Univ Study Points to 'Market Foreclosure in Manufactured Housing' – Possible Antitrust Violations – 'Distort Competition to Monopoly Outcome' Named Specific Manufactured Housing Institute Firms

Per his website, Maris is an "Assistant Professor of Finance at the Tippie College of Business at the University of Iowa. My research fields include household finance, real estate, industrial organization, and corporate finance. In recent work, I study the manufactured housing market (the Wild West of finance). I try to explain this mystery. Before moving to Berkeley for my Ph.D., I worked in tech, in government, and in music journalism."

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Per Gemini AI in response to an inquiry by MHProNews is the following. "In economics, market foreclosure refers to practices that limit buyers and sellers from accessing each other in a market, essentially shutting out competition. This can be done through various means, including restricting access to essential goods, services, or distribution channels."

Here's a more detailed explanation:

- **Limiting Access:**

Foreclosure involves a dominant company or group of companies actively preventing rivals from reaching customers or supply sources. This can be done by controlling key inputs, distribution networks, or access to essential technologies.

- **Vertical Foreclosure:**

  A specific type of foreclosure is "vertical foreclosure," which involves restricting access to either upstream suppliers or downstream buyers. For example, a company might own a key supplier, preventing its competitors from accessing that supplier, or it might own a major distribution channel, limiting access to customers.

- **Anticompetitive Practices:**

  Foreclosure is considered an anticompetitive practice because it reduces competition and can lead to higher prices, lower quality, and less innovation for consumers.

- **Examples:**

  Examples of market foreclosure include a company using exclusive contracts with retailers to prevent rivals from accessing those retailers, or a company

controlling a vital technology that is essential for competitors to operate.

- **Legal Consequences:**

  In many jurisdictions, market foreclosure is illegal and can lead to antitrust actions against the company or companies involved.

Manufactured Housing and Market Foreclosure

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January 7, 2024

Manufactured housing is the largest source of unsubsidized affordable housing in the US, but the production of manufactured homes has fallen from more than fifty percent of single-family housing starts in the mid-70s to under ten percent today. Using publicly claimed security interests and the movement reported on oversize trip permits, I follow each home in Texas from factory to dealership to buyer, as it transforms from finished goods to wholesale collateral to consumer collateral, to show that this restriction in supply is consistent with market foreclosure. Upstream manufacturers extend "floor plan" financing to downstream retailers buying homes for their lots, and restrict output in the

downstream market. Floor plan financing acts as the vertical restraint a manufacturer needs, during two decades of a growing housing shortage, to distort competition closer to the inefficient monopoly outcome.

Figure 1. This is a manufactured home. Photo: Alabama.gov

For nearly a century, homes built in factories have provided a low-cost alternative to conventional site-built construction in the US. See Figure 1 for an example of a manufactured home – the official term for any home built in a factory according to the federally administered Manufactured Home Construction and Safety Standards.

In the 1970s, one out of every two new homes sold in the US was a manufactured home.[1] Given the myriad advantages of factory production – the economies of scale, increased production capacity, more consistent quality control, and more efficient use of resources and labor than traditional on-site construction methods – the share of new homes that were manufactured homes was expected to increase.[2] Builders began developing two-story manufactured homes, and designing stackable manufactured home towers.[3]

But today, less than ten percent of single-family homes are built in factories. Shipments of new manufactured homes have been stagnating around ten percent of total single-family housing starts for two decades. Manufactured housing only represents about six percent of the nation's housing stock.[4]

This is surprising, given the cost-effectiveness and the high quality of manufactured homes

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Schmitz (2020b) notes that from 1960 to 1972, shipments of small factory-built homes increased from 10 percent to 60 percent of total single-family home production. As the HUD Code was established in 1976, we can only make apples to apples comparisons thereon.

[2] The New York Times (1972), *In a Mobile Home: Cozy and It's Yours*. [3]

See US Department of Housing and Urban Development, Office of Policy Development and Research and NAHB Research Center (2000), Ernest Cline's *Ready Player One* and mobilehomeliving.org/stacked-mobile-homes-highrises for examples. [4]

An estimated 17 million Americans live in manufactured homes.

data.census.gov/table?q=b25033+2021

today, and given that the US is experiencing what government officials refer to as a "housing affordability crisis" (Maxine Waters 2023). Affordable housing is where factory-built housing has the comparative advantage. Larger, higher-end homes offer site-built developers higher profit margins and the ability to spread fixed costs, but factories can profitably build small (Schmitz 2020b). The average manufactured home is around half the size of the average sitebuilt home, and approximately half the price per square foot.[5] The relative cost per square foot to build a manufactured home has dropped from 55 percent in the 1990s[6] to 29 percent today.[7] The supply of existing homes for sale has never been tighter.[8] It is puzzling[9] that we are not building more manufactured homes.[10]

To investigate why, I merge the results of more than 20 successful federal and state freedom of information requests with various public datasets to build a comprehensive database. I track each manufactured home in Texas – the nation's largest manufactured home producer and consumer – as it moves from factory to dealership to its first buyer. Following Hart and Tirole (1990), I define foreclosure as the restriction of output in one market through the use of market power in another market. Using the evolution of the industry from 1995 through 2020, I show that the restriction in manufactured housing supply is consistent with vertical foreclosure. The upstream manufacturer extends financing – a form of inventory financing called "floor plan" financing or "flooring" – to downstream retailers to restrict output in the downstream market.

I show that the greater the share of integrated flooring loans in a market (the share of inventory loans extended by lenders who are integrated with manufacturers), the lower the number of homes shipped to a market, and the higher the prices. The implied differences are substantial. My results suggest that going from a market with no integrated flooring to one with a 20 percent market share of integrated flooring is associated with a 16 percent drop in manufactured home shipments, and a three percent increase in prices. A look at the raw data is helpful.

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[5] US Census Bureau, 2021 Cost and Size Comparisons

census.gov/programs-surveys/mhs/tables/time-series/sitebuiltvsmh.xlsx

[6] US Department of Housing and Urban Development and NAHB Research Center (1998).

[7] Home Builder Digest (2019), *How Much Does it Cost to Build a Custom Home?*. [8] Joint Center for Housing Studies of Harvard University (2021).

[9] There is no state or county in the US where a renter working full-time at minimum wage can afford a two bedroom apartment (nlihc.org/oor).

[10] Schmitz (2020a) suggests that many of the crises facing low- and middle-income Americans – the US housing crisis included – are the result of "toothless" monopolies sabotaging low-cost alternatives that the poor would purchase.

Table 1

Evolution of the Manufactured Housing Industry in Texas

	1995	1998	2001	2004	2007	2010	2013	2016	2019
Number of manufacturers	29	25	20	19	18	10	9	10	14
Number of plants	61	72	46	32	34	25	26	28	35
Number of retailers	434	723	583	340	298	241	282	294	318
Number of integrated floor lenders	2	3	4	2	2	3	2	3	3
Number of independent floor lenders	47	59	63	66	63	47	60	57	51
Integrated share of flooring loans (%)	13	22	19	43	71	77	81	85	87
Integrated share of MH production (%)	6	25	19	25	41	51	53	56	53
MH sold (in thousands)	33	45	21	11	11	8	12	13	16
MH share of building permits (%)	47	45	19	7	9	12	13	12	12

This table shows summary statistics for various segments of the manufactured housing industry in Texas. Per year: manufacturers and plants ship at least ten homes to Texas; retailers sell at least five homes to buyers in Texas; floor lenders provide floor plan financing for at least one dealership in Texas. Integrated floor lenders are integrated with a manufacturer. MH = manufactured housing.

Data: TDHCA, TxDMV, Texas Secretary of State, US Census Bureau

In Table 1, we see that the numbers of manufacturers, plants and retailers in the industry have dropped by half since the 1990s. By contrast, the numbers of floor lenders – both independent floor lenders and floor lenders who are integrated with manufacturers – have remained stable. This masks massive change and consolidation. In late 2002, the independent Conseco Finance, who provided over 20 percent of the industry's flooring, filed for

bankruptcy. The second largest lender, Deutsche Financial, liquidated its flooring portfolio soon after. An estimated 40 percent of the industry's flooring, suddenly gone.

Integrated lenders step in, offering floor plan financing not only for their parent manufacturer's homes, but for their competitors' homes. The share of inventory floored by integrated manufacturers rises to 87 percent, alongside the integrated share of manufactured home production. Aggregate production drops. The manufactured housing share of single-family housing starts drops. These are strong trends that are consistent with vertical foreclosure. They might also be consistent with other stories, perhaps efficiency- or demand-based ones. I will show that my results are robust to various specifications and sources of identification, with vertical foreclosure explaining what happens in manufactured housing when integrated manufacturers extend floor plan financing to retailers.

The empirical literature on vertical foreclosure thus far is sparse.[1] Hortaçsu and Syverson (2007) show that over 34 years in the cement and ready-mixed concrete industries, foreclosure does not drive patterns in the data. Asker (2016) studies exclusive dealing arrangements in the Chicago beer market, and also finds no evidence of anticompetitive foreclosure effects. But Boehm and Sonntag (2023) do find evidence that buyer-seller relationships are more likely to break after a supplier vertically integrates with a buyer's competitor. I will add support that, at least when finance is involved, vertical relationships can have anticompetitive effects.

1 Development of Hypotheses

Consider the ex-post monopolization model of Hart and Tirole (1990), adapted for manufactured housing. The game is illustrated in Figure 2. We have a manufacturer, M, who is a monopoly producer of manufactured homes with marginal cost c. M supplies two downstream retailers, R_1 and R_2, who compete to sell homes in the same local market. The retailers can also buy from a second, higher-cost competitor.

In the first stage of the game, M offers each retailer a contract; the retailers order quantities, and pay. In the second, M ships the homes to the retailers; the retailers observe each others' quantity choices, and set their prices. Downstream competition is Bertrand with

[1] The literature on manufactured housing is even more sparse. See the aforementioned Schmitz papers, Banga (2022) for work on price regulation in the manufactured home loan market, and Becker and Rickert (2019) and Becker and Yea (2015) for work on the economics of manufactured home communities.

capacity constraints, which is sensible here as manufacturers produce to order. Under Kreps and Scheinkman (1983) conditions, the equilibrium is Cournot.

M would like to offer the monopoly price and quantity to both retailers, but as Hart and Tirole (1990) point out, as soon as one retailer agrees, *M* has the incentive to sell more than the monopoly quantity to the other retailer. (*M* takes the quantity as given for the contracted retailer and reoptimizes quantity for the other retailer). This lowers the profits of the first retailer, making him unwilling to sign in the first place. In other words, *M* can't make the full monopoly profit without distorting downstream competition. To restore monopoly power,

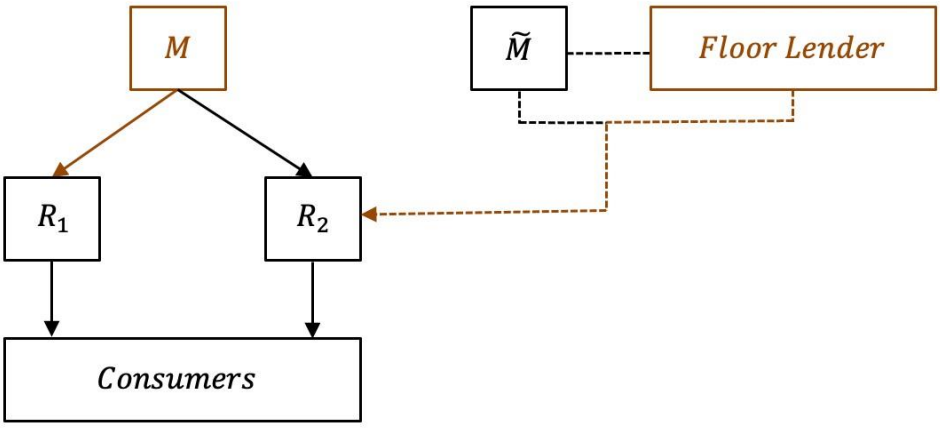

Figure 2. *M* is integrated with a floor lender; $\tilde{M}$ is not.

he needs either control rights over R_1, or to credibly commit to limiting his future production.

In Hart and Tirole (1990), the manufacturer achieves this with vertical integration. *M* can integrate with R_1 and sell nothing to R_2, but then R_2 will second source from the higher-cost competitor. So *M* integrates with R_1 and still sells to R_2 – at a price that just undercuts the higher-cost competitor. This yields an asymmetric Cournot outcome downstream, with the unintegrated R_2 facing higher costs than the integrated R_1: vertical foreclosure (VF). This framework leads to the following testable implications:

Implication 1: *Vertical integration motivated by VF should result in lower quantities and higher average prices in downstream markets.*

Implication 2: *M ships fewer homes to R_2, or charges R_2 a higher price. Integrated retailers gain downstream market share.*

Implication 3: *The greater the upstream cost asymmetry (the higher the cost of bypassing M), the greater M's incentive for VF.*

1.1 Discussion

In our context, M is the integrated manufacturer-cum-floor lender who "integrates" with R_1 downstream by extending floor plan financing. This is similar to the Coasian durable goods argument in Murfin and Pratt (2019), where producers face consumers who are unwilling to buy heavy equipment because prices might fall (ie, they face competition from their own future production). Murfin and Pratt (2019) suggest that manufacturers financing their own products is a commitment to restrict production that encourages consumers to buy, because risky debt makes lender profits sensitive to the threat of borrower default. The same argument applies here: providing financing allows M to internalize the price impact of his production choices.[2]

The higher-cost competitor is the unintegrated manufacturer with outside flooring. Why would this competitor be higher-cost? The list of the integrated manufacturer's competitive advantages is long.

The integrated manufacturer can set the price of a home and its financing to maximize the joint profits of manufacturing and lending. Benetton, Mayordomo, and Paravisini (2021) show that the liquidity constrained integrated manufacturer can increase the cash collected from car sales by relaxing lending standards and reducing loan amounts.

The integrated manufacturer can provide a bundle, the home and the loan, while unintegrated manufacturers must refer dealers to independent lenders. Nalebuff (2000) shows that the integrated firm offering a version of each component in a system with many components gains market share against firms offering a single component, to a point that can offset a price reduction from an increase in competition from bundling, as the unintegrated firms face multiple marginalization problems.

The ability to provide credit can be a more effective competitive weapon than price. We see this often, especially in housing and cars, as in Grunewald and Lanning (2020), where consumers are less responsive to finance charges than to vehicle charges.

[2] Cestone and White (2003) also apply the Coasian commitment problem to finance: the well-informed investor will be tempted to fund another firm. In Cestone and White (2003), the solution to the Coase problem is equity ownership.

The integrated manufacturer usually has better knowledge than a banking relationship alone would supply. Stroebel (2016) shows that asymmetric information about collateral quality — newly developed properties, in his case — leads to significant adverse selection and nonintegrated lenders charging higher interest rates.

The integrated manufacturer can insulate dealers from the vagaries of the credit market. Historically, lenders think of wholesale credit as hazardous: tight money conditions severely affect the availability of wholesale credit. While integration is no guarantee – see Benmelech and Meisenzahl (2017), who show that growing illiquidity at non-bank institutions like captive finance companies led to the collapse in car sales in 2008 (while noting that car dealerships list a lack of floor plan financing as a first-order reason for the decline in car sales) – some bumps can be handled. General Motors successfully introduced the diesel locomotive to a devastated railroad industry during the Depression, while more than 70,000 miles of railroads were in receivership, by financing its sale.

In periods of liberal credit, the integrated manufacturer can either retire from the floor lending market, or guarantee himself a market in the dealers buying his homes.

And then there is the positive use of credit. Banner (1958) points out that captive finance companies cannot be relied on to react in the way monetary authorities anticipate. While independent lenders tighten lending standards and ration credit as rates increase, the integrated manufacturer — knowing these conditions exist — may take advantage of the situation to enhance his market position. The limitation on credit for his competitors' products could even be his impetus to provide credit: "At such a time new markets can be invaded and a broader distribution of products achieved." This is Implication 3. The greater the upstream cost asymmetry, the greater *M*ś incentive for VF, and the closer we get to the inefficient monopoly outcome.

2 Empirical Strategy and Data

My empirical approach is straightforward. I will compare the data with the implications of foreclosure theory. Does integrated financing result in higher prices and lower quantities in downstream markets? Do retailers with integrated financing gain downstream market share? As the integrated manufacturer's incentive for VF increases, do markets more closely approach the monopoly outcome? To generate plausibly exogenous variation in the level of integrated flooring in markets, I will use national acquisitions of downstream dealership

chains by manufacturers (where some of the acquiring manufacturers provide inventory financing, and some do not). For plausibly exogenous variation in the integrated manufacturer's incentive for VF, I will use changes in upstream competition generated by the unexpected demand for Federal Emergency Management Agency (FEMA) trailers after Hurricane Katrina, which monopolized the production capacity of manufacturers awarded FEMA contracts throughout the US.

This project is motivated by the sluggish manufactured housing supply – why aren't we producing more manufactured homes? – but the industry provides a particularly nice setting for study. Manufacturers in almost all states, Texas included,[3] are barred from selling directly to consumers. Manufacturers sell only to licensed retailers – à la Hart and Tirole (1990).

Manufactured homes are big, bulky objects. Moving one costs minimum $5,000,[14] a sizable chunk of the total selling price of a home, and this scales up with size and distance. These transportation costs severely limit the market radius of each factory and dealership. Texas law restricts transportation of oversize loads to daylight hours, so manufacturers typically locate their factories within a day's drive[15] from the markets they serve: about 250 miles. These costs cut even deeper for retailers, who rarely sell homes to consumers more than 50 miles away: 75 percent of new manufactured homes sold in Texas from 1995 through 2020 are installed within 30 miles of the dealership that placed the order. These nice retailer markets are the downstream markets we are interested in: the retailers playing the Bertrand-Edgeworth games. As Texas law also mandates oversize trip permits for oversize loads traveling on Texas roads – and as mentioned, manufactured homes are oversize – the movement of homes reported on trip permits between factories, dealerships, and buyers will allow us to define and study local downstream markets that capture actual competition between retailers.

2.1 Data

For the sake of brevity, the blow-by-blow histories of the various datasets, and how they are merged, are left for the online Data Appendix. But in every case, I require either a HUD label[16] match or at least three consistent data points (eg, I match without a HUD label if a reported manufacturer name, factory address, or model [1] corresponds with a reported

[3] Texas Manufactured Housing Act

serial number [2], and that serial number falls sequentially in line with a reported manufacturing date [3]).

In addition to oversize trip permits from the Texas DMV (TxDMV), my analysis rests on a few key datasets. The Texas Department of Housing and Community Affairs (TDHCA) released physical address, license, name, DBA/trade name, and ownership changes for licensed manufacturers and retailers in Texas since the 1980s. Around 20 percent of the dealerships in Texas from 1995 through 2020 changed names or ownership at least once, and dealerships publicly report only their mailing addresses (which can be miles, cities, or even states away from their physical locations), so this information is crucial. It allows me to confidently build maps of plants and dealerships over time. For example, Figure 3 shows the supplier relationships between factories and dealerships in 2020. Note that in 2020, as in other years, plants in

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statutes.capitol.texas.gov/Docs/OC/htm/OC.1201.htm

[14] Homes Direct (2022), *How Much Does it Cost to Move a Manufactured Home?*. [15] See Grissim (2006).

[16] HUD certification labels (or HUD tags) uniquely certify that a manufactured home was built to HUD Code.

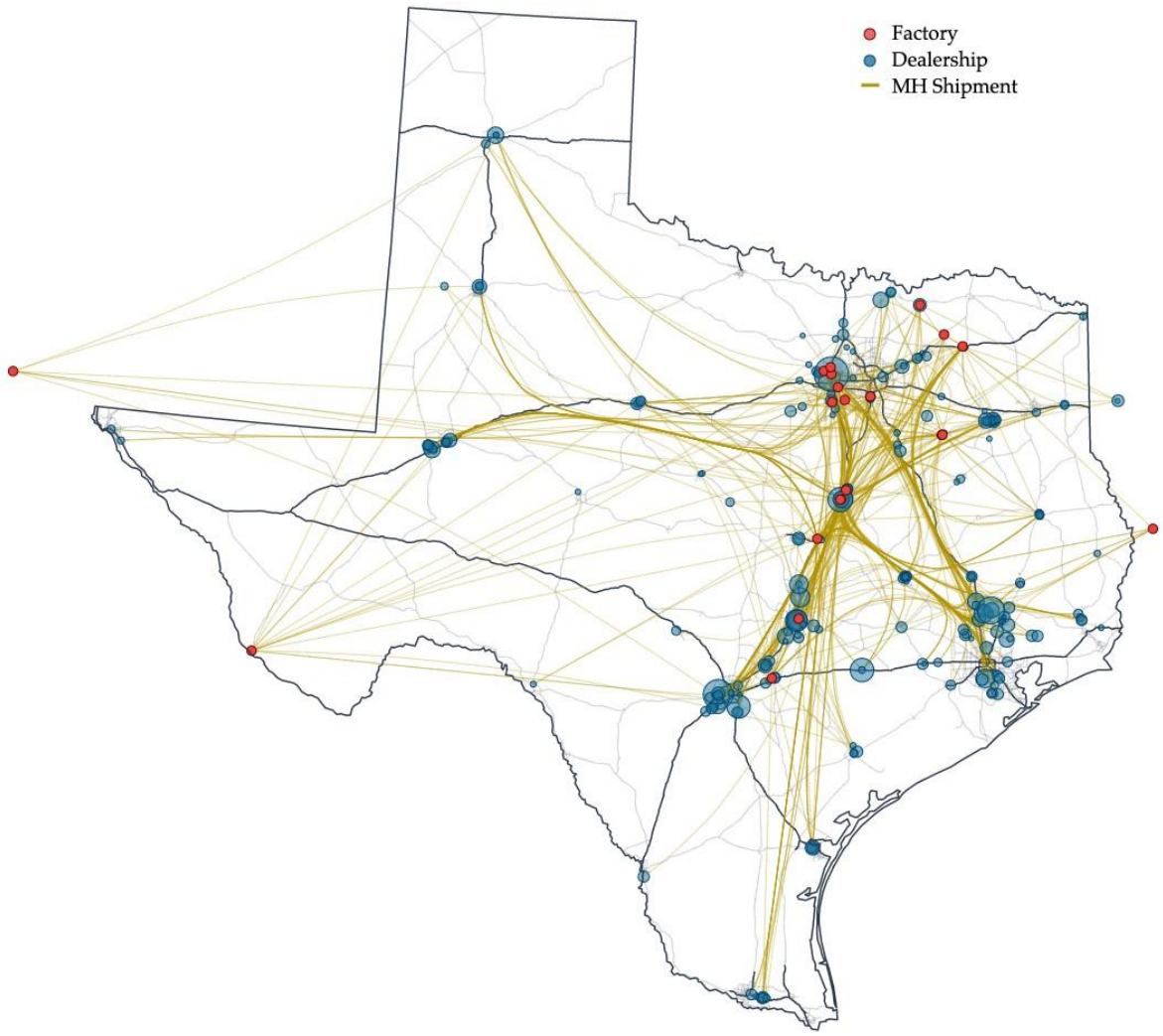


Figure 3. This map shows the manufactured homes shipped from factories to dealerships in Texas in 2020. Dealerships, in blue, are sized by the number of homes received. Paths between factories and dealerships, in yellow, are drawn only when a factory shipped at least two homes to a dealership. MH = manufactured home. *Data:* TDHCA, TxDMV

neighboring states – here, in New Mexico and Louisiana – are definite players in some Texas markets. This is not a problem, as we are interested in homes shipped to local markets, and competition within those markets – not "homes produced in Texas."

The TDHCA also give us Statements of Ownership and Location that detail sundry characteristics of each home – eg, the HUD label, serial number, manufacturing date, model, weight and dimensions – along with the name and address of each home's buyers. These ownership statements allow me to back out missing information from used homes and homes produced in other states, and to add housing characteristics to any price regressions.

Information on flooring contracts comes from three sources: Uniform Commercial Code (UCC) financing statements filed with the Texas Secretary of State, inventory finance liens released by the TDHCA, and older inventory finance liens that were not released by the TDHCA but were publicly accessible online.[17] Legally, only inventory finance liens reported to the TDHCA are valid and enforceable, but as many floor lenders still file UCC financing statements, and we are interested in flooring loans extended to retailers – not flooring liens that are legally enforceable – I use all available information. For a nice introduction to UCC filings, see Edgerton (2012).

Pricing data comes from Texas counties, via Zillow ZTRAX. Unfortunately, these prices are "market values," not sales prices.[18] But Texas counties have the actual sales prices of manufactured homes sold in their appraisal district, as retailers in Texas are required to submit monthly inventory tax statements listing each manufactured home alongside its "Purchaser's Name" and "Sales Price." It would be more difficult for counties to come up with their own valuation system than it would be for them to use the sales prices the retailers send. I deflate these values using the US Bureau of Labor Statistics's manufactured home price index.

Table 2 presents summary statistics for all control variables used in the regressions, broken down by whether or not a home was floored by an integrated lender. The two columns on the right show the average differences and associated standard errors between the groups, controlling for the year a home was produced. The homes that are floor financed by integrated and independent lenders are remarkably similar. Manufactured homes in Texas are personal property by default; we see that the share of homes that are later converted to real property is small for both groups – around 16 percent. The vast majority of homes, however, are installed on private property, not in manufactured home communities.

The percent of homes sold by "factory-owned" dealerships – meaning dealerships that are owned by a manufacturer – varies considerably from year to year. On average, we see that around 27 percent of homes floored by integrated lenders, and around 40 percent of homes floored by independent lenders, are sold by factory-owned dealerships.[19] But less than sixty

[17] The older liens were likely not released because their information has not been transferred into the TDHCA's current inventory financing database, but I found them via an API that works with the released liens, and they are internally consistent – eg, the reported dates line up with the reported HUD labels, and the reported lenders were active floor lenders during the reported years – so I have no reason to doubt them. [18]

Manufactured homes are taxed as personal property, separate from the underlying land, so each home – homes on leased land included – nearly always has its own, distinct assessment record. Records listing sections from multiple different homes are dropped. [19]

In 2020, about 25 percent of manufactured homes were shipped to factory-owned dealerships.

Table 2

Summary Statistics of Control Variables for Manufactured Homes in Texas

	IntegratedFlooring	IndependentFlooring	Δ	SE
Installed in park (%)	17.4	18.6	-2.5	0.1
Real property (%)	16.0	15.6	-3.7	0.2
Manufacturer				
Is lender (%)	59.3			
Out of state (%)	7.1	16.6	-5.9	0.2
Retailer				
Factory-owned (%)	26.7	39.7	-13.4	0.3
Is builder (%)	19.3	31.5	-12.5	0.2
Out of state (%)	0.34	0.33	-0.2	0.0

	Integrated Flooring		Independent Flooring			
	median	*mean*	*median*	*mean*	Δ	SE
Sections	1	1.5	1	1.5	-0.0	0.0
Square Feet	1,296	1,415	1,248	1,397	-44.4	2.2
Weight	25,840	25,937	23,920	24,544	-214.6	35.0
Days at dealership	109	160	104	153	-3.75	1.0

This table shows summary statistics for the control variables in the analysis. The full dataset includes 449,821 new manufactured homes produced in or shipped to Texas from 1995-2020. The second-to-last column shows the integrated flooring coefficient in a regression of the characteristic on an indicator for integrated flooring and year fixed effects. The last column shows standard errors of the estimate. *Data:* TDHCA, TxDMV, Texas Secretary of State

percent of homes floored by integrated lenders are floored by the home's manufacturer. In other words, more than 40 percent of the homes integrated lenders choose to provide inventory financing for are built by their competitors.

Approximately 11 percent of the homes produced in Texas are eventually sold to buyers in other states. Homes that are shipped to a Texas dealership, then sold out of state, are included in the sample (so long as they remain on the lot for more than ten days). Homes that are shipped to dealerships in neighboring states, but are sold – new – to a Texas buyer within three months, are also included. All other homes that are immediately shipped out of state are dropped from the sample. On average, it takes a dealership 100 to 150 days to sell a manufactured home.

Figure 4 depicts the manufactured housing industry in Texas in 1998, given the data discussed so far: the factories, the dealerships, the buyers and the flooring. For the manufactured housing industry in 2018, 20 years later, see Figure A.1 in the Appendix. For a breakdown of the top players in the flooring, builder, and retailing markets by year, see Tables A.1 to A.3 (also in the Appendix).

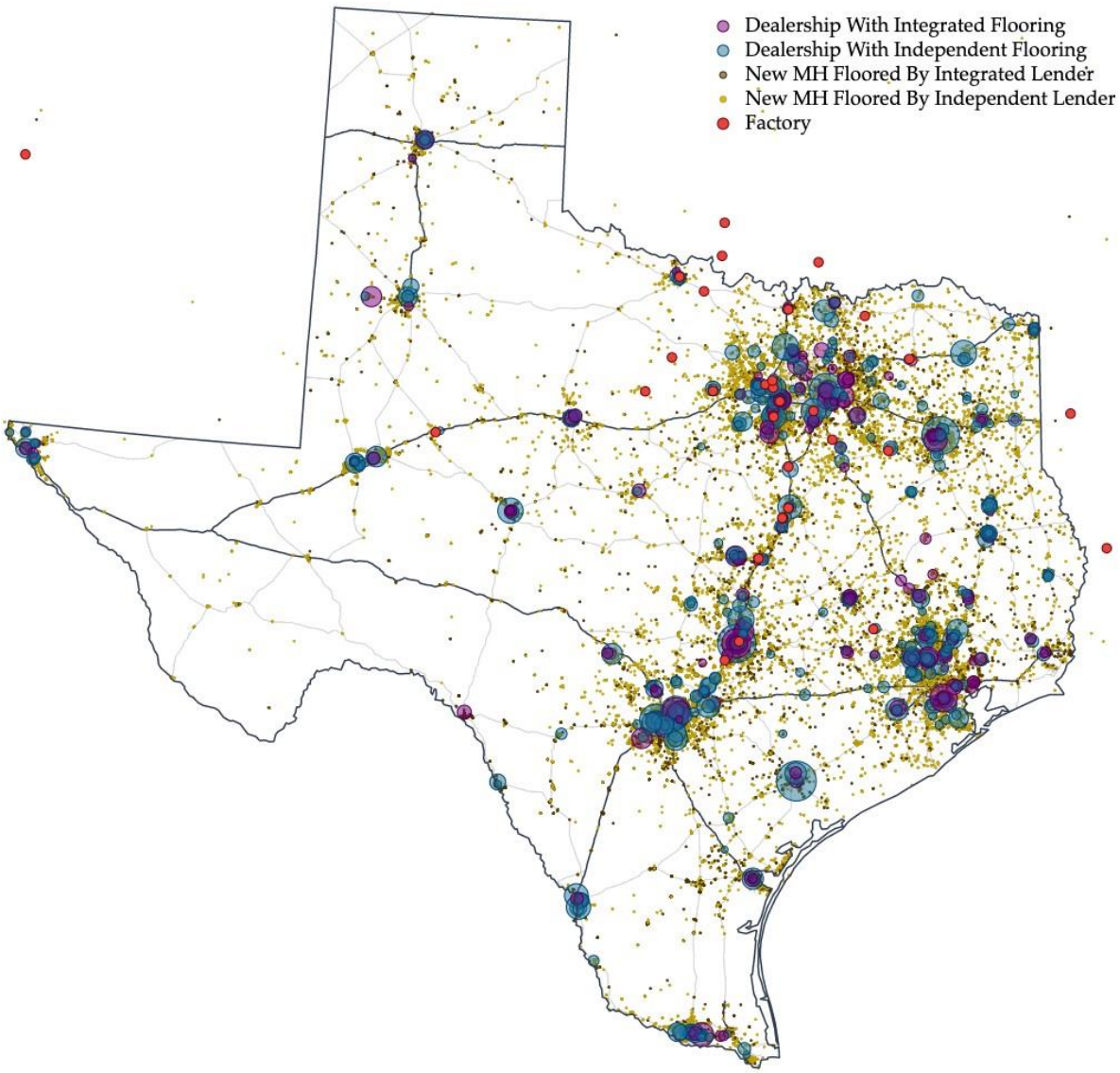


Figure 4. This map shows the industry's factories, dealerships, buyers and flooring in Texas in 1998. Dealerships are sized by the number of homes received. MH = manufactured home.

Data: TDHCA, TxDMV, Texas Secretary of State

2.2 Defining a Local Market

The goal here is to determine whether or not manufacturers are using flooring to act monopolistically within local downstream markets, so how we define a local market matters. We want each market to capture retailers in competition with each other, which is not the same thing as retailers within a county, or retailers within some market radius (though the high transportation costs do provide a nice upper bound). We also want the local markets to remain constant, even while the underlying flows of population, production lines and dealerships change considerably over the decades in question.

To identify local markets, I first transform each retailer's raw catchment from geodetic to planar coordinates, and split the bounding polygon into a hexagon grid.[4] I rank the likeliness of retailer sales to a particular cell in the grid by the fraction of homes sold by a retailer that he ships to said cell, and define each retailer's catchment area as the concave hull of the highestranked cells generating 80 percent of his sales. If the majority of a retailer's sales fall within another retailer's catchment area, I consider the two retailers competitors in the same local market. See Figure 5. In the panel on the right, the orange and red dealers are grouped in the same local market.

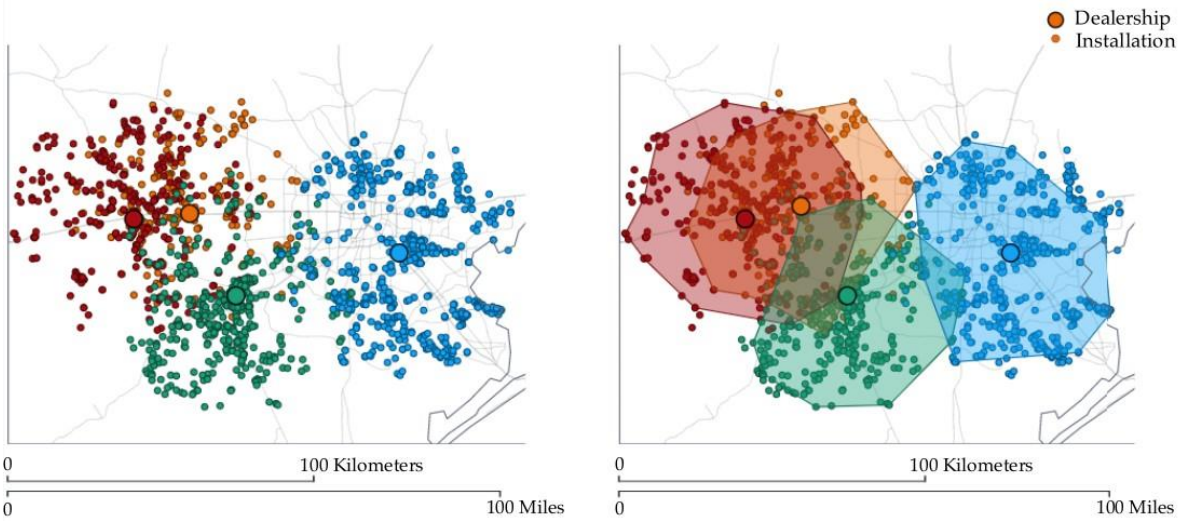


Figure 5. The panel on the left shows the raw catchment of four dealerships, as determined by the destinations listed on oversize trip permits. The panel on the right shows each dealer's calculated catchment area. As the majority of the orange dealer's catchment area falls within the red dealer's catchment area, the orange and red dealers are grouped in the same local market.

Data: TDHCA, TxDMV

Table 3 shows summary statistics for the 45 local markets I find. Growth and population are unevenly distributed across Texas — 90 percent of Texans live in urban areas today, while 85 percent of its land mass is working agricultural (farms and ranches) – so there is significant heterogeneity in the geographic and constituent sizes of local markets. The average number of retailers in a market-year in the sample is 11. The largest market has 71. Nine different builders ship homes to the average market, but in one market-year (in the 1990s), 25 builders

[4] Of the shapes that tile (triangles, squares and hexagons), only hexagons have all neighbors the same distance away. See Tiling the Earth with Hexagons (video).

contributed. The average number of homes shipped to a market is 388; the largest is over three thousand. See Figure 6 for a rough map.[5]

Table 3
Summary Statistics of Downstream Market Structure (1,152 market-years)

	Mean	Min	Q1	Q2	Q3	Max	SD
Number of retailers	11	2	5	8	14	71	9
Retailer HHI	2,487	290	1,329	2,047	3,040	10,000	1,798
Number of homes sold	388	22	127	235	463	3,814	463
Approximate area (miles^2)	3,700	20	2,200	3,150	5,000	9,350	2,350
Integrated flooring share (%)	33	0	4	27	57	100	31
Upstream supply							
Number of plants	20	1	12	18	25	61	11
Number of manufacturers	9	1	5	8	11	25	4
Manufacturer HHI	3,135	744	1,902	2,733	3,837	10,000	1,728
Number of floor lenders	8	1	5	8	11	25	5
Floor Lender HHI	3,033	808	1,632	2,540	3,855	10,000	1,869

This table shows summary statistics for the 45 local markets found in Texas. Per market-year: retailers sell at least five homes to buyers in Texas; plants and manufacturers ship at least one home to a market and at least five homes to Texas; floor lenders provide floor plan financing for at least one retailer in a market. The integrated flooring share is the share of inventory in a market floored by lenders who are integrated with a manufacturer.

Data: TDHCA, TxDMV, Texas Secretary of State

[5] Each market's "catchment area" in the figure is the concave hull of its constituent dealers' calculated catchment areas. These catchment areas are meaningful only insofar as they were used to determine the local markets.

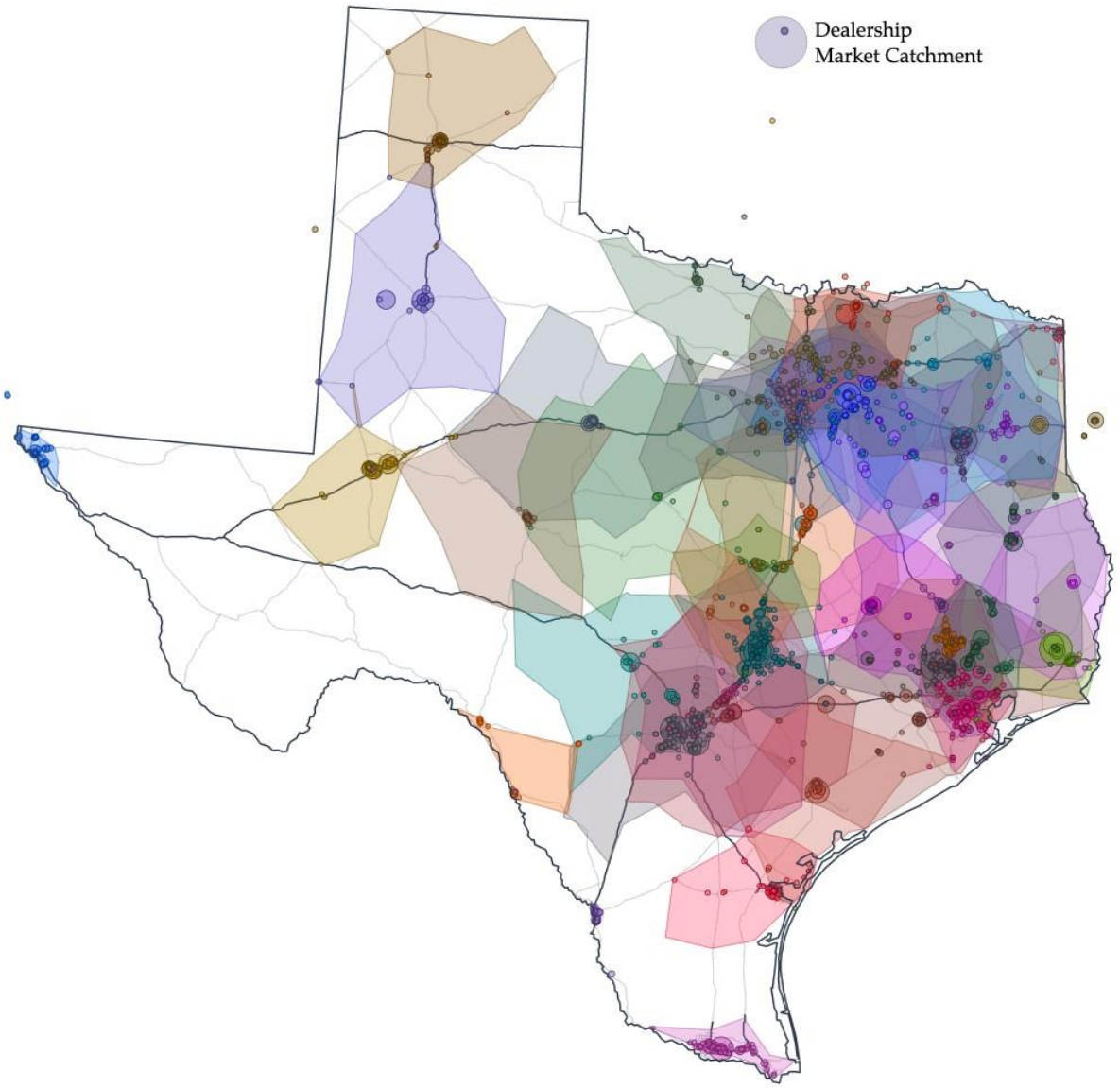


Figure 6. This map shows the approximate catchment areas of the 45 local markets found in Texas, along with their constituent dealerships. Dealerships are sized by shipments received, and colored to match their respective local markets. Each market's "catchment area" is the concave hull of its constituent dealers' calculated catchment areas; these catchment areas are meaningful only insofar as they were used to determine the local markets.

Data: TDHCA, TxDMV

3 Shipments, Prices and Integrated Flooring

Foreclosure theory implies that integrated flooring motivated by VF should result in lower quantities and higher average prices in downstream markets. Using the markets just defined, I will show that the patterns in the data are consistent with VF. Then, I will confirm that these results are robust to numerous specifications and sources of identification.

3.1 Does Integrated Flooring Lower Quantities and Raise Prices?

Economic activity in the industry is generally reported in terms of shipments: units shipped from factories. The first two columns of Table 4 report the coefficients obtained by regressing total logged shipments to downstream markets on the integrated share of flooring loans (the percent of flooring loans in a market by integrated floor lenders). In the second two columns, I regress logged prices in a market on the integrated share of flooring loans, and a bevy of controls to account for housing characteristics: the number of sections, weight and titling of a home (personal property or real property), and whether the home is in a manufactured home community.[6] Year fixed effects are included in all specifications to account for the aggregate movement evident in Table 1; specifications are reported both excluding and including market fixed effects. Because we are interested in competition within local markets – the retailers playing the Bertrand-Edgeworth games – we focus on the latter (Columns 2 and 4).

Table 4 Market-Level Relationships Between Quantities, Prices and Integrated Flooring

	Total Shipments		Prices	
	(1)	(2)	(3)	(4)
Integrated share of flooring loans	-0.62	-0.60	0.23	0.16
	(0.27)***	(0.16)***	(0.01)***	(0.06)***
$R2$	0.25	0.29	0.58	0.58
Observations	1,117	1,117	282,971	282,971
Year FE	Yes	Yes	Yes	Yes
Market FE		Yes		Yes

The prices and total quantities of new manufactured homes shipped to a downstream market in Texas are regressed on the market share of integrated floor lending. Hedonic controls in the price regressions include the number of sections, weight and titling of each home, and whether the home is in a manufactured home community. Standard errors are clustered by market. *p < 0.10, **p < 0.05, ***p <

[6] ie, in a mobile home park / on leased land. In Texas, manufactured homes are personal property by default (chattel), but owners who also own the underlying land can choose to convert their homes to real property. Many who have this option opt against the conversion, perhaps to avoid encumbering their land (Freddie Mac and The Center for Community Capital at the University of North Carolina at Chapel Hill 2020). In some states, Texas included, manufactured homes on leased land can also occasionally be titled as real property.

0.01.

Data: TDHCA, TxDMV, Texas Secretary of State, ZTRAX

We see that the greater the share of integrated flooring loans in a market, the lower the shipments, and the higher the prices. The implied differences are large and significant. Columns 2 and 4 imply that going from a market with no integrated flooring to one with a 20 percent market share of integrated flooring is associated with a 16.4 percent reduction in shipments, and a 3.5 percent increase in prices. Since 1995, the aggregate market share in Texas of integrated flooring has increased from 13 percent to 87 percent.

3.2 Do Integrated Retailers Gain Market Share?

Foreclosure theory predicts that integrated retailers – defined here as retailers with at least one integrated floor lender in a given year – will gain market share, as the integrated manufacturer either ships fewer homes to unintegrated retailers, or charges unintegrated retailers a higher price. Are integrated retailers less likely to exit a market?

In Table 5, I regress an indicator for whether a retailer exits a market in the next year on an indicator equal to one if the retailer has an integrated floor lender, or the share of the retailer's flooring loans that are integrated. Market and year fixed effects are included in all specific-

Table 5 Likelihood of Retailer Exit from a Downstream Market

	(1)	(2)	(3)	(4)
Integrated retailer indicator	-7.28		-3.98	
	(0.81)***		(0.92)***	
Integrated share of flooring loans		-7.24		-4.18
		(1.00)***		(1.24)***
Number of homes sold			-11.52	-11.60
			(0.49)***	(0.49)***
R^2	0.02	0.02	0.10	0.10

An indicator equal to 100 if a retailer exits a market in the next year is regressed on either an indicator equal to one if a retailer has at least one integrated floor lender, or the share of the retailer's flooring

loans that are integrated. The sample consists of 10,280 retailer-year observations. Market and year fixed effects are included in all specifications, and standard errors are clustered by market. *p < 0.10, **p < 0.05, ***p < 0.01.

Data: TDHCA, TxDMV, Texas Secretary of State

ations. We see that, indeed, integrated retailers are significantly less likely to exit a market than their unintegrated competitors. Retailers with at least one integrated floor lender have a 7.3 percentage point lower probability of exit. Even controlling for the (logged) number of homes shipped to a retailer, retailers with at least one integrated floor lender have a 4.2 percentage point lower probability of exit. For comparison, the unconditional exit rate across retailers is 15.5 percent. This is consistent with the VF of unintegrated retailers.

One might worry the results can be explained by unobserved differences in retailer quality. If integrated floor lenders attract or choose higher quality retailers, this would lead to the higher observed exit rates for unintegrated retailers. But if the integrated floor lender has this knowledge, he should be more willing to lend to low-quality dealers than the independent lender, if flooring another home means selling another home. Moreover, if the results are due to efficiency, we would expect lower average prices and higher aggregate quantities downstream. In Table 4, we see the opposite.

In Table 6, I regress the logged quantities of new manufactured homes shipped to downstream retailers on an indicator equal to one if a retailer has at least one integrated floor lender,

Table 6 Shipments of New Manufactured Homes to Downstream Retailers

	FullSample		IntegratedManufacturers	
	(1)	(2)	(3)	(4)
Integrated flooring indicator	0.27		0.52	
	(0.04)***		(0.05)***	
Integrated share of flooring loans		0.25		0.53
		(0.05)***		(0.06)***
R_2	0.02	0.02	0.07	0.07
Observations	10,173	10,173	4,643	4,643

The quantities of new manufactured homes shipped to downstream retailers in Texas are regressed on an indicator equal to one if the retailer has integrated flooring. Columns (3) and (4) limit the sample to shipments from integrated manufacturers. Market and year fixed effects are included in all specifications, and standard errors are clustered by market. *p < 0.10, **p < 0.05, ***p < 0.01.

Data: TDHCA, TxDMV, Texas Secretary of State

or the share of the retailer's flooring loans that are integrated. A retailer having at least one integrated floor lender is associated with receiving 30.8 percent more homes. The implied difference becomes even more stark when the sample is limited to shipments to dealers from integrated manufacturers. Again, this is consistent with VF. The integrated manufacturer, M, tilts shipments to favor the integrated retailer, R_1. The quantity q_1 of homes shipped to the integrated retailer increases – but q_1 increases by less than the quantity q_2 of homes shipped to the unintegrated retailer decreases. Aggregate shipments in a market fall, and average prices increase.

3.3 Robustness: Multi-Market Acquisitions

Now, we will revisit this evidence paying more attention to endogeneity. The fundamental empirical challenge here is that the manufacturer's choice to extend floor financing to retailers is endogenous to local economic conditions. If local demand is high, the likelihood that a retailer will sell the home and pay back his loan – and that the manufacturer can in turn sell more homes and capture a greater share of the market – increases. If lending is tight, the likelihood that a retailer can only purchase a home if the manufacturer provides flooring increases. Shocks to demand will affect both the level of lending and profitability.

The structural relationship of interest is the impact of flooring on shipments and prices:

$$y_{it} = \alpha_i + \gamma_t + \lambda X_{it} + \beta IntegratedFlooring_{it} + \epsilon_{it} \quad (1)$$

where y_{it} is an outcome for local market i in year t,

α_i are local market fixed effects, γ_t are year

fixed effects,

X_{it} is a vector of local market characteristics, and

$IntegratedFlooring_{it}$ is the share of the market's flooring loans by integrated lenders.

To identify the impact of integrated flooring on shipments and prices, I use variation in the extent of integrated flooring in local markets generated by multi-market acquisitions of downstream retailers by manufacturers, where some of the acquiring manufacturers provide

inventory financing, and some do not. Perhaps surprisingly, factory-owned dealerships in general are not more likely to be floored by their parent manufacturer.[7] Retailers with a parent floor lender, however, are significantly more likely to use in-house flooring. It follows that markets exposed to acquisitions by integrated manufacturers – where I consider a market "exposed" to an acquisition if at least one constituent dealership is acquired – should see a plausibly exogenous increase in the market share of integrated flooring. Markets exposed to acquisitions by unintegrated manufacturers should not.

The critical identifying assumption, used first by Hastings and Gilbert (2005), [8] is that multi-market acquisitions are exogenous to other economic conditions that might differentially affect local markets (ie, factors that might simultaneously affect shipments, prices and flooring market structure). To ensure this is true – that the acquisition events are large enough that we can assume they were based on considerations of the acquiring and target manufacturers as a whole, rather than on conditions in any given local market, and hence that we can reasonably claim their incidence is exogenous to economic conditions in local markets – I limit the sample to national acquisitions of large dealership chains (Table 7).

Table 7 Downstream Acquisitions

Year	Manufacturer	Floor Lender	Acquires	Dealerships	In Texas
1998	Fleetwood		HomeUSA	91	5
1998	Champion	Crestpointe Financial	A-1 Homes	60	33
2005	Clayton	21st Mortgage	Fleetwood Retail	121	30
2011	Cavco		Palm Harbor	49	34

This table lists the four national downstream acquisitions included in the sample, along with their respective numbers of affected dealerships.

[7] We see evidence of this in Table 2.

[8] See also Asker and Ljungqvist (2010), Nguyen (2019) and Zhang (2020).

3.3.1 Description of the Acquisitions

Demand for manufactured homes was high in the 1990s, and early in the decade, two of the biggest builders – Clayton Homes and Oakwood Homes – began integrating downwards into distribution. By the mid 1990s, Clayton owned 143 dealerships and Oakwood owned 120 (Grissim 2006). This triggered what Grissim calls "an industry stampede" into retail distribution.

> **Acquisition 1 [unintegrated].** In 1998, Fleetwood Enterprises acquired HomeUSA, the leading independent national retailer of manufactured homes. Fleetwood CEO Glenn Kummer on the purchase: "The HomeUSA acquisition establishes Fleetwood as a major force in the manufactured housing retail sector. We are delighted with this ... outstanding group of retailers assembled by HomeUSA, and see this as a major step in our goal of becoming a vertically integrated manufactured housing company."[25]

Acquisition 2 [integrated]. A few months later, Champion Enterprises and its integrated floor lender, Crestpointe Financial, acquired the ICA Group (which sold homes under the more recognizable tradenames A-1 Homes, Homes of America and USA Homes). Champion CEO Walter Young said of the purchase: "Champion is now both a major producer and distributor of manufactured housing. We are acquiring some of the best and most profitable retailers in the country."[26]

As both 1998 acquisitions were national, large scale, and motivated by vertical integration into distribution,[27] our exogeneity assumptions are tenable.

The bankruptcies in manufactured housing begin in 2001.[28] American Homestar files for Chapter 11 bankruptcy in January. The following year, Conseco Finance defaults, and Oakwood files for Chapter 11 bankruptcy.

Acquisition 3 [integrated]. In 2005, Clayton and its integrated floor lender, 21st Mortgage, acquired over a hundred dealerships through its purchase of Fleetwood Retail. Clayton offered no comment at the time, but in his public announcement of Fleetwood's exit from the retail business, Fleetwood CEO Elden Smith noted that Clayton was "a well capitalized company."[29]

In 2009, both Fleetwood and Champion filed for bankruptcy. In 2010, Palm Harbor Homes filed for bankruptcy.

Acquisition 4 [unintegrated]. In 2011, Cavco Homes bought the assets of Palm Harbor: assets including 5 operating factories, 9 idled factories, and Palm Harbor's 49 retail locations.

These were eventful years, both in manufactured housing and outside it, and this history is far from exhaustive. But as all four acquisitions in the sample were motivated at the national level and involve national chains – national chains that, by design and to save on transport

[25] sec.gov/Archives/edgar/data/314132/000031413298000004/0000314132-98-000004.txt

[26] Champion Enters Manufactured Housing Deal

[27] if not for the benefits of vertical integration, then in response to others' vertical integration into distribution

[28] In his 2008 letter to shareholders, Warren Buffett calls the 2004-2007 period in conventional housing an "eerie rerun" of the 1997-2000 years in manufactured housing. [29] sec.gov/Archives/edgar/data/314132/000031413205000011/secexh9017705.txt

costs, spread out their dealerships – we can reasonably assume each market's exposure to an acquisition is as good as randomly assigned. That is, we can assume that there is no systematic difference between markets that would make a manufacturer more likely to have acquired a dealership chain. Table 8 offers further evidence that, conditional on controls, exposed markets do not differ significantly from control markets in the years prior to an acquisition. As far as I know, no multi-market acquisitions by manufacturers of downstream dealership chains were excluded. [9] Markets exposed to single-market acquisitions by manufacturers – ie, the purchase of one dealership by a manufacturer – are dropped from the sample.

Table 8 Summary Statistics for Exposed and Control Markets

Characteristic	Treatment	Control 1	p-value	Control 2	p-value
	(1)	(2)	(3)	(4)	(5)
Number of retailers	12.1	10.2	0.20	10.4	0.74
Retailer HHI	2514.6	2559.2	0.75	2508	0.70

[9] Several upstream acquisitions – for example, Clayton's acquisition of Karsten Homes – are excluded because the manufacturer owned no dealerships in Texas. The Oakwood acquisition is excluded from the sample because, of the 85 Oakwood dealerships in Texas that were active in the 1990s, zero were still active when Oakwood was acquired in 2004.

Number of homes sold	241.6	177.0	0.17	280.5	0.12
Integrated flooring share	0.34	0.36	0.47	0.34	0.51
Upstream supply					
Number of factories	25.5	20.6	0.13	25.7	0.10
Manufacturer HHI	2631.4	2791.8	0.28	3034.6	0.14
Floor Lender HHI	2601.3	2770.3	0.48	2806.8	0.87

Treatment Group = Markets exposed to an acquisition by an integrated manufacturer
Control Group 1 = Markets exposed to an acquisition by an unintegrated manufacturer Control Group 2 = Markets where zero dealerships are acquired by a manufacturer

Summary statistics are generated by estimating regressions of pre-acquisition characteristics on the relevant indicators and market fixed effects. Column 3 reports the p-value for the difference between Columns 1 and 2. Column 5 reports the p-value for the difference between Columns 1 and 4. *Data:* TDHCA, TxDMV, Texas Secretary of State

3.3.2 Results

I compare outcomes in markets exposed to a multi-market acquisition by an integrated manufacturer (treatment group) with markets exposed to a multi-market acquisition by an unintegrated manufacturer (control group 1). Both groups are also compared to markets where zero dealerships are acquired by a manufacturer (control group 2).[10] This allows separation of the impact of flooring from the market power effects of vertical integration in general, and suggests the following first-stage regression:

$$IntegratedFlooring_{it} = \kappa_i + \theta_t + \rho X_{it} + \upsilon E_{it} + \beta_f(E_{it} \times FloorLender_{it}) + \omega_{it} \quad (2)$$

where E_{it} indicates market i's exposure during year t to a multi-market downstream acquisition involving a manufacturer, and $FloorLender_{it}$ indicates whether or not that manufacturer is also a floor lender. In this framework, the identification assumption is still one of parallel trends: absent the acquisition, the relative outcomes of markets affected by either category of acquisition would trend the same way. For easier examination of pre-trends and parallel trends, I estimate the event-study counterpart:

[10] I allow markets where dealerships change ownership but remain independent. Of the approximately 1,500 dealerships in the data, more than 20 percent change ownership at least once.

$$y_{iat} = \alpha_i + \gamma_t + \lambda_t X_i + \sum_\tau \psi_\tau (D_{at}^\tau \times E_{ia}) + \sum_\tau \delta_\tau (D_{at}^\tau \times E_{ia} \times FloorLender_a) + \epsilon_{iat} \quad (3)$$

where y_{iat} is an outcome for market i during year t for acquisition a,

α_i are local market fixed effects, γ_t are year fixed effects,

X_i is a vector of market characteristics with effects allowed to vary by year,

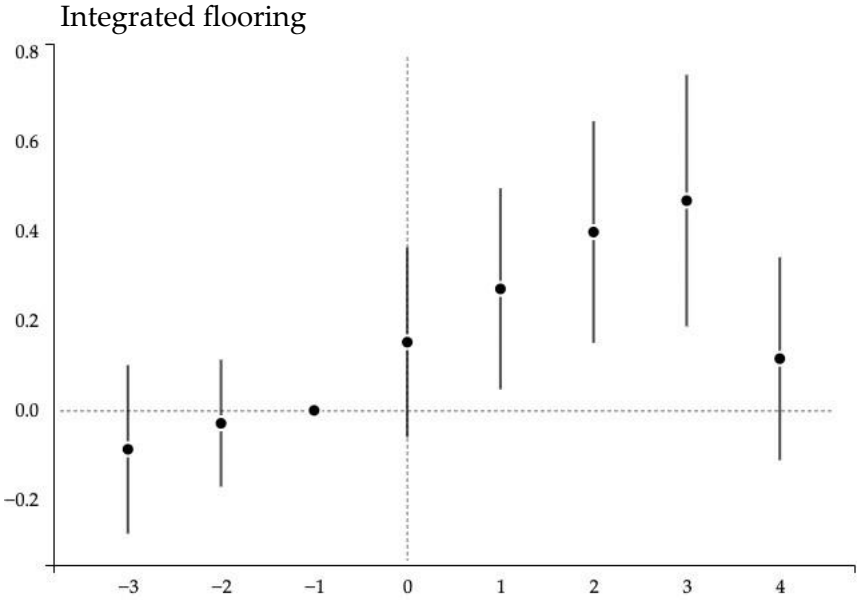
D_{at}^τ is a dummy equal to one if year t is τ years after acquisition a,

E_{ia} is a dummy equal to one if market i is exposed to acquisition a,

$FloorLender_a$ indicates whether acquisition a involves a floor lender, and τ ranges from -3 to 4.

X includes the retailer HHI and floor lender HHI of the given market-year to control for the horizontal structure of the local market, and standard errors are clustered by market. The coefficient of interest is δ_τ, which measures the difference, conditional on controls, in an outcome between exposed and control markets τ years after an acquisition.

Figure 7 plots the estimated δ_τ, where the dependent variable is the share of integrated flooring in local market i during year t. $\delta_\tau > 0$ indicates an increase in integrated flooring in markets exposed to an acquisition by an integrated manufacturer relative to markets exposed to an acquisition by an unintegrated manufacturer τ years after an acquisition.



Years since acquisition

Figure 7. This figure plots the first-stage relationship between exposure to an acquisition by an integrated manufacturer and the market share of integrated flooring, relative to an acquisition by an unintegrated manufacturer. Coefficients are normalized relative to $\tau = -1$, where $\tau = 0$ is the year the acquisition occurred. The bars show 90 percent confidence intervals. Standard errors are clustered by market.

Data: TDHCA, TxDMV, Texas Secretary of State

Figure 7 shows that prior to an acquisition, exposed markets are not more likely than control markets to see an increase in the share of integrated flooring. But relative to controls, the likelihood increases the year following the acquisition, and continues to increase for several years. The difference becomes insignificant 4 years after an acquisition. Table 9 presents the corresponding point estimates in Column 1. The estimated ψ_τ of equation (3) are listed in Table A.4 in the Appendix. These results confirm an acquisition-by-an-integratedmanufacturer-induced increase in the level of integrated flooring in a market.

Table 9 First Stage and Reduced Form Estimates

	IntegratedFlooring	Shipments	Prices
	(1)	(2)	(3)
$\delta^{<-1}$	−0.03	−0.38	−0.04
	(0.09)	(0.30)	(0.19)
δ_0	0.15	0.43	0.12
	(0.13)	(0.58)	(0.26)
δ_1	0.27	−0.10	0.50
	(0.14)**	(0.55)	(0.20)***
δ_2	0.40	−1.01	0.47
	(0.15)***	(0.51)**	(0.21)**
δ_3	0.47	−1.62	0.38
	(0.17)***	(0.59)***	(0.25)
δ_4	0.12	−3.08	0.68

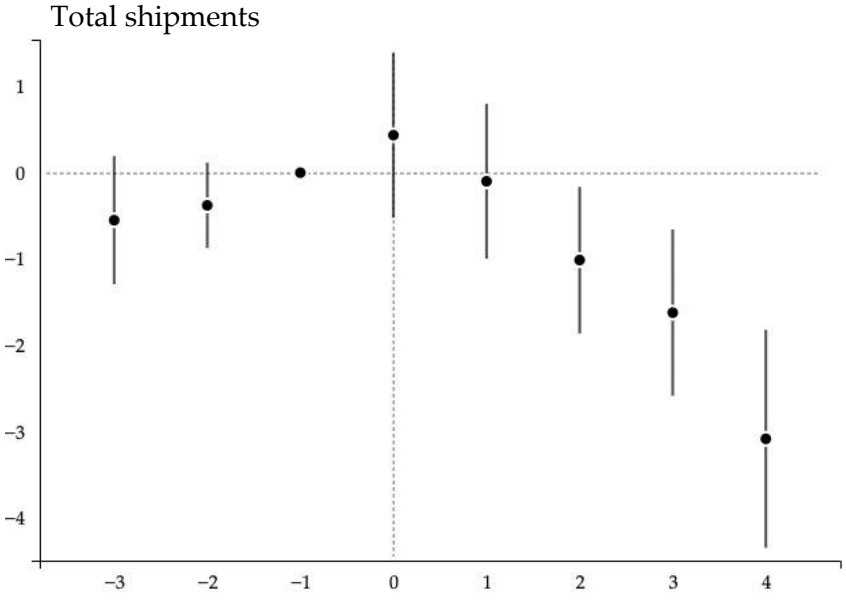
	(0.14)	(0.77)***	(0.21)***

This table shows estimates of equation (3). The sample consists of 726 market-years. All regressions include the downstream retailer HHI and flooring HHI to control for the horizontal structure of the local market, and market and year fixed effects. Column 1 shows the first-stage relationship between integrated flooring and exposure to an acquisition by an integrated lender, relative to an acquisition by an unintegrated lender. Columns 2 and 3 show the reduced-form relationship between exposure to an acquisition by an integrated lender, relative to an acquisition by an unintegrated lender, and manufactured home shipments and prices, respectively. Hedonic controls in the price regressions include the number of sections, weight and titling of each home, and whether the home is in a manufactured home community. All coefficients are normalized relative to $\tau = -1$, where $\tau = 0$ is the acquisition year. Standard errors are clustered by market. *p < 0.10, **p < 0.05, ***p < 0.01.

Data: TDHCA, TxDMV, Texas Secretary of State, ZTRAX

Figure 8 shows the reduced form relationship between logged total shipments to downstream markets and exposure to an acquisition by an integrated manufacturer, relative to an acquisition by an unintegrated manufacturer. In the years prior to an acquisition, up through the year following an acquisition, there is no evidence of a difference. Shipments drop in year 2, then continue to fall. The corresponding point estimates are listed in Column 2 of Table 9.

As predicted by foreclosure theory, an exogenous increase in the share of integrated flooring results in lower quantities shipped to a downstream market.

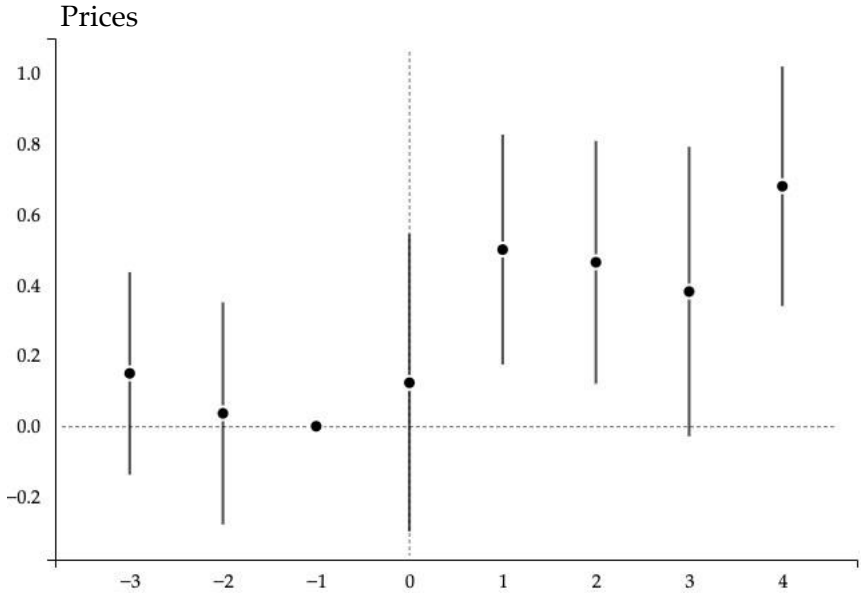


Years since acquisition

Figure 8. This figure plots the reduced-form relationship between exposure to an acquisition by an integrated manufacturer and the quantity of new homes shipped to a market, relative to an acquisition by an unintegrated manufacturer. Coefficients are normalized relative to $\tau = -1$, where $\tau = 0$ is the year the acquisition occurred. The bars show 90 percent confidence intervals. Standard errors are clustered by market.

Data: TDHCA, TxDMV, Texas Secretary of State

Figure 9 shows the reduced form relationship between the prices of homes shipped to a downstream market and exposure to an acquisition by an integrated manufacturer, relative to an acquisition by an unintegrated manufacturer. To account for housing characteristics, I control for the number of sections, weight and titling of each home, and whether the home is in a manufactured home community. Again, in the years prior to an acquisition, there is little evidence of a difference. But relative prices increase the year following the acquisition – an increase that lasts. The corresponding point estimates are listed in Column 3 of Table 9. As integrated flooring motivated by VF would imply, a plausibly exogenous increase in the share of integrated flooring is associated with both higher prices and lower quantities in a downstream market.



Years since acquisition

Figure 9. This figure plots the reduced-form relationship between exposure to an acquisition by a manufacturer and the prices of new homes shipped to a market. Coefficients are normalized relative

to $\tau = -1$, where $\tau = 0$ is the year the acquisition occurred. The bars show 90 percent confidence intervals. Standard errors are clustered by market.

Data: TDHCA, TxDMV, Texas Secretary of State, ZTRAX

4 Upstream Competition and Integrated Flooring

The theory predicts that the integrated manufacturer has more incentive for VF in markets where he has the greater advantage. The greater the upstream cost asymmetry – the greater the marginal cost difference between the integrated manufacturer and his higher-cost competitors – the greater the manufacturer's incentive to distort downstream competition, and the larger the negative impacts on consumers and welfare.

We can think of this upstream cost asymmetry as the cost of bypassing the integrated manufacturer for another upstream supplier. If many manufacturers and many floor lenders compete in a market, competition should be the main determinant of prices and shipments, as the manufacturer's ability to distort downstream competition depends on the presence of upstream market power. In this case, the integrated manufacturer has little incentive to strategically raise prices for "unintegrated" retailers, as retailers can costlessly second source. But if credit is scarce or the number of competing homes dwindles, the integrated manufacturer has the ability – through integrated flooring – to offer different prices to "integrated" retailers and their rivals, and to increase profits.

If manufacturers are using flooring monopolistically, then, markets should more closely approach the monopoly outcome as the cost of bypassing the integrated manufacturer increases. Prices should rise, and shipments should fall, as competition upstream becomes less fierce. Figure 10 illustrates the correlations we expect between the number of homes shipped to a market and upstream competition in our sample, conditional on the market share of integrated flooring. The Justice Department considers markets with HHI measures below 1,000 competitive, markets with HHI measures above 1,000 moderately concentrated, and markets with HHI measures above 1,800 highly concentrated. As the manufacturer HHI increases beyond 1,800 and markets become less competitive, we see a stronger relationship between

Shipments, low integrated flooring Shipments, high integrated flooring

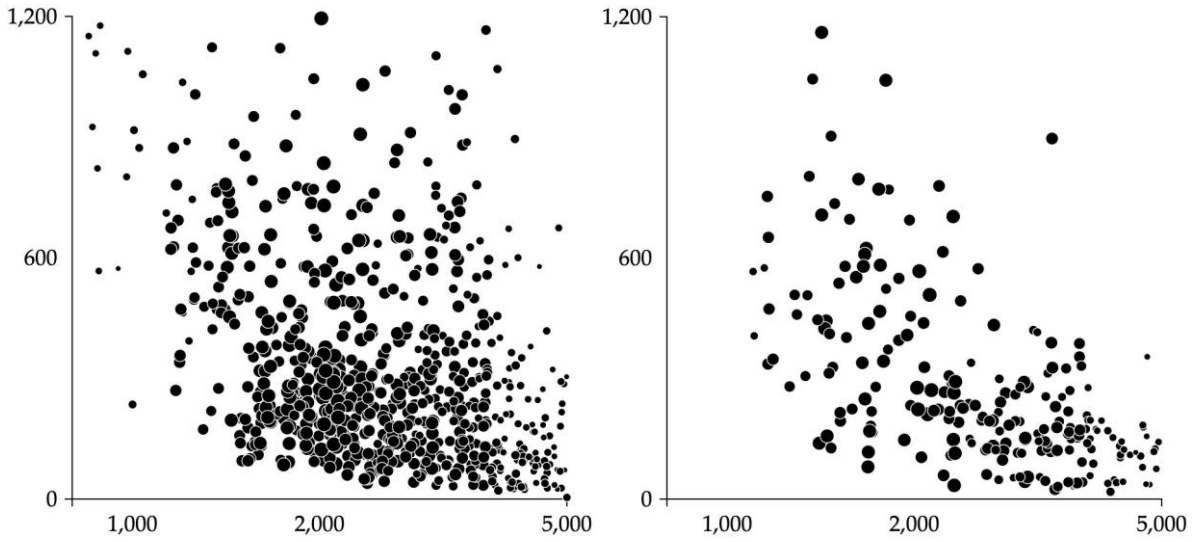


Figure 10. This figure plots the number of homes shipped to a downstream market in Texas versus the market's manufacturer HHI from 1995 through 2020. The panel on the left shows markets in the bottom 75 percent of integrated flooring; the panel on the right shows markets in the top quartile of integrated flooring (integrated floor lenders are integrated with a manufacturer). Dots are sized by the number of markets in the same shipments-HHI bin. The manufacturer HHI is defined as: $HHI = \sum_i^N s_i^2$, where s is the share of homes shipped to a market produced by manufacturer i.

$HHI \leq 1000$ = unconcentrated

$1000 < HHI \leq 1800$ = moderately concentrated

$HHI > 1800$ = highly concentrated

Data: TDHCA, TxDMV, Texas Secretary of State

shipments and HHI in the panel on the right, which pictures markets in the top quartile of integrated flooring, than is evident for the remaining 75 percent of markets. This is consistent with the integrated manufacturer's strategic use of flooring for VF: his incentive to distort competition increases with both the HHI and his ability to use flooring monopolistically (the share of integrated flooring in a market). Competitive markets are relatively rare in our sample, but nevertheless, there is no evidence of a relationship between shipments and HHI even for moderately competitive markets. This is true for markets both in the top quartile and in the bottom 75 percent of integrated flooring.

This suggests a negative coefficient on the interaction term, which we can think of as the integrated manufacturer's incentive for VF, in the following model:

$$Shipments_{it} = \alpha_i + \gamma_t + \beta_1 IntegratedFlooring_{it} + \beta_2 BypassCost_{it} + \beta_3 (IntegratedFlooring_{it} \times BypassCost_{it}) + \lambda X_{it} + \epsilon_{it} \quad (4)$$

where $Shipments_{it}$ is the number of homes shipped to local market i during year t, α_i are market fixed effects, γ_t are year fixed effects, $IntegratedFlooring_{it}$ is the share of inventory floored by integrated manufacturers, $BypassCost_{it}$ is the cost of bypassing the integrated manufacturer, and X_{it} is a vector of market characteristics.

As the cost of bypassing the manufacturer increases, shipments fall. The greater the share of integrated flooring in a market, the greater (more negative) the drop. But the typical measures of upstream competition in a market – the manufacturer HHI included – are endogenous.

Our goal is hence to test for the effects of integrated flooring on prices and shipments in downstream markets through exogenous shocks to upstream competition. Differential decreases in upstream competition should imply proportional exogenous increases in the integrated manufacturer's incentive for VF – the interaction term – and if manufacturers are using flooring for VF, we should see higher prices and lower quantities. To identify this impact, I use the unexpected national production of FEMA trailers after Hurricane Katrina, which discretely and differentially affected competition in local markets by monopolizing the production capacity of manufacturers that were awarded FEMA contracts for months.

4.1 Description of the Disaster

Hurricane Katrina made landfall along the Gulf Coast on August 29, 2005, flooding 80 percent of New Orleans and destroying 300,000 homes.[32] Under the authority of the Stafford Act, FEMA initiated its Direct Housing Assistance Program.

The manufactured housing industry immediately contacted FEMA about the possible purchase of existing inventory or the production of new homes. While FEMA entertained the idea of buying off the lot, insofar as they collected inventory lists, J.D. Harper – the Executive Director of the Arkansas Manufactured Housing Association – testified before Congress that the industry would likely not participate in future efforts to gather inventory lists from retailers "because we have not seen any real instance that FEMA is going to purchase retail inventory."[33] Instead, FEMA created a new specification sheet for FEMA

trailers,[34] then gave industry manufacturers one day to submit bids for the production of new homes.[35]

Contracts were awarded (Table A.5 in the Appendix) on either a non-competitive basis or under limited competition to manufacturers across the country.[36] And the production of tens of thousands of FEMA trailers began. Manufacturers spread emergency production throughout their plants, regardless of their distance from Louisiana. For example, the Indiana-based Forest River built more than 500 of its 5,000 FEMA trailers at its Oregon plant.[37] Per Harper's Congressional testimony, "participating builders found it necessary to suspend their normal production of homes ... to produce FEMA-approved units for disaster relief efforts, creating major disruptions in the normal course of business and in the normal supply of manufactured housing."

Downstream markets throughout Texas were differentially exposed to these disruptions.

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[32] US Department of Homeland Security (2008) [33] govinfo.gov/content/pkg/CHRG-109shrg28240/html/CHRG-109shrg28240.htm

[34] Manufactured homes are built to HUD Code, which is national and supersedes local and state construction codes, but in this case FEMA chose to develop its own specifications. In an 'amusing' turn of events, 10,000 of the homes FEMA purchased (to the new specifications) ended up sitting in an Arkansas airport instead of being sent to Louisiana, because per FEMA regulations, they could not be placed in floodplains.
Chairman Collins. It is not as if these regulations are from another part of the Federal Government and FEMA was unaware of them. These are not new regulations, are they?
Mr. Garratt. I am not sure of the exact date of that Executive Order, but it has been in place for some time.
Chairman Collins. The Executive Order is dated May 24, 1977. [35] Cavalier Homes president David Roberson testimony on the process: "It would be helpful if the industry were given more than one day... It would not be unreasonable to provide manufacturers at least two." archives-financialservices.house.gov/media/pdf/091505dr.pdf [36] FEMA testimony on the acquisitions: "The initial manufacturing contracts for temporary housing units were awarded on a non-competitive basis to geographically dispersed vendors to meet the immediate humanitarian need... Subsequent manufacturing contracts were awarded based on limited competition." hsgac.senate.gov/imo/media/doc/041006Burnette.pdf [37] rvbusiness.com/forest-river-starts-production-of-fema-units

Table 10
MonthlyMeanMarketShareofFEMAFactoriesDuringtheYearPriortoHurricaneKatrina

Manufacturer	Factory	Affected Markets	Min	Median	Max
American Homestar	Lancaster	24	2	14	35
Champion	Burleson	27	1	3	20
Clayton	Bonham	35	3	7	34
Clayton	Breckenridge	13	1	2	21

Palm Harbor	Austin	27	1	3	18
Palm Harbor	Buda	28	2	5	23
Palm Harbor	Fort Worth	29	1	4	12
Patriot	Waco	19	1	2	30
Silver Creek	Henrietta	21	1	4	25
Southern Energy	Fort Worth	20	1	3	17

This table lists the factories in Texas that produced homes in support of Hurricane Katrina relief efforts, alongside the number of downstream markets each factory supplied and each factory's minimum, median, and maximum mean market share during the 12 months prior to Hurricane Katrina (August 2004 through August 2005). Markets affected by Hurricane Rita in September 2005 were dropped from the sample.

Data: FEMA, Texas GLO, TDHCA, TxDMV

Consider the case of a factory that supplies two local markets: it builds five percent of the homes shipped to one market, and 30 percent of the homes shipped to the other. When this factory begins emergency FEMA production, the two markets experience the hit differently. The likelihood of a retailer bypassing the integrated manufacturer for another supplier drops more in the second market – where the "FEMA Factory" had a 30 percent market share – than it does in the first market. Note that in both markets, retailers can always bypass the integrated manufacturer: they can order homes from more distant factories that are not building FEMA trailers. But because of the high transportation costs involved, the more distant the factory, the higher the price – so the likelihood of a retailer actually buying from another manufacturer drops more in the market where the FEMA Factory historically provided 30 percent of supply than in the market where the FEMA Factory provided only five percent. So long as the manufacturer's decision to begin FEMA production at this particular factory was made on the basis of the firm as a whole, rather than on conditions in either downstream market – and so long as FEMA's awarding of contracts was likewise unrelated to specific factories or downstream markets – this difference in upstream competition will be exogenous to market-specific outcomes.

Table 10 lists summary statistics for the factories in Texas that produced homes in support of Hurricane Katrina relief efforts ("FEMA Factories") during the 12 months prior to

Hurricane Katrina. Markets affected by Hurricane Rita in September 2005 were dropped from the sample. As the table makes apparent, factories supply many downstream markets, and every market in Texas is supplied by more than one factory, so FEMA disruption in this context is cumulative. Table 11 shows summary statistics for supplier factories and manufacturers, FEMA supplier factories and manufacturers, and the cumulative mean market share of FEMA Factories in the 43 downstream markets in the sample during the 12 months prior to Hurricane Katrina. The FEMA Factory share varies from two percent to 75 percent in affected markets. This variation across markets in cumulative FEMA disruption is the variation in upstream competition we will use to identify the impact of integrated flooring on shipments and prices through the integrated manufacturer's incentive for VF.

Table 11 Summary Statistics for Upstream Supply in Affected Downstream Markets (N=43)

	Mean	Min	Q1	Q2	Q3	Max	SD
FEMA Factory share (%)	37	2	29	37	49	75	15
FEMA Factories	6	1	5	7	8	10	2
Factories	16	5	13	17	20	26	5
FEMA manufacturers	4	1	4	5	6	7	1
Manufacturers	9	2	7	9	11	16	3

This table lists summary statistics for the 43 downstream markets in the sample exposed to FEMA production for Hurricane Katrina victims during the 12 months preceding Hurricane Katrina. The FEMA Factory share is the monthly mean market share of manufactured homes shipped to a market by factories that went on to produce for FEMA (FEMA Factories). Factories ship at least one home to a market and at least five homes to Texas.

Data: FEMA, Texas GLO, TDHCA, TxDMV

I construct a variable, "FEMA Exposure," that approximates both a market's exposure to FEMA production and the resulting exogenous increase in the cost of bypassing the integrated manufacturer. The construction is detailed in Table 12, but the logic is simple: I weight the expected supply gap by the actual monthly drop in the share of homes shipped to local markets by FEMA Factories, in an attempt at the counterfactual (what FEMA Factories would have produced for local markets, were it not for Hurricane Katrina). Every FEMA Factory built FEMA trailers in October 2005, but the start and end production dates

vary by contract, so the FEMA exposure variable provides a better approximation for the relevant upstream competition than either the simple market share or FEMA trailer production numbers.

Table 12 Approximating a Market's Exposure to FEMA Production

Variable Construction and Definitions
$$\text{Expected Gap}_i = \frac{1}{12}\sum_{t=-12}^{t=-1} \frac{\#\text{ homes shipped by FF to market } i \text{ during month } t}{\#\text{ total homes shipped to market } i \text{ during month } t}$$
$$\frac{\#\text{ homes shipped by FF to market } i \text{ during month } t}{12\ \#\text{ total homes shipped by FF during month } t} = \frac{1}{\text{FF Share}_i}\sum_{t=-12}^{t=-1}$$
$$\text{FF Actual}_{it} = \frac{\#\text{ homes shipped by FF to market } i \text{ during month } t}{\#\text{ total homes shipped by FF during month } t}$$
$$\text{FEMA Exposure}_{it} = \text{Expected Gap}_i * \max\{\frac{\text{FF Share}_i - \text{FF Actual}_i}{\text{FF Share}_i}, 0\}$$

FF = FEMA Factories (factories that produced homes in support of Hurricane Katrina relief efforts)

For example, 16 factories shipped new homes to the Tyler market during the year before Hurricane Katrina. Of those 16 factories, six had parent manufacturers who were later awarded FEMA contracts – so the Tyler market was affected by six "FEMA Factories." On average, these six FEMA Factories built 42 percent of the total homes shipped each month to Tyler:

$$\textbf{Expected Gap}_{Tyler} = 0.42 = 12 \sum_{t=-12}^{t=-1} \frac{\#\text{ FF homes shipped to Tyler during month } t}{\#\text{ homes shipped to Tyler during month } t}$$

But these six FEMA Factories built homes for other markets in addition to Tyler; during the year prior to Katrina, they collectively shipped only an average 14 percent of their new homes to Tyler:

$$\textbf{FF Share}_{Tyler} = 0.14 = \sum_{t=-12}^{t=-1} \frac{\#\text{ FF homes shipped to Tyler during month } t}{12\ \#\text{ FF homes shipped during month } t}$$

In late September 2005, the production of FEMA trailers began. The six FEMA Factories shipped 13 percent of the homes they produced that September to Tyler:

$$\textbf{FF Actual}_{Tyler,\ 200509} = 0.13 = \frac{\#\text{ FF homes shipped to Tyler during September 2005}}{\#\text{ FF homes shipped during September 2005}}$$

So FEMA Exposure in September 2005 in the Tyler market was close to negligible, only 0.03 – which makes sense, as FEMA Factories only started building FEMA trailers at the end of the month (very few FEMA trailers in the denominator above):

$$\textbf{FEMA Exposure} = \textbf{Expected Gap}_{Tyler} * \max\{\textbf{FF Share}_{Tyler} - \textbf{FF Actual}_{Tyler,\ 200509}, 0\}$$

$$= 0.42 * \max\{\frac{0.14 - 0.13}{0.14}, 0\}$$

FF Share$_{Tyler}$

= 0.03

By October, FEMA production was well underway. The six FEMA Factories shipped less than two percent of the new homes they built to Tyler,[11] so FEMA Exposure in October 2005 in the Tyler market was 0.36:

$$\textbf{FEMA Exposure} = \textbf{Expected Gap}_{Tyler} * \max\{\textbf{FF Share}_{Tyler} - \textbf{FF Actual}_{Tyler,\,200510}, 0\}$$

$$= 0.42 * \max\{\frac{0.14 - 0.02}{0.14}, 0\} = 0.36$$

FF Share$_{Tyler}$

That November, the six FEMA factories shipped less than one percent of their new homes to Tyler. By December, many FEMA contracts had been fulfilled; eight percent of new FEMA Factory homes were shipped to Tyler. The production of FEMA trailers continued at some factories into mid-2006.

4.2 Results

We replace the hypothetical bypass cost variable in Equation 4 with FEMA exposure:

$$y_{it} = \alpha_i + \gamma_t + \beta_1 IntegratedFlooring_{it} + \beta_2 FEMAExposure_{it} + \beta_3 (IntegratedFlooring_{it} \times FEMAExposure_{it}) + \lambda X_{it} + \epsilon_{it} \quad (5)$$

Our coefficient of interest is still the interaction term, which measures the integrated manufacturer's incentive for VF. Do prices rise, and quantities fall, given FEMA-induced increases in the cost of bypassing the integrated manufacturer?

The identifying assumption is again one of parallel trends: that markets would trend the same way with no exposure to FEMA production – that there is no other contemporaneous shock generating a difference in differential trends between affected markets. As our FEMA exposure variable is continuous, a causal interpretation also requires the stronger

[11] Many of the homes shipped to local retailers while FEMA production was running full steam were likely shipped from storage.

assumption that markets with low exposure to FEMA disruptions are a good counterfactual for markets with high exposure to FEMA disruptions (that conditional on controls, the evolution of outcomes across markets and exposure levels would have been the same).

We see the negative relationship implied by VF between shipments and the integrated manufacturer's incentive to use flooring for VF in Table 13, which reports the results for affected markets during the 24 months surrounding Hurricane Katrina. In all specifications, the coefficients on both the interaction term and FEMA exposure are negative and significant. This is true in the cross section (Column 1), and within markets over time (Columns 2 and 3). The specification without market fixed effects highlights differences across markets where the integrated manufacturer's incentive for VF differs. In Column 2, the "main" integrated flooring effect loses significance, but given the market fixed effects, relatively small sample

Table 13

The Effects of Upstream Competition and Integrated Flooring on Shipments

	TotalShipments		
	(1)	(2)	(3)
Integrated flooring	-0.23	-0.06	-0.27
	(0.08)***	(0.13)	(0.10)***
FEMA Exposure	-0.23	-0.26	-0.13
	(0.05)***	(0.06)***	(0.05)***
Integrated flooring x FEMA Exposure	-1.68	-4.04	-2.88
	(0.59)***	(0.85)***	(0.66)***
$R2$	0.46	0.11	0.10
Observations	1,075	1,075	1,757
Market FE	No	Yes	Yes

The total quantities of new manufactured homes shipped to a downstream market in Texas over the 24 months surrounding Hurricane Katrina (12 before, 12 after) are regressed on the market share of integrated floor lending, the market's FEMA exposure, and the interaction between the two. Controls: retailer HHI, floor lender HHI. In Column (3),the sample is expanded to the 40 months surrounding Hurricane Katrina. Standard errors are clustered by market. *p < 0.10, **p < 0.05, ***p < 0.01. *Data:* FEMA, TDHCA, TxDMV, Texas GLO, Texas Secretary of State

size, and the fact that FEMA exposure is zero for the majority of the sample, this is not surprising. When we expand the sample to the 40 months surrounding Hurricane Katrina, all three coefficients are negative and significant.

In Table 14, we see the positive relationship between prices and the interaction term implied by foreclosure theory – but the relationship appears much less strong. The positive FEMA exposure effect alone (and forseeably) retains significance in all three specifications. But in Columns 2 and 3, our specifications with market fixed effects, the interaction term is positive and significant. Together, these results support the integrated manufacturer's strategic use of flooring for VF.

One might worry these effects are driven by selection – either by FEMA's selection of manufacturers to build FEMA trailers, or by the manufacturers' selection of factories for FEMA **Table 14**

The Effects of Upstream Competition and Integrated Flooring on Prices

	Prices		
	(1)	(2)	(3)
Integrated flooring	0.01	0.03	0.01
	(0.04)	(0.02)*	(0.02)
FEMA Exposure	0.05	0.05	0.05
(0. 02)*** (0.01)*** (0.01)***			
Integrated flooring x FEMA Exposure	0.07	0.16	0.16
	(0.17)	(0.09)*	(0.08)**
$R2$	0.61	0.61	0.63
Observations	18,384	18,384	18,384
Market FE	No	Yes	Yes

The prices of new manufactured homes shipped to a downstream market in Texas over the two years surrounding Hurricane Katrina are regressed on the market share of integrated floor lending, the market's FEMA exposure, and the interaction between the two. Controls: retailer HHI, floor lender HHI. Hedonic controls in the price regressions include the number of sections, weight, titling, whether the home is in a manufactured home community – and in Column (3), the manufacturer. Standard errors are clustered by market. *p < 0.10, **p < 0.05, ***p < 0.01.

Data: FEMA, TDHCA, TxDMV, Texas GLO, Texas Secretary of State, ZTRAX

production. While I cannot confirm that FEMA production was uniformly spread across factories,[12] every manufacturer in the sample spread production over multiple factories. Plant production capacity is limited, and manufacturers were given deadlines, so this is not surprising. Moreover, Table 15 shows that before Hurricane Katrina, prices were not significantly higher for any FEMA factory than prices for non-FEMA factories, so the results are not due to FEMA monopolizing production in cheaper factories.

In fact, prices for four of the FEMA factories were significantly higher than prices for nonFEMA factories, which suggests a non-random awarding of FEMA contracts the other way.

Table 15 Manufactured Housing Production in Texas for Hurricane Katrina Relief

Manufacturer	Factory	Price Difference
American Homestar	Lancaster	0.02 (0.01)
Champion	Burleson	0.01 (0.02)
Clayton	Bonham	0.05 (0.02)***
Clayton	Breckenridge	−0.01 (0.03)
Palm Harbor	Austin	0.11 (0.02)***
Palm Harbor	Buda	0.05 (0.02)**
Palm Harbor	Fort Worth	0.03 (0.03)
Patriot	Waco	−0.05 (0.04)
Silver Creek	Henrietta	0.01 (0.02)
Southern Energy	Fort Worth	0.16 (0.03)***

This table lists the factories in Texas that produced homes in support of Hurricane Katrina relief efforts, alongside the coefficient and standard error obtained from regressing logged prices of the

[12] FEMA responded to a FOIA request for a complete list of the HUD labels or serial numbers of FEMA units with a list that included only 90 homes built in the two years following Katrina, and HUD did not respond at all. See the online Data Appendix for how I backed out FEMA production in Texas.

listed factory and non-FEMA factories on an indicator for the listed factory and the usual controls (market and year fixed effects; the number of sections, weight and titling of each home; and whether the home is in a manufactured home community). All statistics were calculated using the two years prior to Katrina. *p < 0.10, **p < 0.05, ***p < 0.01.

Data: FEMA, Texas GLO, TDHCA, TxDMV

While we would expect the government to choose the lowest bidders, competition here was – in FEMA's own words – non-competitive or limited, and manufacturers were only given one day to submit bids. These price differences are not ideal, but for our purposes they are better than the alternative – and they support our assumption that manufacturers selected FEMA plants at the firm-level, rather than the factory- or market-level (if there was any selection at all).[13]

Brass tacks, the integrated manufacturer's incentive for VF – the interaction term – is negatively correlated with shipments and positively correlated with prices. The results support the integrated manufacturer's strategic use of flooring for VF, and the possible market power effects of vertical integration proposed in the theoretical literature on VF.

5 Conclusion

The majority of empirical work on VF finds no evidence of anticompetitive foreclosure effects. But vertical integration is fundamentally different when financial firms are involved (versus, say, kale producers) – because access to credit affects prices. Even holding supply and demand fixed, financing changes the price. It relaxes the budget constraint. It changes the reservation price. It can be a more effective competitive weapon than price.

Hart and Tirole (1990) suggest that policymakers should be especially alert to anticompetitive VF when one of the firms is especially efficient – when the upstream cost asymmetry is large. But as Dennis Carlton points out in his comment on the paper, this is "precisely the situation in which efficiency gains from vertical integration are greatest because price exceeds marginal cost and there are variable proportions or a double markup." While this still may be true for financial firms, the competitive advantages of integrated

[13] Id est, we would expect choosy Palm Harbor and Clayton manufacturers to limit FEMA production to their

finance (Section 1.1) can allow firms to perennially sustain prices above marginal cost. And this is most likely in precisely this situation: when the upstream cost asymmetry is large.

Firm size implications are also worthy of mention. The successful use of integrated financing for VF requires both access to credit and upstream market power. Large firms have better access to liquidity and can borrow at lower rates (Chodorow-Reich, Darmouni, Luck, and Plosser 2022); they invariably have established sources of financing. Integrated financing is hence strategically useful only to large firms – yet another competitive advantage of size.

I find evidence that VF through integrated financing is quantitatively important in the manufactured housing industry: quantities fall, prices rise, and retailers floor financed by integrated lenders gain market share. Of course, VF does not fully explain the drop in the production of manufactured homes; there are other factors in play. Schmitz (2020b) details how builders in site-built housing have lobbied for regulations to make manufactured housing less substitutable for site-built homes – for example, with zoning requirements. We also

Fort Worth and Breckenridge plants, respectively. (The signs and significance of all coefficients stay the same in price difference regressions without the market fixed effects.)

know that site-built homes offer better legal protections, buildup of equity, and marketability – and that consumers who qualify for conventional mortgages on average get more favorable terms than those who take out chattel loans, which suggests they might also offer better financing. These are serious shortcomings, but they are the product of laws, policy choices, and business practices. They are not inherent in manufactured housing.

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A Appendix

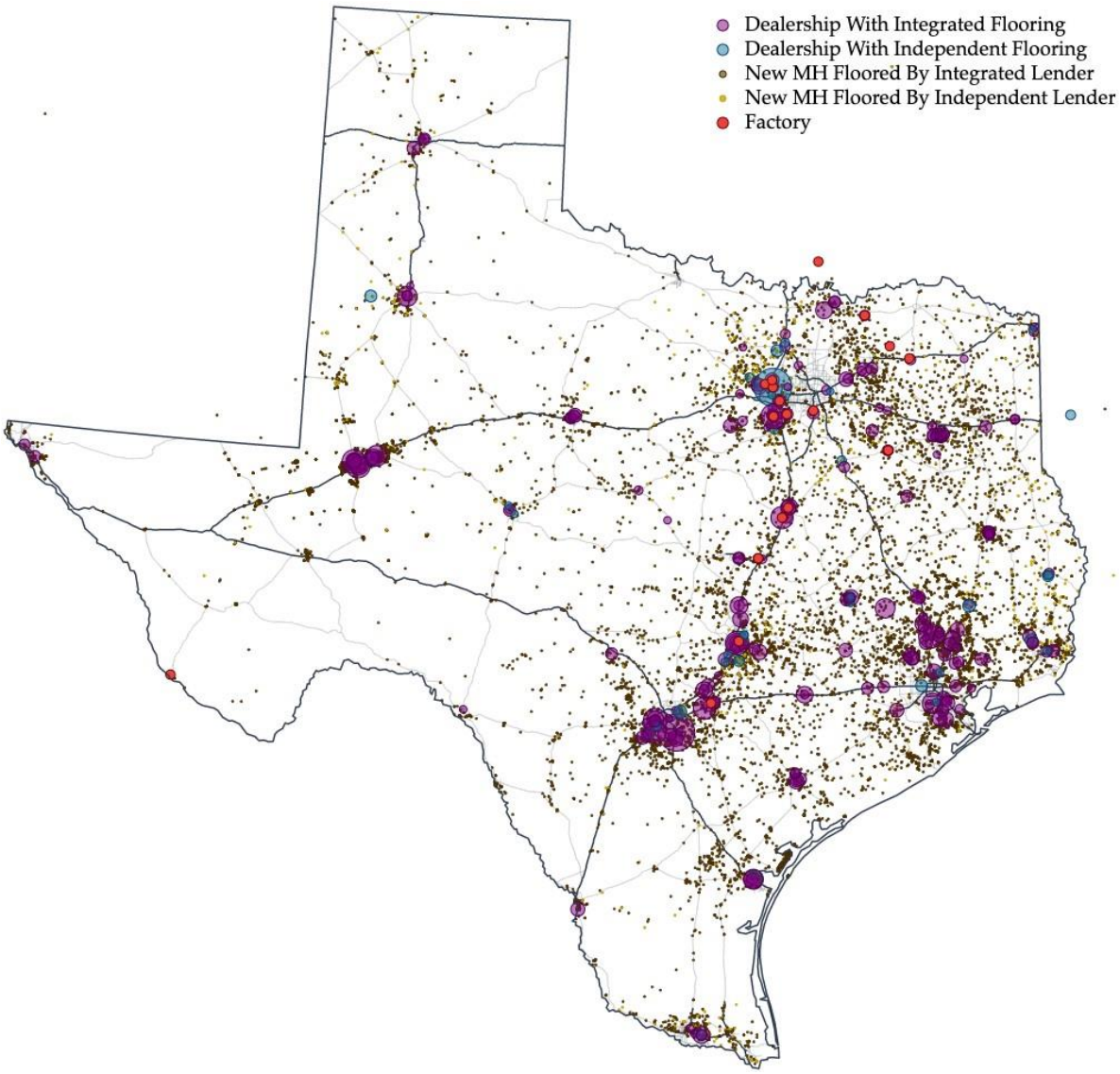
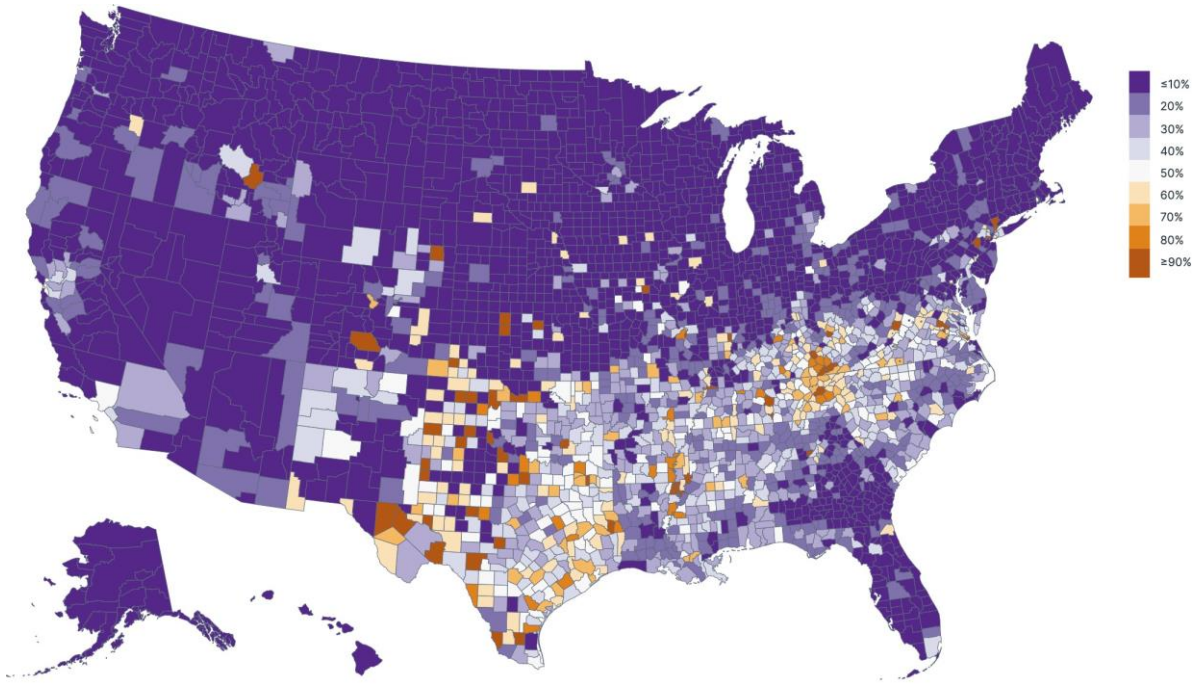


Figure A.1. This map shows the industry's factories, dealerships, buyers and flooring in Texas in 2018. Dealerships are sized by the number of homes received.

Data: TDHCA, TxDMV, Texas Secretary of State

2004



2020

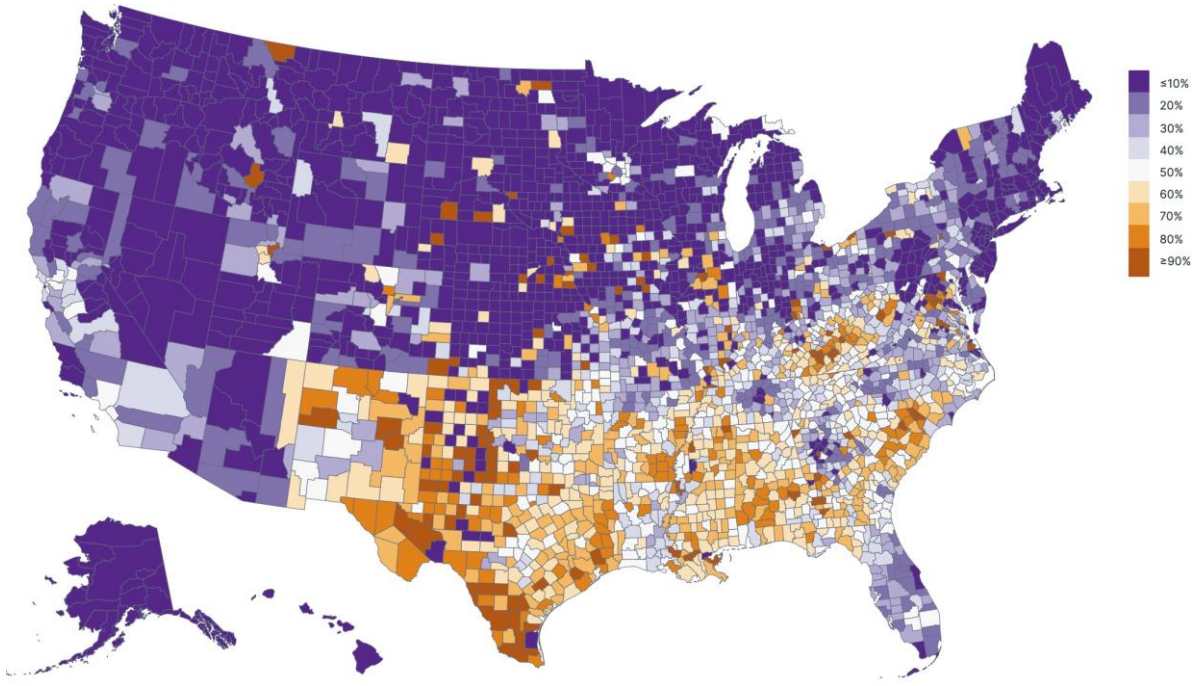


Figure A.2. This map shows the share of HMDA-reportable consumer loans per county financed by integrated lenders that also provide floor financing for dealerships in Texas in 2004 and 2020.

Data: Home Mortgage Disclosure Act (HMDA)

Table A.1 Reported Floor Lending in Texas by Market Share

	1995		2002	
	Floor Lender	Floor Lender	Share	
1				
2	Ford Housing Finance	Deutsche Financial	0.19	
3	Green Tree Financial	Textron Financial	0.18	
4	Transamerican Commercia	Bombardier Capital	0.12	
5	Bombardier Capital	**21st Mortgage [Clayton]**	0.12	
6	Deutsche Financial	Transamerican Commercial	0.10	
7	Deere Credit	Conseco Finance	0.09	
8 9	General Electric	General Electric	0.05	
10	Nationscredit Commercial	**CMH Parks [Clayton]**	0.03	
	Associates Housing	CIT Group	0.02	
	Crestpointe Financial [Ch	Bank of America 2018	0.01	

	2008			
	Floor Lender		Floor Lender	Share
1	**21st Mortgage [Clayton]**	0.36	**21st Mortgage [Clayton]**	0.43
2	General Electric	0.14	**CMH Parks [Clayton]**	0.20
3	**American Homestar**	0.10	Bombardier Capital	0.09
4	Textron Financial	0.09	Capital One	0.05
5	**Legacy Housing**	0.07	Triad Financial	0.03
6	Wells Fargo	0.03	CSL Financial	0.03
7	Transamerican Commercial	0.02	Northpoint Commercial	0.02
8	Bombardier Capital	0.01	Affiliates Floorplan	0.02
9	American Bank of Commerce	0.01	**Legacy Housing**	0.02
10	CIT Group	0.01	TCF Inventory	0.01

This table lists the lenders who reported the most inventory financing in 1995, 2002, 2008 and 2018. Integrated floor lenders are bolded. Conseco and Deutsche Financial exited the market in 2002. Textron liquidated its floor planning business in 2009. Implied floor lending is excluded (ie, Legacy Homes likely floors homes for Legacy dealerships with no reported flooring).

Data: TDHCA, Texas Secretary of State

Table A.2 Manufactured Home Builders in Texas by Market Share

	1995	2002	
	Manufacturer	Manufacturer	Share
1	Fleetwood	Clayton	0.18
2	Palm Harbor	Palm Harbor	0.17
3	Redman	Fleetwood	0.16
4	Clayton	Champion	0.10
5	Oakwood	Oakwood	0.09
6	American Homestar	Cavalier	0.09
7	Champion	American Homestar	0.07
8	Belmont	Southern Energy	0.04
9	Cavalier	Solitaire	0.03
10	Southern Energy	Patriot	0.03

	2008		2018	
	Manufacturer		Manufacturer	Share
1	Clayton	0.35	Clayton	0.49
2	Palm Harbor	0.14	Cavco	0.17
3	Fleetwood	0.11	Skyline-Champion	0.12
4	Legacy	0.10	American Homestar	0.08
5	American Homestar	0.09	Legacy	0.08
6	Cavco	0.06	Solitaire	0.03
7	Solitaire	0.04	Jessup	0.01
8	Champion	0.03	Hamilton	0.01
9	Patriot	0.02	Kabco	0.01
10	Silver Creek	0.02	New Vision	0.00

This table reports the manufactured home builders that shipped the most homes to Texas in 1995, 2002, 2008 and 2018 (years chosen to match Table A.1). Champion acquired Redman in 1996. Cavalier acquired Belmont in 1997. Clayton acquired Oakwood in 2004. Clayton acquired Southern Energy in 2006. In 2009, Clayton acquired Cavalier (via Southern Energy) and Cavco acquired Fleetwood. Cavco acquired Palm Harbor in 2011. Skyline and Champion merge in 2018. Cavco acquired Solitaire in 2023. Bankruptcies: American Homestar in 2001, Oakwood in 2002, Champion and Fleetwood in 2009, Palm Harbor in 2010.

Data: TDHCA

Table A.3 Manufactured Home Dealerships in Texas by Market Share

	1995	2002	
	Dealer	Dealer	Share
1			
2	Oakwood	Palm Harbor Village	0.17
3	Nationwide [AH]	CMH / Luv [Clayton]	0.17
4	Newco [Palm Harbor]	Nationwide [AH]	0.07
5	CMH [Clayton]	A-1 / Accent [Champion]	0.04
6	A-1 / Accent [ICA Group	Oakwood	0.04
7	Solitaire	Arc Dealership	0.04
8	People's MH	Fleetwood	0.03
9	Homes of America	Solitaire	0.03
10	Mega Housing	Factory Liquidators [Cavco]	0.01
	HomeUSA	Emerson MH	0.01

	2008		2018	
	Dealer		Dealer	Share
1	Clayton	0.25	Clayton	0.25
2	Cavco Home Center	0.15	Cavco	0.17
3	Oak Creek / Nationwide [AH]	0.08	Palm Harbor Villages [Cavco]	0.14
4	A-1 / Accent [Champion]	0.04	Titan Factory Direct [Champion]	0.09

5	Solitaire	0.03	Nationwide [AH]	0.06	
6	Worldwide Mobile	0.03	Alamo Homes	0.04	
7	Golden Triangle	0.02	Kesterson Retail [Solitaire]	0.02	
8	Gauthier Home Inc	0.01	Legacy Housing	0.02	
9	American Family Housing	0.01	MH Consultants	0.02	
10	Mcdonald Mobile Homes	0.01	Worldwide Mobile	0.01	

This table reports the manufactured home dealerships that sold the most homes to buyers Texas in 1995, 2002, 2008 and 2018 (years chosen to match Table A.1).

Data: TDHCA

Table A.4 First Stage and Reduced Form Estimates, Acquisition by a Manufacturer

	IntegratedFlooring	Shipments	Prices
	(1)	(2)	(3)
$\psi_{<-1}$	0.04	0.19	−0.13
	(0.06)	(0.19)	(0.16)
ψ_0	0.01	−0.03	−0.06
	(0.09)	(0.30)	(0.22)
ψ_1	−0.04	0.43	−0.45
	(0.09)	(0.16)***	(0.20)**
ψ_2	−0.10	1.06	−0.51
	(0.09)	(0.18)***	(0.16)***
ψ_3	−0.17	1.01	−0.28
(0.09)* (0.27)***	(0.24)		
ψ_4	−0.07	1.85	−0.40
	(0.10)	(0.31)***	(0.14)***

This table shows estimates of equation (3). The sample consists of 726 market-years. All regressions include the downstream retailer HHI and flooring HHI to control for the horizontal structure of the local market, and market and year fixed effects. Column 1 shows the first-stage relationship between integrated flooring and exposure to an acquisition by a manufacturer. Columns 2 and 3 show the reduced-form relationship between exposure to an acquisition by a manufacturer, and manufactured home shipments and prices, respectively. Hedonic controls in the price regressions include the number of sections, weight and titling of each home, and whether the home is in a manufactured

home community. All coefficients are normalized relative to $\tau = -1$, where $\tau = 0$ is the acquisition year. Standard errors are clustered by market. *p < 0.10, **p < 0.05, ***p < 0.01.

Data: TDHCA, TxDMV, Texas Secretary of State, ZTRAX

Table A.5 Manufactured Housing Contracts for Hurricane Katrina Relief

Source	Awarded	Manufacturer	Value ($)	Per Unit ($)	Texas
FOIA	Sept 3	Clayton	60,932,395	34,021	Yes
FOIA	Sept 4	Palm Harbor	4,203,881	38,217	Yes
FOIA	Sept 9	Clayton	8,242,183	34,058	Yes
FOIA	Sept 16	Southern Energy	5,269,814	39,922	Yes
Press	Sept 20	Fleetwood			
FOIA	Sept 23	Champion	80,800,000	40,400	Yes
FOIA	Sept 26	Circle B Enterprises	287,515,000		
FOIA	Sept 27	Clayton	69,790,000		Yes
FOIA	Sept 28	Fuqua	4,294,440		
FOIA	Sept 29	Southern Energy	30,917,100		Yes
FOIA	Sept 29	Fuqua	480,000		
FOIA	Sept 30	Silver Creek	4,559,400		Yes
FOIA	Sept 30	American Homestar	4,737,500		Yes

This table lists information on contracted manufactured home production in support of Hurricane Katrina relief efforts. Travel trailer production is not included. FEMA paid $857.8 million for 24,967 manufactured homes: an average of $34,357 per manufactured home. The recipient of the largest contract, Circle B Enterprises, did not have a license to build manufactured housing in its home state; Circle B outsourced production to licensed manufacturers including Cavalier and Patriot. Patriot produced homes for FEMA in Texas.