The Effects of Inter-Industry Competition in the Paving Sector

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Infrastructure spending is at an all-time low

More Potholes? This Might Be Why.
Infrastructure spending as a percentage of G.D.P. has fallen to the lowest level in decades.

Source: U.S. Census Bureau

How do we do more with less?
Competition among product substitutes could lower prices

Substitute: A product or service that satisfies the need of a consumer that another product or service fulfills

Inter-industry competition could lower paving prices

Does the presence of competition between material substitutes impact pavement material prices?
The pavement sector makes for an interesting case study due to the presence of two forms of competition

- **Intra-Industry Competition**: Between firms that pave with *the same material*
  - Typical indicator – number of bidders for a given job

- **Inter-Industry Competition**: Between firms that pave with *material substitutes*
  - Number of firms or participants
  - Market concentration
  - Market Share

**Focus of this study**: Characterize the effect of increased inter-industry competition in the paving sector

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How would you measure competition or competitiveness?

- **Intra – industry**
  - Typical indicator – number of bidders for a given job

- **Inter – industry**
  - Number of firms or participants
  - Market concentration
  - Department of Justice uses this for monopolies
  - Market Share

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To characterize the effects of competition in the paving sector we conducted a statistical analysis of 10 years of bids

- **Oman BidTABS database**
  - Bids, not actual costs
  - Includes most highway works projects
  - Some large and PPP projects excluded
  - Spread out over 10 years (2005-2014)

- We analyze competitive bid data:
  - Across 47 states (excludes HI, NJ, and AK)
  - 298k pay items, 164k jobs, filtered down to 30,000 data points that are relevant to mainline paving

Details on method: [Swei et al, 2020](#)

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Parameters of interest in Oman BidTabs data

- Project size (quantity)
- State market size (annual spending)
- Price adjustment clauses (asphalt only)
- Number of bidders (intra-industry competition)
- Dominant market share (% spending on AC; inter-industry competition)
Statistical model shows large impact of inter-industry competition

- Project Size
- State Market Size
- Price Adjustment Clause
- Number of Bidders
- Dominant Market Share
- Asphalt Unit-Price ($/ton)
- Concrete Unit-Price ($/CY)
- Asphal only
- Intra-industry competition
- Inter-industry competition

Lower unit-prices for bid items are correlated with increased concrete spending

- For a state spending an average of 5% on concrete, an increase to this level of concrete market share...
- Impact of competition on costs estimated using statistical model

Increased competition can translate into more paving

- Annual paving tonnage for a state with a $100M budget
- % Spent on Concrete
- % Spent on Asphalt

Next step: explore mechanism of competition's impact on prices

- Understand correlation vs. causation, just like medical studies
- Correlation between Smoking and Lung Cancer
- Exercise and Mental Health
- Healthy Diet and Life Expectancy
- What is the mechanism?

Assume asphalt price of $65/ton and concrete price of $175/CY
Thank you
http://cshub.mit.edu/
cshub@mit.edu
Understanding the Value of Competition [Part 2]

“Technology Tuesday” Webinar
April 6th, 2021

Leif G. Wathne, P.E.
American Concrete Pavement Association

MIT: Inter-Industry Competition Lowers Pavement Costs!

Passes the gut-check, and verified by the most comprehensive and rigorous scientific analysis ever undertaken on this subject

- Extends the purchasing power of our highway dollar.
- Including asphalt and concrete not only lowers pavement costs, it also improves quality, and spurs innovation.
- Healthy industries can INVEST in training, people and technology

So... What’s the Problem?

- Competition is probably the single-most overlooked aspect of getting the most from our pavement investments...?!?
- Most agencies are NOT adequately capitalizing on the benefits of competition between paving industries

NOTE: A few states do, and use a healthy two-pavement system to their advantage...

Rooted in Self-Reinforcing Analyses

- Sole project-by-project focus can cause you to inadvertently miss the bigger opportunity... (i.e. miss the forest for the trees)
- Stewardship involves a program of projects... and stepping back allows for a better perspective
Fictional State of Missitucky...

- Slowly shifted to a one-pavement system over a few decades
- Potential driver: First cost decision-making...
- Systematic deselection has essentially led to elimination of concrete pavement lettings and the industry with it...
- PTS Process? Based largely on LCCA. “Data Driven”.
  - Cost inputs for LCCA? No slip form jobs to draw from. Slab replacement? Repair jobs? Ramps? Approach slabs? Such costs are vastly inflated!
  - No meaningful concrete pavement cost data for LCCA!...
- Tried implementing ADAB. Concrete cost inputs still not competitive (LCCA, design, mobilization, equipment, training, supply chain etc.).
  BUT, asphalt unit bid prices did drop.... for those select few projects.

Of course, this is nothing new...

- AASH(T)O knew this over 60 years ago and warned agencies about it in a document written SPECIFICALLY to reinstall faith in the interstate highway program!
- Covers a lot of information... including PTS, aiming “to assure the public of full value for their highway dollar.”

1960 AAS(T)HO Guide

- In section on cost comparisons (LCCA): “doubt as to the validity [of such analysis] arises in the case where on[e] type of pavement has been given monopoly status by the long-term exclusion of a competitive type.” i.e. cost data is not meaningful
- In section discussing competition, they write “…It is desirable that monopoly situations be avoided, and that improvement in products and methods be encouraged through continued and healthy competition among industries involved in the production of paving materials.”
- Highway officials recognized the importance of establishing and maintaining competing industries.
Having Multiple Bidders on Projects Isn’t Enough…

Contractor Competition
Limits competition at the supplier level, which can limit effectiveness

Industry Competition
Assures competition happens between both contractors and suppliers

First Level
Asphalt Contractors
- Contractor 1
- Contractor 2
- etc

2nd Level
Asphalt Material Suppliers

3% Impact lowering bid prices

WHAT DOES ALL THIS MEAN?

- Inter-industry competition is foundational to meaningful cost analyses (i.e. LCCA)
- And by extension... any stewardship program, including ADAB, mix-of-fixes, planning, asset management, etc.

What can Missitucky do?

- Acknowledge that they are a monopsony… and leverage that opportunity!
- Fundamentally, send a clear signal to both paving industries – serious about marshalling benefits of competition. Programmatic view!
- Industry will respond (both concrete and asphalt)
- Must be confident that the state is committed to the health of both industries… involves investment in training, education, equipment, research, etc.
- All is in the best interest of Missitucky!

How to get there...?

Several Paths to Spur and Maintain Inter-Industry Competition...

Announce letting of a program of concrete projects (as done w/ HMA)

- Multiple projects each year over several years signals a sustained commitment
- Limits “buying” of jobs...
- Can also focus on regions/locations with single bidder lettings
- Example: Florida
Another Path to Spur and Maintain Inter-Industry Competition…
Maintain healthy industries by balancing quantities (e.g. square yards to tons, $s)
- Used successfully by agencies who recognize it is in their best interest to have more than one industry
- Can smooth the peaks and valleys for each industry to enhance certainty and stability, contributing to consistent competitive pricing and quality
- Generates lowest unit prices for both concrete and asphalt pavement
- Example: Iowa, Wisconsin...

Another Means to Spur and Maintain Inter-Industry competition…
Commit to a program of alternate bid projects (ADAB)
- Can be effective if done in accordance with FHWA ADAB guidance (T5040.39) and is sustained!
- Design equivalence, LCCA bid adjustments, no price escalation clauses, equivalent quantity measures, etc.
- Example: Pennsylvania, Kentucky, Louisiana, West Virginia...

How to get there?
- No single way... but only with two healthy industries will agencies be able to maximize the purchasing power of highway dollars!
- An agency can employ LCCA, ADAB, AM, etc., but will never know what they SHOULD be paying for pavement without inter-industry competition!
- An aging network, growing needs and constrained resources demand a rethinking of how we stretch and steward investment
- Reason why competition is foundational to American way of doing business... it pays dividends!

How to get there?
- Involves a programmatic approach to a healthy two pavement system (i.e. diversify)
  - Have to recognize the ‘forest’!
  - Must send clear signal to both industries
  - NOT about one being better than the other
  - Diversify concrete solutions portfolio across all applications (Mix of Fixes)
  - Benefit from competition in multiple markets (highways, county roads, streets, airfields) across solutions (minor rehab, major rehab, overlays, reconstruct, new construction)
Involves a programmatic approach to a healthy two pavement system (i.e. diversify).

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**How to get there?**

<table>
<thead>
<tr>
<th>Category</th>
<th>Mix of Fix treatments applicable to existing pavement types</th>
<th>Maintenance</th>
<th>Performed Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventive maintenance</td>
<td></td>
<td>AC</td>
<td>1-5</td>
</tr>
<tr>
<td>Corrective maintenance</td>
<td></td>
<td>AC</td>
<td>1-5</td>
</tr>
<tr>
<td>Minor Rehabilitation</td>
<td></td>
<td>AC</td>
<td>6-18</td>
</tr>
<tr>
<td>Major Rehabilitation</td>
<td></td>
<td>AC</td>
<td>19-30</td>
</tr>
<tr>
<td>Reconstruction</td>
<td></td>
<td>AC</td>
<td>5-10</td>
</tr>
</tbody>
</table>

The value of inter-industry competition is that it enables our stewardship tools like LCCA, ADAB, planning, mix-of-fixes, and asset management to function properly!

**Particularly Important…**

- In the face of massive infrastructure investment. $2 trillion, $3 trillion? Reauth.
- Must apply lessons learned from the past!
- Cannot afford public and Congress to lose confidence in program administration.
  - “… assures the public of full value for their highway dollar…”
  - “… through continued and healthy competition among industries involved in the production of paving materials.”
- Ensuring inter-industry competition is a critical component good stewardship!

**Understanding the Value…**

Questions?