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On the Cover: The new cosmic portrait -- called the cosmic microwave background -- was captured by scientists using NASA's Wilkinson Microwave Anisotropy Probe (WMAP) during a sweeping 12-month observation of the entire sky, article on page 4. Photos courtesy of NASA/WMAP Science Team.

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CERTIFICATION PAPER

Budget Busts: The Influence of Demand in the Construction Market

Jonathan Moss, CCC

Certification Papers - Each candidate seeking certification as a Certified Cost Consultant/Certified Cost Engineer (CCC/CCE) is expected to write a professional paper of a minimum of 2,500 words on a cost engineering-related subject and must be submitted before or at the time of the examination. Published are some of the top scoring entries as an example of what constitutes a good entry. Other members and readers will also gain insights on current industry trends and projects with the publication of these papers in the Cost Engineering journal.

ABSTRACT: The adequacy of the owners budget is fundamental to the successful implementation of a project and the cost estimate is the primary management tool in deriving that budget. In establishing a budget, a level of risk is accepted in respect of its adequacy. Consequentially, there is a normal statistical failure rate at any level of said risk. The failure rate for owners budgets in the construction industry has, in recent months, significantly increased. Tender prices have risen on average 10-20 percent compared to a year ago despite reports of inflation remaining subdued and construction cost indices declining. The public sector has been especially hard hit, in particular school projects where in some cases tender prices are reportedly as much as 60 percent higher. Increased demand relative to market supply is to blame for rising bid prices. The increasing failure rate is indicative of weakness in both estimating ability to predict market trends and of management approach to providing appropriate levels of contingency for price risk. While there is the potential to improve upon predictive ability and responsiveness in a volatile market through implementation of effective cost management techniques, the risk of budget failure will always remain. It is therefore important to not only be aware of such risk but also to actively plan remediation measures in the event of a budget bust.

KEY WORDS: Budget, cast central, overruns, owner, estimating

The Owners Budget

Fundamental to the successful implementation of a given project is the adequacy of the owners budget in meeting the cost of the programmatic goals expressed in terms of function, quality, and schedule. The primary management tool in establishing and validating the budget is the cost estimate in its multiple forms and incarnations. Much has been discussed elsewhere in professional literature, training manuals, handbooks, and seminars regarding the various methodologies and approaches used in estimating, and it is not the intent here to revisit such topics.

For the purposes of this article, it is important to note that estimating is not an exact science and there is a level of risk inherent in reliance on any estimate, no matter how skillfully executed. The estimate is, after all, an attempt at predicting the future and there can be no guarantees. Common practice in the construction industry is to base (owners) estimates on historic cost data modified to suit the specific project and adjusted according to perceptions of market trends and anticipated conditions at time of bid.

Varying levels of effort, expertise, and experience are expended in producing the estimate and these also have a marked effect on the potential accuracy and level of risk. Reasons for such variation in approach include personal and corporate circumstance, time and financial constraints, individual preference, and skill. Such risk can be mitigated by thorough understanding of the basis and approach adopted in formulating the estimate and providing for an appropriate contingency when deriving the overall budget. Again, procedures and approaches for setting contingency are discussed extensively elsewhere and will not be described here. It must, however, be understood that any contingency provision reflects the level of risk acceptance that an owner is prepared to live with, which for very pragmatic reasons will usually be greater than zero. In reality, unless the management team has total control over every single contributing factor, it is impossible to guarantee 100 percent accuracy of any and every budget and without infinite funds it is impossible to provide total contingency protection for that budget.

Given, then, that estimating is not exact, has inherent risk, and that risk cannot be fully offset by contingency budgeting and planning, it is inevitable that there will be a normal "failure" rate associated with budget setting and the potential for a budget overage or, in the vernacular, a bust.

Budget overruns can occur at any point in the program development or execution. Good cost control is essential through the execution stage but this is for the most part dependent on adequate budget allocation in the first place. For the development budget in the construction industry, the "proof of the pudding" comes at bid date when prime and/or sub contractor tenders are opened. While budget overages are sometimes handled by a management reserve over and above the budgeted contingency, in all likelihood such busts will result in program reduction or cancellation, and resources expended to that point have been wasted. A forensic review after the fact will normally highlight the causal factors, if any, and lessons learned can be fed into future budget development.

Budget busts are to be avoided. For a given organization or industry, failure rate should diminish over time as lessons are learned from previous failure. A statistical minimum failure rate can be identified over time and management provision made as deemed appropriate. Of course, for a client who may only develop one project, this is of little comfort or use.

Problems result when this failure rate increases markedly, as is the present case in the construction industry where (development) budgets are being significantly exceeded at bid opening. Does this signify a mass failure in the application of techniques employed by owners and their budget teams when developing cost

plans or is there an underlying problem with the techniques in themselves?

The Problem

Recent months have seen a dramatic increase in the number of projects bidding significantly over budget expectations. The extent has varied by region and market sector, but reports typically indicate a 10 to 20 percent increase in prices when compared to similar projects a year or, in some cases, even six months ago. Although this escalation is being experienced across the board, it is the impact on publicly funded schemes that is being trumpeted in the press, and it is here that the worst horror stories are found. Consider North County High School in Anne Arundel County, Maryland. Officials report a 60 percent increase cost in the past year to $162 per square foot [1]. Less extreme, but of no less concern, Fairfax County Virginia Schools have seen budget busts of up to 30 percent [2]. A glance through recent editions of the CMD bulletin for Washington DC will show that high schools are regularly bidding as high as $136/sf where $110 was normal at the start of the year.

The Washington Post in the same edition as the Virginia schools article, reported inflation through June as, "remaining subdued. [2]" To anyone familiar with the construction market, this does not seem realistic, and is patently untrue when tender prices are considered. The Engineering News-Record continues to report a decline in its construction cost index [3], but this is not being borne out in practice. So, just what is going on?

Unfortunately, popularly quoted assessments such as the above are based on indicators that lag behind the curve and are slow in reflecting a change in underlying trends. Even industry-based indices are fundamentally slow in reacting to a change. The Department of Commerce notes that underlying trends may not become apparent for three to eight months. As the majority of the present escalation has taken place in the last quarter, the change in the market has not yet percolated through into the figures. In a highly volatile market, economic indicators cannot be relied on to accurately reflect the current situation.

Furthermore, such indices are often composites of many sub-indices specific to individual regions, markets, or industries.

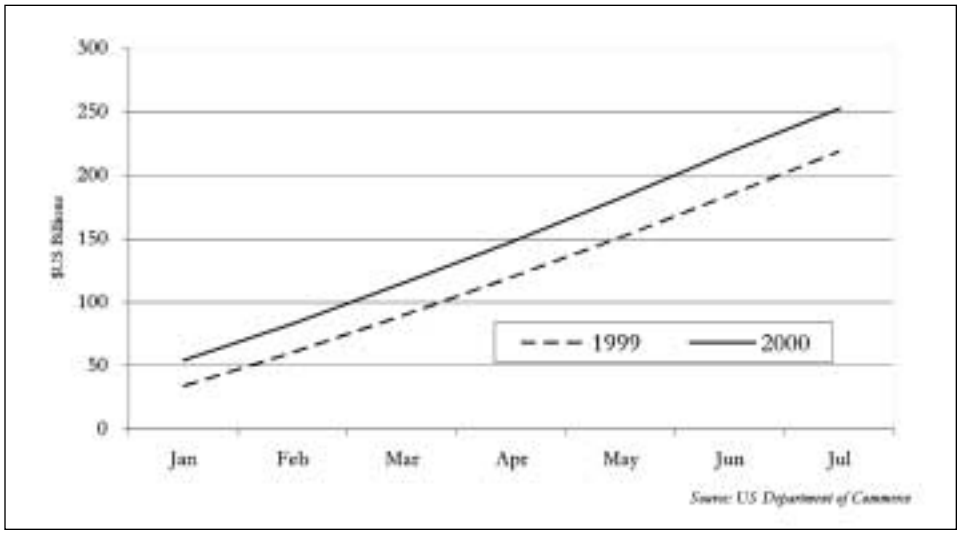

Figure 1—Non Residential Construction In Place—2000 YTD

They are therefore limited in sensitivity to local conditions particular to your own region or market sector. In addition, most indices are a reflection of cost rather than price trends and the difference between the two can be significant as they are, to all intents and purpose, independent of each other.

Cost Versus Price

A given resource, be it raw material, assembled product, component, labor, services or otherwise, has a cost associated with its use, processing, or performance.

Price is the monetary value at which said resource can be purchased. The price of a given item can be greater, equal, or less than its cost and is a function of the willingness of the items' owner to sell. Equally, it is also a function of the purchaser's willingness to buy. Both are reliant on internal factors such as risk and profitability and external factors such as market conditions.

Thus, a construction project will have a total cost to the contractor. It is up to that contractor to determine the price he wishes to charge the client for performing the work. The client must then determine if he is prepared, or indeed able, to pay that price.

At the time of writing, the "asking price" for performance of construction projects has risen substantially and clients are experiencing difficulty in reconciling these prices with their budgets.

As there seems to be little sign of construction prices cooling off, it is therefore advisable to consider the reason behind the current situation and make the

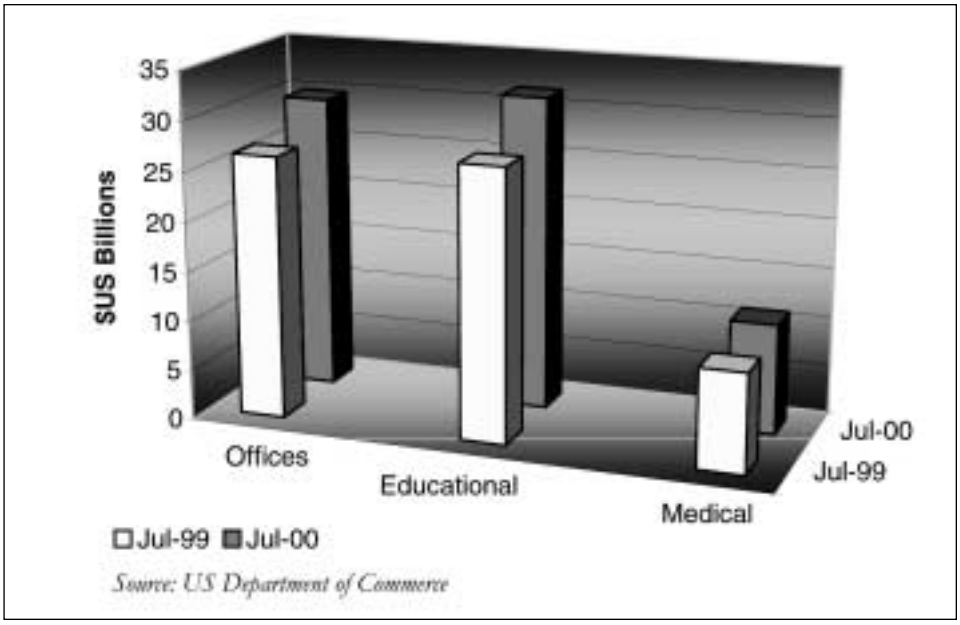

Figure 2—Comparative Value of Construction In Place By Sector, 1999 and 2000

necessary preparations for dealing with its inevitable effects on your own project.

The Reason

The explanation for the escalating prices can be summarized in one word, demand.

Figure 1 shows the cumulative monthly value of construction put in place for the year-to-date and reflects the volume of construction work in the US. In all sectors, these values have significantly increased in the past 12 months, with key areas averaging around nine percent. More telling is a look at increases in the individual sectors, prominent among which are office (13 percent in the private sector alone), educational (20 percent private, 16 percent overall) and medical (15 percent public, 11 percent overall) construction (Figure 2).

Public and private spending is at record high levels, fuelled by a thriving economy. There is little likelihood of things slowing down in the immediate future. Large US federal and state surpluses, such as the $300 million of additional funding authorized by Maryland State Governor Parris Glendenning for educational projects earlier this year, are being funneled back into the various capital expenditure programs.

High demand for construction impacts many elements, chief among which are the following.

- bid coverage;
- availability of construction materials;
- availability of construction labor;
- availability of professional services;
- quality control; and
- contract completion.

Bid coverage

Bid coverage refers to the number of bidders for each contract and/or contract package. The greater the number of bidders the better the price and vice-versa.

To help understand just why this is so, imagine the procurement process as an auction with the contract being the item for sale, albeit to the lowest rather than the highest bidder. When the item (the project) offered for sale is rare, more bidders (namely the contractors) are eager to obtain the work. Competition is strong and bid prices fall. Conversely, if the item (project) is just one of many available, the bidding is more selective and bid coverage low. Prices go up, as contractors are able to pick and choose the most desirable of jobs in terms of profit margin and reduction of risk. At the present time, demand is outstripping supply such that many projects are having difficulty obtaining a single bidder.

Materials costs

Increased demand leads to supply shortfalls and/or delays, with contractors looking further afield for suppliers or paying premiums to jump the fabrication line. The suppliers themselves encourage this behavior (after all, they are looking to maximize their profits too) and will often play rival projects against each other. Those contractors who wish to circumvent this may preorder materials, but then the cost of financing and risk is just added to the bid spread and the price to the owner still goes up.

Labor Costs

In a busy market, labor costs are pushed up as contractors find themselves paying premiums to retain labor crews. The crews need incentives to stay, otherwise they pack up and head down the road to another contractor's jobsite where wages are higher or perks such as paid overtime premiums are available. A similar situation is true of subcontractors. If you talk to any contractor at the moment, he will complain to you of shortages in both material and labor because of unprecedented demand. This will either cause him grief if he is endeavoring to closeout an old project (he has his own budgets to manage) or delight if he is explaining just why his bid is so inflated (he can charge you more money).

"Soft" Costs

The effects of high demand are not solely seen in the contracting and supply industry. In such a market, professional services are similarly in demand, and design fees and associated costs are also likely to increase as the consultants pick and choose the projects they wish or have the capacity to be involved with. Furthermore, staffing costs tend to increase, as employees are able to "shop around" for more lucrative positions.

Other problems

Quality control and on time completion are also likely victims of the booming market as contractors struggle to bring jobs in on budget while facing the same cost crises outlined above. To maintain margin as costs soar, contractors are often forced into hiring and buying from the shallow end of the supply pool. Quality can and does suffer as a result. Poorer quality labor and materials, and/or the delay involved in procuring them have a negative impact on schedule. Extra and prolonged supervisory effort adds to the cost burden and contributes to this downward spiral.

The additional time and effort called for from the owners supervisory team can also become problematic and expensive. Relationships are more prone to become adversarial as contractors seek to recover as much of the lost time and cost from the owner through claims. Consultants find themselves struggling to balance project demands with diminishing fee balances and this too has consequences for the owner.

Analysis: Failure or Circumstance?

Let us turn now to the question posed earlier and synopsize the discussion presented above:

- Typically, the construction cost estimate is based on a combination of historic cost data and future predictions.
- Current prices are up.
- Historic costs do not change.
- Market conditions have changed—demand has increased relative to market capacity (supply).
- Demand is at unprecedented levels.
- The failure rate has risen and the budget bust is real.
- There are no guarantees when predicting the future.

It can be argued that in the context of construction tenders all budget overages reflect either, or a combination, of the following.

- Technical failure in terms of the execution of the estimate.
- Strategic (management) failure manifested in a lack of adequate risk assessment and associated contingency provision at budget establishment and/or lack of control through the program development and execution.

It is difficult to comment holistically on the individual application of estimating procedures, particularly in the absence of detailed knowledge of the projects concerned. Experience dictates that a proportion of the budgets in question were fundamentally flawed in their technical execution and that their failure was inevitable. The scale of the problem (namely the increase in failure rate or number of "budget busts" encountered) is significant enough to imply that the industry in general, and specifically owners and their development teams, were caught off guard by the changing market conditions. In not recognizing this early enough, the budget teams did indeed fail to reflect the current market price in either its effect on historic cost data and/or in predicting the risk of future increase. This is a characteristic vulnerability of the public sector funding cycle. The legislative process for fund allocation is lengthy and requires budget establishment at an extremely early stage in the planning process, thus increasing the lead time over which the budget team is called to predict design development and market trends.

We can thus observe that the increased failure rate is indicative of strategic failure in budget development and is therefore a failure in application of budget techniques. While there is inherent uncertainty in the predictive estimate, this uncertainty should have been quantified and managed accordingly.

There is a further scenario given that demand is at unprecedented levels and that there are no guarantees when predicting the future. With hindsight, it is easy to criticize and lay blame at the individual estimators or budget teams who were proved incorrect. As risk can never be totally removed one could argue that the budget team are blameless provided the budget accurately reflected the costs at the time of development, that risk of price variation was identified and management, for whatever reason, accepted a certain degree of that risk. In this context, the market change could have been suitably swift as to defy accurate prediction and thus is a manifestation of the risk that was accepted. If fault is to be found in this scenario, then it is in those budgets set that failed to take account of the true nature of the current market, once it became apparent.

The Solution

Unfortunately, there is no simple straightforward solution to this problem, although it is ultimately self-resolving. We are basically paying the premium associated with the booming US economy. At some point in the future, the market will adjust to compensate, demand will reduce and so with it, prices. When this will happen is difficult to determine. As long as a sufficient number of purchasers are willing to pay the asking price and proceed with their project, demand will continue unchecked and prices remain high.

There are steps you can take, however, to mitigate the effect that market forces will have on your scheme. First and foremost, establish a cost management procedure. Secondly, invest in the necessary resources to implement this procedure effectively. The following are useful techniques to apply to your situation.

If Your Project Is In Design or Preparing to Bid

- Perform a detailed risk analysis.
- Thoroughly research and review the marketplace and validate your cost database.
- Prepare a reliable cost model based on realistic and not purely historic data.
- Ensure you understand the cost model and its basis.
- Review your schedule. What is the maximum premium you are willing to pay to build at the time you wish to build?
- Monitor the market and carefully target your bid date.
- Keep the bid package simple—no complex alternates and/or confusing documents.
- If you must have alternates, use deduct alternates and clearly define the scope.
- Consider alternative procurement approaches.
- Market your project.
- Avoid compromising the design, but consider alternative (more readily available) materials.
- Use commonly accepted and proven forms of contracts. Avoid onerous contract conditions and unreasonable requirements. Be realistic!
- Avoid limiting the competition by excessive use of bidding restrictions and requirements, and/or nominated suppliers and subcontractors.
- Set a realistic bid period, not too short (precludes thorough bid compilation) or too long (bidders lose interest, opportunity, and temptation to make changes increases).

If Your Project Has Bid Over Budget

- Review bid coverage—if inadequate, solicit further bids.
- Talk to the bidders—identify weakness in subcontract coverage.
- Review the bids. Establish a fair and reasonable price. Determine whether you are prepared to pay the premium.
- Consider postponing the project.
- Consider phasing the project and/or reducing the program.
- If not, and if acceptable, value engineer.

If You Are Trying to Close-Out A Project

- All of the above, depending on stage of procurement.
- Maintain effective quality control.
- Be understanding of the perspectives and motivation of the various team members involved and promote positive cooperation.
- Consider incentives, e.g., a bonus for timely completion.
- Strongly enforce your contractual rights.

Risk associated with fluctuations in market demand must be addressed during budget development. Application of effective cost management techniques using suitably skilled personnel will assist in quantifying and somewhat mitigating the risk. However, contingency planning for remedial action must be part of the project plan.

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