

Single Bidders and Tacit Collusion in Highway Procurement Auctions

David Barrus

Department of Economics
Brigham Young University-Idaho
Rexburg, ID 83460-0815

Frank Scott

Department of Economics
University of Kentucky
Lexington, KY 40506-0034

Bid rigging in the asphalt industry

- Monopoly cases of 1960s and 1970s
- 1980s: change in emphasis to price fixing
- Highway contractors: over 600 cases brought
- Lots of convictions, fines, and jail time
- 1990s and beyond: no overt collusion??
- New problem: single-bidder auctions!

Table 1: Summary Statistics of all projects in Kentucky – 2005 to 2007

	Number of Projects		Total Value of Projects (\$ in millions)		Over or Under Engineer's Estimate (%)	
	Asphalt Paving	All Other Projects*	Asphalt Paving	All Other Projects*	Asphalt Paving	All Other Projects*
1	680	154	437.8	737.6	2.22	2.38
2	287	223	121.8	800.8	-13.53	-6.02
3	76	211	36.0	488.3	-16.73	-13.22
4	29	153	11.4	174.4	-15.35	-16.02
5	3	83	1.8	144.0	-14.15	-19.52
6		43		49.8		-17.22
7		23		44.0		-21.30
8		12		17.1		-16.07
9		7		4.6		-26.08
12		1		0.7		-11.05
Grand Total	1075	910	608.8	2,461.1	-3.84	-10.39

*These other projects include grade and drain, bridge, mowing, concrete, etc. Some of these projects have asphalt components as part of the project.

Highway procurement auctions

- Types of contracts: new construction, bridges, asphalt resurfacing, trimming and mowing, etc.
- Funding often separated by county, so projects often delineated by county lines
- Monthly bid-letting, projects advertised well in advance, prequalification of bidders
- Sealed-bid auction, collusion checks ex post
- Qualified bidders are publicly revealed prior to the auction in Kentucky!

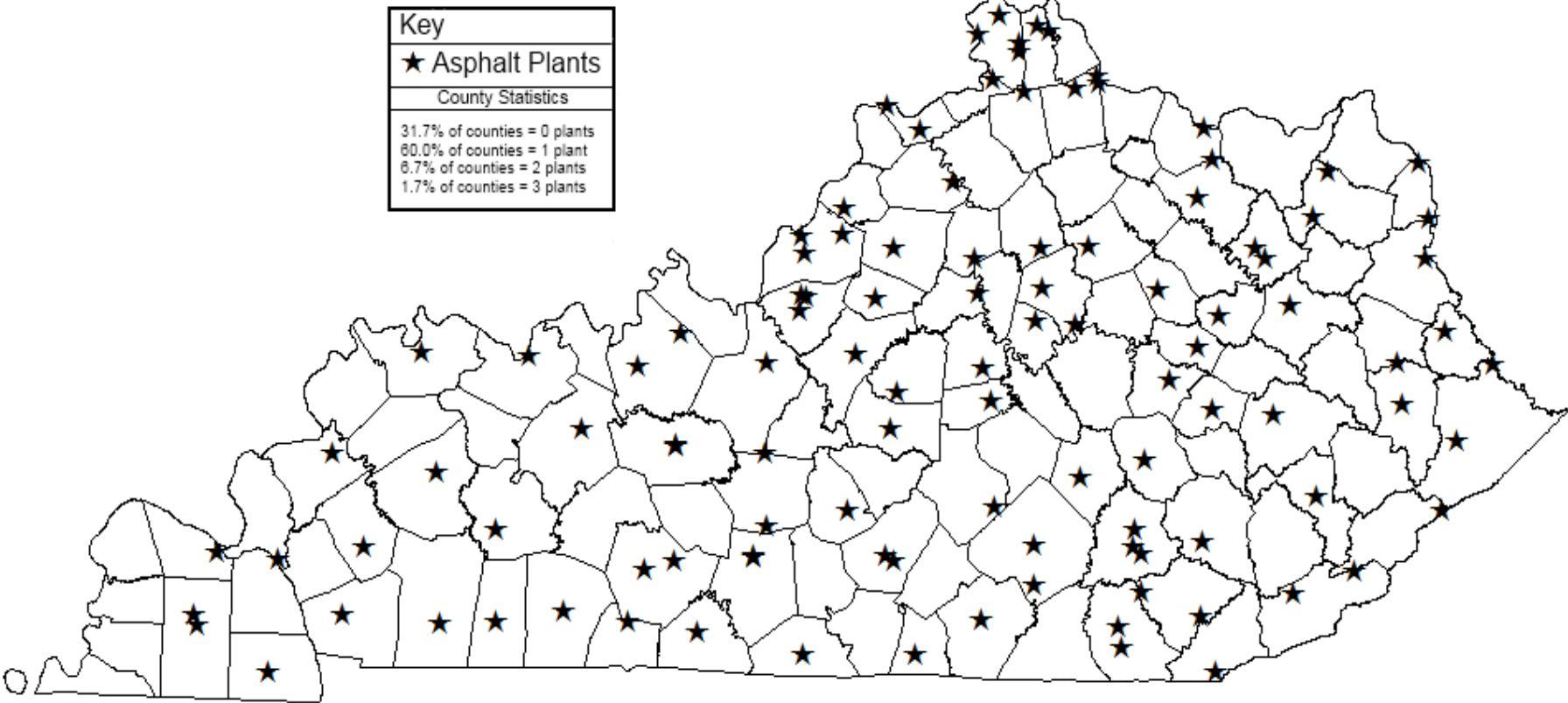
Asphalt Economics

- Sand and Gravel, asphalt cement, heat
- Asphalt is hot and heavy
- No firm in KY bid on a project farther than 60 miles from its plant
- Haul it, spread it, and compact it quickly, because it is a mess if it cools.

Collusion? Coordination of bidding in a repeated game

- Competitive markets in Kentucky: Louisville area and northern Kentucky area. Market conditions not conducive to collusion.
- Oligopoly markets: spatially separated firms when transportation costs are significant. Market conditions conducive to collusion???
- Natural monopoly markets: eastern Kentucky. Collusion not necessary???

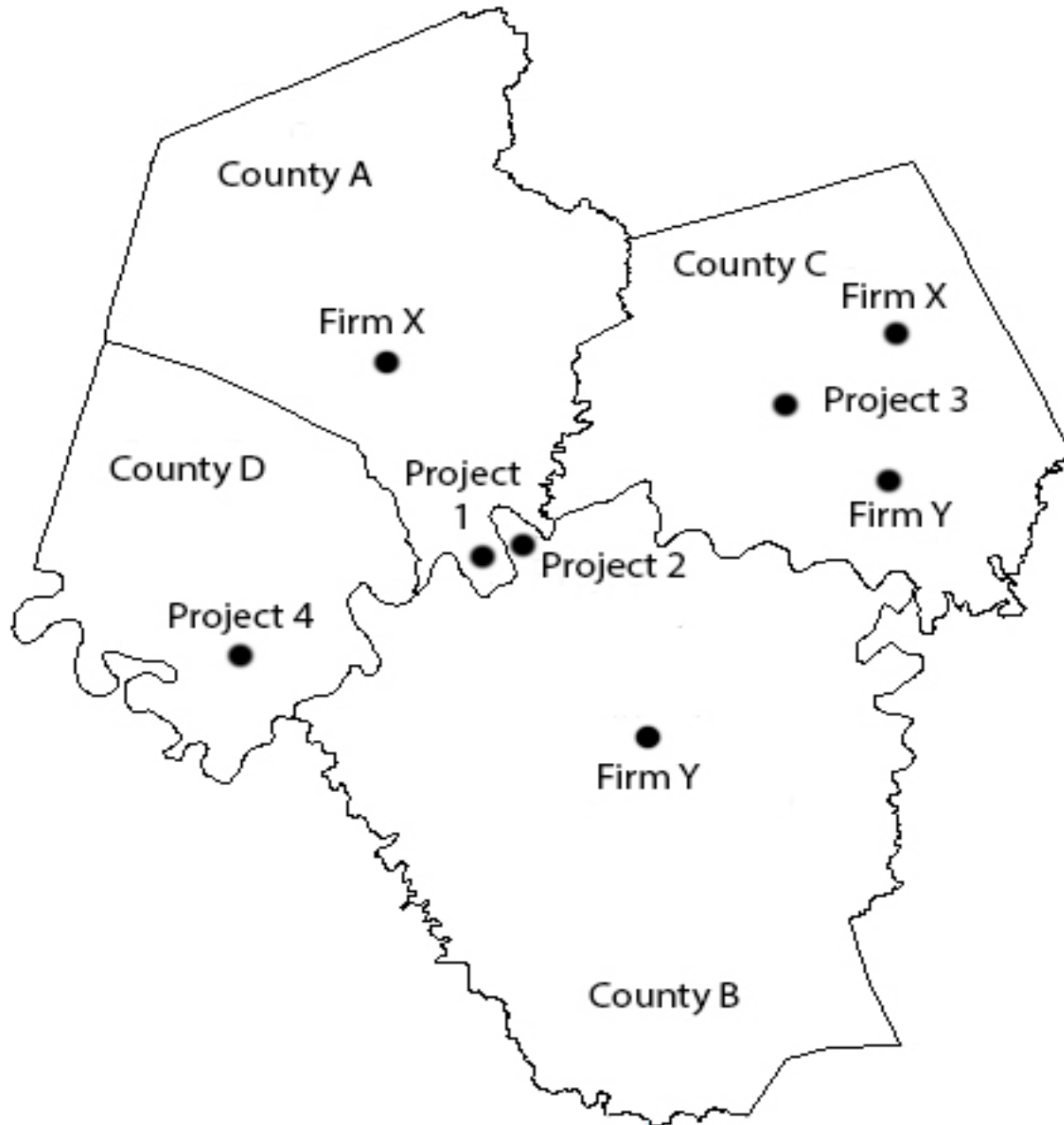
Figure 1: Asphalt Plant Locations in Kentucky



Tacit vs. Overt Collusion

- Problem is figuring out who the low-cost bidder is.
- Sometimes it is clear, other times not.
- Distance can serve as a coordinating device, i.e. a FOCAL POINT.
- Even better solution for colluders: KYTC defines projects according to county boundaries.

Figure 2: County Boundaries and Bid Coordination



Data

- Publicly available data from KYTC on all highway procurement auctions: 2005-07
- Location of project
- Location of asphalt plants
- Focus on asphalt jobs: clearly delineated geographic markets and hence lots of duopoly/oligopoly markets in KY

Figure 6: Service area – H&G Construction

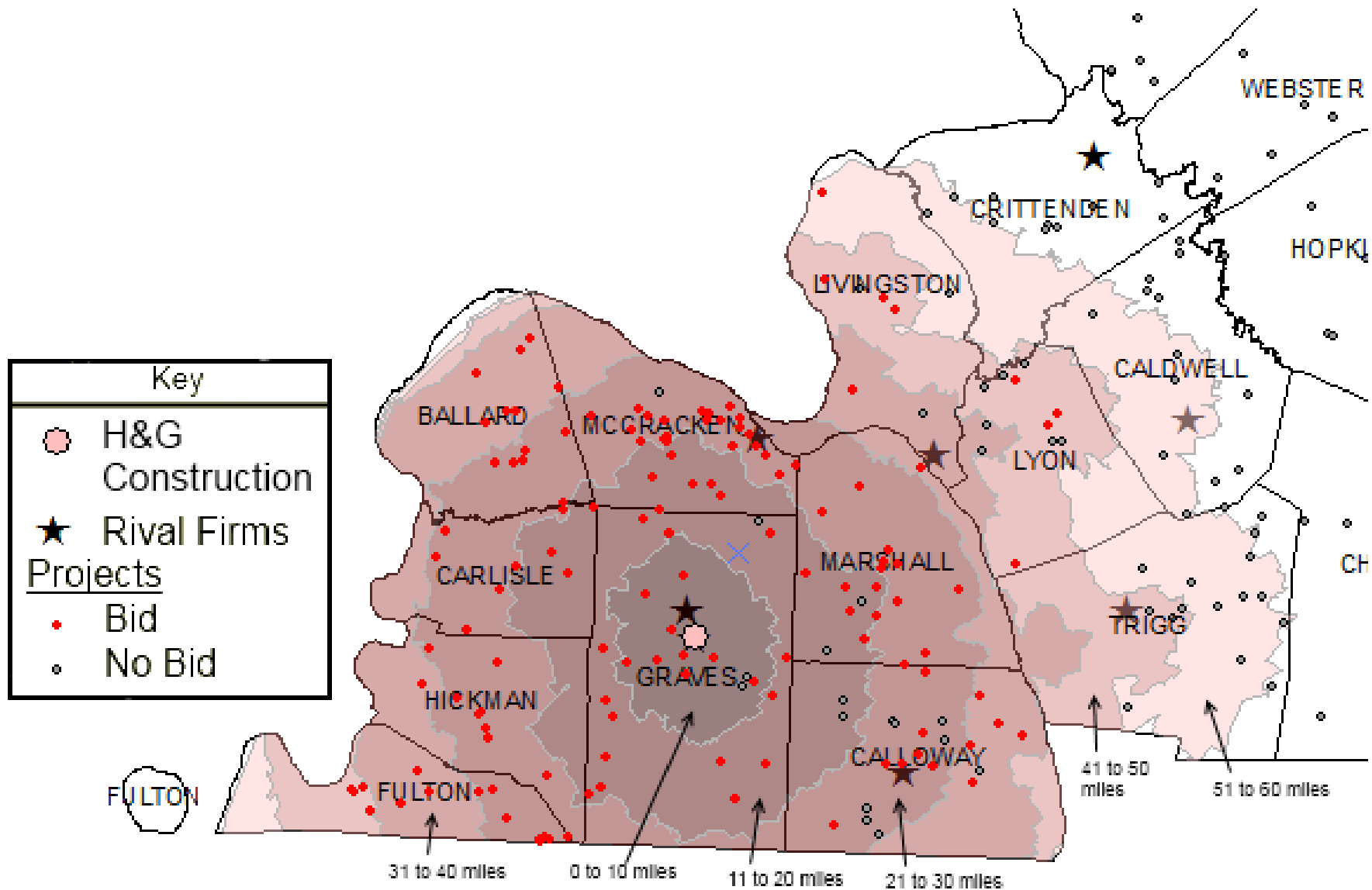
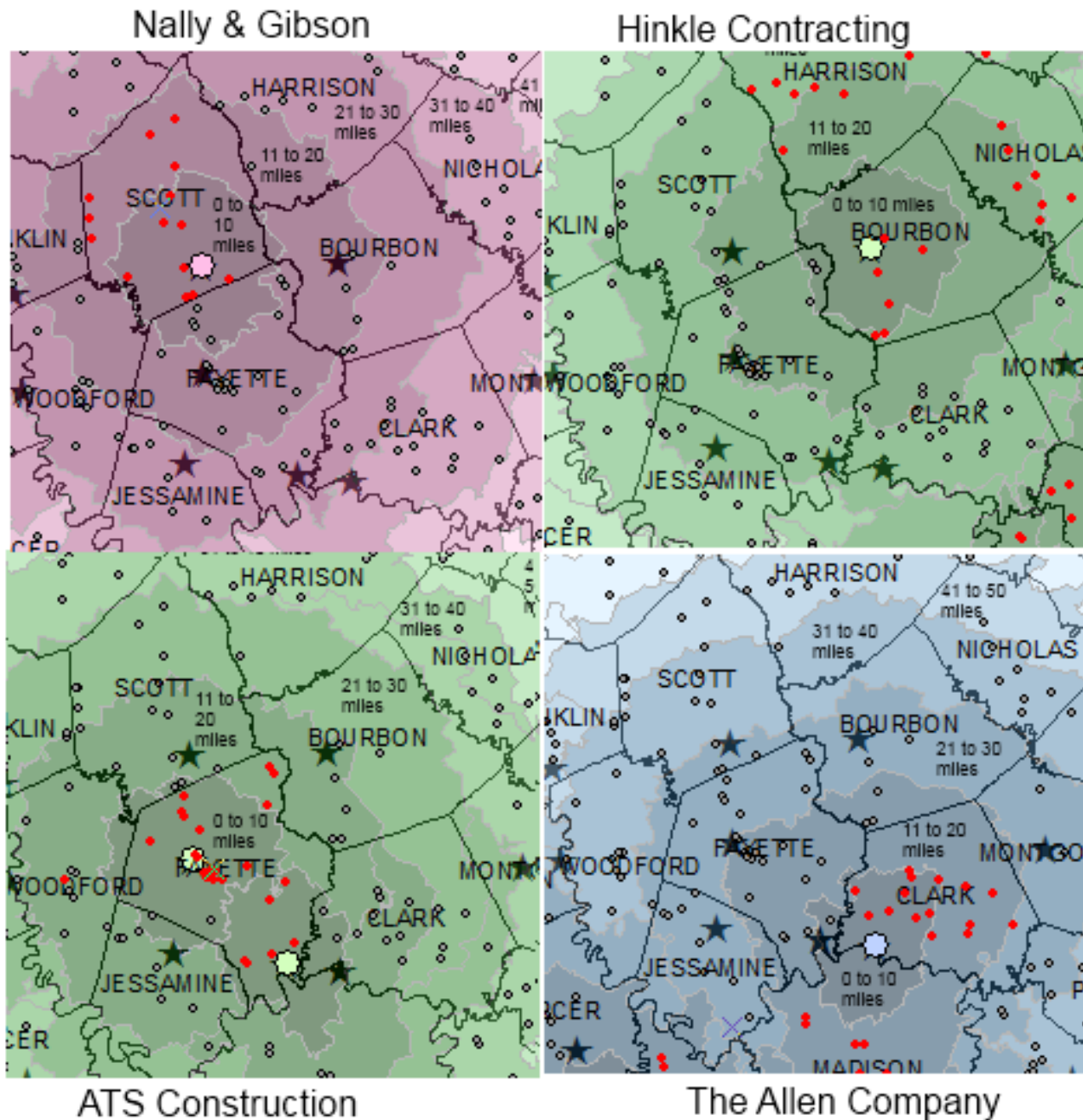


Figure 7: Bidding behavior of four firms in Central Kentucky



Participation decision results

- In competitive regions (Louisville and northern Kentucky):
 - Distance is a significant determinant of the likelihood of bidding.
 - Jobs under contract, engineer's cost estimate, and number of potential competitors are not statistically significant.
 - Firms are more likely to bid in their own county than in an adjacent county, regardless of the locations of rival firms' plants and whether or not another firm purchases a bid proposal.
- In non-competitive regions (rest of state):
 - Distance is still significant, but magnitudes of effects are roughly half.
 - Presence of even one likely other bidder (bid proposals purchased) greatly reduces likelihood that a firm bids.
 - County identifiers indicate the following bidding behavior: (a) bid if the project is in your county, regardless of whether there is a rival plant in the county; (b) maybe bid if the project is in an adjacent county with no rival firms; and (c) avoid bidding if the project is in an adjacent county where a rival firm has a plant.

Pricing decision results

- In all regions, distance from plant to project is not statistically significant, however, distance advantage over next-closest rival is highly significant. Number of potential rivals is significant but small in magnitude.
- In competitive regions:
 - Single-bidder auctions (4% of sample) result in markups that are 9.3% higher than when there are multiple bidders.
 - County boundaries do not influence bid levels.
- In non-competitive regions:
 - Single-bidder auctions (56% of sample) result in markups that are 16.5% higher than when there are three or more bidders.
 - Bids in counties where a rival firm also has a plant are 3.6% lower than when there are no rival plants in the county, controlling for the number of bidders.
 - Bids in adjacent counties where there are no rival plants do not differ from those in the firm's home county.
 - Bids into an adjacent county where a rival firm's plant is located are 3.4% higher, controlling for the number of bidders.

Figure 12: Central Kentucky (District 4) Counties, Firms, and Asphalt Plants

District 4

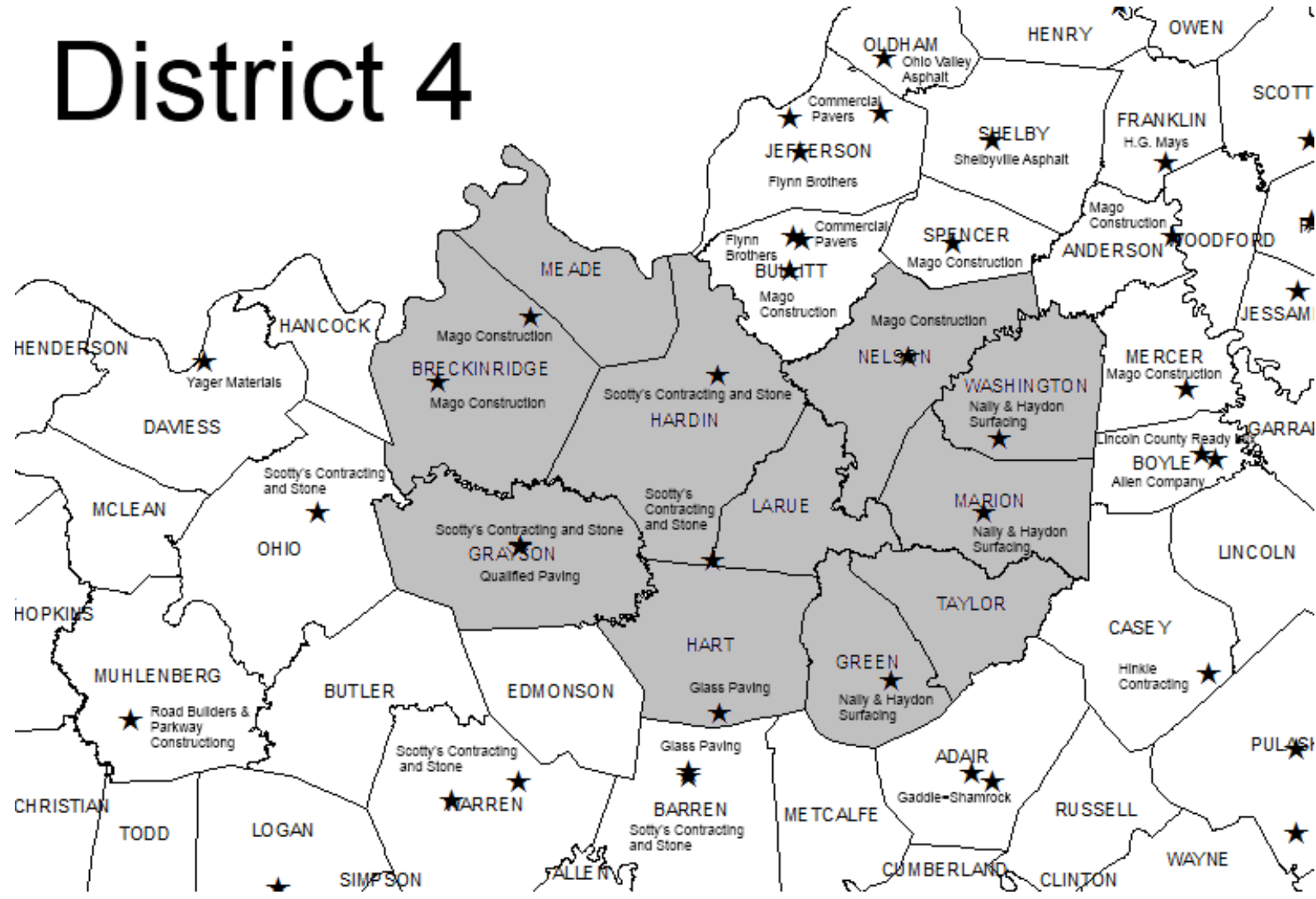


Figure 13: Nally & Haydon Service Area

