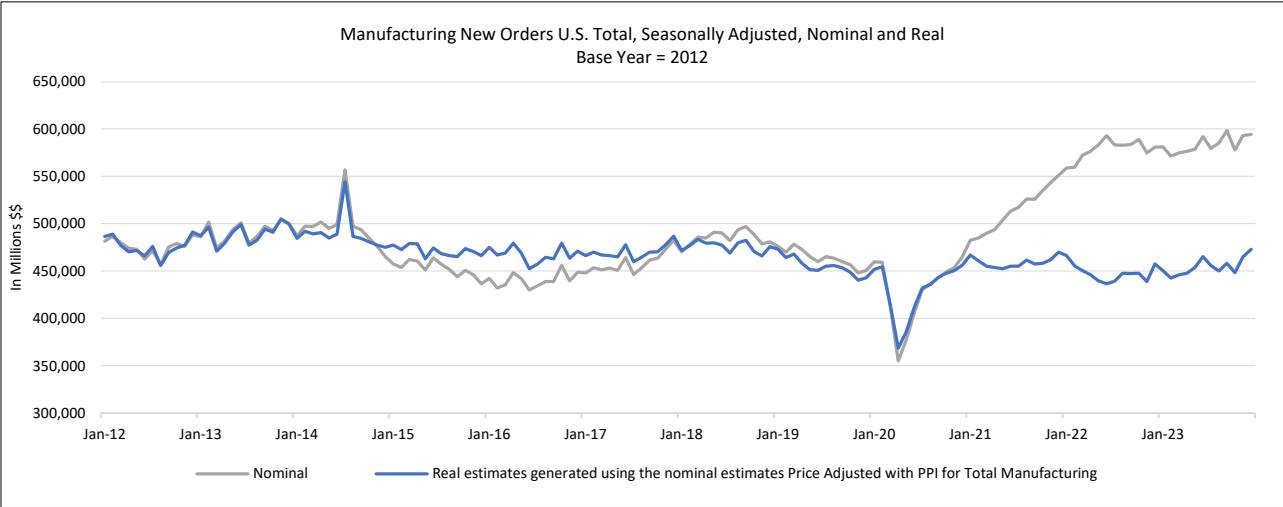


Figure 2. Nominal vs Real estimates generated using the nominal estimates Price Adjusted with PPI for Total Manufacturing Sources: Producer Price Index (PPI) for Total Manufacturing Industries, January 12, 2024, U.S. Bureau of Labor Statistics; U.S. Census Bureau, Manufacturers' Shipments, Inventories, and Orders, February 2, 2024.

Using the calculated real dollar estimates shown in Figure 2, this process allows calculations of real dollar month-to-month percent changes that can be compared against their nominal counterparts. See Figure 3 below for this presentation.

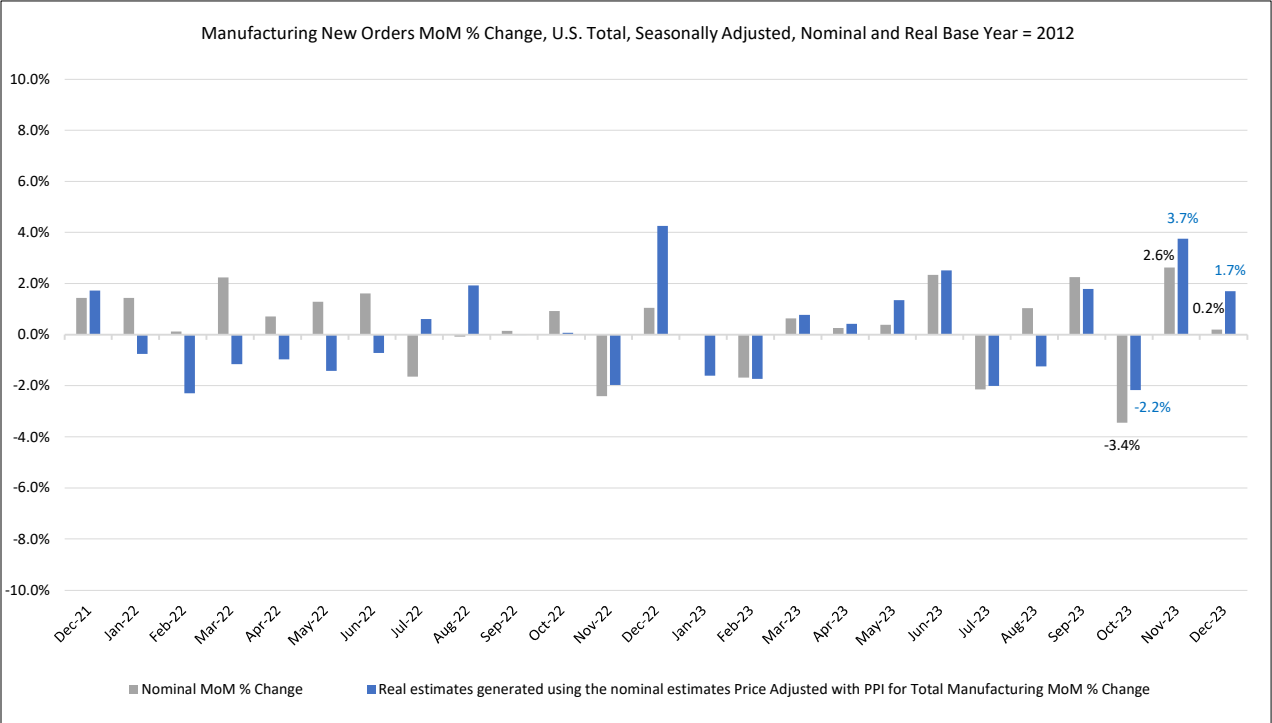


Figure 3. Nominal vs Real estimates generated using the nominal estimates Price Adjusted with PPI for Total Manufacturing MoM % Change Sources: Producer Price Index (PPI) for Total Manufacturing Industries, January 12, 2024, U.S. Bureau of Labor Statistics; U.S. Census Bureau, Manufacturers' Shipments, Inventories, and Orders, February 2, 2024.

Similarly, calculations can be done for year-over-year percent changes. Figure 4 presents these results. As with the month-to-month percent changes in Figure 3, one can see how the percent changes vary between a nominal and real dollar basis, providing a different perspective of manufacturing demand and spending trends.

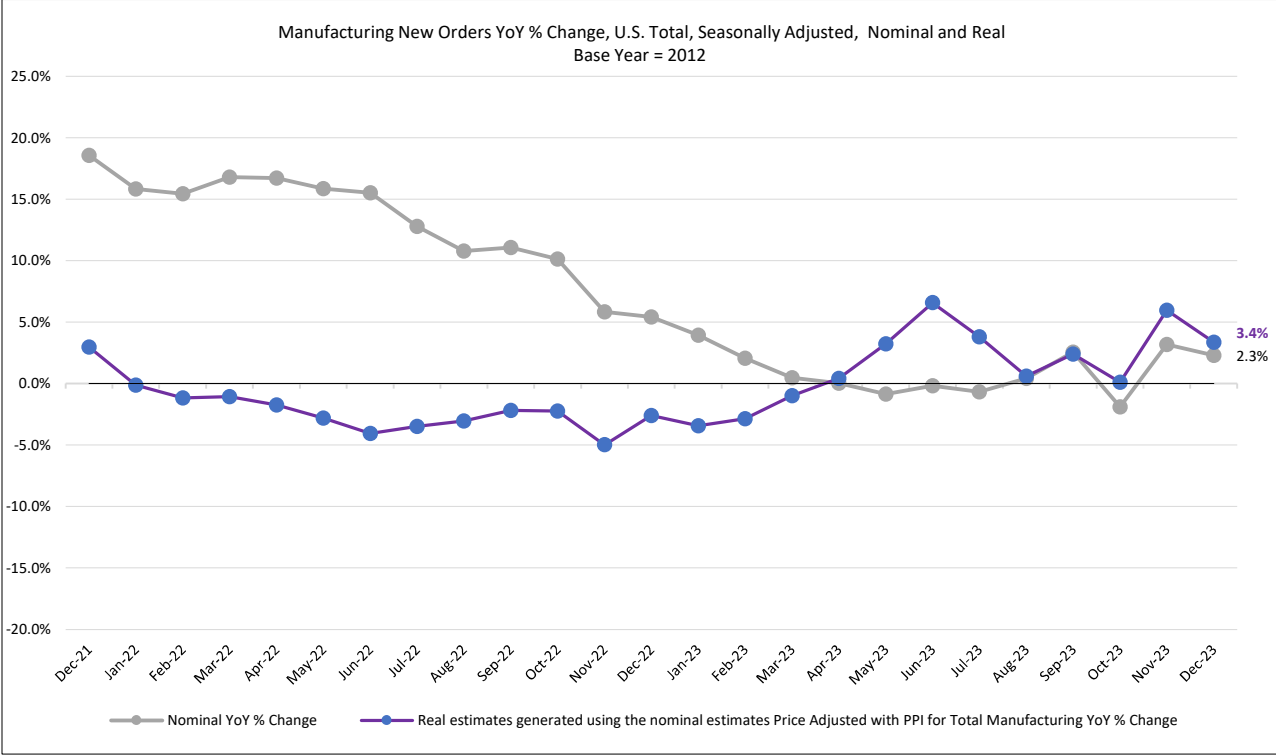


Figure 4. Nominal vs Real estimates generated using the nominal M3 estimates Price Adjusted with PPI for Total Manufacturing YoY % Change
 Sources: Producer Price Index (PPI) for Total Manufacturing Industries, January 12, 2024, U.S. Bureau of Labor Statistics; U.S. Census Bureau, Manufacturers' Shipments, Inventories, and Orders, February 2, 2024.

Summary

Since the U.S. Census Bureau does not publish real dollar estimates for many of its economic indicators, interpreting the meaning of changes in any given month can be a challenge. Utilizing time series from the U.S. Census Bureau along with corresponding price indices from the BLS' PPI can provide users with a method to better understand the impacts price changes may be having on the estimates.

The methods presented here for the M3 do have their limitations. The M3 sample is not a probability-based sample, so statistical significance is not measurable for this survey. The new orders estimates collected each month represent the value of orders booked and do not have unit or quantity information. Also, the methods described above do not try to decompose the estimates to a finer level of detail so that more precise price indices can be used in creating price adjusted estimates. This is what the BEA does as part of the GDP calculations each quarter.

This effort was undertaken to provide some insight into the price impacts on manufacturing orders, but these results should be interpreted with caution. However, the type of price adjustment presented does have value for helping data users better understand the role prices may be playing in the nominal estimates released each month.

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