'Fragile Virtue:'
Rural Labor Market Response to a New Competitive Environment

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I. Introduction

The shift from cost to non-cost factors of competition is commonly thought to have disadvantaged rural production in the 1980s and 1990s. Differentiated consumer tastes in combination with demand for higher quality products have rewarded production systems which are both flexible and adaptable. It is argued that labor market characteristics of rural areas, reliant on routine production of standardized products, are ill-suited to fill these requirements. In contrast, urban areas have accommodated this change in the competitive environment by deploying pools of skilled labor which can perform a large variety of unstandardized tasks and move rapidly from declining to emerging industries or firms. The change can be characterized as a replacement of the 'robust regime' of mass production to a 'resilient regime' of flexible accumulation.

However, this depiction of production 'resilience' is inconsistent with the labor market practices which characterize the most successful examples of this new competition. These production systems are described as 'fragile' due to the high degree of interdependency between labor and management within firms, and amongst firms in supplier-contractor or co-production relations. This paper investigates the experience of rural firms in the Upper Midwest which have derived competitive advantages from the fragility inherent in rural labor markets. Two specific examples include the transformation of firms from mass producers for inventory to just-in-time suppliers and that of small-batch producers dependent on the substantial accumulation of firm specific skills to penetrate niche markets of highly differentiated goods.

The argument of potential rural advantage rests on two important assumptions. First, the most recent data suggest that the transformation in industrial relations/human resource (IR/HR) strategies thought required of best practice in the fragile regime has had a limited diffusion throughout the U.S. economy (Osterman 1994; Weintstein & Kochan 1995). Second, this best practice is thought to confer long-term competitive advantages with respect to the rate of process and product innovation, quality control and production flexibility. These two assumptions taken together pose a disturbing puzzle for advanced industrial economies such as the U.S.: if these alternative strategies do possess competitive advantages, why haven't they been widely diffused in the U.S. economy?

The purely cultural explanation of this puzzle has finally been banished from serious academic debate. In its place is a more productive and more challenging analysis of the institutional and organizational constraints facing strategic actors (Koike 1988; Finegold 1991; Sabel 1994). To the extent that institutions are derivative of the norms and values in a society there is an important cultural component to this analysis. However, it is the constraints that a firm or worker faces in local labor markets, in the bidding process for contracts or in the "market" for vocational and technical training which delimit the range of feasible strategies (Finegold 1991). The salient differences in urban and rural labor markets in the United States—while considering the minimum requisites for a transformation of traditional IR/HR strategy—provide the analytical leverage of this paper.

The arguments presented can be interpreted at several different levels. Rural boosterism which has emerged in the popular press (e.g., WSJ Sept. 16, 1996) will likely derive support from the analysis which represents potential rural advantage as more than merely the maintenance of traditional values and a dedicated work force. The analysis can also be understood

as suggesting the different evolutionary paths of urban and rural places; that is, how the context of local areas affects their ability to adapt to change. It will be argued that the wider range of options available in urban areas may dilute the commitment required for transformation to a socially preferred state. From this perspective, the economic crisis of the 1980s may have had two very different impacts across urban and rural areas: in urban areas it resulted in a process of accommodation; in many rural areas it resulted in a process of either insolvency or adaptation. Perhaps the most sober interpretation is that rural areas are neither disqualified from transformation to a fragile regime nor disabled by lacking the requisites of a resilient regime of production.

II. Alternatives to Robust Production

The "new economy" construct which shapes much of the discussion on domestic rural development is driven by the locational proclivities of rapidly emerging sectors. It is argued that these emerging sectors are dependent on dense information networks, diversified pools of skilled flexible labor and close proximity to highly specialized services which are only available in large urban centers (McGranahan 1991). However, through the rapid diffusion of just-in-time inventory and production practice, the same economies of localization and urbanization required in the emerging sectors are increasingly being seen as a prerequisite for many types of traditional manufacturing (Barkley 1996). Finally, as the economy becomes increasingly driven by rapidly changing and differentiated consumer tastes, producers who are insulated from market changes, e.g., by remote rural location, will fail to recognize new market opportunities. Taken together, this perspective views manufacturing decline as the problems of small population base and geographical isolation which characterize rural areas.

Convergence in industrial and economic structures which had allowed rural areas to bridge much of the gap with urban areas (Garnick 1983) halted in the 1980s. The self-organizing process of capital deepening which had operated under the cost competition rationale of mass production was replaced by a reinforcing process of amalgamation which seemingly made development potential dependent on settlement size. This is perhaps best summarized in the statement addressing the outmigration of highly educated workers from rural areas in the 1980s: "[t]he 'new economy' is an 'urban economy'." (McGranahan & Ghelfi 1991). Given the history of economic development in the United States in which lagging regions progressed by emulating more successful regions, the inherent disadvantage of rural areas appeared insurmountable. If resilient production required factor markets of substantial size, depth and diversity, then rural areas would be excluded from developing toward these new urban forms.

The dichotomy between markets and hierarchies provides an understanding of the transformation in factor markets and the location bias of resilient production. The fundamental sources of the transformation can be found in the confluence of technological change and increasing volatility of goods markets. The paraprofessionalization of many functions induced by the microelectronic revolution reduced many of the idiosyncratic aspects of work (Noyelle 1987). Social mobility became less connected to one's position in a firm and more dependent on one's competence in an occupation. In the absence of internal markets which provide long-term commitments to overcome problems of asset specificity, skilled workers will prefer locations characterized by a large number of potential buyers of their labor in order to pool labor market risk (David & Rosenbloom 1990). In addition, a more volatile economic environment may overtax the ability of headquarters to keep abreast of changes, again favoring the decentralized attributes of markets over centralized hierarchies.

An alternative response to increasing competition and more rapid rates of change is provided by fragile production regimes. Also referred to as high commitment or mutual gains strategies (Ichniowski 1990; Kochan & Osterman 1994), the increasing professionaliza-

tion of work is seen as the principal rationale for increasing employee involvement and investments in employee training. These two objectives sustain interest in the internal labor market as a means to recoup training investments. The mechanisms often erroneously identified with this strategy are permanent employment and seniority-based salary increases providing a strong incentive for workers to stay with a single firm. However, these strategies are logically inconsistent if a firm wishes to maximize profits over the long-term or wishes to survive a serious economic downturn (Koike 1988). Understood from the market-hierarchy dichotomy, the fragile production regime is a fair-weather strategy which can only be maintained if growth in profits remains strong.

However, the economic dislocations of the 1980s strongly suggest that the market-hierarchy dichotomy is not inclusive. Fragile production regimes survived and arguably outperformed resilient, market-oriented and robust, hierarchy-oriented regimes over this time period. One theoretical alternative is to understand markets and hierarchies as two of a larger number of possible institutional forms or governance structures (Ostrom 1990). The governance structure used to characterize those strategies identified with 'fragile production' is referred to as a 'constitutional order' (Sabel 1991).

A constitutional order consists of constituent units and a superintendent (Sabel 1991). The role of the superintendent is to determine the justification and responsibilities of the units and to set rules insofar as the units do not do so themselves. Also, the rules must be set in consultation with the constituents. This obligation derives from the presumption that the constituents know more about the general features of their situation and how to order it than the superintendent. The relationship between the constitutional order and the environment is ambiguous. The superintendent has limits imposed that do not allow it to act with the freedom of a head office. Similarly, the superintendent's mediation power deprives constituents of the immediate freedom to respond to changes as in markets. Constitutional orders do best when there are coordination problems which markets have no hope of solving but which outpace the adaptive capabilities of hierarchies (Sabel 1991).

Examples of constitutional orders include the delegation of responsibility to the shop floor where workers are actively involved in formulating job descriptions and redesigning the workplace. In interfirm relations, design collaboration between end-producers and suppliers is an explicit acknowledgment that constituents (suppliers) may command rich sources of information on how to produce a component. However, the need to integrate the component into a complex design—which may also be sourced from other suppliers—presents serious coordination problems preventing a market solution. Both of these phenomena were evident in the rural case studies discussed in the next section.

The complex interaction of a number of personnel strategies—to increase employee-employer communication, tie remuneration to performance, increase levels of worker training and delegate authority more broadly through the organization—with firm performance have been examined primarily using case studies. Ichniowski (1990) makes a stalwart attempt to derive an econometric assessment of the array of possible IR/HR strategies on firm performance. The analysis isolates collections of IR/HR strategies that correspond to resilient production practice—termed the "Do Nothing Find a Body" IR/HR—and fragile production practice—termed the "High Commitment" IR/HR.[1] The companies grouped into the "Find a Body" strategy tended to be in industries characterized by higher levels of worker education, higher R & D-to-sales ratios and higher rates of employment growth. These findings are consistent with an interpretation of emergent industries being characterized by resilient production practice. In contrast to the "Find a Body" industries, companies grouped into the "High Commitment" strategy tended to be in industries characterized by substantially lower R & D-to-sales ratios, slightly lower but statistically

significant differences in levels of worker education and lower but not significantly different rates of employment growth. However, when estimating the impact on individual firm outcomes, the "High Commitment" firms outperformed the "Find a Body" (and all other strategies) in both labor productivity and the stock-market value measure of Tobin's q.

In summary, generalizable studies provide support for the argument that "the emergent economy is an urban economy." The heavy reliance of these industries on external markets to provide highly specialized, skilled labor would surpass the capacity of most rural labor markets. However, the ability of firms—typically in more traditional industries—to incorporate high commitment IR/HR strategies and outperform firms predominantly in these emergent industries casts the debate on the viability of rural manufacturing in a different light. High commitment IR/HR strategies are reliant on an internal promotion skill formation process to satisfy specialized labor requirements. This approach is feasible in rural labor markets. Whether rural areas are able to pursue high commitment IR/HR strategies remains an empirical question to be addressed in the next section.

III. Rural Response to the New Competitive Environment

The examples which follow were drawn from four case studies in the Upper Midwest.[2] All of the counties examined were relatively small, with total urban populations of less than 10,000, and 3 of the 4 were not adjacent to a metropolitan area. The one adjacent county was also the smallest of the counties with no urban population (settlements of at least 2,500 people) as of the 1990 Census. The low-skill characterization of the rural labor force is seriously devalued in the "new economy" as the complexity of production processes, the diversity of products and the volatility of product demand increase requirements for skilled, flexible workers. Examples from the four case studies demonstrate two factors which serve to mitigate this decline in the economic value of rural workers: 1) the existence of a sector which is dependent on workers who acquire a substantial amount of skill on the job; and 2) the transformation of numerically flexible low-skill manufacturers into semi-skilled suppliers of just-in-time lead manufacturers. Firms in the first category, which will be termed small-batch producers, are found in each of the case study counties, providing a rich story of alternative responses to the economic dislocation of the 1980s. While no claim is made of the representativeness of these cases, the claim that the location of small-batch production is highly feasible in rural areas (Reich 1988) is corroborated. The second category is the labor transformation required of former intermediate producers for inventory to just-in-time suppliers.

A. Employment Relations in Rural Small-Batch Firms

The necessity of flexibility in providing a wide range of products is dictated by the small or ephemeral character of the end-market and by the resulting inability to achieve economies of scale through the use of purpose built machinery and a more highly articulated division of labor. The economies of scope the firm pursues through the combination of general purpose machines and a functionally flexible labor force become the source of the small-batch producer's competitive advantage. The market approaches used by the various firms in the case study counties to achieve this result match the strategies of small-batch producers summarized in Scranton (1991, n.d.). This strategy, in turn, allows the internalization of training benefits which has been central to increasing the production capability of these firms.

Internal promotion—workers acquiring firm-specific skills over an extended time period (Koike 1988, p. 273)—characterizes the skill formation process of a majority of production workers in the small-batch firms studied. New hires are generally not skilled in various manufacturing techniques. It is through intensive on-the-job training, their own mechanical aptitude and, for some, entry into an apprenticeship that cumulative skill development generates skilled

workers over time. While firms are generally eager to hire workers with training from a post-secondary vocational education program, none of the firms are dependent on the output of such graduates for their hiring needs. And, while some of the hires come to the job with previous manufacturing experience, this is not a prerequisite. In fact, some employers express a desire for workers with no past manufacturing experience for the simple reason that bad habits acquired from past employment are difficult to erase. The mathematical, problem-solving and innate mechanical abilities of a worker are seen as essential to the long-term development of skills.

The long tenure of skilled workers is commonly cited as an advantage of doing business in a rural community. The rate at which skilled workers leave, or are recruited by other firms, is low, allowing the employer to internalize the benefits from training investment. However, this account of low worker turnover diverges from the historical descriptions of small-batch producers (Scranton 1991). The best employees in the traditional small-batch firms would leave their jobs for two main reasons: 1) in industries where entering the market was fairly easy, ambitious employees would break out to start their own firms; and 2) the desire to advance to the level of journeyman or superintendent also led to the transfer to other firms—sometimes in different, but related, industries—where the long-run opportunities were thought to be greater. On both points, the relative isolation of the rural producers advanced their ability to internalize the long-run return to labor training.

Workers switching employers for better job opportunities was not identified as a serious problem by employers. Employee turnover occurs mainly in the first year, with the largest loss or termination of workers in the probationary period—ranging from 45 to 90 days. However, the extent of worker loyalty differs in each county. In Forestville the commitment between firm and worker is strongest with very little switching between firms. In the other counties the loss of employees with some skill, especially at plants paying below top wage in the community, is more common. The reciprocal of management's general praise of worker loyalty is the negative value attached to lengthy work histories of potential employees. This belief in the value of long-term relationships between employer and employee makes the strategy of poaching skilled workers from other local firms an anathema to the hiring philosophy of most of the manufacturers. However, with increasing competition to recruit skilled workers from firms outside of the various communities, internalizing the benefits of training expense over a long period of time is coming under increasing threats.

1. The Dual Commitment Relationship

A labor practice which is most evident among Forestville manufacturers is an implicit covenant between the employer and worker to ensure the long-term viability of the employment opportunity through time. As with the often misinterpreted "permanent employment" relationship enjoyed by production workers in Japan (Koike 1988, p. 57), this dual commitment relationship should not be seen as a guarantee of employment through all economic contingencies. Rather, the firm commits to provide meaningful work for the employee and to take aggressive moves in the market to ensure such work, in exchange for the increasing skill base being developed by the employee. In turn, the employee commits to work for the employer, and to develop his or her skills, for the employee's working life. Although this dual commitment relationship is an implicit part of the labor contract, it was spelled out by both firm owners and observers of the Forestville economy. The employer's interest is to keep the investment in skill acquisition internal to the firm and to create a secure work environment while increasing morale. The relationship thus allows the employer to retain a more highly skilled workforce with which to produce non-standardized goods of high quality. The employee's interest is in securing a livelihood to stay in the community in which they wish to

live. The relationship allows the worker to acquire a level of skill that might not be attainable outside the community.

Dual commitment allows the Forestville labor market to overcome a major drawback of small population size: i.e., the ability to pool labor market risk (David & Rosenbloom 1990). The commitment relationship from both labor and management derives from the attachment to place. Clearly, the employee is free to migrate in search of skilled employment elsewhere. Likewise, the employer could choose to locate in a larger city and secure skilled labor directly without the need for lengthy labor training. The fact that both employer and employee have strong ties to the community reduce the risks of both parties by increasing their mutual dependence. Cyclical risks, such as the recession in many manufacturing industries extending through the mid-80s, are mitigated through the custom and small-batch market strategy followed by the firms. However, the inadequacy of this approach to eliminate redundancies in all situations has driven many of the firms to a classification of core and contingent workers. In contrast to the strategy of using temporary workers to cover short-term fluctuations in demand, the contingent workforce in Forestville is hired as a regular full-time employee with benefits. The provisional basis of their employment is made explicit. Should employee attrition or long-term growth in the customer base warrant creation of a permanent position, candidates are drawn from this contingent pool.

The welfare effects of the dual commitment relationship would require more detailed data and assumptions regarding the risk aversion of workers and employers. As a first cut, the 1987 wage rate of production workers in manufacturing in Forestville was slightly below the average wage being paid in other rural counties with similar sized manufacturing agglomerations (i.e., total manufacturing employees less than 4,000) with a significant share of employment in Machinery industries *(Table 1* below*)*. Wages were significantly above the average of all rural counties in the sample with fewer than 4,000 in manufacturing workers, and the rate also exceeded that offered in any of the other case study counties. The rates in the larger manufacturing agglomerations are provided for comparison. The important point is that the dual commitment relationship is not bought by employees through the acceptance of significantly lower wages.

The relationship observed in Forestville is unique to the extent that employers feel an obligation to provide secure work for employees, even if the economy is doing poorly. However,

TABLE 1

1987 Average Hourly Wage Rate

Production Workers, Upper Mississippi Valley Region

County Type	Average Wage Rate /Hour
All Rural Counties with Production Worker Employment < 4,000	$7.92
Rural Machinery Industry Counties, Prod. Worker Employment < 4,000*	$9.88
All Counties with Production Worker Employment 4,000-10,000	$10.53
All Counties with Production Worker Employment 10,000-20,000	$11.97
All Counties with Production Worker Employment > 20,000	$11.43
Riverton	$7.20
Poplar Grove	$9.25
Prospect Falls	$8.37
Forestville	$9.62

* Machinery Industry Employment or Establishment Numbers Disclosed in 1987 Census of Manufacturers. Source: Census of Manufacturers.

the economic benefits of retaining skilled employees is recognized in all of the communities by small-batch firms. Since the lay-off of skilled employees exposes firms to the risk of permanently losing some of them, firms attempt to avoid or postpone releasing redundant workers. The communality held by the small-batch firms is the belief that skill acquisition is cumulative, providing a strong incentive for a durable employment relationship. The prevalence of the small-batch producers in these rural counties—places where one might expect to find a low-skill labor force—suggests that the relation between the market, production technology and the labor process is contingent. A belief in the existence of a trainable, permanent workforce can be combined with general purpose machinery to produce highly differentiated products. In contrast, a belief in the existence of a low-skill labor force—or knowledge on how this segment of the labor market can be secured—can be combined with purpose built machinery to manufacture standardized products.

It is the relative isolation of rural areas that has made the pursuit of either strategy feasible. Indeed, the 'captive labor market' is a necessary but often unstated assumption of received theories of rural industrial development such as the product life cycle. The rural small-batch firms demonstrate how this condition of limited alternatives may also be used to align the long-term interests of employers and employees in the areas of cumulative skill acquisition and firm competitiveness. In comparison to an urban producer, the small-batch firms enjoy a level of worker loyalty which, from the most skeptical perspective, may be viewed as nothing more than the rational pursuit of self-interest. The fact that this condition has existed for some time has allowed these rural producers to make incremental changes in IR/HR practice, moving closer to the 'high commitment' archetype. However, this does not mean that the transition has always been simple. The next example suggests that innovations in employment practice have at times threatened the existence of these rural firms. The fact that survival depended in part on the limited alternatives of workers and also on the past goodwill of management may provide some clues as to why these innovations have enjoyed only limited diffusion in the U.S. economy.

2. Group Incentives to Innovate versus Individual Incentives to Produce

Despite the long-term nature of the employment relationships, it would be incorrect to characterize these relationships as static. This was especially true in the 1980s in the study area when workplace innovations were introduced with increasing frequency. The formation of work groups or teams was combined with initiatives to increase the amount of worker involvement in production. Changes in the method of remuneration also were implemented at a number of firms—innovations which sought to tie remuneration to performance rather than more mechanical fixed wage schedules. Firms had successfully made the transition to combinations of fixed wage and profit sharing or employee stock ownership plans, pay-for-knowledge, and gain sharing which awarded any savings in labor content below a pre-specified minimum to workers. Given the strong work ethic of the rural labor force which employers lauded, the transition to more flexible wages—which would presumably benefit groups of hard workers—should have been an incentive-compatible change to the wage schedule. However, in those instances where the prior wage protocol had worked to establish its own set of incentives, changes in worker remuneration were tumultuous. In the example that follows, this change came closer than any crisis in the firm's fifty-year history to threatening the solvency of the firm.

The firm produces high quality aluminum castings for a diverse set of industries. The economic crisis of the 1980s had weeded out nearly a third of all foundries in the United States, dropping from 3,500 to about 2,500 at the end of the decade. The competition which remained was very tough in terms of both quality and price. The firm realized that the only way to remain competitive was to increase

the firm's capability to innovate. The one major obstacle to any plant or group level innovation was the piecework wage schedule which rewarded individual innovation along with its secrecy. Management felt that meaningful innovation in production would require group innovation and the sharing of all relevant information among workers. When the firm introduced the gain sharing scheme in contract negotiations in 1987, the compensation plan was seen as the prerequisite to the implementation of innovations in worker participation and work redesign; the interest in increasing wage flexibility was subordinate.

The firm was not expecting the disruption in work generated by the replacement of one set of incentives with another. With the elimination of the personal incentives built into the piecework system, workers shirked with the collective result of work slowdowns. Management places most of the blame on the "tremendous attitude adjustment problems" which resulted from this shift—from individual gain to new ideas of gain through teamwork and cooperation. It is not clear whether the work slowdown was the result of worker distrust of the new collective wage formula or of uncertainty about a group's ability to win premiums in the new system. Since the new system eventually did result in significant productivity improvements by 1992, workers eventually demonstrated a capability to operationalize cooperation and teamwork to the worker's individual benefit.

Whatever caused the nearly tragic work slowdowns is open to debate. But the problems management identified in the old remuneration system were backed up by the experience of failed innovations. Initiating work redesign under the old system was nearly impossible as alterations to the production system might alter the value of a workers accumulated tacit knowledge of the production process. And since most of the employees in the firm possessed firm-specific skills, this tacit knowledge was the primary source of value brought to the job. Incremental change to the production process poses a limited threat to this tacit knowledge and may even augment it. However, the introduction of radical change can negate a significant portion of this tacit knowledge, in effect reducing the value of specific skills accumulated over time. As long as the piecework system existed, any change which stepped out from incremental change would be seen as a threat to each worker's collection of tacit knowledge. If management wanted to implement substantial changes in the production process, then it had no choice but to replace the piecework system. Had management known about the difficulties created by the introduction of gain sharing, they likely would have taken the same approach given the built-in rigidity of the former system.

The example suggests that the crises facing manufacturing firms in the decade went beyond external changes in foreign competition or in the market; the crises extended to the relationship between labor, management, wages and substantive changes in work design or employee involvement. The necessity of these changes did not guarantee the success of the new policy. This example illustrates that even competent firms faced the possibility of insolvency resulting from a failed innovation. In this regard, operating as a small-batch producer provided few resources to deal with the nature of the problem.

A unit plant operating in a rural area faced several disadvantages over branch plants or urban firms: e.g., there were no examples from sister divisions on the difficulties encountered and lessons learned from similar initiatives; there were no examples from proximate plants which had undergone the same type of remuneration changes. If rural firms do suffer a considerable "demonstration effect" disadvantage relative to urban firms, then more active assistance, or a richer networking of firms facing similar challenges, would be indicated.

And yet, the firm did survive and did successfully introduce the innovation in worker remuneration. Are there particular characteristics of the rural environment that allowed the firm added flexibility to deal with the crisis? Again, the condition of limited alternatives suggests itself as the salient difference between rural and urban areas. If workers were initially

dissatisfied with the gain sharing arrangement leading to lower initial levels of compensation and low worker morale, and if alternative employment opportunities did exist, then a difficult transition in an urban firm might result in workers seeking employment in other firms. Management was cognizant of the fact that long-term benefits of a strategy change might impose substantial short-term costs. The fact that management had regularly expressed its long-term commitment to employees and the limited demand for specialized labor in the local market might have convinced workers that mitigating short-term costs was not likely to result in greater long-term benefits. This is not to suggest that urban firms are not able to implement these innovations. Rather, it provides added insight into why deep labor markets might impede adoption of high commitment IR/HR labor strategies.

B. Employment Relations in Just-in-Time Supplier Firms

The discussion now turns to examining the transformation of firms producing intermediate goods for inventory, reliant on highly routinized production practices, to more flexible producers satisfying the just-in-time supply requirements of end-producers.

Long production runs and the slack in the manufacturing process resulting from the production for inventory made the mass production strategy both economically and technically feasible. The length of the production runs made investment in purpose built machines and dies cost-effective while at the same time minimizing the requirements of worker discretion. Production for inventory provided a manufacturing system which was "robust" to worker absenteeism, poor workmanship or mechanical failure, as inventory in reserve could always be drawn down in the event of a disruption (Kochan 1993). These types of crises, which would halt production in just-in-time manufacturing practice, could be dealt with in due course and with less dramatic effect. The important implication was that improvements in the labor process, to upgrade workmanship or decrease bottlenecks, were made on an *ad hoc* basis, to remedy immediate disruptions.

The principles guiding the labor process in the numerically flexible case are inconsistent with requirements of just-in-time production. The nature of the transformation is most pronounced in the two Riverton plants now filling just-in-time contracts. The most obvious transformation is the move from narrow task assignments on a given production line to multiple task assignments, both within and across production lines. The narrow task assignments of the numerically flexible work force allowed jobs to be easily filled by new hires. In addition, the low level of investment in employee training gave workers little power in bargaining for higher wages or other forms of compensation. The employers' power over the compensation schedule was further boosted by the lack of union representation in either plant. In essence, the two plants operated according to the spatial division of labor ideal type, which is often used to define the typical rural firm: i.e., the use of low-wage, low-skill, highly routinized and unorganized labor to produce standardized products.

In contrast to the spatial division of labor ideal-type, just-in-time production requires a core work force which can perform a variety of tasks to produce the goods required by the customer for that day or week. It is the variance in workload across several products which would make hiring and laying off single task workers intractable. Even if demand were stable there would be advantages to a long-term core work force. The premium placed on quality makes the operation of quality control on the production line central to the objectives of the firm. Indeed, any defective parts are likely to impede assembly of the product in the lead firm's plant. The robustness of the numerically flexible strategy, which allowed a subcontractor to quickly replace workers and perform quality control at the end of the production line, is in many ways opposite to the fragile just-in-time strategy, which makes employers more dependent on the tenacity of the labor agreement and requires more trust in the operation of quality control in each employee (Kochan 1993).

The ability of rural subcontractors to meet the quality and delivery requirements of lead firms is based on the employees' acquired skill and their attention to detail. Workers with farm backgrounds made up a significant but decreasing share of the manufacturing labor force. Employers lauded the very high mechanical aptitude and the strong work ethic these employees brought to the job. But employees with no farm background were also deemed as competent in mechanical and mathematical skills. More important to the development of manufacturing processes dependent on considerable skill formation of workers over a relatively long time period is the length of tenure with a particular firm. The loyalty of the workforce was identified as the greatest advantage of rural location relative to an urban environment. Perhaps the strongest evidence of this advantage more generally is the decision of Japanese automobile plants to locate on greenfield sites in order to pursue internal promotion skill formation strategies that have been essential to Japanese competitive strategy (Kenney & Florida 1993, pp. 101-102; Koike 1988, p. 266).

What the example demonstrates is that the creation of employment which does fit the spatial division of labor ideal type does not necessarily define the highest level of industrial functioning by the local labor force. In assessing the adaptability of rural areas to new forms of production organization, the socialization into the requirements of the spatial division of labor ideal type may be a more important impediment than the skill and schooling level workers have attained. In the Riverton plants, older workers tended to have much more difficulty adapting to the requirements of just-in-time production. Employees working a long time at these plants felt that they were being paid to perform a task. Thinking about the production process was foreign, clearly in the domain of management. There was also some resistance to switching tasks between workers throughout the day, as the feeling of being expert in one task initially generated more job satisfaction than switching tasks with other employees. These examples were the exception.

This is not to say that the transformation in labor practices will not adversely affect some workers. General training of the workers in problem-solving skills off the shop floor produced the same measurable variation in performance as would be expected in a classroom setting. Management expressed the concern that some workers were unable to, or chose not to, excel in these skills. However, it was clear that these skills were becoming an integral part of work re-organization as a joint activity of engineering and shop floor employees and that this activity was a continuous, ongoing process. Dismissal of employees unable to develop these skills was seen as inevitable. The example argues strongly for maintaining the quality of public education and suggests that some rural areas may have a significant advantage in transforming traditional rural IR/HR systems.

While the switching of workers across assignments is required by the increased volatility of production departments throughout the firm, improved ergonomics and increased employee motivation are cited as the two greatest ancillary benefits. The incentives used to ensure that workers acquire a larger repertoire of skills include wage scales related to the number of skills the worker has mastered and periodic evaluations to assess the worker's proficiency in various tasks and his or her overall productivity. In addition, plant-wide gain sharing plans related to reduction in scrap are also used to increase group incentives to reduce production costs.

The labor flexibility these firms enjoy is not the result of merely trading numerical flexibility for functional flexibility. There are times when the number of job orders would be insufficient to employ a full regiment of core employees. Previously, the firm would layoff redundant workers during an economic downturn. Under the current system a layoff presents the chance that employees with some level of training may not return when the firm is able to re-hire. For the employee, the perception of job insecurity works to undermine the long-term relation between firm and worker. This reduces the amount of worker involvement in quality

control and productivity improvements which are central to effective just-in-time management. In order to protect against these undesirable results, the firm maintains a core group of employees who are hired on a long-term basis. The size of this workforce approximates the number of personnel needed to operate the plant during an economic downturn. To cover labor demands above this level, the firm relies on temporary employees. This temporary workforce can be as large as 40% of all production labor. Thus, numerical flexibility in the firm has been replaced by both tenurial and functional flexibility.

There are indications that managerial prerogative with respect to the maintenance of a large contingent workforce may be severely restricted by quality control certification such as ISO 9000. In the one firm which is certified but has significant demand for low- or semi-skilled workers, about 5% of the production workforce is temporary. Since all new employees are required to pass through the same training procedure, the training investment in temporary employees is very high given their short tenure. Similarly, the prospective strategy of the firm pursuing certification is to drastically reduce the number of temporary workers in anticipation of the increased costs of the formalized training procedure. Management admits that reliance on the temporary workforce adversely affects quality. Making quality control operative in each job is an implicit goal of ISO 9000 standards which will be increasingly difficult to satisfy with a large share of contingent workers.

The dilemma facing the rural just-in-time firms is one justification for the superiority of urban location. If fluctuation in demand cannot be smoothed using unskilled temporary employees, then the existence of deep external markets for workers in urban areas may provide a more feasible solution. And yet, the strategy of relying substantially on external labor markets is contrary to high performance, high commitment IR/HR practice. The point of agreement is that work has become less idiosyncratic, transforming the former necessity of internal markets to deal with problems of asset specificity into a management option. In the 'fragile model' of industrial development it is the 'professionalization' of work within a specific firm context which argues for the internalization of skill formation and promotion. In contrast, the 'resilient model' regards the 'professionalization' of work as transcending firm boundaries. Urban location will likely be necessary to follow this latter strategy.

Which option management follows will be a function of both the characteristics of the specific industry and the constraints imposed by the local economic environment. In more traditional industries rural areas may be able to internalize long-term skill formation, supporting the development of fragile production practice, which may be less likely in urban areas. Examples include those industries in which worker-employer interdependency has been typically low and where the credible commitment of management to follow internal promotion strategies might be lacking. Firms in rural areas may choose to maintain these same employment relations characteristic of robust production. However, the limited alternatives of both the physical capital of the employer and employment opportunities for workers suggest stronger incentives to maintain the competitiveness of a going concern than would exist in an urban environment.

IV. Conclusion

Deriving conclusions from case study analysis is always contentious. Whether the examples from the four counties in the Upper Midwest are emergent or exceptional rural processes cannot be adequately addressed within this analysis. However, it would be wrong to conclude from the analysis that fragile production is inherently predisposed to rural industrial development. Japan and Germany provide numerous examples of fragile production complexes existing in densely populated areas characterized by deep labor markets. Analyses in these countries also point to the long, incremental process which led to the development of the IR/HR systems and the differences in labor and industrial institutions contrasted to those in the

United States (Baethge & Wolf 1995; Nakamura & Nitta 1995). While many of the most notable examples of transplants to the United States have located in rural greenfield sites—presumably choosing environments which will allow recreating some of the IR/HR strategies used in home plants—the data suggest that this is not a dominant pattern (Kim 1995, Kenney & Florida 1993).

The argument that rural areas may effectively incorporate high commitment employment relations and pursue fragile production practice may appear pollyannaish. The preponderance of the relevant literature appears pointed in the other direction. The inherent disadvantage of rural areas mated to the weaker capabilities to adapt to changing circumstances paints a constrained, if not dismal, rural future. From the contrarian perspective it is the stimulus to change, not the capability to adapt, which is the critical variable. The contrarian hopes the naysayers are correct, at least initially. If meaningful, sustainable adoption of these alternative IR/HR strategies requires an integrated, systematic redesign of labor and production processes (Kochan, et al. 1993; Locke et al. 1995), then the stimulus for change may have to be severe. No threat is more severe to a business enterprise than that of insolvency. Both the numerically flexible producers for inventory and the small-batch producers were faced with such threats to their survival which resulted in sweeping changes in work organization. The analysis suggests that piecemeal alterations were not a viable alternative in the rural context. It does not suggest that ruralness is any guarantee of a rosy outcome.

If one believes that high commitment IR/HR strategies do confer long-term advantages, then the proper response is to envision how firms in both rural and urban areas might make this transformation. By providing successful examples of this process the analysis suggests that there exist productive policy concerns for rural as well as urban areas. But, importantly, the problem of adaptation to fragile production practice may present itself differently in each context. The concern in the literature with the capability of rural areas to adapt to a volatile economic environment is well placed. If, in addition, the number of alternative responses of rural actors is more constrained, then policy directed to increasing this capability may be relatively effective. In contrast, the problem in urban areas may be as much one of heightening awareness of competitive threats as increasing capability. This is not to suggest that the process of accommodating these threats through resilient production practice is due to shortsightedness. The potential costs of collective action problems or those often associated with being the first adopter may not be compensated by the potential gains. Lacking threats to a firm's existence, the piecemeal approach may be the most reasonable one. Rather than decrying rural areas' inability to emulate urban response to a new competitive environment, one might step back and ask what is lost and what might be gained.

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ENDNOTES

1. Using cluster analysis, Ichniowski identifies 9 groups of IR/HR practice: 1) "Traditional Union," 2) "Union-Like but No Seniority," 3) "Union-Like but No Grievance Procedures," 4) "Do Nothing Find a Body," 5) "Do Nothing Keep a Body," 6) "Employee-Employer Communication," 7) "Employee-Employer Communication and Flexible Work Design," 8) "Employee-Employer Communication and Significant Training," and 9) "High Commitment" or "Employee-Employer Communication with both Flexible Work Design and Significant Training." Although dependence on internal labor markets was not an explicit attribute of the strategies examined, the "Do Nothing Find a Body" businesses' reliance on external candidates to fill vacancies was markedly different from businesses with any other IR/HR.

2. The names of the counties have been changed in this discussion. Readers wishing to investigate the cases more thoroughly are invited to contact the author for the genuine county names. The counties are located in Southern Minnesota, Missouri and Iowa and Northern Wisconsin.