

2008

## Employment Research, Vol. 15, No. 2, April 2008

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### Citation

W.E. Upjohn Institute. 2008. Employment Research 15(2). [https://doi.org/10.17848/1075-8445.15\(2\)](https://doi.org/10.17848/1075-8445.15(2))

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## Employment Research

APRIL 2008

### In this issue . . .

Thomas Klier and James Rubenstein  
Who Really Made Your Car?



Kevin Hollenbeck and  
Bridget Timmeney

Lessons Learned from a  
Workplace Literacy Initiative



The 2008 World Congress on  
National Accounts and Economic  
Performance Measures for Nations



New and Recent Books

Vol. 15, No. 2

*Employment Research* is published quarterly by the W.E. Upjohn Institute for Employment Research. Issues appear in January, April, July, and October.

The Institute is a nonprofit, independent research organization devoted to finding and promoting solutions to employment-related problems at the international, national, state, and local levels. The Institute is an activity of the W.E. Upjohn Unemployment Trustee Corporation, which was established in 1932 to administer a fund set aside by Dr. W.E. Upjohn, founder of the Upjohn Company, to conduct research on the causes and effects of unemployment and seek measures for the alleviation of the hardships suffered by the unemployed.

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## Who Really Made Your Car?

*This article highlights some of the research presented in the authors' new book, Who Really Made Your Car? Restructuring and Geographic Change in the Auto Industry, which is available now from the Upjohn Institute. To order the book, see p. 8.*

**T**hese are challenging times for the U.S. motor vehicle industry. Employment declined by 26 percent during the first seven years of the twenty-first century, from 1,160,000 in 2000 to 860,000 in 2007. During the same period, the share of the U.S. market held by the U.S.-owned Detroit 3 carmakers (General Motors, Ford Motor Co., and Chrysler LLC) declined from 65 percent to 51 percent.

### Employment in the U.S. auto industry declined 26 percent between 2000 and 2007.

While traditionally the focus has been on the carmakers, they now provide just 22 percent of industry jobs. In 2006, employment in the motor vehicle parts sector in the United States was 673,000, compared to 186,000 in final assembly (Table 1). Suppliers also provide around 70 percent of value added of vehicles. Despite the importance of parts suppliers, we know relatively little about this sector of the motor vehicle industry. Our book, *Who Really Made Your Car?* sheds light on how parts suppliers are impacting the structure of the motor vehicle industry and the resulting changes in the geography of production.

The book's analysis is based on a unique database. It includes observations

from several thousand individual parts plants in the United States, Canada, and Mexico. A large number of variables have been collected for every factory operated by the 150 largest North American suppliers, as well as more than a thousand smaller companies. The starting point for constructing the database was information acquired from ELM International, Inc., a Michigan-based vendor of information about automotive suppliers. Altogether we have data for 3,179 parts plants located in the United States, plus 416 in Canada and 673 in Mexico. Combined, these plants account for the overwhelming majority of parts production in North America (see Figure 1).

### Structural Changes in the Auto Industry

Until the late twentieth century, U.S. carmakers produced most of their own parts themselves and dominated the suppliers from whom they purchased parts. In the twenty-first century, responsibility for making most of the parts has been passed to independently owned suppliers.

Several structural changes underlie the increased role played by parts suppliers, including the following:

- Instead of gathering together thousands of individual parts and components at their final assembly plants, carmakers are now purchasing large modules and systems ready to be installed on the final assembly line.
- Instead of buying from thousands of suppliers, carmakers are offering large

**Table 1 U.S. Assembly and Parts Employment, 2007**

	Employment (000)	Share (%)
Carmakers		
Total light vehicle assembly	186.0	21.7
Parts suppliers		
Electronics	83.9	9.8
Exterior	153.0	17.8
Powertrain	139.3	16.2
Chassis	76.4	8.9
Interior	61.4	7.1
Other	159.0	18.5
Total parts suppliers	673.0	78.3

SOURCE: Bureau of Labor Statistics via Haver Analytics.

contracts to a handful of suppliers, which are consolidating into fewer larger firms. These supplier companies in turn interact with smaller suppliers.

- Instead of awarding contracts annually to the lowest-price bidders, carmakers are developing long-term relationships with suppliers, at least for the several-year life of specific vehicle models, if not longer.

- Instead of providing detailed specifications, carmakers are giving their direct suppliers responsibility for research and development to design and build innovative modules and systems.

- Instead of maintaining a large inventory of parts, carmakers are requiring suppliers to deliver modules and systems on a just-in-time basis, often within only a few minutes before needed on the final assembly line.

**Geographical Impacts of Structural Changes**

These structural changes have changed the geography of motor vehicle production on several scales.

**Michigan.** When the Detroit 3 sold more than 90 percent of the vehicles in the United States, southeastern Michigan was the center of the industry’s manufacturing, research, and administration. The decline of the Detroit 3 carmakers has hit employment in Michigan especially hard. During the 1950s, three-quarters of all parts were made in or near Michigan, whereas the state is now responsible for only one-quarter. As recently as 1990 Michigan

had 289,000 jobs in the motor vehicle industry, compared to 181,000 less than 20 years later.

However, not all motor vehicle production has abandoned Michigan. The

**During the 1950s, three-quarters of all parts were made in or near Michigan, whereas the state is now responsible for only one-quarter.**

state still houses a disproportionate share of production of engines, transmissions, and bodies, as well as the parts that go

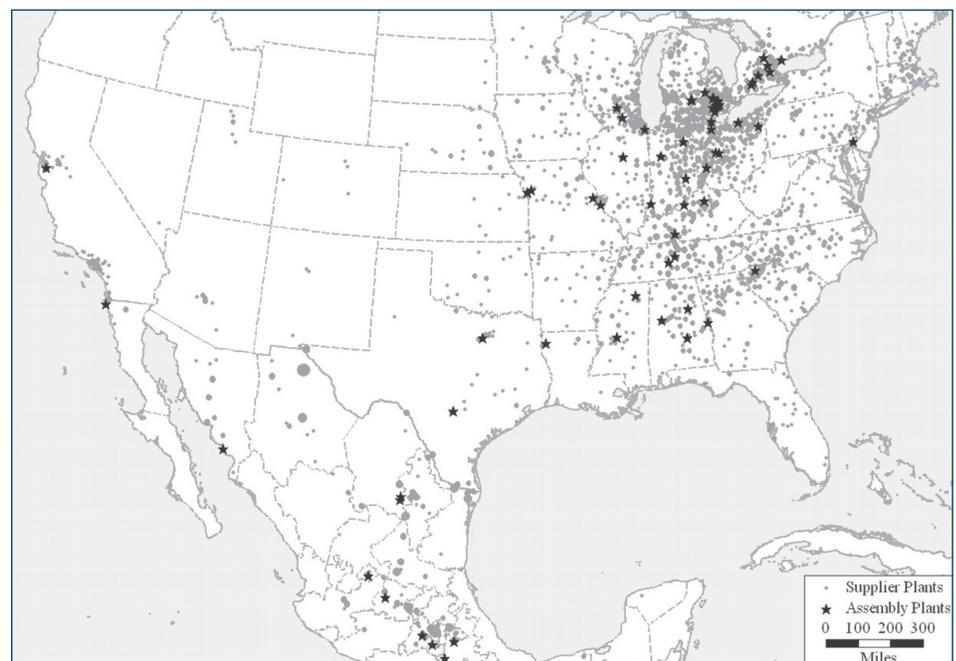
into them. The industry’s research and headquarters functions continue to be centered in Michigan.

**Local-Scale Networks.** Close linkage between an assembly plant and its network of suppliers is crucial for efficient operation in the contemporary environment of lean inventory with just-in-time delivery. For most suppliers, close linkage means a factory site within a one-day delivery range of the assembly plant; typically around three-fourths of an assembly plant’s suppliers are situated within that distance.

At the same time, close linkage does not mean suppliers must locate next door to the assembly plant. In fact, only few suppliers are found within a one-hour drive of an assembly plant. The seat supplier is invariably close by, as are some stamping and trim shops, while most other parts are delivered from further away.

That most suppliers are within one day but not within one hour is pertinent to local government attempts to entice new plants. Government subsidies exceeding \$100,000 per job for final assembly plants have been justified with the fact that each new assembly job generates several new supplier jobs. However, most

**Figure 1 Parts and Assembly Plants in North America**



SOURCE: Supplier Database, Maptitude.

of the new supplier jobs are destined for political jurisdictions other than the one enticing the final assembly plant.

**Auto Alley.** Though Michigan's dominance has waned it continues as the industry's hub. Today's U.S. auto industry remains very highly clustered in a small portion of the country. More than three-fourths of auto industry jobs and facilities are located in a narrow corridor between the Great Lakes and the Gulf of Mexico formed by two north-south interstate highways, I-65 and I-75. This corridor is commonly referred to as Auto Alley.

In 1979, the United States had 55 assembly plants, 34 in Auto Alley and 21 elsewhere. In 2008, the number of assembly plants in Auto Alley had increased to 43 while elsewhere their number declined to seven.

Auto alley has become the home of the U.S. auto industry primarily because of transport costs. The most critical transport factor for carmakers is the cost of shipping vehicles from final assembly plants to customers. Because assembled vehicles are bulky and fragile and tie up a lot of capital, it is imperative that they are delivered to customers as quickly as possible.

**North-South Shift within Auto Alley.** The seven southern states of Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee together had 7 percent of transportation sector employment in 1972. Thirty years later, the region's share had grown to 16 percent.

The South's growing importance can be seen in both assembly and supplier plants. The number of assembly plants in the South increased from 5 to 13 between 1979 and 2008. In addition, 67 percent of all parts plants in the South were opened between 1980 and 2006, compared with only 40 percent in the rest of the United States.

The auto industry has been moving south in Auto Alley primarily because of labor considerations. Wage rates have been lower in the South than in the Midwest, and union membership has been lower as well. As the auto

industry has moved southward, it has been transformed from a high-wage to an average-wage industry, and rates of unionization have gone from high to low.

As recently as the 1980s, 90 percent of production workers in the U.S. motor vehicle industry belonged to a union, and their wages were 50 percent higher than the national average for production workers. However, in 2006, only one-third of supplier plants had union representation. Approximately three-fourths of production workers at assembly plants belonged to a union in 2006, primarily at the Detroit 3. But as the Detroit 3 share of vehicle sales has declined, they had to close some of their unionized plants, whereas foreign-owned carmakers have been opening nonunion ones.

Leading the move southward within Auto Alley have been foreign-owned parts suppliers. In 2006, foreign-owned

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### **67 percent of all parts plants in the South were opened between 1980 and 2006, compared with only 40 percent in the rest of the United States.**

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parts plants accounted for 44 percent of all plants in the South, compared to only 26 percent in the rest of the country. Lower wage rates and a nonunion atmosphere have attracted foreign-owned firms to the South.

**Globalization.** Imported parts captured 27 percent of the U.S. new vehicle market in 2002, according to the census, and foreign-owned factories in the United States another 17 percent. That left U.S.-owned factories in the United States with the remaining 56 percent.

The share of parts supplied by U.S.-owned, U.S.-based factories has declined since 2002, although the precise level can't be calculated until results of the 2007 Census of Manufactures are released. According to the U.S. Trade Commission, U.S. imports of parts (those destined for both new vehicles and aftermarket sales) increased from \$63 billion in 2002 to \$85 billion in 2006,

a much faster rate of growth than the overall parts market.

Since 1994, *Automotive News* has identified the 150 largest suppliers of original equipment in North America. The number of U.S.-owned companies on the list has declined from 108 in 1994 to 59 in 2006.

The largest sources of foreign parts were Mexico and Canada, followed by Japan. China accounted for just over 6 percent of motor vehicle parts imports in 2006. The widespread belief is that most imports are price-sensitive generic parts that can only be produced competitively in low-wage countries. In reality, a large share of imports arriving at U.S. final assembly plants actually consists of engines and transmissions made by highly skilled workers in wealthy countries like Canada and Japan.

### **Summary**

The growing importance of parts makers has been the central element in the recent restructuring of the motor vehicle production process. Based on our analysis, we believe that the fundamental geography of auto assembly in North America is not likely to change anytime soon: most vehicles sold here will continue to be assembled here. But more parts will be coming from elsewhere in the world. And the parts made in North America and the vehicles assembled in North America will increasingly be produced by corporations with global headquarters outside of North America.

*Thomas Klier is senior economist at the Federal Reserve Bank of Chicago. James Rubenstein is a professor of geography at Miami University.*

*Kevin Hollenbeck and Bridget Timmeney*

# Lessons Learned from a Workplace Literacy Initiative

**D**uring a recent evaluation study of an Indiana workforce literacy initiative, Upjohn Institute staff members revealed two surprising findings. First, there was a significant pent-up demand for college education by incumbent workers, many of whom were in full-time, career positions. These workers said that they experienced barriers to their careers by not having some college education. The other interesting result pertains to the innovative digital literacy component that Indiana incorporated into its traditional initiative. Despite being highly supported by both workers and employers, the state had great difficulty finding appropriate curriculum and assessment materials for the digital literacy. Consequently, most of the adult learners struggled considerably, and a large percentage did not pass the certification.

## Background

In 2005, the Indiana Department of Workforce Development (DWD) funded an innovative set of 10 projects, which comprised its 21st Century Workplace Skills Initiative. Each project was a partnership of one or more employers and a literacy training provider, such as a postsecondary institution or workforce development agency. The projects devised their own training regimens, which varied in terms of time and place (on- or off-site), curriculum, paid release time or not, use of technology, class size, and most other characteristics.

The initiative had two broad goals. First and foremost, it was intended to demonstrate whether basic skills training provided to incumbent workers can translate to a stronger and more productive state economy. Second, it was

intended to contribute knowledge about best practices to the field of workplace skills development.

The core of the 21st Century Workplace Skills Initiative was a certification system. The DWD awarded certificates to workers who achieved certain levels of proficiency in reading, math, critical thinking, problem solving, and computer literacy. Three levels of certification (gold, silver, and bronze) were based on specific achievement levels in reading and math as assessed by the Comprehensive Adult Student Assessment System (CASAS) and computer literacy as certified by Internet and Computing Core Certification (IC3).

## The Indiana literacy initiative was intended to raise the basic workplace skill levels and to explore different models of workplace education.

The Upjohn Institute was awarded a contract to evaluate the 21st Century Workplace Skills Initiative for the DWD. The evaluation used both a qualitative and quantitative methodology. Site visits to the funded projects, which were located at firms all across the Hoosier state, were the basis of the qualitative data. In addition, learning gains and earnings histories of participants were quantitatively analyzed. This article focuses on the qualitative findings.

## Qualitative Findings

**College was a key motivator.** Many of the sites promoted their programs as a chance to earn college credits or to prepare for college. In interviewing participants, this seemed to be a strong

motivator. Many of the programs' participants had not attended college, and they feared that their lack of education jeopardized their job security and/or limited their promotion potential. One person said, "I'm tired of all of those individuals passing me by because I don't have any college." The College at Work program at one site, where participants could earn credits in Ivy Tech's basic curriculum, was a prime example. Although they were less explicit in terms of curriculum, Vincennes University programs at two other sites offered participants college credit. At one of the health care sites, participants were motivated to attend the basic skills program because they wanted to succeed in a postsecondary technical program in a health services occupation.

**Workplace programs need to be flexible.** The instruction in this demonstration needed to be tailored by two factors: first, the learners were adults and second, the instructional setting was in the workplace. Our observation of instruction suggested that sound adult education was taking place. For the most part, the learners were serious and highly engaged. On the other hand, as with most adult education, other responsibilities got in the way of attending class. Sometimes workloads or personal situations would preclude an individual's attendance. Instructors had to be flexible because they were never quite sure about how many or which students they would have in class. An instructor at one of the programs, who was a retired high school teacher, opined that this was perhaps the most important challenge she faced.

**Contextualization.** At the onset of the initiative, the expectation had been held that the work site instruction would involve considerable contextualization. Employers presumably would see the benefits of inculcating workplace materials into the training. We were therefore somewhat surprised by a relative lack of contextualization. As a generalization, the typical site had made some effort to include workplace materials, but they were generally not as

central to the instructional materials as we expected.

### **IC3; digital literacy emphasis.**

In the design phase of the effort, the digital literacy feature was not primary. As it turned out, this feature became one of the predominant aspects of the demonstration. However, sites struggled to find appropriate curricula and with the difficulty level of the certification itself. The DWD realized that technologically delivered instruction had pervaded basic skills instruction (as it has most levels of education and training), so it decided to include digital literacy as part of the 21st Century certificate, but found a paucity of certifications that were competency-based instead of “seat-time”-based. An investigation led to IC3 as virtually the only candidate.

**Business return not foremost for employers.** We would characterize the partnerships that we observed between programs and employers as quite solid, but we were surprised by a relative absence of interest in measureable return. In general, employers seemed to be motivated by providing the training as a benefit for employees that would likely improve morale. They were less motivated by an expected business return. The business perspective seemed to be that if workers improved their skills and had improved morale, they were likely to be somewhat more productive, and consequently, the business will benefit. However, the workers’ benefit was the primary motivation for participation, not the business’ benefit.

**Keys to success: Program champion and paid time.** Two characteristics were associated with the most successful programs. First, the program needed to have a “champion” in the business firm; a midlevel or higher manager. Because of the pilot nature of the program, many changes were made along the way, and it was important for an individual to have enough authority to exercise the flexibility that was required to make the adjustments that were needed. The other characteristic that seemed to be associated with program success was

compensating workers for their time spent in training. About half of the sites had this feature, and those sites had no difficulty in recruiting individuals, and they had very high attendance rates. On the other hand, when the training was on employees’ own time, attendance faltered, and the expected number of participants lagged well behind what was expected.

### **Lessons Learned**

The Indiana Department of Workforce Development designed and funded the 21st Century Workplace Skills Initiative to raise the basic workplace skill levels of Indiana workers while exploring the viability and effectiveness of different models of workplace basic skills education. To use a cliché, the pilot demonstrations were intended to be win-win-win-win programs. Indiana

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### **Many of the programs’ participants had not attended college, and they feared that their lack of education jeopardized their job security and/or limited their promotion potential.**

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workers would gain basic skills, which would result in more stable careers and higher wages and productivity. Employers would gain more productive workers who would exhibit better workforce attachment that would translate into business payoffs such as enhanced productivity or profitability. The field of basic skill instruction would learn from the experiences of the Indiana partnerships offering innovative programs in diverse workplace settings. The state would house more competitive employers with more productive workers and would develop a workplace basic skills training capacity. We summarize here the initiative’s payoff to workers, the companies, and the literacy field.

**Payoff to workers.** Our technical report notes six lessons learned about the payoff to some or all of the workers who participated in the initiative. First,

most participants genuinely were appreciative of their employers offering the opportunities. Significant morale improvements occurred in virtually every site. Second, the level of participation and excitement among many of the workers underscored a substantial demand for and interest in upgrading skills. Employees seemed to understand clearly the importance of training and skill acquisition to their own job and career prospects. The third lesson we learned was that the possibility of earning college credit was a strong motivator for workers in addition to upgrading skills for their own productivity.

Fourth, as implemented in this initiative, the opportunity to earn a skill certificate was not a strong motivator for workers. Workers seemed to understand the linkage between their own skills/knowledge and productivity but were less clear about the value of certifying the skills/knowledge. Workers apparently did value computer training because it became a major component of the initiative. There seemed to be two motives for this: some workers had absolutely no background and wanted to get very basic training, and other workers were interested in upgrading their skills. Most participants, but especially the former group, found the IC3 certifications to be quite challenging. Finally, the benefits to the workers were quite variable. A few workers blossomed. Many workers had positive experiences, and some workers probably benefited only a little. Of course, when you add all of these together, you get a substantial aggregate payoff to workers.

**Payoff to companies.** The employers came to this initiative as voluntary partners or as grantees. None of them seemed to regret their participation; rather, they expressed appreciation for the chance to train their workforces. Whether it was the manufacturing, health care, tourism, or human service sector, all of the business owners and managers interviewed clearly noted the growing competitiveness of their businesses. Attracting and retaining employees was a continual issue. Owners and managers viewed training as a key strategy for

operating efficiently and as a means to grow their own workers through promotions.

Despite their understanding of the strategic nature of training, perhaps the most notable observation about employer involvement was the lack of interest in or attempt to measure potential business outcomes from the initiative. It became apparent through interviews that businesses became engaged in the initiative mainly as a benefit for employees. They saw it as a way to improve employee morale. Most of the business representatives understood and articulated the fact that if workers would improve their basic skills and exhibit higher levels of morale, then they would likely be more productive. However, virtually none of the employers attempted to measure such outcomes.

**Payoffs to literacy providers.** While the payoffs were not of a financial nature, the initiative contributed a number of valuable lessons to the field of workplace literacy. First is an issue with which the field needs to grapple. The impetus for the Indiana initiative was a belief that the basic skills of a substantial share of workers were deficient and were jeopardizing economic growth and competitiveness. However, the scores on the CASAS appraisal and pretest were quite high. Workers seemed to possess reasonably high levels of skills, and as a consequence, far less basic skill training was pursued by sites than planned. Naturally, the question is raised as to how this occurred. Was the underlying assumption of deficient basic skills in error?

Hypotheses include the following: The initiative may not have tested the lowest-functioning employees. At most of the sites, participation was voluntary. Individuals with extremely low levels of literacy may not have wanted to be identified out of fear of being stigmatized. For sites that had a limited number of participants, only the more motivated (and more capable) employees may have volunteered. Another hypothesis is that CASAS doesn't measure the literacy and numeracy skills that are important in the workplace. That is, employers' reports of deficient basic

skills may be referring to a workplace vocabulary or problem solving that is not tested by CASAS. If this hypothesis is true, then there is an imperative to contextualize the instruction in workplace learning programs.

The computer skills of participants were extremely heterogeneous. Some individuals had never turned on a machine; others used computers in their jobs on a daily basis. IC3 certification seemed difficult for the latter and impossible for the former. There seems to be a pressing need to design a valid preassessment of computer skills, and to develop a training curriculum for those who have very little background or knowledge. Furthermore, there seems to be a need for an alternative assessment tool that is not as technical as IC3 for individuals who have limited expertise.

Lessons learned from this initiative in terms of motivating participation were the not surprising finding that paid time for training was important, but perhaps more surprising was the importance that workers placed on receiving some college credit. Most of the workers who were interviewed had not attended any postsecondary institution, and they were usually quite proud of the fact that they were going to get some college credit, and a college transcript; all at the expense of their employer. This finding suggests that employers or providers interested in offering workplace basic skills instruction should try to collaborate with a postsecondary institution.

#### Note

This article summarizes the 2008 evaluation report titled "An Evaluation of the 21st Century Workplace Skills Initiative," by Kevin Hollenbeck and Bridget Timmeney. Individuals interested in obtaining further information about the program and evaluation can contact Terri Schulz at the Indiana Department of Workforce Development: (317) 233-5663; [tschulz@dwd.in.gov](mailto:tschulz@dwd.in.gov).

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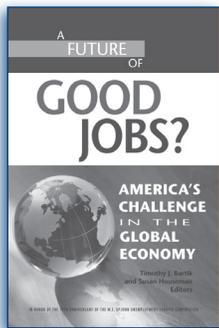
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327 pp. 2008. \$40 cloth 978-0-88099-332-6  
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## Who Really Made Your Car?

### Restructuring and Geographic Change in the Auto Industry

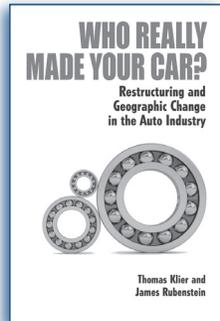
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Ann Markusen, Editor

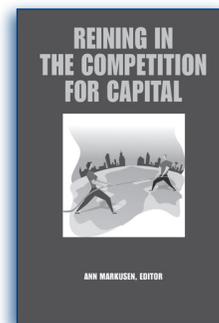
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