

MACROECONOMIC ADVISERS'
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MACROECONOMIC ADVISERS' MEASURE OF MONTHLY GDP

With the probability of recession rising, and with media interest in this possibility intensifying, attention is now focusing on the Business Cycle Dating Committee (BCDC) of the National Bureau of Economic Research (NBER) and its role as the official arbiter of business cycle peaks and troughs. Since 2003, Macroeconomic Advisers' index of Monthly GDP (MGDP) has been included in the suite of variables on which the BCDC focuses in making its recession calls. MGDP is a monthly indicator of real aggregate output that is conceptually consistent with real Gross Domestic Product (GDP) in the NIPAs. As such, it is an excellent monthly indicator of the broadest available measure of domestic production. It is of current interest that monthly GDP rose strongly in both November and December of last year, reaching an all-time high in December. This suggests quite strongly that the economy continued to expand through the end of 2007, although it is possible that subsequent revisions in the source data could overturn this observation.

INTRODUCTION

Macroeconomic Advisers' index of Monthly GDP (MGDP) is a monthly indicator of real aggregate output that is conceptually consistent with real Gross Domestic Product (GDP) in the NIPAs. The consistency is derived from two sources. First, MGDP is calculated using much of the same monthly source data that is used in the calculation of GDP. Second, the method of aggregation to arrive at MGDP is similar to that for official GDP. The result is a monthly index whose variation at the quarterly frequency mimics that of official GDP, and whose intra-quarter variation is a meaningful and comprehensive measure of changes in output from month to month.

MGDP is calculated in two steps. First, a "raw index" is calculated from various monthly data, most of which are source data that BEA uses to calculate official quarterly GDP. When aggregated to the quarterly frequency, growth of this raw index is highly correlated with growth of official GDP, but the correlation is not perfect. In the second step, a monthly "residual" is calculated which reconciles the raw index with official GDP at the quarterly frequency. This reconciling monthly residual is selected so as to add as little new monthly variation to the raw index as possible. The result is a monthly index whose intra-quarter movement is determined primarily from the monthly source data and whose quarterly averages are nearly identical to official quarterly GDP.

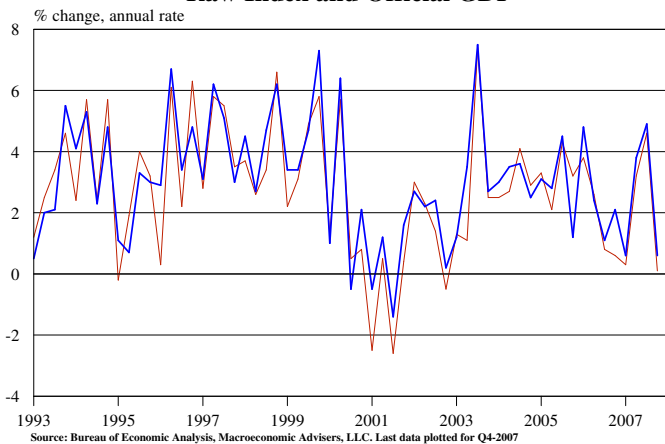
Given the public interest in Monthly GDP, Macroeconomic Advisers is now making this series available to the public at no cost in the "Public Reading Room" of its website: <http://www.macroadvisers.com>. The data may be obtained directly by following this link: http://www.macroadvisers.com/content/MA_Monthly_GDP_Index.xls. Furthermore, Macroeconomic Advisers has given permission for this Macro Focus to be distributed to any who are interested.

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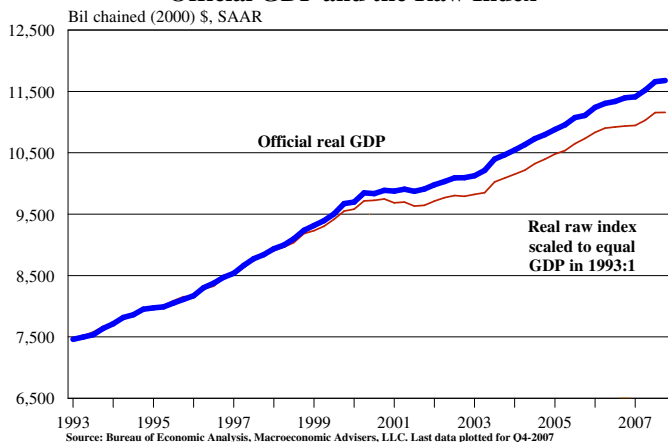
**Figure 1:
Raw Index and Official GDP**



**Figure 2:
Coverage of Nominal Raw Index**



**Figure 3:
Official GDP and the Raw Index**



CALCULATION OF THE “RAW INDEX”

The real raw index is a Fisher chain-type aggregate of 16 monthly measures of real spending, while the nominal raw index is a simple sum of the nominal versions of these measures. (Details of the calculation of the raw index appear in the Appendix.) Fisher aggregation requires data on both real spending and the associated price indexes. Table 1 lists the 16 subcomponents included in the raw index and the sources for the nominal data, the real data, and the price indexes. The major subcomponents include personal consumption expenditures, construction expenditures, capital goods shipments, exports, imports, and non-farm inventory investment. Some of the cells of Table 1 include the term “implicit,” which indicates that the associated series is calculated from the other two. For example, real private residential construction is calculated by deflating published values for nominal spending with a published price index.

Growth of the real raw index at the quarterly frequency is highly correlated with growth of official GDP. Figure 1 shows growth of the quarterly averages of the raw index (at annual rates) along with growth of official real GDP. The correlation of the two growth rates over this sample is 0.90. This is well above the correlation between growth of GDP and industrial production (IP) over the same period (0.57) as well as between growth of GDP and the Index of Coincident Indicators (ICI) over the same period (0.60). This suggests that even the raw index is superior to both IP and the ICI as a measure of aggregate output at the monthly frequency. Still, it would be useful to have a monthly index whose quarterly averages grow at the same rate as GDP. In the next section, we further illustrate the differences between the raw index and official GDP and we describe the adjustment we make to the raw index that reconciles it with official GDP.

CALCULATION OF “RESIDUAL GDP” AND MGD

In nominal terms, the raw index accounts for roughly 90% of nominal GDP. However, this coverage ratio has been declining in recent years (see Figure 2). This likely suggests that the elements of the raw index, taken together, have been rising more slowly than official GDP, and the portion of GDP not covered by the raw index, “residual GDP,” has been rising more rapidly. Figure 3 displays the quarterly averages of the real raw index along official real GDP. In this chart, the raw index is scaled to equal official GDP in

TABLE 1: DETAILED COMPONENTS OF MONTHLY GDP

Description of component	Nominal	Real	Price
Personal Consumption Expenditures	BEA: personal income and outlays	BEA: personal income and outlays	BEA: personal income and outlays
Non-PCE autos	BEA: table 7.2.5S (underlying detail), units x average expenditure per unit	implicit	BEA: table 2.4.4U (underlying detail), chain-price index for PCE on new autos
Truck sales to business sector	implicit	Estimated by MA from various data, mainly unit sales split into PCE, E&S, government based on interpolated quarterly expenditure shares (published data).	BEA: table 2.4.4U (underlying detail), chain-price index for PCE on new and net used trucks and recreational vehicles
Truck sales to government sector	implicit	Estimated by MA from various data, mainly unit sales split into PCE, E&S, government based on interpolated quarterly expenditure shares (published data).	BEA: table 2.4.4U (underlying detail), chain-price index for PCE on new and net used trucks and recreational vehicles
Private residential construction	Census: private residential new housing construction put in place	implicit	Census: houses under construction price deflator index
Manufactured homes and residential brokers' commissions	Implicit	Estimated by MA using growth of new home sales (Census), existing home sales (NAR), and mobile home placements (Census).	Calculated by MA: Fisher chain-type aggregate of NIPA price indexes for manufactured homes and residential brokers' commissions interpolated (quadratic) to the monthly frequency.
Private nonresidential construction	Census: total private construction less residential construction	implicit	Calculated by MA: NIPA price index for business structures excluding contribution from mining exploration, shafts and wells. Interpolated (quadratic) to monthly frequency.
Public construction: state and local	Census: total state and local construction	implicit	NIPA price index for state and local gross investment, structures, interpolated (quadratic) to monthly frequency.
Public construction: federal	Census: total federal construction	implicit	Calculated by MA: fisher chain-type aggregate of price index for defense gross investment, structures, and nondefense gross investment, structures. Interpolated (quadratic) to monthly frequency.
Shipments of capital goods	Census: manufacturers' shipments of capital goods	implicit	BLS: PPI for capital equipment; manufacturing industries
Exports of capital goods ¹	Census: exports by end-use category and commodity	implicit	BLS: export price index, capital goods
Imports of capital goods ¹	Census: imports by end-use category and commodity	implicit	BLS: import price index, capital goods
Total exports	BEA/Census FT-900. Exports of goods and services (BOP basis)	implicit	BLS: export price index, all commodities
Total imports	BEA/Census FT-900. Imports of goods and services (BOP basis)	implicit	BLS: import price index, all commodities
Government wages and salaries	BEA: personal income and outlays	BLS: Establishment Survey. Government employment scaled to equal nominal government wages and salaries in 2000	implicit
Nonfarm inventories	BEA: underlying detail table 5.6.5BM1, change in private inventories, nonfarm industries	BEA: underlying detail table 5.6.6BM, change in real private inventories, nonfarm industries	From 1997 through present, BEA: underlying detail table 2BUI, implicit price deflator for manufacturing and trade sales. Prior to 1997, calculated by MA mainly as a book-value weighted sum of various PPI's and CPI's

¹ Capital goods exports and imports are defined as nonautomotive capital goods less civilian aircraft engines, civilian aircraft parts, industrial engines, marine engine parts, semiconductors, and electric apparatus.

Figure 4:
Official GDP, the Raw Index, & the "Fisher Difference"

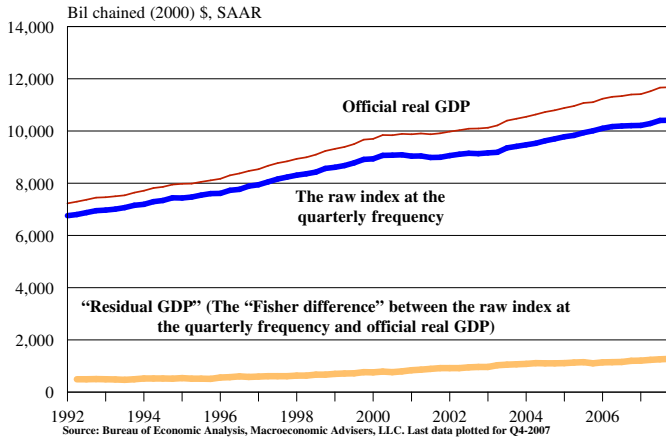
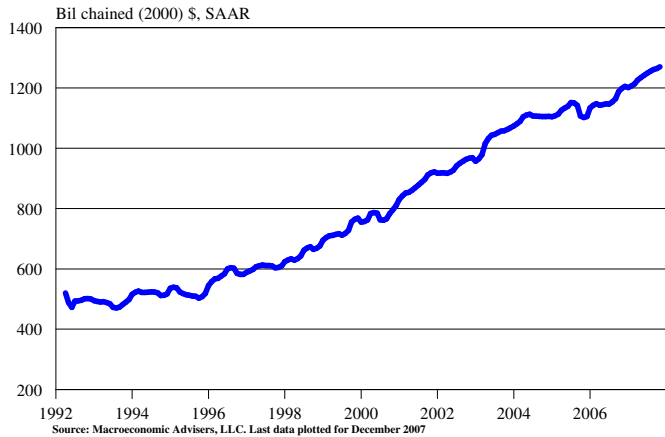


Figure 5:
"Residual GDP" Interpolated to the Monthly Frequency



the first quarter of 1993. This chart exhibits the declining coverage of the raw index. Declining coverage in the raw index is a problem in that it has inherent a "growth bias." That is, over the period of declining coverage, monthly growth of the raw index, on average, is too low (below that of actual GDP). In this section, we describe an adjustment to the raw index that corrects for this problem.

The goal of the adjustment to the raw index is to add back to the index "residual GDP," (the portion of GDP not included in the raw index) in a way that introduces as little new monthly variation to the raw index as possible. Attaining this goal would eliminate the growth bias and retain the monthly profile in the index generated by the intra-quarter movements in the monthly source data.

Figure 4 displays real GDP, the real raw index (quarterly averages), and "Residual GDP." Residual GDP is calculated as the "Fisher difference" between official GDP and the quarterly averages of the raw index. The Fisher difference between the two series is the result of "Fisher subtracting" the quarterly averages of the raw index from official real GDP. Fisher subtraction is a process we developed that results in a series that, when Fisher aggregated with the Fisher-subtracted series, recovers precisely the original aggregate.¹ We use a monthly interpolation of residual GDP to reconcile the monthly raw index with official GDP.

Figure 5 displays residual GDP interpolated to the monthly frequency. The method of interpolation is quadratic, with the average value of the interpolated data within a quarter restricted to equal the quarterly value for the original data. Our official Index of Monthly GDP (MGDP) is then calculated by including the monthly interpolation of residual GDP along with the other components of the raw index in the Fisher aggregation procedure noted above.²

¹ A detailed exposition of "Fisher subtraction" is contained in a separate note and is available from Macroeconomic Advisers upon request.

² Residual GDP and its monthly counterpart for a given quarter can be calculated only if official GDP and the raw index are available for that quarter. Due to the timing of the release of official GDP, residual GDP cannot be calculated in time for the preparation of monthly GDP for the first two months of the latest historical quarter. For example, fourth quarter official GDP was released at the end of January, but by then, we had already published values for monthly GDP for the first two months of the fourth quarter. We did this by making an assumption for residual GDP as follows. Residual GDP for the fourth quarter was implicit in the combination of our tracking forecast of fourth-quarter GDP growth and our assumptions for the components of the raw index during the fourth quarter. We simply assumed a constant growth rate of monthly residual GDP through the fourth quarter that reconciled our tracking forecast and our assumptions for the components of the raw index. This is our standard procedure for estimating residual GDP prior to the release of official GDP.

Figure 6 shows the levels of MGD_P and the raw index, while Figure 7 shows their one-month percent changes. By construction, the quarterly averages of MGD_P are virtually identical to official quarterly GDP, so MGD_P has the correct growth rate, and it does not have the growth bias evident in the raw index as discussed above. Furthermore, as seen in Figure 7, the intra-quarter movements in MGD_P are very similar to the intra-quarter movements in the raw index, suggesting that our method of reconciling the raw index with official GDP did little to alter the month-to-month changes in the raw index. This suggests that the intra-quarter movements of MGD_P are determined primarily by the monthly source data and only modestly by residual GDP, for which there is no monthly source data.

SUMMARY AND CONCLUDING THOUGHTS

Monthly GDP is a measure of aggregate output at the monthly frequency that, by construction, is consistent in concept and in content to the Commerce Department's official measure of real GDP, which is available only at the quarterly frequency. The appeal of Monthly GDP has been noted by members of the Business Cycle Dating Committee, who now use it in conjunction with other measures of economy-wide activity to identify the peaks and troughs in the business cycle. As currently estimated, Monthly GDP in December 2007 was at an all-time high, suggesting that it's unlikely that the economy slipped into recession at the end of last year. However, revisions to the underlying source data could overturn this observation.

Figure 6:

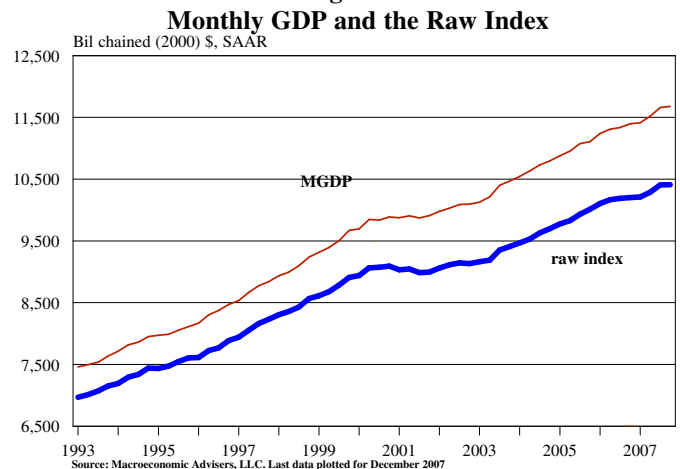
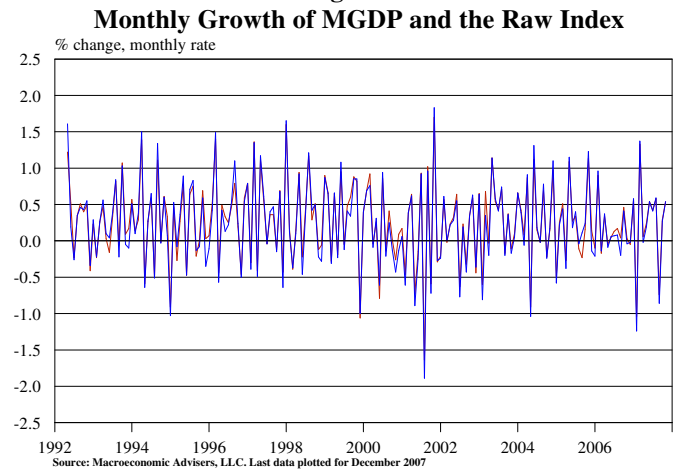


Figure 7:



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APPENDIX: CONSTRUCTION OF THE RAW INDEX

The nominal raw index, $RAW\$_t$, is a simple sum of the 16 nominal elemental components. The real raw index, RAW_t , is calculated by Fisher chain-type aggregation at the monthly frequency. The details follow. Let Q_t be the 16x1 vector of real quantities at time t , and P_t be the 16x1 vector of prices at time t . Total real imports and real exports of capital goods both appear in Q_t pre-multiplied by negative 1. A Fisher growth factor is calculated as

$$F_t = \sqrt{\frac{P_{t-1} \cdot Q_t}{P_{t-1} \cdot Q_{t-1}} * \frac{P_t \cdot Q_t}{P_t \cdot Q_{t-1}}},$$

where the dots indicate inner product. Next, an index number, I , is calculated using the following steps.

$$I_0 = 1$$

$$I_t = I_{t-1} * F_t \quad \text{for } t = 1, 2, \dots$$

Finally, I is scaled so that its average in 2000 is equal to the nominal raw index in 2000:

$$RAW_t = \frac{I_t}{I_{2000}} * RAW\$_{2000},$$

where I_{2000} is the average of I_t in 2000 and $RAW\$_{2000}$ is the nominal raw index in 2000.