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The Case of the Disappearing Large-Employer Manufacturing Plants: Not Much of a Mystery After All

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Executive Summary

This paper seeks to contribute to policy discussion over recent declines in U.S. manufacturing through close investigation of employment trends in U.S. manufacturing plants with 1,000 or more workers, "large-employer plants." These plants are disappearing at a rate much greater than the decline in manufacturing as a whole. To determine what is happening to these plants, the paper links the 1997 and 2007 published Census Bureau tabulations of the locations of manufacturing plants. This makes it possible to distinguish between plants that are no longer large employers because they have downsized to a smaller employment level and plants that have closed outright.

The author concludes that the dramatic disappearance of large employers is neither mysterious nor surprising. Most of the missing large employers from 1997 are still open, only with fewer employees. The plants that have closed have tended to rely on large quantities of unskilled labor, making them vulnerable to strong import competition from China and other nations, where unskilled labor is less expensive.

The analysis begins with trends in *all* of U.S. manufacturing and narrows successively. The initial narrowing focuses on a specific geographic area, the "Piedmont region" of the southeastern United States, which has specialized in manufacturing industries that use unskilled labor intensively. Scrutiny then narrows further within the Piedmont to industries heavily impacted by imports from China, designated here as "China surge industries." The analysis ends by contrasting how two large-employer plants making furniture in the Midwest have managed to survive, while the furniture industry in the Piedmont region has collapsed.

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Introduction

In 1950, U.S. Steel employed 30,000 workers at its Gary, Ind., plant, and Bethlehem Steel had a factory of similar size in Sparrows Point, Md. Ford's massive Rouge River plant near Detroit employed even more workers—over 100,000 in the 1930s.

Things are far different today. Gigantic employer plants like these are virtually extinct in the United States. Indeed, as of 2007, only 47 plants with more than 5,000 workers exist, half as many as just 10 years earlier. To find massive-employer manufacturing plants, look to China. The Foxconn complex in Shenzhen where iPhones are assembled, for example, is credited in news reports with employing an astonishing 300,000 workers.

The decline of manufacturing in the United States has generated widespread concern and intense discussion about what government should do, if anything, to prevent (or even reverse) the painful downward trend. "The answer is to build things better, make things better, right here in the United States," declared President Obama in 2010, as he signed the Manufacturing Enhancement Act.[1]

Many Americans believe there is a close connection between the international competitiveness of the U.S. manufacturing sector and the nation's ability to remain a prosperous country. A world where China sends container ships filled with manufactured goods to the United States effectively in exchange for U.S. Treasury notes is unsustainable in the long run. Manufacturing also relates to income distribution and inequality trends because it has long provided stable, well-paying jobs for blue-collar workers not skilled in high tech or high finance and ill-suited to design the next iPad or Wall Street innovation.

[1] Remarks by the president at the signing of the Manufacturing Enhancement Act of 2010. http://www.whitehouse.gov/the-press-office/2010/08/11/remarks-president-signing-manufacturing-enhancement-act-2010

Unfortunately, most discussions of manufacturing employment trends lump together plants of all sizes, big and small. Obama noted in his 2010 speech, "Over the last decade, the manufacturing workforce shrank 33 percent." While not inaccurate, such statistics can be misleading, because they obscure diverse trends *within* the manufacturing sector.

In this paper, I hope to illustrate this diversity by focusing specifically on what is happening at the top, to the large-employer plants: those with 1,000 or more employees. To do so, I use published government statistics in a rather novel way to track large employers over time, and since the number of these plants is declining rapidly, there is much activity in the data. Because the largest plants are more likely to be exporters and tend to pay higher wages, this focus on the biggest employers is particularly relevant for issues related to the trade deficit in manufacturing and trends in inequality.[2]

Before I go into details of the analysis, a broad overview that begins with a specific example might be helpful. Go back to the steel plant in Gary with 30,000 workers in 1950. The plant is still in operation, but according to Dun and Bradstreet, its current employment is down to 5,000. Remarkably, with one-sixth as many workers, the plant produces even more steel now than in 1950, as capacity has increased from 6 million to 7.5 million tons a year.[3]

This example of growth in labor productivity illustrates a general long-term trend of technological change and mechanization. One reason some large-employer plants have disappeared is that they have "downsized" into relatively smaller-employer plants, but remained steady or even "upsized" in output. At such plants, tasks once done by American workers are still being performed in the United States, but by machines instead of people. Of course, it's also true that other plants are no longer on the large-employer list because they have closed outright and the work has shifted overseas.

In this paper, I take on the case of the disappearing large-employer manufacturing plants. In the end, I don't find much that is mysterious. Many of the plants that disappear from "large-employer" status are simply dropping down to the next-lower size category.

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[2] For classic references, see Bernard and Jensen (1995) about exporters and Brown and Medoff (1989) about pay and plant size.

[3] For current capacity, see United States Steel Corp. (2010). For 1951 capacity, see American Iron & Steel Institute (1951).

Yet there are also plenty of instances of dramatic employment decline or actual closure. To better understand these trends, I focus on specific industries hit hard by imports from China, including the apparel and furniture industries. And I focus especially on the Piedmont region in southeastern United States.

For most of the last century, the Piedmont played the same role relative to the industrialized Northeast and Midwest of the United States as China is playing today vis-à-vis the United States as whole. In the earlier period, labor-intensive factories in places like Pennsylvania and Michigan closed down and moved operations to North Carolina to take advantage of low wages. The Piedmont region ended up with huge factories employing large numbers of unskilled laborers in routine tasks.

Today, these large employers in the Piedmont are being closed at a disproportionately high rate compared with the rest of the country. Given their industry specializations, this turns out not to be a mystery. There is tremendous cost pressure to eliminate routine, labor-intensive tasks from manufacturing in the United States, where labor is relatively expensive, and everything I find is consistent with the power of this force.

This paper starts at a broad level—all of manufacturing—and successively narrows down. By the end, the discussion focuses on what is happening in just two furniture plants in the Midwest, including "nano-level" details about job postings. These are not simply two random plants pulled out of a hat for the sake of an anecdote. Rather, they are the two largest plants that have managed to survive in an industry otherwise decimated by Chinese imports. These two plants alone account for about 10 percent of all that is left of employment in their industry.

Large employers are interesting not only for all the "action" noted above, but also because they are disproportionately important as a source of jobs. Understanding the nitty-gritty about just a few large plants can therefore provide information that is quantitatively important for the industry as a whole. Readers will see that these two Midwest plants are full of white-collar workers and so, ultimately, it will be no mystery why these plants have survived, while the Piedmont plants, once filled with thousands of blue-collar workers, are gone.

Matching plants over time

To track large employers, I use public data from the Census of Manufactures taken by the U.S. Census Bureau every five years. The Census publishes a tabulation of the number of plants at each location and industry in various employment size ranges, such as "2,500 and more employees," "1,000-2,499 employees" and so forth.[4] From these data, I determine the list of all plants in the 1997 Census of Manufactures with 1,000 or more employees and define these as "large employers." I then go 10 years forward to 2007 and look for a match in the same location and industry. The appendix describes the matching algorithm in detail.

For smaller employers it would be difficult or impossible to match specific plants over time, because business starts and closures (entry and exit) are so common. A restaurant reported in the 1997 Census in a particular location with 1-19 employees might be the same restaurant observed in the 2007 Census, or—just as plausibly—the 1997 restaurant might have closed down, and the 2007 report is a new, similar-sized restaurant in the same location.

Large-employer plants, by contrast, are extremely rare, so when they are linked over time, I can be highly confident the link is true. For example, in the 1997 publication for the industry "Iron and Steel Mills" in the place "Gary, Indiana," there is exactly one "2,500 plus" plant and no other plant with more than 250 employees. In the 2007 publication, there again is exactly one "2,500 plus" plant. My matching algorithm links these as being the same plant, which of course is a correct match.

While the algorithm isn't always perfect, it seems to work very well overall. It greatly helps matters that in the more recent censuses, the location information has been published in greater geographic detail than the county level used in earlier censuses. For example, in the 1997 Census, not only is there a "2,500 plus" steel plant in Gary, but there is another "2,500 plus" steel plant in "East Chicago, Indiana." These two places are in the same county, so these two plants would be grouped together if the place-level detail in the 1997 Census were not available. Having data at narrow geographic detail makes it possible to reliably match plants over time. The analogous tabulation with

[4] For 1997, this is file E9731e2 from the 1997 Census of Manufactures (U.S. Bureau of the Census 2001). For 2007, this is file EC0731SA11 from the Census FTP site (U.S. Bureau of the Census 2007).

detailed geography for the 2007 Census of Manufactures was only just released in January 2011. Combining this freshly available, detailed public data from 1997 to 2007 provides a wealth of information about American manufacturing over a decade of dramatic transformation—invaluable evidence for untangling the "mystery" of disappearing large employers.

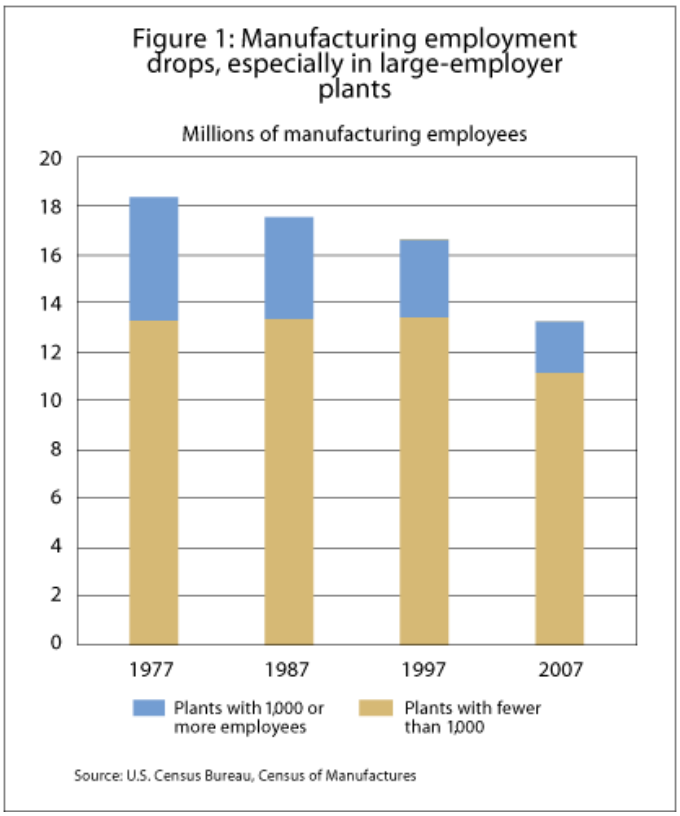
A broad overview

Table 1 and Figure 1 show the long-term decline of large-employer plants (defined in this paper as 1,000 or more employees). Employment in such plants fell from 5.1 million in 1977 to only 2.1 million in 2007. The number of such plants decreased by about half, from 2,061 to 1,014 (Figure 2). The decline is even more remarkable in plants with 5,000 employees, where the numbers fell from 192 plants in 1977 to only 49 by 2007.

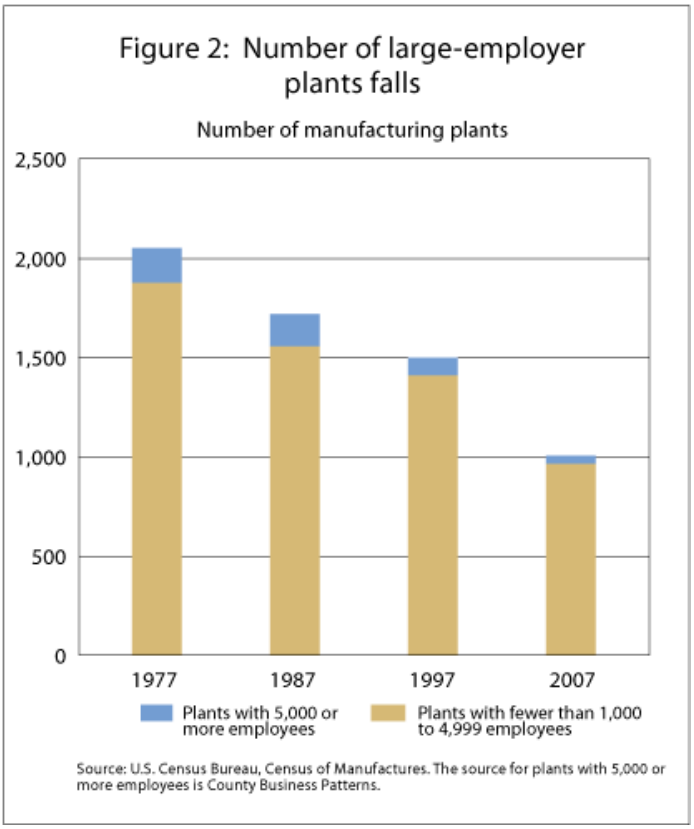
Table 1: Long-Term Trends in U.S. Manufacturing Employment

	1977	1987	1997	2007
Employment in plants with 1,000 or more employees (Millions of employees)	5.1	4.2	3.2	2.1
Number of plants with 1,000 or more employees	2,061	1,711	1,503	1,014
Number of plants with 5,000 or more employees	192	154	97	49
Manufacturing employment in plants of all sizes (millions of employees)	18.5	17.7	16.8	13.4
Manufacturing employment as share of total private (nongovernment) employment	22.4%	17.4%	13.7%	9.7%

Source: U.S. Census Bureau, Census of Manufactures. The source for plants with 5,000 or more employees is County Business Patterns (1977, 1987, 1997, 2007).



What has happened to these large employers? It is well known that the U.S. manufacturing sector is in decline generally, that is, across plants of *all* sizes. Over the 30-year period, overall manufacturing employment fell from 18.5 million to 13.4 million. Since nonmanufacturing employment grew during these decades, manufacturing's share of employment fell from 22.4 percent to 9.7 percent. While the overall decline of manufacturing is indeed significant, what is happening at the top, to large-employer plants, is even more dramatic. Table 1 and Figure 1 make this point very clear.



By looking more closely at these large plants and the enormous changes they've undergone, I can get a better sense of the forces behind the overall transformation of the manufacturing sector. And I can do this by tracking plants over time, using the algorithm described above to match large employers in 1997 to the same (if changed) plants in 2007.

To illustrate the matching algorithm at work, first look at *huge* employers (2,500 plus) that have newly appeared as of 2007, in the sense of not matching to a plant in 1997 with 500 or more employees. There are only 15 of these, making it possible to put all of the plants in a table (Table 2) to get a sense of the data. The plants listed include both brand-new entrants that started from scratch over the 1997-2007 period and existing plants from 1997 with fewer than 500 employees that grew to huge status (2,500 plus) by 2007. Both kinds of expansion are extremely interesting, and it simplifies the algorithm when I don't have to separate them out.

Table 2: List of "2,500 or More Employee" Plants from 2007 that Are New Entry*

Industry Code	Industry Description	Plant Location
	Automobile and Truck Plants	
336111	Automobile manufacturing	Canton, MS
336112	Light truck and utility vehicle manufacturing	Montgomery, AL
336112	Light truck and utility vehicle manufacturing	Talladega County, AL
336112	Light truck and utility vehicle manufacturing	Gibson County, IN
336112	Light truck and utility vehicle manufacturing	Delta Township, MI
	Meat Processing	
311611	Animal (except poultry) slaughtering	St. Joseph, MO
311615	Poultry processing	Dunwoody, GA
311615	Poultry processing	Camilla, GA
311615	Poultry processing	Robeson County, NC
	All Other	
313230	Nonwoven fabric mills	Bensley, VA
326199	All other plastics product manufacturing	Wharton, TX
334111	Electronic computer manufacturing	Austin, TX
334413	Semiconductor and related device manufacturing	Wood County, OH
334510	Electromedical and electrotherapeutic apparatus manufacturing	Waukesha, WI
336414	Guided missile and space vehicle manufacturing	Jefferson County, CO

* "New entry" is defined as no match in 1997 with 500 or more employees in the same industry and location.

Source: This table was constructed by the author using published tabulations of the Location of Manufacturing plants from 1997 and 2007 Census of Manufactures.

Five of the new huge plants in Table 2—one-third of the total—are auto plants. These are all highly publicized new plants, for example, the new Nissan facility in Canton, Miss., the Hyundai plant in Montgomery, Ala., and so on. Auto plants are highly capital-intensive facilities, where robots do much of the assembly work; it is no surprise that they are still opening in the United States.

The next four on the list are meat-processing plants, which make intensive use of low-skilled labor. A reporter taking a job at a huge meatpacking plant vividly describes

the work: Men standing at assembly lines using knives to hack meat off bone by hand.[5] Given the difficulties inherent to transporting live animals and fresh meat, it makes sense that this work is still done in the United States. The remaining six plants on the list are generally in high-tech industries, where it is understandable why new capacity is being added.[6]

Table 3 reports the main results of the matching algorithm regarding the disappearance and new appearance of large (again, 1,000 plus) employer plants between 1997 and 2007. The top panel answers the question: Where did the large employers from 1997 go? The table shows that of the 1,503 large employers from 1997, just under half of them (708 plants) remained as large employers 10 years later. Fully one-quarter of them (383 plants) downsized employment to the "500-999" category, and 6.5 percent (97 plants) downsized even further to the "250-499" category.

Table 3A: Large-Employer Plants in 1997: Where Did They Go?

	United States		Piedmont	
	Number	Percent	Number	Percent
1997 plants with 1,000 or more employees	1,503	100.0	326	100.0
Of the plants above, number of employees in 2007				
1,000 or more	708	47.1	122	37.4
500-999	383	25.5	81	24.9
250-499	97	6.5	24	7.4
Closure*	315	21.0	99	30.4

[5] See LeDuff (2000).

[6] One puzzling plant in the list is the "non-woven fabric mill" in Virginia. Given the decline in the U.S. textile industry, it is surprising to see a brand-new huge plant. After some digging, I found that the plant actually isn't new at all; rather, it dates to 1929. (The appendix provides details.) The algorithm missed this because of a significant change in the plant's industry classification over the period. As noted, the algorithm isn't perfect, but it works well overall. It is reassuring, for example, that all five of the auto plants in the table are indeed new plants, as easily verified through news sources.

Table 3B: Large-Employer Plants in 2007: Where Did They Come From?

	United States		Piedmont	
	Number	Percent	Number	Percent
2007 plants with 1,000 or more employees	1,014	100	187	100.0
Of the plants above, number of employees in 1997				
1,000 or more	708	69.8	122	65.2
500-999	172	17.0	30	16.0
250-499	29	2.9	3	1.6
Entry*	105	10.4	32	17.1

*Closure includes shrinking to a plant size below 250 employees. See the discussion in the text. Analogously, entry includes starting with a plant in 1997 with fewer than 250 employees.

Source: This table was constructed by the author using published tabulations of the Location of Manufacturing plants from 1997 and 2007 Census of Manufactures.

The remaining 21 percent (315 plants) either closed outright or contracted to a plant size of below 250 employees. Both kinds of decline represent an extreme level of contraction, and I simplify the algorithm by grouping these two outcomes together and calling it "closure."

The bottom panel answers the related question: Where did the large employers from 2007 come from? Here the table shows that the vast majority of such plants were already large employers in 1997. About 10 percent of them either didn't exist in 1997 or expanded from a very small base of below 250 employees, an outcome I label "entry." The industry composition of the entrants is very similar to the entry of new huge employers in Table 2. Nearly 70 percent are in four broad industries: food, transportation, computers and chemicals.

Table 3 reveals a broad overview of what is happening to the disappearing large employers. But to get a clearer picture of what is going on, I need to dig deeper.

Narrowing the investigation

To examine further the case of the disappearing large employers, I narrow the investigation to industries that have been heavily impacted by imports from China. I put particular focus on what is happening in the Piedmont region.

For much of the 20th century, the Piedmont region in the southeastern United States, at the foothills of the Appalachian Mountains, has been a center of low-wage labor, attracting industries that use unskilled labor intensively, in much the same way that China does today. Holmes and Stevens (2004) presents a map of manufacturing activity in the region and some early references. For simplicity, here I am going to define the region broadly to include the following seven states: Virginia, North and South Carolina, Tennessee, Georgia, Alabama and Mississippi. (While Tennessee and Mississippi are not *geologically* part of the Piedmont plateau region, for this economic analysis, it makes sense to include them.) In 1997, these states accounted for 14.1 percent of the U.S. population.

The two right-hand columns of Tables 3a and 3b present an analysis of disappearing large employers as before, but just for plants in the Piedmont region. In 1997, the Piedmont was home to 326 large-employer plants. This is 21.7 percent of the nation's total of 1,503 large-employer plants at the time, much greater than the Piedmont's 14.1 percent share of the U.S. population. Note that the closure rate for Piedmont's large employers is 30.4 percent, well above the national rate of 21 percent.

To get a sense of why the closure rate in the Piedmont is particularly high, it is useful to sharpen the focus still further by looking at industries that have been knocked around by imports from China over the 1997-2007 period. Here I'll call these the "China Surge" industries.[7] Table 4 lists the 17 industries. Total employment declined dramatically from 1997 to 2007 for all 17, with infant apparel declining at an astonishing rate of 97 percent. In these industries, imports grew from about 20 percent of the U.S. market to 60 percent over the decade, and China's share of these imports grew from 20 percent to 57 percent.[8]

[7] See Holmes and Stevens (2010) for details of how these industries are selected.
[8] See Holmes and Stevens (2010).

Table 4: Employment Change in the Piedmont Region's "China Surge" Industries

China Surge Industries	Change in Employment 1997-2007 (percent)
Infants' cut & sew apparel mfg.	-97
Women's & girls' cut & sew suit, coat, skirt mfg.	-91
Silverware & plated ware mfg.	-82
Glove & mitten mfg.	-78
Other apparel accessories & other apparel mfg.	-75
Hat, cap, & millinery mfg.	-74
Women's & girls' cut & sew dress mfg.	-71
Electronic computer mfg.	-68
Men's & boys' neckwear mfg.	-67
Costume jewelry & novelty mfg.	-63
Power-driven hand tool mfg.	-56
Electric housewares & household fan mfg.	-54
Other household textile product mills	-51
Blankbook, looseleaf binder, & device mfg.	-51
Nonupholstered wood household furniture mfg.	-51
Metal household furniture mfg.	-48
Curtain & drapery mills	-47

Source: The percent employment change is calculated using the 1997 and 2007 Census of Manufactures. The selection of industries is discussed in Holmes and Stevens (2010).

Now I'll track what happened to large employers in the China Surge industries between 1997 and 2007. Table 5a shows that the Piedmont had 21 of the large employers in 1997, while the rest of the country had 29. These numbers show the high concentration of these industries in the Piedmont—just 14 percent of the nation's population, but 42 percent of the large employers in China Surge industries. In other words, the Piedmont region specialized in the same labor-intensive industries, like apparel and furniture, that have now shifted over to China.

Table 5A: Large-Employer Plants in the China Surge Industries in 1997: Where Did They Go?

	Piedmont		Rest of U.S.	
	Number	Percent	Number	Percent
1997 plants with 1,000 or more employees	21	100.0	29	100.0
Of the plants above, number of employees in 2007				
1,000 or more	1	4.8	5	17.2
500-999	5	23.8	6	20.7
250-499	2	9.5	4	13.8
Closure*	13	61.9	14	48.3

Table 5B: Food Processing Plants in 1997: Where Did They Go?

	Piedmont		Rest of U.S.	
	Number	Percent	Number	Percent
1997 plants with 1,000 or more employees	52	100.0	77	100.0
Of the plants above, number of employees in 2007				
1,000 or more	32	61.5	39	50.7
500-999	14	26.9	28	36.4
250-499	3	5.8	3	3.9
Closure*	3	5.8	7	9.1

*Closure includes shrinking to a plant size below 250 employees. See the discussion in the text.

Source: This table was constructed by the author using published tabulations of the Location of Manufacturing plants from 1997 and 2007 Census of Manufactures.

Things have been rougher for these industries than for the manufacturing sector as a whole, and things are particularly rough for the Piedmont plants. Of the 21 large China Surge employers in the Piedmont in 1997, *only one* was still a large employer 10 years later. Moreover, as I'll discuss later, this one plant switched to a different industry little threatened by Chinese imports. Therefore, *not a single one* of the 21 large employers in the Piedmont survived as a large employer competing head to head with the Chinese. And 13 of them ended up in the closure category. While matters are also rough in the rest

of the country, where 14 of 29 closed, China Surge industry plants have fared a little better than those in the Piedmont; five plants outside this region somehow managed, as of 2007, to continue on as large employers. I will further investigate some of these later.

The China Surge industries contrast strongly with food processors, which experience little pressure from imports because of transportation issues. Food processing plants in the Piedmont are doing well (see Table 5b). Of 52 large-employer food processors in 1997, only three ended up in the closure category, a rate of only 5.8 percent, compared with the 10.6 percent closure rate in the rest of the country. Note also in Table 2 that three of the four newly entering huge meat processing plants are in the Piedmont. The bottom line is that in food industries not under import threat, the Piedmont plants are doing better than the country as a whole. But in the China Surge industries, the Piedmont is doing far worse.

Manufacturing in the Piedmont has been hit hard, not only because it has specialized in low-skill-intensive industries, like apparel and furniture, that have been heavily impacted by Chinese imports, but also because even *within* these industries it has specialized in that segment of the business that makes standardized goods with heavy use of low-wage labor—precisely that part of an industry that is most vulnerable to competition from China. Holmes and Stevens (2010) provide a related analysis. Here, I make the case by digging deeper into the furniture industry.

Making the case with the casegoods

In 1997, wood furniture, such as bedroom and dining room furniture—the industry uses the term "casegoods"—sold anywhere in the United States was very likely made in the vicinity of High Point, N.C., in one of the many towns like Thomasville or Lexington that have lent their names to well-known brands of furniture. This area was turned upside down in a remarkably short time by Chinese imports. Over the years, furniture makers have tried to adopt mass production techniques, but making quality wood furniture requires human craftsmanship—expensive in the United States, but not in China. There is an interesting recent video about the last day of work at the Hooker Furniture Factory, a plant near High Point that closed in 2007. It is striking to see the extent of the hands-on nature of the production process, the physical touches of the wood, the spraying of stain

by hand and so on. The piece is fittingly called "With These Hands: The Story of an American Furniture Factory."[9] With the relative ease of transporting casegoods from overseas, the U.S. industry collapsed in remarkable fashion.

To understand what has happened, it is useful to contrast casegoods with two related, but very different industries: kitchen cabinets and upholstered furniture. Kitchen cabinets are usually built to the specifications of a particular kitchen. There are two great advantages in having this work done locally: quicker turnover and better communication. The high value of proximity in this industry has kept imports to a minimum. Table 6 shows that the import share is quite small and changed little between 1997 and 2007. Custom plants don't have assembly lines and tend to be small, craft-oriented shops, averaging only 12 employees in each plant. This is in sharp contrast to the average employment size of 87 workers in casegoods plants in the Piedmont region.

Table 6: Comparison of Different Kinds of Furniture Industries

	Casegoods	Upholstered furniture	Kitchen cabinets and countertops
Share of industry employment			
Piedmont region	47.0	69.1	17.9
Rest of U.S.	53.0	30.9	82.1
Average employment per plant in 1997			
Piedmont region	86.8	111.1	12.2
Rest of U.S.	21.6	25.8	12.7
Import share			
1997	29.5	7.8	3.2
2007	61.8	22.7	4.6
Percent change in U.S. employment over 1997-2007	-50.6	-13.9	39.4
Share of employment in Piedmont region			
1997	47.0	69.1	17.9
2007	28.1	68.0	16.1

Source: Author's calculations with published tabulations of the 1997 and 2007 Census of Manufactures. The import shares use import information posted by the U.S. International Trade Commission at its website, as well as revisions for the furniture industry reported at the website of the International Trade Administration.

[9] The 2009 film is by Matt Barr. An 8-minute clip can be seen at http://www.youtube.com/watch?v=2_qKYolUU_A

Upholstered furniture is yet another story. With wide varieties of fabric patterns and colors, there are more variables to deal with than for casegoods with their limited selection of finishes. This makes managing inventory a central issue. The first key advantage then of U.S. production is that it allows for quick inventory turnaround. The second is the shipping expense of bulky sofas. Therefore, the upholstery work shifted to China tends to be the labor-intensive "cut and sew" of fabric into a "kit." These fabric kits are cheap to ship overseas, and U.S factories finish sofas by stuffing locally built frames of foam and wood into the imported kits.

The upshot is that the import share for upholstery has remained relatively low, unlike what is happening with wood furniture. While upholstery is like cabinetry in that the work is still done in the United States, it differs in that it is done in large plants, not custom craft shops. (See Table 6.) In this respect, upholstery plants are like the casegood plants: Both are large and produce standardized sizes and shapes.

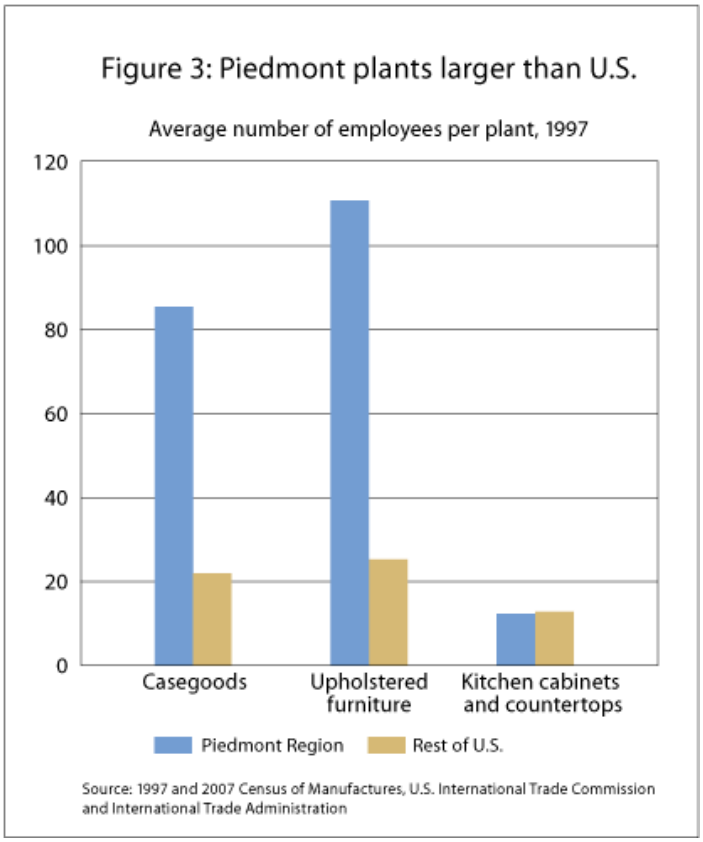
Table 6 presents some sharp contrasts between the Piedmont and the rest of the United States in terms of these three related industries.[10] First note the Piedmont's extremely large shares of the casegoods and upholstery businesses, with 47 percent and 69 percent of U.S. production in 1997, vastly exceeding the region's 14 percent population share. Again, both industries tend to produce standardized products in large factories with low-wage employees.

In contrast, the region's share of the cabinet industry is relatively close to its population share. This industry does not tend to have large plants full of low-wage, unskilled workers, so—unlike casegoods and upholstery—had no incentive to concentrate in the Piedmont.

A second contrast: average plant size *within* each of the industries. For casegoods and upholstery, average plant size (in number of employees) is *four times* larger in the Piedmont than elsewhere in the United States—87 employees in the average Piedmont casegoods plant versus 22 in the rest of the country; 111 employees versus 26 in upholstery plants (see Figure 3). In fact, in terms of average size, casegoods plants in the

[10] "Casegoods" here corresponds to the Census industry "nonupholstered wood household furniture."

rest of the United States are closer to cabinet plants than furniture plants in the Piedmont. Furniture plants outside the Piedmont are not making low-skill-intensive, assembly-line-style standardized goods. Instead, they are making either craft-oriented, custom furniture (like an Amish furniture shop) or furniture from highly mechanized production.



The final thing to see in Table 6 is what has changed over time. The entire U.S. casegoods industry has been battered by imports, with the share of imports more than doubling from 1997 (29.5 percent) to 2007 (61.8 percent). (See Figures 4 and 5.) But the Piedmont has been especially hard hit. Its share of what is left in the United States has plummeted from 47 percent to 28 percent. In contrast, imports have had relatively little impact on the Piedmont's shares of U.S. employment in upholstery and cabinetry/countertops, dropping just 1 and 2 percentage points, respectively.

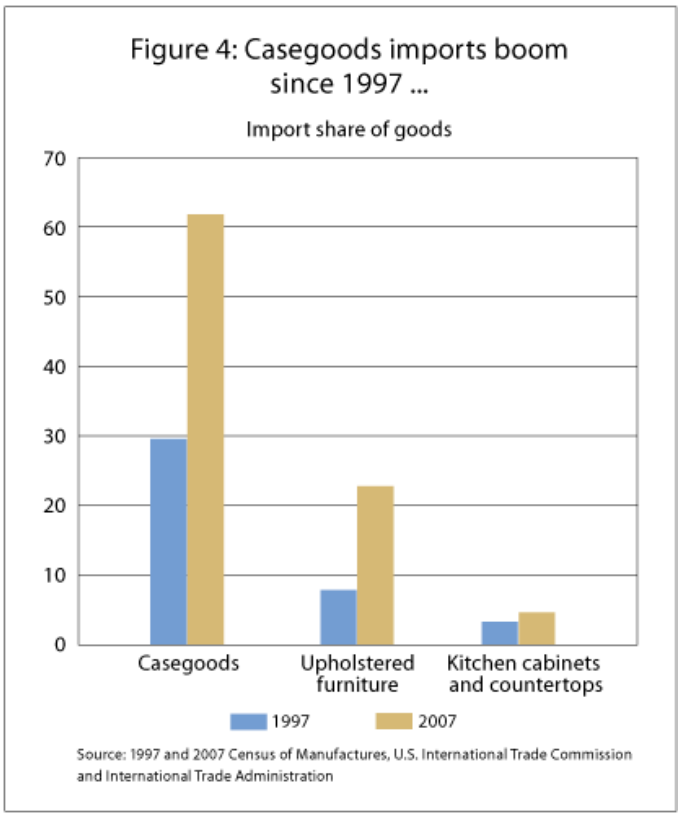


Figure 4: Casegoods imports boom since 1997 ...
Import share of goods
70
60
50
40
30
20
10
0
Casegoods
Upholstered furniture
Kitchen cabinets and countertops
1997
2007
Source: 1997 and 2007 Census of Manufactures, U.S. International Trade Commission and International Trade Administration

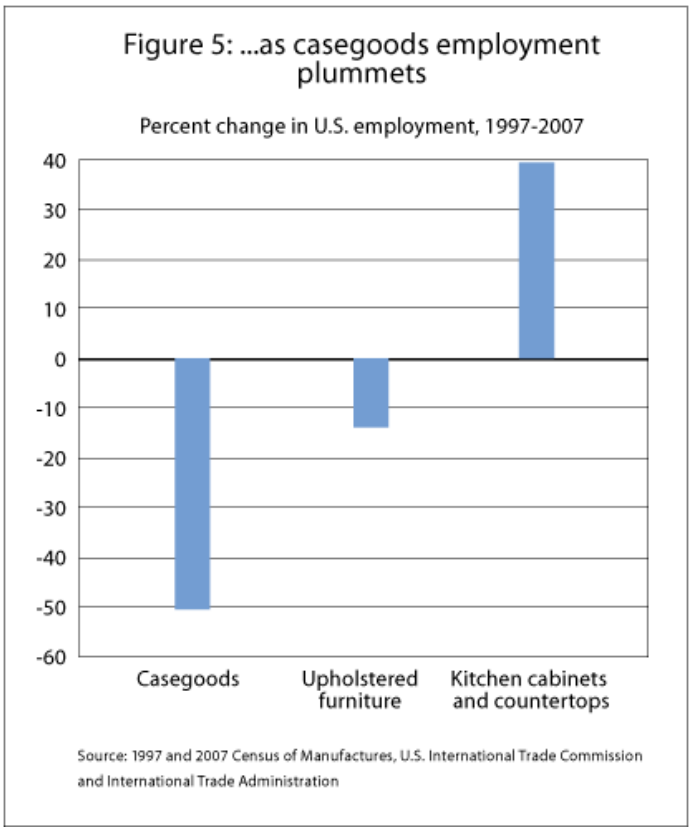


Figure 5: ...as casegoods employment plummets
Percent change in U.S. employment, 1997-2007
40
30
20
10
0
-10
-20
-30
-40
-50
-60
Casegoods
Upholstered furniture
Kitchen cabinets and countertops
Source: 1997 and 2007 Census of Manufactures, U.S. International Trade Commission and International Trade Administration

What about the large employer casegoods manufacturers that *have* survived?

Having established some facts using data based on plants of all sizes, I'll complete my analysis of what is happening to casegoods by making use of the linked data on large employers that I created for this paper. In 1997, there were 12 large U.S. employers in casegoods, seven of them in the Piedmont. As of 2007, *only one* of seven Piedmont plants remained a large employer. But interestingly, this plant switched from casegoods (a tough place to be) to upholstery (a relatively safe place). This is the plant mentioned earlier as the only one of 21 China Surge industry plants in the Piedmont to have remained a large employer. Remarkably, as of 2007, there are no longer any large-employer casegood plants in the Piedmont region.

If I look *outside the Piedmont region* in 2007, however, I can find a few large employers in China Surge industries. In particular, there are two huge (2,500 plus) plants classified in casegoods, one in Archbold, Ohio, and the other in Trempealeau, Wis. By using publicly available information, I can figure out quite simply what these plants now do.[11]

Sauder Woodworking's website claims that its facility in Archbold is one of the "most technologically advanced furniture facilities in the world." The product is "ready-to-assemble" furniture, so buyers, not workers, perform the labor-intensive task of putting the pieces together. "All Sauder furniture has a paper laminate finish," implying that machines put on the finish and there is no human handwork, unlike the Hooker plant mentioned above where workers spray on finish. The manufacturing facility in Archbold is the company headquarters and includes management and engineers designing new products and other workers not directly engaged in furniture manufacture. For example, one recently posted job at the Archbold facility is for a "social media specialist" in the marketing department.

Ashley Furniture is one of the largest furniture companies in the world. Its website explains that the facility in Arcadia is both its worldwide headquarters and its core manufacturing center in the United States. While the Wisconsin plant is classified in the casegood industry, on a recent trip to an Ashley store, I found that all of the

[11] I used a trade magazine for the casegoods industry to identify the plants. See FDMonline for February 2007, where there is a directory of the 300 largest firms. http://www.fdm-digital.com/fdm/200702/

casegoods were made outside the United States, with tags like "Made in China" or "Made in Malaysia." A salesperson explained that while the wood furniture is imported, the Wisconsin plant did the upholstery. But even the upholstery's labor-intensive cut-and-sew work has been sent offshore to a 5,000-employee plant in China.[12]

In summary, there are only two casegood plants with more than 2,500 employees in the 2007 Census, one in Ohio, the other in Wisconsin. With more than 5,000 employees between them, they account for approximately 10 percent of the entire 2007 U.S. casegood employment of 63,000. Thus, it is quantitatively important to understand these two stories. These plants do not look anything like the casegood plants in the Piedmont that have been decimated by Chinese imports. In previous decades, the Piedmont plants had been full of low-wage workers doing routine tasks, but the current Ohio and Wisconsin plants are full of white-collar workers running the company and marketing its products. The plants do indeed make things—that's why they are classified as "manufacturing"—but the routine, labor-intensive work has moved elsewhere: The Ohio plant has shifted this labor to the consumer, and the Wisconsin plant has sent it to China.

Summing up

Debate about the disappearance of manufacturing jobs in the United States sometimes implies that mysterious forces are at work. But a closer look at recent trends, especially at large-employer plants, reveals no such puzzles. To survive competition from overseas—particularly from China—large employers in the U.S. manufacturing sector have been engaged in a relentless drive to cut routine, unskilled production tasks out of processes taking place in facilities in the United States, where labor is relatively expensive. Unless precluded by transportation barriers (as for live animals and fresh meat) or government restrictions (related to national security), these forces have led to a dramatic decline in the number of large-employer manufacturing plants in the United States.

By linking plants over time, I have shown that most plants that have fallen out of large-employer status have done so by shrinking down to the next-lower size category. Yet closure also has been substantial in industries—such as apparel and furniture, and

[12] For more about Ashley, see Russell (2006).

especially in the Piedmont region—where large plants have tended to employ low-wage workers doing routine tasks. I have noted that the shift of this kind of work out of the Piedmont area to China today is a reprise of the previous century's shift of this kind of work *within* the United States. In the earlier case, it was a migration *to* the Piedmont region away from the high-labor-cost Northeast and Midwest. In both industry migrations, the lure of lower wages was a primary attraction.

There was much consternation and painful adjustment in the earlier period, as industries shifted from North to South within the nation. In the end, things seem to have worked out for former manufacturing giants like Chicago and Boston that have become great centers for services and innovation. For Detroit, things have not gone as well.

How the second showing of this story will play out, with China newly replacing the role of the American South, is an issue of great importance for policy discussions. I believe there is much to be learned through particular focus on large-employer plants; this paper is a step in that direction.

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Technical Appendix

Automated and Manual Plant Matching Procedures for The Case of the Disappearing Large Employer Manufacturing Plants: Not Much of a Mystery After All

The automated matching algorithm

The goal of the matching algorithm is to match the 1,503 large-employer plants from 1997 to their corresponding plants in 2007, for those cases where the plant is still open in 2007 and a match exists. Analogously, the 1,014 large employers from 2007 are linked to 1997. Large employers are defined as plants with 1,000 or more employees. The data used are the public tabulations in the Subject Series: Location of Manufacturing Plants. For 1997, this is file E9731e2 from the 1997 Census of Manufactures (U.S. Bureau of the Census 2001). For 2007, this is file EC0731SA11 from the Census FTP site. (See the link in the references.)

The procedure—done automatically via computer—uses an algorithm to match plants by location, industry and plant size. The geographic information in the file is the Census five-digit place code and county. The industry information is the six-digit NAICS code. For each location and industry, the files report numbers of plants in the following employment size categories: "2,500 or more," "1,000-2,499," "500-999," "250-499" and smaller categories that I do not use. The following table shows the number of plants in each of these categories for the two years.

Table A1
Plant Counts in Location of Manufacturing Plants Files

Employment Size Category	1997	2007
250 to 499 employees	7,854	6,154
500 to 999 employees	3,279	2,410
1,000 to 2,499 employees	1,187	822
2,500 employees or more	316	192

Part 1 of the automated matching algorithm takes the 192 plants from 2007 in the "2,500 or more" category and looks backward, chronologically, for matches in 1997. The following sequential procedure is used.

Step 1 looks for matches in the 1997 file in the "2,500 or more" category, looking first for an exact match on place, county and six-digit NAICS and then second for a match on just county and six-digit NAICS code.

For plants not matched at this stage, step 2 looks for matches in the "1,000-2,499" category in the same sequence as in step 1.

Step 3 repeats steps 1 and 2, only it loosens the NAICS match criterion to the four-digit level rather than the six-digit level.

Step 4 is to match remaining plants to the "500-999" size category at the four-digit level, first by place and county and then by county.

Part 2 of the algorithm is analogous to Part 1, but going in the other direction: taking plants from 1997 and linking them to their matches in 2007. It starts with the remaining unmatched plants in the "2,500 or more" category from 1997 and matches them to "2,500 or more," "1,000-2,499" and "500-999" in 2007 using the same steps as in Part 1.

Part 3 takes the remaining unmatched plants from 2007 in the "1,000-2,499" category and matches them to 1997, using the same steps as in Part 1.

Part 4 takes the unmatched plants from 1997 in the "1,000-2,499" category and matches them to 2007, using the same steps as in Part 2.

Part 5 repeats all of the steps above in the same order, only now it looks for matches in the "250-499" category instead of the categories with 500 or more employees.

Manual matching

After running Part 1 of the procedure just described, I found that of the 192 plants in the "2,500 or more" category for 2007, 21 plants remained unmatched. I examined this list manually to see if the automated procedure described above was missing matches.

To determine identities of plants, I looked up plants in Dun and Bradstreet's Million Dollar Directory, which provides information about address and employment. I also used information in the Toxic Release Inventory (TRI) from the Environmental Protection Agency, which is a database of pollution emissions of plants.

There are seven defense industry plants among the 21 unmatched plants from the "2,500 or more" category for 2007. With a very high degree of confidence, I was able to manually match six of these to existing large-employer plants at the same location in the 1997 file. The algorithm missed these matches because of a significant change in industry classification for these six defense plants. For example, two plants were in NAICS 334220, "Radio & TV broadcasting & wireless communication," and they moved to NAICS 334511, "Search, detection, and navigation instruments." While these industries are the same at the *three*-digit level, the industries differ at the *four*-digit level, and so were not matched in the automated procedure.

It is possible that in Parts 2 through 5 above, the automated algorithm misses additional defense industry matches for similar reasons. Time constraints prevented manually investigating each of these cases. Because defense plants are not a large portion of the total, I do not regard this issue as an important limitation of the analysis.

The Bensley, Va., plant in Table 2 in the "Non-Woven Fabric Mills" industry is another plant that existed in 1997 missed by the algorithm. I left this plant unmatched, and in footnote 6 of the paper, I refer to this case as an example of an imperfection in the matching algorithm. The DuPont Corp. at its website explains that the plant, called the

"Spruance Plant," currently has 2,700 employees at the location.[13] The plant was built in 1929, and it corresponds to a plant in 1997 at the same location in the "1,000-2,499" category. The algorithm missed the match because the industry classification switched from "Noncellulosic Organic Fiber" to "Nonwoven Fabric Mills." The records in the TRI file mentioned above show that the plant indeed produces in both of these industries.

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[13] See http://www2.dupont.com/Spruance/en_US/.