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Competition and Productivity Growth in the Rust Belt

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Abstract

The “Rust Belt,” the heavy manufacturing region bordering the Great Lakes, fared worse than any other region of the United States in the post-World War II period in terms of employment and value added. In addition to the evolution of the employment share itself, we document three salient facts and analyze how they accounted for the region’s decline: (1) wages in the Rust Belt were substantially higher in the 1950-80 period, (2) productivity growth in key Rust Belt industries was low compared to other manufacturing industries and compared to the same industries abroad, and (3) competition in domestic output markets for these Rust Belt products was weak between the 1950s and mid-1980s. The Rust Belt’s downturn was largely homemade and persistent labor market conflict plays a key role in explaining all the salient facts. The region’s decline has little, if anything, to do with structural change and foreign competition. While manufacturing in Wisconsin mirrored the trajectory of the broader Rust Belt in the early post-war decades, we observe a distinct shift in the state’s labor relations in the 1980s, which, in turn, set in motion a recovery of manufacturing employment relative to both the Rust Belt region and the United States more broadly. The trajectory of Wisconsin’s manufacturing sector since World War II suggests that flexible labor markets are key for the creation of sustainable manufacturing jobs, and plausibly jobs in general.

1 Introduction

The “Rust Belt,” the heavy manufacturing region bordering the Great Lakes, fared worse than any other region of the United States in the post World War II period. From 1950 to 2016, the Rust Belt’s share of U.S. manufacturing employment fell from more than one-half to less than one-third, and its share of aggregate employment dropped by a similar magnitude.¹

In this paper, we review the recent literature – mainly [Alder et al. \(2014\)](#) and [Alder et al. \(2017\)](#) – on the patterns of labor reallocation in (and out of) the Rust Belt region. In contrast to widely held views, we emphasize that many of the challenges the Rust Belt has faced in the past six decades were homemade rather than the result of free trade or globalization.

The public debate and the corresponding policy discussion have focused on structural change and foreign competition as the most likely culprits for the secular decline of this former manufacturing power house. While there is no doubt that structural change is key to understanding the *aggregate* decline of manufacturing in terms of both employment and value added, it cannot explain the decline of manufacturing in the Rust Belt *vis-à-vis the rest of the country*.

It turns out that foreign competition does not offer a plausible explanation for the employment trajectory of this region either. While there is a widely held view that the Rust Belt was an economic success story until the 1980s and then fell victim to competition first from Japan and then from China and Asia more broadly, this view is at odds with the empirical evidence. In fact, the data tells a very different story. The Rust Belt’s manufacturing employment share fell most dramatically between 1950 and the mid-1980s, after which the region stabilizes somewhat, precisely at a time when foreign competition is increasing. Clearly, the timing is off and the conventional wisdom is in need of an overhaul. This strikes us as a particularly salient undertaking at a time when the policy debate is shifting in favor of a more protectionist U.S. trade policy stance.

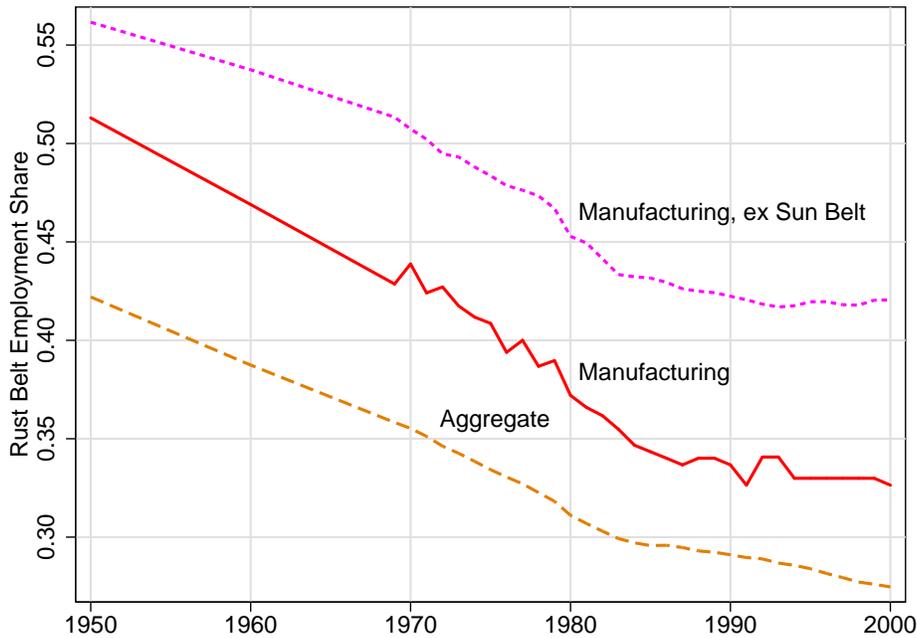
Before we attempt to identify the potential sources of the Rust Belt’s decline, it is worth recalling some of the facts in more detail. Together, these facts point to a source for the decline that has little, if anything, to do with structural change and foreign competition.

2 The Salient Facts

In addition to the drop in manufacturing employment – relative to the U.S. as a whole – three facts stand out starkly: (1) wages in the Rust Belt were substantially higher in the 1950-80 period, (2) productivity growth in key Rust Belt industries was low compared to other manufacturing industries and compared to the same industries abroad, and (3) competition in domestic output markets for these Rust Belt products was anemic between the 1950s and mid-1980s. Since these stylized facts are key to understanding the source(s) of the region’s decline, it is worth reviewing them in order.

¹We define the Rust Belt to be the states of Illinois, Indiana, Michigan, New York, Ohio, Pennsylvania, West Virginia and Wisconsin.

Figure 1: The Rust Belt’s Employment Share



2.1 The Rust Belt’s Employment Share

The Rust Belt’s share of employment decreased secularly over the postwar period. Importantly, the decline does not simply reflect a shift out of manufacturing, nor was it driven by job relocation to warm “Sun Belt” states, made possible by the advent of air conditioning for large industrial structures. Figure 1 plots the evolution of the Rust Belt’s employment share from 1950 through 2000 using three different measures: aggregate employment, manufacturing employment, and manufacturing employment excluding the Sun Belt states of Arizona, California, Florida, New Mexico and Nevada (Blanchard and Katz, 1992).

While the drop in the Rust Belt’s aggregate employment share (dashed orange) is consistent with structural change – that is, job losses driven by the decline of manufacturing itself – the solid red line suggests it’s not the main culprit. The drop in the region’s manufacturing share of employment is of a similar magnitude as the aggregate share (roughly 16 percentage points) and shows that employment *within the manufacturing sector* shifted from the Rust Belt to the rest of the country. The forces behind the relocation of these manufacturing jobs must be distinct from those of a structural shift out of manufacturing and into services.² Furthermore, this pattern holds even within more narrowly defined industries. For example the Rust Belt’s share of U.S. employment in steel, autos and rubber tire manufacturing fell from 75 percent in 1950 to 55 percent in 2000. Put differently, the decline isn’t simply the

²The Rust Belt’s decline isn’t confined to employment alone. The share of GDP also declined secularly since 1950, from 45 percent down to 27 percent in the aggregate, and from 56 percent to 32 percent in manufacturing.

result of the decline of the traditional industries that dominated the region. Rather, economic activity shifts from the Rust Belt to other parts of the country even *within* these industries.³

The Rust Belt's share of manufacturing employment excluding the Sun Belt states (dotted purple) was 56 percent in 1950 and fell by 14 percentage points to 42 percent in 2000. This suggests that the decline is not accounted for by movements, possibly related to weather, of workers to the Sun Belt. This is consistent with the work of [Holmes \(1998\)](#), who studies U.S. counties within 25 miles of the border between right-to-work states (most of which are outside the Rust Belt) and other states. He finds that employment growth in the right-to-work state counties next to the border is higher compared to the counties across the state border (in a no-right-to-work state) which arguably share the same weather patterns.⁴

No other region of the United States declined as much as the Rust Belt. Of the seven states with the largest drops in their share of aggregate employment between 1950 and 2000, six are in the Rust Belt. Of the seven states with the sharpest decline in manufacturing employment, five are in the Rust Belt. Among the eight Rust Belt states, Wisconsin's decline initially followed the broader Rust Belt pattern but rebounded more vigorously in the 1980s in terms of its national employment share. Similarly, Wisconsin outperformed its Rust Belt peers and almost doubled its regional employment share between 1970 and 2017 (see [Figure 6b](#)).⁵ Not surprisingly, the state also has an manufacturing employment share (relative to all non-farm employment) of almost 16 percent, compared to a national average of less than 9 percent (September 2017). We will analyze the likely cause for Wisconsin's divergence from the broader regional trends in our labor market discussion below.

2.2 High Wages in the Rust Belt

The Rust Belt was also characterized by high wages, particularly during the early postwar period. [Figure 2](#) shows the evolution of relative wages earned by manufacturing workers in the Rust Belt using two different statistics. We focus on manufacturing since the mechanisms we emphasize in our theory are particularly salient in this sector (though the patterns hold when we include all workers; see [Appendix C](#) in [Alder et al., 2017](#)).

The first (solid orange line) is the ratio of average wages of manufacturing workers in the Rust Belt to average wages of all other U.S. manufacturing workers, where wages are calculated as the ratio of annual labor earnings to annual hours. Clearly, wages in the Rust Belt were considerably higher throughout this period. The wage premium was between 10 percent to 15 percent between 1950 and 1980, and lower, yet still positive, afterwards.

The second measure (dotted red line) is the Rust Belt wage premium among manufacturing workers when adding controls for schooling, potential experience, race and sex. Specifically, the line is the

³Notable examples are the emergence of auto assembly plants and steel mills in the U.S. South and Southeast.

⁴Similarly, [Rappaport \(2007\)](#) concludes that weather-related migration out of the states in the Rust Belt played only a modest role in their declining population share. Other areas in the midwest and New England, for example, have similar weather but experienced more moderate population share losses.

⁵We also observe this relative strength in more disaggregated industries such as Fabricated Metals or Machinery Production in the post-1990 period.

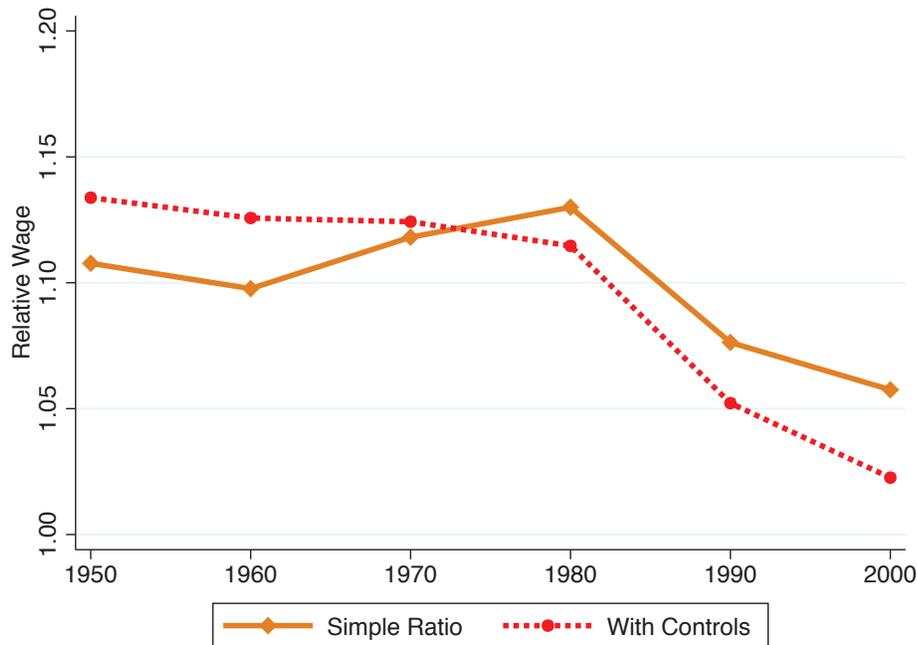


Figure 2: Relative Wages of Rust Belt Workers

coefficient of a Rust Belt dummy variable interacted with the year in a Mincer-type regression. The pattern is similar to that of the first wage measure. The salient regressions coefficients are greater than one for the entire period and suggest a wage premium around 12 percent between 1950 and 1980, and falling afterwards (though still positive.) Thus, even after controlling for standard observables, manufacturing workers in the Rust Belt earned more than manufacturing workers in the rest of the country.

We interpret these patterns of wage premia as the result of union bargaining power which was strong up to 1980 and then weakened considerably after that. In [Farber \(1986\)](#)'s survey chapter on union behavior, the standard view of unions is that of an organization that bargains over industry rents in the form of wage premia, and that rations scarce, high-paying union jobs in order to preserve those premia. Unionized labor markets and job rationing are the focus of the large literature on insider-outsider models developed by [Lindbeck and Snower \(1988\)](#), [Blanchard and Summers \(1986\)](#) and [Cole and Ohanian \(2004\)](#), in which unions restrict their membership to maximize rents per worker. These studies cite considerable evidence of union rents and job rationing. More broadly, [Dickens and Lang \(1985, 1988\)](#) present evidence from CPS data that supports job rationing. Using CPS data from the early 1980s, they find a significant union wage premium after controlling for race, marital status, education, experience, and allowing for workers to switch between union and non-union sectors. They also report evidence of non-price rationing that favored white males.

[Meier and Rudwick \(1979\)](#) and [Hinshaw \(2002\)](#) provide very detailed studies of the U.S. auto and steel

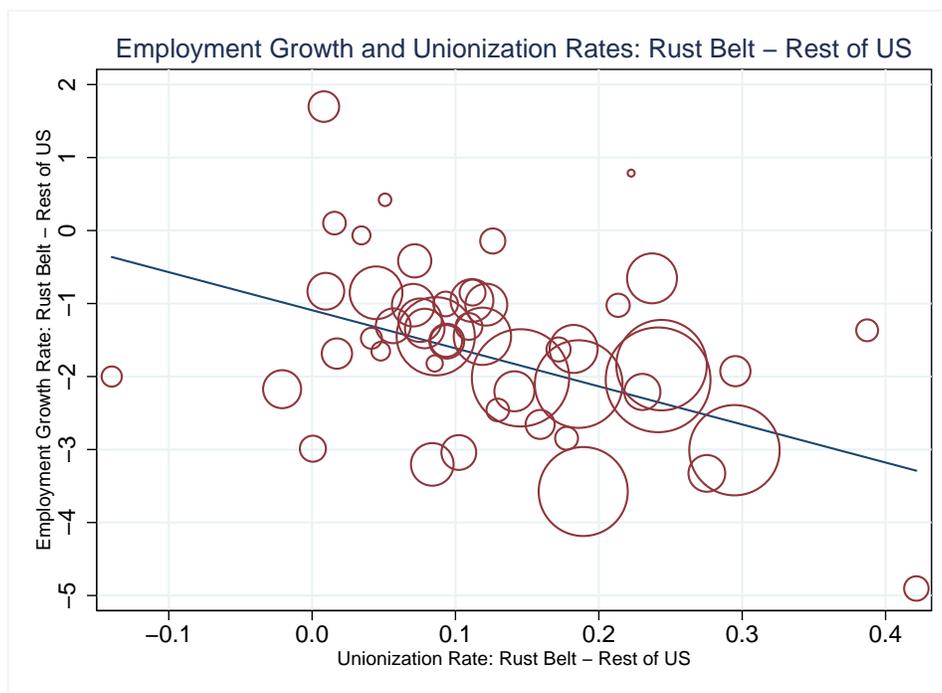


Figure 3: Effect of Unionization on Employment Growth

industries, and confirm [Dickens and Lang \(1985, 1988\)](#)'s finding that rationing often took the form of restricting women's and minorities' access to union jobs. Nepotism was also quite common. [Kupfberg \(1999\)](#) describes discrimination lawsuits in the auto and steel industries, in which unions de facto discriminated against minority candidates by accepting new members who were referred by existing union workers, typically through family or friendship connections. Figure 3 illustrates the effect of unionization on employment growth at the disaggregated city level in the Rust Belt, with growth rates expressed relative to the rest of the United States.

One possible alternative interpretation of wage premia in Figure 2 is that they are compensating wage differentials driven by higher costs of living in the Rust Belt than in other parts of the country. While there are no panel data on regional costs of living in the U.S., the Bureau of Labor Statistics estimated them in a sample of 39 cities in a single year, 1966, roughly in the middle of our "high wage" period ([U.S. Bureau of Labor Statistics, 1967](#)). When comparing the average cost of living in Rust Belt cities to the average for the rest of the country, we find that the difference is small in magnitude, with the Rust Belt cities being at most two percent more expensive. Moreover, the difference is statistically insignificant. This evidence casts substantial doubt on cost-of-living differences as an explanation for the observed wage premia. In addition, to explain the evolution of wage premia the cost-of-living differences would have had to change suddenly in the 1980s, which seems unlikely.

Another alternative interpretation is that workers in the Rust Belt were more productive, on average. If this were the case, then Rust Belt and non-Rust Belt workers would experience similar post-

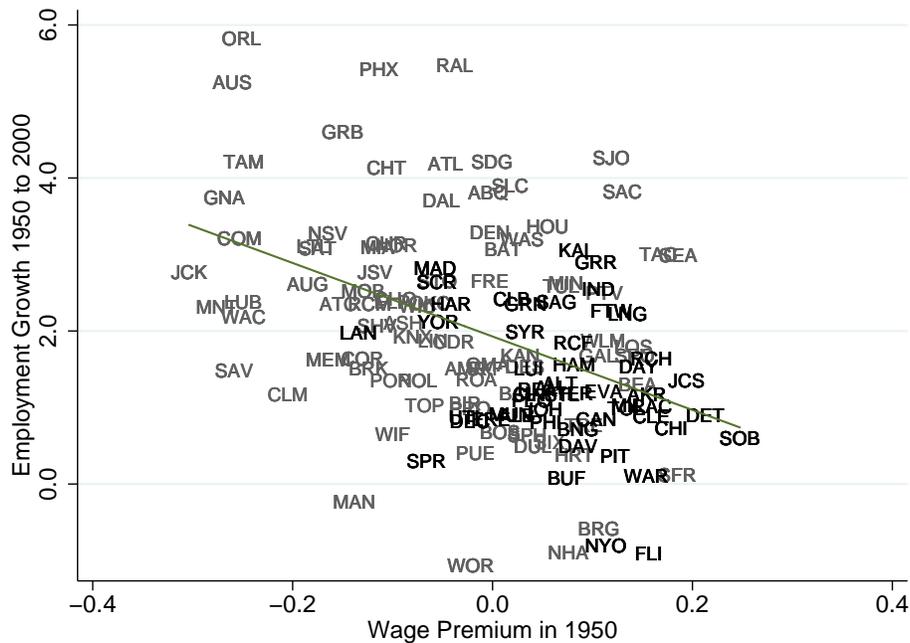


Figure 4: Wage Premia and Employment Growth across MSAs

displacement wage losses. The evidence in the Displaced Workers supplement to the Current Population Survey (CPS) of 1986 (Flood et al., 2015), however, does not support this alternative view. Rust Belt workers lost 51.1 percent of their pre-displacement wages, on average, after a plant closing, compared to 35.5 percent for workers in the rest of the country. The difference is statistically significant at the one-percent level. This suggests that Rust Belt workers were earning premia in the form of rents rather than by virtue of higher productivity.⁶

The link between wages and employment growth is also very clear in more disaggregated data. Figure 4 shows a cross-plot of wage premia in 1950 and (local) employment growth over the next five decades at the MSA level, with Rust Belt cities in black and the remainder in grey. Rust Belt MSA tend to be clustered in the Southeast quadrant suggesting that high premia are associated with below-average wage growth between 1950 and 2000.

The link is also evident at the state level. In Figure 5 we plot the premium that Wisconsin manufacturing workers earned between 1950 and 2000. While the time path resembles the broader pattern in the Rust Belt (a positive premium followed by a drop), it is also evident that the premia were more moderate from the 1950s through 70s and then fell more aggressively around 1980. Remarkably, the premium

⁶This conclusion is consistent with the industry evidence in Carrington and Zaman (1994) who find the highest wage losses among displaced workers from heavily unionized industries, such as primary metals manufacturing and transport equipment manufacturing. It is also consistent with Jacobson et al. (1993) who study wage losses from displacement among high-tenure manufacturing workers in Pennsylvania, and find that “losses are larger in settings where unions or rent-sharing are likely to be prevalent (...).”

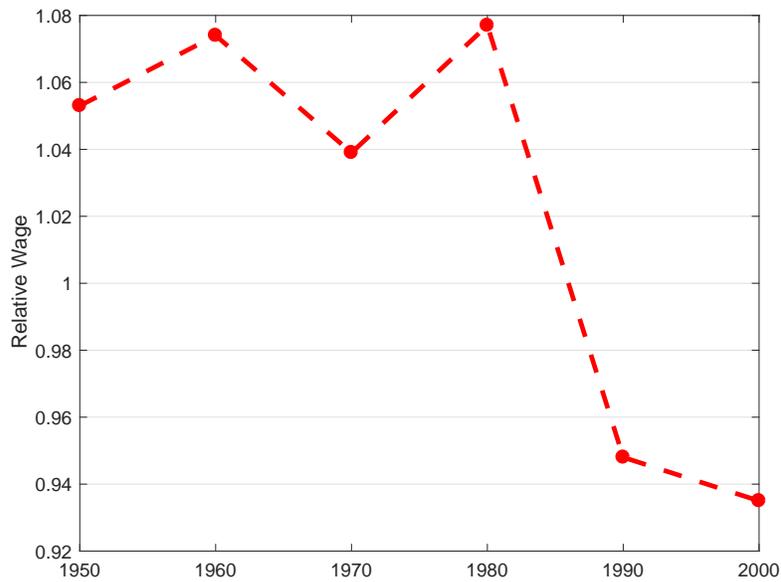


Figure 5: Relative Wages of Wisconsin Manufacturing Workers

turned negative in 1990 and 2000.⁷ If our hypothesized link between wage premia and employment is correct, this implies that the state’s employment share should drop more modestly until the 1980s and then rebound more vigorously thereafter. Figures 6a and 6b show that this was indeed the case. The former, in particular, is an almost exact mirror image of 5: Wisconsin’s employment share vis-à-vis the U.S. rises when the measured manufacturing wage premium is low and it drops when the premium is high. Moreover, since the wage premia were more modest in Wisconsin compared to the remainder of the Rust Belt, we would expect the state to gradually rise in terms of its *regional* employment share and Figure 6b confirms that exact trend in the data.

While we aren’t aware of any significant labor market reforms at the state level in the 1980s, our data suggest that local labor market conflict diminished around that time. Broadly speaking, the state follows national trends but, in contrast to other Rust Belt states, the wage premium vanishes completely by the 1990s and 2000s. This, we argue, is key to understanding the state’s performance with respect to both national and regional employment.

2.3 Low Productivity Growth in Rust Belt Industries

Labor productivity growth in the major Rust Belt industries was anemic all the way through the 1980s, after which it picked up considerably. Due to data limitations, we focus on measures of productivity growth in a broad set of industries by matching industry-level productivity data to census data containing the geographic location of employment for each industry. This allows us to compare productivity growth in the industries with the highest employment concentrations in the Rust Belt to

⁷The negative coefficients are significant at the 1 percent level.

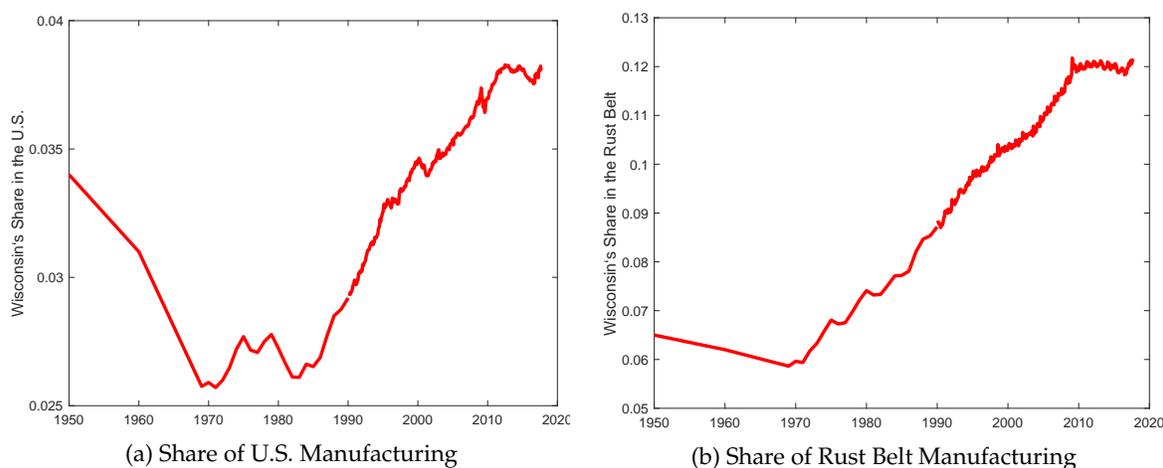


Figure 6: Wisconsin's Employment Share

other manufacturing sub-sectors.

Table 1 reports productivity growth rates for the Rust Belt industries and their average over time. Productivity growth is measured as the growth in real value added per worker, using industry-level price indices as deflators. The first data column reports productivity growth in each industry, and the Rust Belt weighted average, for the period 1958 to 1985. On average, productivity growth rates were 2.0 percent per year in Rust Belt industries and 2.6 percent in all manufacturing industries. Productivity growth rates in the Rust Belt were much higher between 1985 and 1997 than before, averaging 4.2 percent per year, compared to 3.2 percent for all manufacturing industries. For the whole period, the Rust Belt industries had slightly lower productivity growth (2.6 percent) than all manufacturing industries (2.8 percent).⁸

We are, of course mindful of the fact that the productivity measures in Table 1 do not directly measure productivity by region. They are, however, consistent with a study that measures productivity by region directly using plant-level data. Collard-Wexler and De Loecker (2015) measure labor productivity and TFP growth in the steel industry for two types of producers: vertically integrated mills, virtually all of which were located in the Rust Belt, and minimills, which sprung up in the Southern U.S. They find that vertically integrated mills exhibit low – even negative – TFP growth from 1963 to 1982. Post-1982, a time when minimills entered product markets that had previously been dominated by integrated producers, productivity growth was up sharply in these integrated mills.⁹ Moreover, some of the growth acceleration post-1985 could be the result of the employment reallocation to more productive firms or plants outside the Rust Belt. Due to the limitations in the underlying data, we cannot decompose the growth recovery.

⁸Table A.4 in the Appendix of Alder et al. (2017) shows that the results are robust to alternative definitions of Rust Belt industries. We also find lower productivity growth rates in Rust Belt industries between 1958 to 1985 when using double-deflated value added per worker, or TFP, as our measure of productivity. A detailed description of the NBER CES data, and the data themselves, are available at <http://www.nber.org/nberces/>.

⁹TFP improved by 11 percent from 1982 to 1987 and by 16 percent between 1992 and 1997.

	Annualized Growth Rate, %		
	1958-1985	1985-1997	1958-1997
Blast furnaces, steelworks, mills	0.9	7.6	2.8
Engines and turbines	2.3	2.9	2.5
Iron and steel foundries	1.5	2.3	1.7
Metal forgings and stampings	1.5	2.8	1.9
Metalworking machinery	0.9	3.5	1.6
Motor vehicles and motor vehicle equipment	2.5	3.8	2.9
Photographic equipment and supplies	4.7	5.1	4.9
Railroad locomotives and equipment	1.6	3.1	2.0
Screw machine products	1.2	1.1	1.2
Rust Belt weighted average	2.0	4.2	2.6
Manufacturing weighted average	2.6	3.2	2.8

Note: To define Rust Belt intensive industries, we match NBER industries (by SIC codes) to those in the IPUMS census data (by census industry codes). In each industry, we then compute the fraction of employment located in the Rust Belt. We define “Rust Belt industries” to be those whose employment share in the Rust Belt is more than one standard deviation above the mean. In practice, this turns out to be a cutoff of at least 68 percent of industry employment located in the Rust Belt.

Rust Belt Industries are defined as industries whose employment shares in the Rust Belt region in 1975 are more than one standard deviation above the mean of all industries. Labor Productivity Growth is measured as the growth rate of real value added per worker. Rust Belt weighted average is the employment-weighted average productivity growth rate for Rust Belt industries. Manufacturing weighted average is the employment-weighted average productivity growth across all manufacturing industries. Source: Authors’ calculations using NBER CES productivity database, U.S. census data from IPUMS, and the BLS.

Table 1: Labor Productivity Growth in Rust Belt Industries

2.4 Labor and Product Market Competition

Lastly, there is ample evidence to suggest that the labor and product markets for Rust Belt industries weren’t very competitive and we briefly summarize the evidence in the next two subsections.

2.4.1 Post-World War II Labor Conflict in the Rust Belt

The threat of strikes, and conflict between unions and management more generally, were a central feature of the main Rust Belt industries in the post-war period. The conflict began with the violent union organizations of these industries in the late 1930s. Prior to that time, Rust Belt firms had prevented a number of union organization attempts but they ultimately succeeded in the late 1930s through the use of the sit-down strike, in which strikers forcibly occupied factories to stop production. The method was tacitly permitted by the National Labor Relations Act of 1935 before being ruled unconstitutional by the Supreme Court in 1939 and facilitated union organization during the late 1930s (Kennedy, 1999; Millis and Brown, 1950).¹⁰

¹⁰General Motors (GM) was among the first Rust Belt firms violently organized by the sit-down strike. Striking workers forcibly shut down production at some GM auto body plants, which led GM to recognize the United Auto Workers (UAW) in 1937 as their worker’s sole bargaining representative. The GM sit-down strikes led to other organization strikes and led

On the eve of World War II, all of the major auto, steel and rubber producers were unionized, and many studies describe how these organizational strikes created deep distrust and resentment between management and labor (see [Clark, 1982](#), [Barnard, 2004](#) and [Strohmeyer, 1986](#)). As an example of the level of the conflict that existed between management and labor, [Barnard \(2004\)](#) describes that there were 170 separate strikes at GM in just the first four months following their union organization in 1937. During World War II, labor relations were largely managed by the government as most major unions agreed to President Roosevelt's no-strike pledge, and the National War Labor Board limited wage increases to cost-of-living increases (see [Cole and Ohanian, 2004](#) and the references therein).

Conflict and strikes re-emerged immediately after the war, as unions sought large increases following wartime wage controls. This conflict is viewed widely as a resurgence of the fierce union organizations of the 1930s and the Bureau of Labor Statistics called this period "the most concentrated period of labor-management strife in the country's history" (see [Seidman, 1953](#), pp. 78-79, and [Richter, 2003](#)).¹¹ Rust Belt industries tried to deal with the chronic threat of strikes by adopting five-year bargaining agreements such as the "Treaty of Detroit" between GM and the UAW in 1950. Other auto firms, and firms in other Rust Belt industries, adopted a similar five-year agreements.

However, conflict re-emerged following the expiration of these agreements and steel strikes, for instance, occurred in fairly regular intervals between 1946 and 1959. The steel strikes of 1952 and 1959 even triggered interventions from U.S. Presidents. Truman tried to nationalize the steel industry in 1952 and Eisenhower tried to force a settlement between union and management in 1959 in a strike involving 500,000 workers. Rust Belt industries tried to resolve this conflict in a variety of ways. One such approach was the attempt to escape labor conflicts by moving operations outside the Rust Belt such as the so-called "Southern Strategy" in the auto industry of 1960s and 1970s. However, none of these strategies worked since "the UAW was able to respond by maintaining virtually 100 percent organization of production workers in all production facilities" (see [Nelson, 1996](#), p. 165).

Similarly, attempts to substitute capital for labor in the auto industry failed since unions successfully added work rules and job classifications into the collective bargaining agreements to undermine management's ability to implement the strategy (see [Steigerwald, 2010](#)). The United Steel Workers' (USW) union accomplished the same by way of Rule 2-b in the collective bargaining agreements in the steel industry.¹²

U.S. Steel, for instance, to recognize the union precursor of the United Steelworkers in mid-1937.

¹¹A 1982 National Academy of Sciences project on the U.S. auto industry argues that the violent union organizations and sit-down strikes of the late 1930s defined an "adversarial and bitter relationship between labor and management" ([Clark, 1982](#)). [Barnard \(2004\)](#), [Katz \(1985\)](#), [Kochan et al. \(1994\)](#), [Kuhn \(1961\)](#), [Serrin \(1973\)](#) and [Strohmeyer \(1986\)](#) also describe how the organization conflicts of the 1930s and 1940s evolved into chronically conflicted relations in which the strike threat dominated Rust Belt labor negotiations after World War II. Moreover, [Lodge \(1986\)](#), [Nelson \(1996\)](#) and [Lam et al. \(1991\)](#) describe how this conflict was much more prevalent in U.S. Rust Belt industries, compared to union-management relations in other U.S. industries, or in union-management relations in other countries.

¹²Rule 2-b limited management's ability to reduce the number of workers assigned to a task, or to introduce new capital equipment that would reduce hours worked or employment (see [Strohmeyer \(1986\)](#)). Section 2-b was the major point of contention in the Steel strike of 1959, as management viewed this clause as limiting their ability to modernize and increase productivity. [Barnard \(2004\)](#) and [Strohmeyer \(1986\)](#), and [Schmitz \(2005\)](#) offer a more comprehensive analysis and review of work rules, productivity, and union job protection.

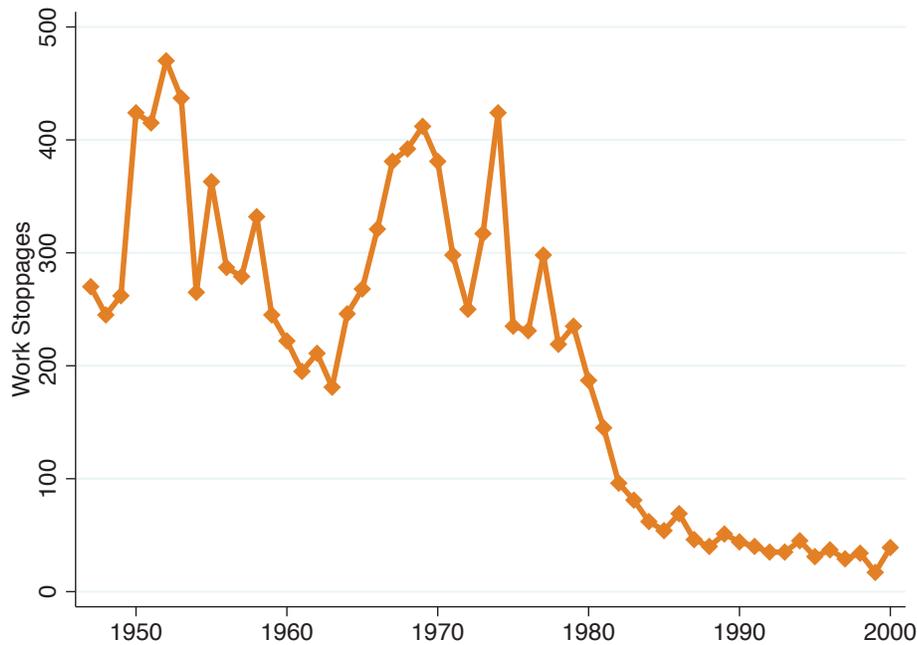


Figure 7: Work Stoppages Affecting More Than One Thousand Workers

2.4.2 More Cooperative Rust Belt Labor Relations after 1980

These adversarial labor relations began to change in the 1980s. A sizeable literature describes how Rust Belt union-management relationships shifted toward more cooperation around this time and we can observe a large decrease in the number of strikes and strike threats (see [Beik, 2005](#), [Katz, 1985](#) and [Kochan et al., 1994](#)). Figure 7 shows the number of strikes per year involving at least one thousand workers from the end of WWII through 2000 and the decline around the early 1980s is quite remarkable. Stoppages drop from several hundred per year before to less than fifty. The literature cites President Reagan’s 1981 decision to fire striking unionized federal air traffic controllers as a watershed moment ([McCartin, 1986](#); [Cloud, 2011](#)). Academic studies and industry participants agree that the firing of the controllers and the decertification of their union opened the door for wider use of permanent replacement workers, which in turn clipped union bargaining power and the effectiveness of the strike threat.¹³

Research also shows that increased competition in Rust Belt industries promoted more cooperative labor relations. [Clark \(1982\)](#), [Hoerr \(1988\)](#), [Kochan et al. \(1994\)](#) and [Strohmeier \(1986\)](#) describe how management and unions changed their bargaining relationships in order to increase the competitiveness of their industries. USW President Lloyd McBride, for instance, admitted that “[t]he problems in our industry are mutual between management and labor relations, and have to be solved. Thus far,

¹³In the Rust Belt, the use of replacement workers played an important role in the rubber tire industry in the 1990s [Krueger and Mas \(2004\)](#).

we have failed to do this” (Hoerr, 1988).

To sum up, the historical evidence suggests that the decline of the Rust Belt occurs at a time of conflicted union-management relations and that the stabilization of the Rust Belt coincides with the emergence of more cooperative labor relations in the 1980s.

2.4.3 Lack of Competition in Output Markets

Alder et al. (2017) and, in more detail, Alder et al. (2014) document the non-competitive markets that characterized the major Rust Belt industries – namely autos, steel, and rubber – in the decades after WWII. To begin with these industries were dominated by just a handful of firms. The three largest steel producers – U.S. Steel, Bethlehem Steel, and National Steel – had U.S. market share of almost 100 percent after World War II and owned 50 percent or more of domestic production capacity through 1980 (Crandall, 1981; Tiffany, 1988). The “Big Three” car companies – General Motors, Ford and Chrysler – accounted for 90 percent of automobile sales in the United States in 1958, and at least 75 percent until around 1980 (Klier, 2009). Rubber tire production was similarly concentrated by their own big four – Goodyear, Firestone, U.S. Rubber, and Goodrich – which controlled at least 90 percent of the market from 1950 to 1970.

In each of these industries, it is generally recognized that firms faced little competitive pressure and had considerable market power. Adams and Brock (1995, p. 94) describe the big Steel producers as having had “virtually unchallenged control of a continent-size market,” which led to a “well-honed system of price leadership and follower-ship” with U.S. Steel acting as the price setter (Hudson and Sadler, 1989, see also). Ingrassia (2011, p. 29) describes the automobile industry as being a “model of corporate oligopoly” throughout the 1950s, 1960s and 1970s, with General Motors acting as a price leader.

During the early decades after World War II, the steel, auto, and rubber tire manufacturers were repeatedly accused of explicit collusion. In 1959, the Federal Trade Commission (FTC) charged fifteen rubber manufacturers with agreeing on common list prices and discounting policies (French, 1991). Tiffany (1988) describes similar instances in the steel industry. By 1963, the Senate Antitrust and Monopoly Committee concluded that there was little, if any, price competition in steel and auto industries, and recommended that General Motors be broken up into competing firms. Similarly, the U.S. Justice Department charged Ford and General Motors with collusion and the Big Three with conspiring to eliminate competition (Adams and Brock, 1995, p. 87).

There is substantial evidence that competitive pressure increased in the 1970s and particularly in the 1980s, as new firms entered, both foreign and domestic, and imports increased. Concentration ratios fell substantially in all major Rust Belt industries. The market share of domestic auto producers fell from around 90 percent to less than 50 percent, and declined similarly for Rust Belt steel and rubber producers (Tiffany, 1988; French, 1991). Estimates of markups also declined as competition increased. Collard-Wexler and De Loecker (2015), for instance, estimate that markups in the US steel industry fell by around 50 percent over the last forty years and they attribute the drop to more intense competi-

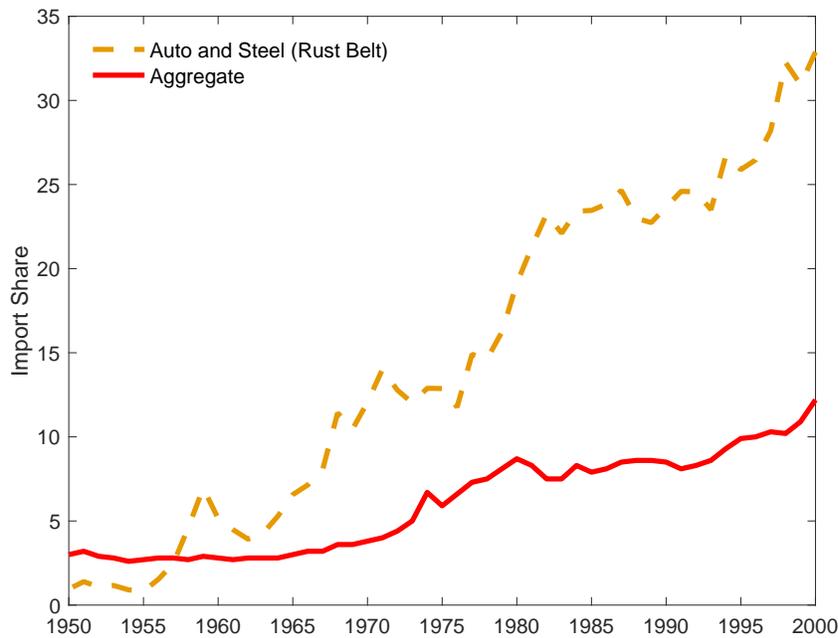


Figure 8: Imports Relative to Domestic Sales

tion.¹⁴

Broader economic policy changes also increased competitive pressure on the major Rust Belt industries. McGrattan (2012) shows that policies that impeded foreign direct investment (FDI) in the 1960s and 1970s changed considerably in the mid-late 1970s. In particular, three policies that reduced FDI were explicitly or implicitly dissolved: interest equalization taxes on FDI, which had significantly increased tax rates on FDI, extraterritorial application of U.S. laws, which had permitted the U.S. to prosecute foreign companies for antitrust violations even if the alleged acts occurred outside the U.S., and national security laws, which had permitted the U.S. to seize foreign assets. Several industry studies also find increased competitive pressure from imports starting around 1980, such as Schmitz (2005)'s study of the U.S. iron ore industry – where lower transportation costs triggered a rise in competitive market pressure – and Dunne et al. (2010)'s study of the U.S. cement industry. In both instances, the exposure gave rise substantial productivity gains. Figure 8 shows this acceleration of import shares in Rust Belt industries in the late 1970s and early 80s. What's more, the nexus between competition and productivity has been documented more broadly. Bloom et al. (2016) show that European firms that are heavily exposed to trade from China innovated and raised productivity more than others. Pavcnik (2002) documents that after the 1980s trade liberalization in Chile, producers facing new import competition saw large gains in productivity. Cole et al. (2005) show that productivity growth, and in some cases productivity levels, declined substantially in a number of Latin American countries when they received protection from competition, and that productivity rebounded once protection ended. Holmes and Schmitz (2010) review a number of other studies at the industry level that document the

¹⁴Unfortunately, markup estimates are not available for many other industries. In the auto industry, Berndt et al. (1990) estimate markups for Ford, GM, and Chrysler between 1959 and 1983 averaging 21 percent, and just 13 percent afterwards.

impact of competition on productivity.

As for the effect of foreign competition on employment, [Autor et al. \(2013a\)](#) and [Autor et al. \(2014\)](#) have documented that workers in U.S. industries that are more exposed to imports from China since 1990 have experienced substantial negative wage growth and labor market outcomes. However, since imports from China accounted for only 2 percent in 1990 and were negligible before that, they are unlikely to have played an important role in the Rust Belt's decline from 1950 to 1990. Furthermore, most of the affected regions were located outside the Rust Belt (see [Autor et al., 2013b](#), Figure 1B). [Bernard et al. \(2006\)](#) estimate negative effects of import penetration from low-wage countries on U.S. manufacturing employment between 1977 and 1992, though virtually none of these were in Rust Belt industries like fabricated metals, transportation equipment, or industrial machinery.

The evolution of competitive pressure in labor and product markets suggest that foreign competition played a minor role in the shrinking employment share of the Rust Belt. The timing is off by a couple of decades or more. Instead, the evidence suggests that the decline was largely homemade: persistent adversarial labor-management relations and, plausibly, non-competitive price-setting behavior by domestic producers in key Rust Belt industries. What is somewhat less obvious is *how* the lack of competitive pressure is linked to the subpar evolution of labor and total factor productivity in these same industries.

In [Alder et al. \(2017\)](#) the authors explore the hypothesis that state policies strengthening the ability of unions to hold up the firms – among them so-called “no right to work” rules – cemented the confrontational labor-management relations whose origins can be traced back to the 1930s and had dynamic effects on productivity and employment growth.

3 Analysis and Policy Implications

Since it is challenging to establish causality using conventional statistical tools in this context [Alder et al. \(2017\)](#) use a dynamic endogenous growth model to quantify the effect, if any, of labor market conflict on productivity growth and employment. The model captures the salient bargaining behavior of the major unions in the industries that dominated the industry mix around the Great Lakes shortly after World War II, namely the UAW and the USW. This being said, it is worth emphasizing that in other unionized sectors labor-management relations weren't nearly as adversarial as in the heavy Rust Belt industries and one must be mindful of these differences when it comes to the policy implications.¹⁵

In a conservative structural estimation, the model can account for about 55 percent of the overall decline between 1950 and 2000, and for more than 70 percent of the decline in the first three decades. Moreover, these labor market frictions not only account for a large fraction of the overall decline, but they also replicate the time path. The job losses are concentrated in the first three post-war decades and the switch to more cooperative labor-management relations in the 1980s is behind the stabilization

¹⁵For instance, while some airlines in the U.S. have similarly adversarial labor-management relationships, others like Southwest do not. To a considerable extent, this has to do with profit-sharing arrangements and widespread stock ownership among employees, which tends to align the interests of labor and management.

in the region's employment share.

The effects of the trade liberalization of the 1980s are more subtle. The contemporaneous and *static* effect is negative and reflects the fact that Rust Belt producers had accumulated a comparative disadvantage over the previous thirty years. Our reading of the policy debate is that this effect receives all the attention, but undeservedly so. The *dynamic* effect of freer trade flows is that it fosters innovation and hence manufacturing productivity growth in all regions of the United States. This is exactly what we observe in the data (Table 1). The strength of the dynamic effect in terms of regional employment *shares* does, however, depend on the productivity gap and the strength of the labor market friction in the Rust Belt in a more nuanced way. In particular, the change in labor-management relations is crucial for the stabilization of the region and a *reversal* of the job losses requires policies that promote labor market flexibility, which in turn foster innovation and productivity growth.

The structural model in Alder et al. (2017) allows for a decomposition of the Rust Belt's decline into those driven by domestic (labor market conflict) and foreign (international trade) forces. The authors find that the trade liberalizations of the 1980s and 90s *by themselves* account for less than three out of the 18 percentage point decline in the region's employment share. In contrast, the adversarial labor-management relations – while holding the extent of foreign competition constant – give rise to a seven percentage point loss and can hence account for about 40 percent of the shift in economic activity out of the Rust Belt. In addition, they find that more vigorous competition from abroad is key for the *overall* productivity growth acceleration of the 1980s (columns 2 and 3 in Table 1) and hence for broader and more sustainable income growth. The latter result serves as a cautionary tale against protectionist trade and foreign investment policies at a time when they have considerable political traction. Curbing foreign competition is unlikely to foster employment growth and, in addition, entails considerable costs in terms of foregone productivity growth.

The Rust Belt's decline illustrates that adversarial labor relations impede the sustainable creation of manufacturing jobs. High wage jobs that rely on union rents tend to undermine productivity and hence employment growth in the long run. Clearly, policies aimed at curbing further manufacturing job losses must take a different approach and our work highlights some key aspects. In particular, capital-skill complementarities were first documented in Krusell et al. (2000) and have spurred a large follow-up literature. In light of this technological reality – which, it's safe to say, is here to stay – a skilled workforce together with flexible labor markets and policies that foster capital investment are necessary conditions for the creation of jobs that stand the test of time. Investment, and hence job growth, will take place where prospective employers can rely on a first-rate education system – and hence a reliable pool of skilled workers – as well as competitive labor and capital markets.

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