Dodge Momentum Index Provides a Leading Indicator of Construction Spending for Nonresidential Building

Nonresidential building is a large and important component of the construction industry, as well as the U.S. economy, so there is always considerable attention directed at its future prospects. With the recent dearth of activity for nonresidential building, interest in predicting a turnaround has been particularly keen. The purpose of this white paper is to introduce Dodge Data & Analytics' Momentum Index, which is derived from construction projects tracked during the planning process, and to demonstrate that it is a useful forward-looking indicator for the nonresidential building put in place statistics issued by the U.S. Department of Commerce.

What is the Dodge Momentum Index and how is it calculated?

The Dodge Momentum Index is derived from Dodge Reports, the largest database of construction projects in the U.S. The information is populated by Dodge reporters who are located in more than 80 major metropolitan areas across the country and call on 35,000 industry sources and more than 150,000 sources overall. The reporters regularly contact architects, owners, and general contractors about projects they have "on the boards" in various stages of planning. These personal connections deliver over a half million projects each year, with 5,500 daily updates. Dodge Reports collect information on all nonresidential building, nonbuilding construction, and multi-unit (3+) residential building projects that reporters are able to identify—the universe of projects, rather than a sample of projects.[1] At any

given time one-third of the projects being tracked are in planning—the projects that feed the new Dodge Momentum Index.

The robust nature and comprehensiveness of this database is why Dodge is the sole private provider of construction starts and project data to the U.S. Commerce Department, which uses the information in creating the federal government's monthly estimate of construction spending put in place, a key input into the nation's Gross Domestic Product (GDP).

The first step in creating the Dodge Momentum Index was to sum the dollar value of Dodge's first-reported nonresidential building projects in planning during a given month. Only the first (or initial) version of the project for each stage was used, rather than updates to existing reports, to ensure that the "momentum" or change in market fundamentals was captured in the underlying trend. Extremely large projects ($500 million+) were excluded because their massive size can create spikes in the data, distorting the time series and hiding underlying trends.

Because of the seasonality in construction data (winter months typically have significantly less activity than summer months), the data was seasonally adjusted. Next, the series was divided by the average monthly value of planning projects during the base year (2000) to create the index. Since the data has been seasonally adjusted, it allows for month-to-month analysis of trends over the course of a year, as well as comparison to the seasonally adjusted construction spending statistics issued by the Commerce Department.

A three-month moving average was then applied to the index to reduce the volatility and random variation in the monthly data. While this

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[1] The information gathered from these construction sources is supplemented with information found from web searches, permit data, and other such means in an effort to collect information on the entire marketplace of projects with a valuation of at least $500,000.

procedure does reduce the lead time, the smoothed data provided a better fit between the index and the construction spending statistics.

The Dodge Momentum Index also only includes projects that are in clearly defined stages of planning. Projects in the earliest stage of planning (prior to actual design and before an architect is chosen) are excluded because, at this stage, the information about them is limited to broad conceptual ideas with many of the details yet to be defined. Fundamentally, too little information is available at this stage for it to be useful in predicting future construction.

Projects for which an architect or engineer have been selected and plans are fully underway are the basis of the index, since initial approvals have usually been granted and a general description of the project is available. Projects that will soon go out for bid, or will start construction within four months, are also included in the index because they are well along in planning and yet far enough away from breaking ground as to provide a somewhat longer lead time for construction spending. Very late stages of planning (such as bidding) have been excluded, not because information is unavailable, but because these stages are too close to start. Including these projects would reduce the lead time that provides the predictive value of a leading indicator.

Because the Dodge Momentum Index is a leading indicator for the nonresidential building categories of construction spending, the index includes planning projects for the following project types: offices, stores, warehouses, auto services and parking garages, hotels, education (including dormitories), healthcare, public buildings, religious buildings and recreational buildings. The manufacturing buildings category has been excluded from the data used to create the Dodge Momentum Index.[2]

How does the Dodge Momentum Index relate to the Commerce Department's construction spending put in place and how can this be measured?

The hypothesis underlying this analysis is that the Dodge Momentum Index should have a very strong and direct relationship with the Commerce Department's construction spending put in place statistics. Given the extensive network of planning projects available in the Dodge Reports and the large amount of information gathered before a project actually starts, the relationship between planning information and construction spending should be highly correlated—even though only a portion of all planning projects that are proposed reach the construction start stage.

Another significant reason for this assumption is that the sample of private construction projects used to conduct the Commerce Department's monthly put in place survey is derived from the Dodge Report projects that have broken ground, *i.e.*, started.

To test this hypothesis, a correlation analysis was conducted to identify the strength of the relationship between the two series. The first step in this correlation analysis was to align the Dodge planning and Commerce Department spending data by structure type and to identify the time period over which the analysis can occur. Dodge Data & Analytics has stored monthly information on the nation's construction projects in planning by detailed construction segment as far back as 1996. While some of the Commerce Department's monthly data is available back to 1993, information on public construction spending (federal, state and local) is only available back to 2002. As a consequence, the correlation analysis for total nonresidential building, which includes both private and public construction, was conducted over the January 2002-June 2015

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[2] Manufacturing construction can be a lagging indicator since it is triggered when capacity utilization has reached a very high level (which typically occurs after a long period of expansion). In addition,

manufacturers are often reluctant to provide information on expansion plans well in advance of construction start since such competitive information can affect their product pricing and profitability.

period (the most recent available data at the time).

An issue in the analysis was the fact that the Commerce Department's information by structure type is not perfectly aligned with the information available from Dodge Data & Analytics. The Commerce Department defines structures by their end use, whereas Dodge defines structures by their building type. This leads to differences in how some types of buildings are categorized.[3] The correlation analysis could not perfectly adjust for these differences, a fact that must be considered in analyzing the results of the correlation between detailed structure types.

After the data were organized and cleaned as described above, the correlation analysis was conducted. A correlation analysis calculates a coefficient, which is a measure of the strength of the relationship between the two variables. The closer the coefficient is to one, the stronger the positive relationship between the two data series being analyzed. By contrast, correlation coefficients that approach zero indicate no relationship.

There can be considerable variation from project to project in the length of time each is in planning, so conducting this analysis only for total nonresidential building is not sufficient. Many factors influence how long a project will remain in planning. For example, the size of the project has a significant impact. As project size increases, the undertaking becomes much more complex and can take longer to move through the approval process. The availability and ease of obtaining financing can also have an impact on the length of time in planning as can regulatory approvals (environmental impact, permits, etc.).

For the purpose of this analysis, correlations were calculated for three broad categories of construction: total nonresidential, commercial (which includes offices, retail, warehouses, hotels and auto services), and institutional (which

includes education/ dormitory, healthcare, as well as government, recreation, and religious buildings). In addition, Dodge Data & Analytics examined three specific types of buildings that each account for a large share of total construction: office, retail/warehouse/auto service, and education construction. For each of these types of construction, Commerce spending put in place was measured against the Dodge planning data on a coincident basis as well as a lagged basis to determine if and by how long the planning data might lead construction spending put in place.

What are the results of the correlation analysis?

The Dodge nonresidential building planning data was analyzed against the Commerce Department's nonresidential building put in place statistics over the January 2002-June 2015 period. This period, which encompassed more
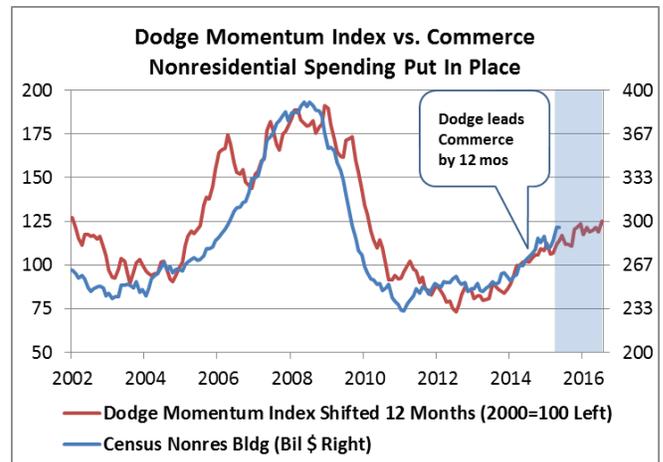
than two business cycles, was more than sufficient to determine a statistically significant correlation between the two data sets. The correlation coefficient for the nonresidential building momentum index versus construction put in place for the nonresidential building categories (excluding manufacturing) was 0.89 with a twelve-month lag. This result suggests that the relationship between the two measures of construction activity is extremely strong and that

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[3] For example, a college-owned gymnasium would be categorized by the Commerce Department as education, whereas Dodge would categorize the same building as amusement/recreation.

projects in planning lead spending by a solid twelve months.

The relationship between the Dodge commercial planning projects and the comparable projects within Commerce's construction spending put in place proved to be the strongest of all sector types with a correlation coefficient of 0.91 at an eight-month lag. This relationship is exceptionally robust, although the shorter eightne-month lead time suggests that the commercial planning data provide a slightly shorter look into the future for commercial building than for overall nonresidential building.

The relationship between the Dodge institutional planning projects and Commerce's institutional building spending put in place is 0.74 with a fifteen-month lag. Although lower than the commercial results, these findings still suggest a strong relationship between the planning data and institutional building. Moreover, the institutional planning data provide slightly more than a year's lead time in helping predict where institutional building put in place is likely to head.

Because the relationship between Dodge planning data and construction spending varies by project type, several additional indices for detailed project types were created. These detailed indices examined the relationship between office, retail/ware-house/auto, and education planning projects and the comparable measure of construction spending put in place.

As mentioned above, definitional issues with some of the detailed categories made a direct comparison more difficult. Nevertheless, the results proved to be quite robust. Only the education sector, which has the largest definitional differences between the two data sources, was slightly lower. The correlation coefficient for office construction was 0.85 with a ten-month lag. For the retail group, it was 0.89, but with a seven month lag. Finally, the correlation coefficient was 0.67 for education with a fourteen-month lag. Despite this lower correlation, the relationship is still significant.

Correlation/Lag Analysis Based on Three-Month Moving Average of the Dodge Momentum Index and Census Construction Spending Put in Place			
Dodge Momentum Index	Census Construction Spending Put in Place	# Months Lag	Correlation
Dodge Momentum Index*	Nonresidential	12	0.89
Institutional	Institutional	15	0.74
Commercial	Total Commercial	8	0.91
Office	Office	10	0.85
Retail/Warehouse/Auto	Commercial (Retail/Warehouse/Auto)	7	0.89
Education	Education	14	0.67
*Nonresidential building, excluding manufacturing			
Sources: Dodge Data&Analytics; U.S. Department of Commerce			

Conclusions and Recommendations

The results of the correlation analysis between the Dodge Data & Analytics planning data and the Department of Commerce's construction put in place statistics yields strong results. This suggests that the Dodge Momentum Index has the ability to assess the future direction of construction spending with enough certainty and enough lead time to positively benefit building products manufacturers and others whose business prospects are highly dependent upon construction spending.

While the Dodge Momentum Index is more volatile than construction spending from month to month, the underlying trend directly correlates with that of construction spending. Even the individual construction sectors – the broad commercial and institutional building categories as well as the detailed office, retail/warehouse/auto group and education building are highly correlated with their respective planning information and offer sufficient lead time to allow those in the construction industry to respond to changing conditions.

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