Education and unequal regional labor market outcomes:

the persistence of regional shocks and employment responses to trade shocks

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Abstract: There are wide disparities in economic outcomes across regions, and these gaps appear increasingly persistent and sorted along educational attainment. Unlike the first 80% of the 20th century, in the last few decades, poor areas are no longer catching up with rich areas. Unemployment rate gaps are more persistent than previously thought, and that persistence is different across educational lines. Areas with adult populations with higher educational attainment maintain persistently low unemployment rates and those with populations with less educational attainment remain stuck with high unemployment rates. We argue one factor in this outcome is that the dominant manufacturing trade shock of the last thirty years - the China shock - has been concentrated on areas with a less educated workforce and that the impact of the shock has been worse in these areas. We suggest this has disrupted a domestic product cycle and makes it harder for areas with populations with less education contributing to persistently high unemployment rates. We conclude with policy recommendations.

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1. Introduction[1]

The last decade has brought increased attention to the plight of struggling regions in the United States and the sharp regional divides in economic outcomes. Growth and income have seemed concentrated in a limited number of successful cities, while a broad swath of communities seem to struggle. In part, the renewed attention has had a political motivation, as some have sought to understand voting patterns and outcomes in the 2016 U.S. election. More broadly, though, the sense that some areas of the United States are being left behind by globalization and automation has triggered new work and raised the profile of studies analyzing variation in regional economic outcomes and evaluations of place-based policies.

From the 1880 to 1980, poorer regions in the United States gradually caught up with richer regions, in no small part due to convergence in labor productivity (Mitchener and McLean 1999). In addition, many viewed labor markets as flexible enough to allow people to move out of regions hit with a negative shock and thus equilibrate unemployment rates across places (Blanchard and Katz 1992). Berry and Glaeser (2005) and Moretti (2011) note that regional income convergence had slowed or stopped in the late 20th century, beginning to question some of the assumptions that regionally concentrated shocks could be accommodated with nationally oriented policy. Austin, Glaeser, and Summers (2018) also establish this cessation of economic convergence and highlight the persistence of differences across regions in non-employment rates amongst prime age individuals. To them, this suggested that regionally targeted employment subsidies might be good policy.

Nunn, Parsons, and Shambaugh (2018) create a general index of economic prosperity and find surprisingly little movement across counties from 1980 to 2016. Despite a wide range of shocks and changes in the U.S. economy over that time, by and large, economically successful counties have remained such, and counties with a lower economic vitality index have continued to struggle. Education appears to play a crucial role in which counties thrive according to this index and which do not, and while counties that had very low high school graduation rates in 1980 have substantially closed the high school graduation gap, dispersion in the share of

[1] This paper borrows from Nunn, Parsons, and Shambaugh (2018) as well as Erikson, Russ, Shambaugh, and Xu (2019). We thank our co-authors on those projects for numerous conversations that helped shape how we think about these issues. We also thank Olivier Blanchard for helpful conversations and feedback. They are not, though, implicated in anything in this paper.

individuals with a college education has actually increased over time, as areas with higher rates of college-educated adults have added to their lead.

One might ask whether the types of shocks hitting the economy have changed over time. Autor, Dorn, and Hansen (2013) call attention to the fact that trade shocks hitting the United States had far more persistent labor market effects than one might assume given what was viewed as a flexible labor market. In particular, they find that commuting zones in the United States with a higher share of employment concentrated in the production of goods that China exported to advanced countries 1990-2007 suffered large and persistent negative labor market outcomes. The study highlighted the fact that the winners from trade generally did not compensate displaced workers, and that the losses could be both consequential and long-lasting. Eriksson, Russ, Shambaugh, and Xu (2019) show that the shock from China was targeted at areas with lower levels of education among the adult population, a fact that could help explain why less economically vital areas have remained so.

A number of think tanks have been exploring this issue for many years, looking for policy responses that might help struggling regions, including the Brookings Metro group (see for example: Hendrikson et al (2018)), the Economic Innovation Group (see for example: Economic Innovation Group (2016)) and the Upjohn Institute (see for example Bartik (1991, 2019).)

Nunn, Parsons, and Shambaugh (2018) contains a number of policy proposals for place-based policies that might combat some of the regional gaps. Bartik (2019) also lays out a number of policy options that could help regions persisting in states of low economic vitality or high unemployment. Policies that either stimulate labor demand in struggling regions, improve funding and public goods in poorer areas, improve educational and nutritional outcomes, or better connect struggling regions to the broader national economy all show promise.

This paper brings together a set of well-established and newly emerging stylized facts about regional inequality and adjustment to shocks in the U.S. economy. It notes that the income convergence across regions prevailing through much of the 20th century has largely stopped and that both good states appear less persistent and bad states more persistent in county-level labor markets that lag behind in levels of education among the adult population. Highlighting recent findings from Eriksson et al (2019), we note that labor markets in regions that were hit by the

very large China shock were in many ways already more prone to adverse effects than other regions, compounding the adjustment problem. We borrow from ideas from previous work (Eriksson et al (2019)) about how a product cycle playing out within the U.S. domestic economy has interacted with trade shocks, and in the last few decades has contributed to economic strains in already weak local economies, possibly compounding these broader trends in the persistence of local labor market outcomes. We conclude with a range of policy implications.

2. An End to Convergence

The existence of economic gaps across regions is not a new concept in the United States. Different regions had vastly different production profiles, and income levels were drastically large at times. Roughly a century ago, incomes in New England and the Mideast had per capita incomes more than two and a half times the incomes in the Southeast. Figure 1 shows that these large regional gaps dissipate to some extent over time. By 1980, no major region had an income per capita more than 15 percent above the national average, and none was more than 20 percent below it. The richer regions were still richer, and the Southeast in particular still lagged the national average, but growth in income per capita was faster in the poorer regions, suggesting the gaps were not permanent, and that national growth in some important way was being shared.[2]

The left panel of Figure 2 illustrates that even at the county level, one can see a similar pattern of convergence from 1960-80. The poorest counties in 1960 were the ones that grew fastest. Inequality both within and across regions was distinctly present, and by 1980, median household income still differed by a factor of 4 from richest to poorest counties, but the gaps were closing. Then regional convergence came to a halt around 1980. After 1980, there divergence across broad regions, as New England, the Mideast, and to some degree the South have pulled back away from the national average, ending the more uniform trend toward national per capital income seen in Figure 1. Likewise at the county level, in contrast to 1960-80, there is no evidence from 1980 to 2016 of convergence in household income. Poorer counties are no more likely to grow faster than rich counties anymore.

[2] See Hardy, Logan, and Parman (2018) for an important discussion of how racial geographic concentration combined with discrimination can contribute to different regional outcomes, a pattern particularly important for the Southeast.

Figure 1: Per Capita Income Relative to the National Average by Region, 1929-2017

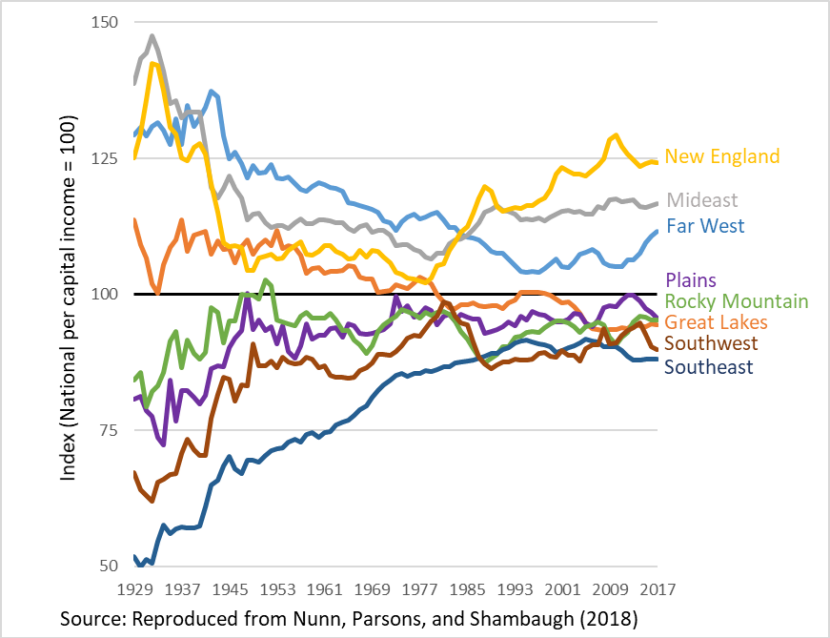
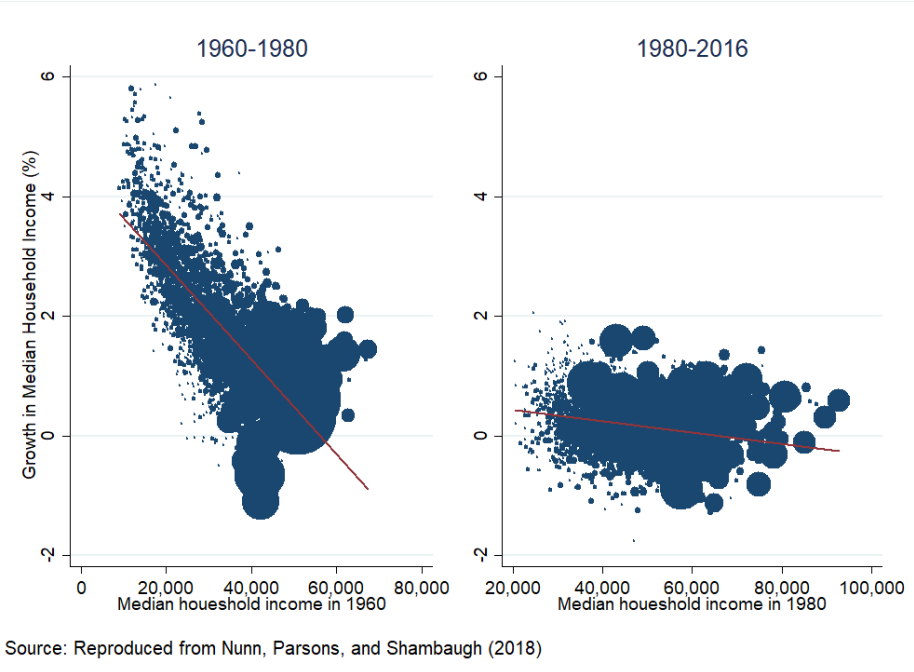


Figure 2: Levels and Growth of Real Median Household Income, 1960-80 and 1980-2016



Economic vitality. Rather than rely strictly on income, one can also pull together a range of economic statistics to create an overall sense of economic outcomes for a place. Nunn, Parsons,

and Shambaugh (2018) created a vitality index that is a combination of income, labor market outcomes, life expectancy, and vacancy rates to get a sense of the overall picture of the economic health of a county. Comparing the index in 1980 to 2016 shows that generally, the same places are thriving that were thriving in 1980, and very few places have moved substantially in their relative outcomes.

Table 1: Nunn, Parsons, and Shambaugh County Vitality Index, Mobility by Quintile

		2016 Vitality Quintile				
		1	2	3	4	5
1980 Vitality Quintile	1	71%	21%	5%	2%	1%
	2	23%	41%	19%	12%	5%
	3	5%	27%	34%	22%	12%
	4	0.5%	10%	31%	34%	24%
	5	0.0%	2%	11%	29%	58%

Source: Reproduced from Nunn, Parsons, and Shambaugh (2018)

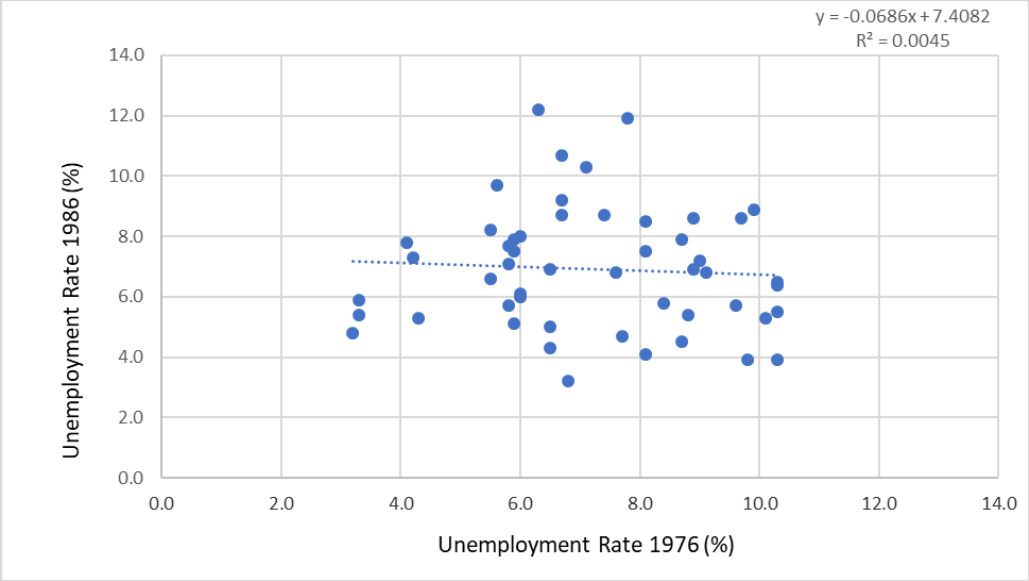
Table 1 shows that of the places in the lowest quintile of vitality in 1980, 92 percent of them are still in the lowest two quintiles by 2016, and just 1 percent had moved to the top quintile. None of the thriving places in 1980 had fallen to the bottom quintile, and 87 percent of them were still in the top two quintiles. There have certainly been some sharp moves in outcomes. Places like Manhattan and San Francisco were not thriving local economies in 1980, and by 2016 are some of the most economically vital counties in the United States. Conversely, places like Detroit and Cleveland used to be around the middle of the distribution and have fallen below it. But the gaps across top and bottom are no longer closing, and the bulk of places are maintaining their relative position in the ordering of the vitality index across places.

2. Growing persistence of labor market outcomes

In addition to gaps in measures of economic vitality that are now more persistent, shocks seem to have become more persistent as well. One of the more famous null results in economics is Blanchard and Katz's (1992) finding that unemployment rates across states in 1975 hold no predictive power for unemployment rates in 1985. The finding is replicated in Figure 3 below with updated state-level unemployment rates for 1976 and 1986. There is simply no predictive power for the condition of the labor market in a state in 1986 based on outcomes in 1976.

Blanchard and Katz showed that mobility was an important part of the convergence process as people moved out of struggling regions towards better employment outcomes.[3] Bound and Holzer (1980) also find that mobility is an important part of the response to labor demand shocks in the 1980s. Importantly, they find that workers with less education are less likely to move in response to a negative labor market shock.

Figure 3: Changes in State Unemployment Rates 1976-1986

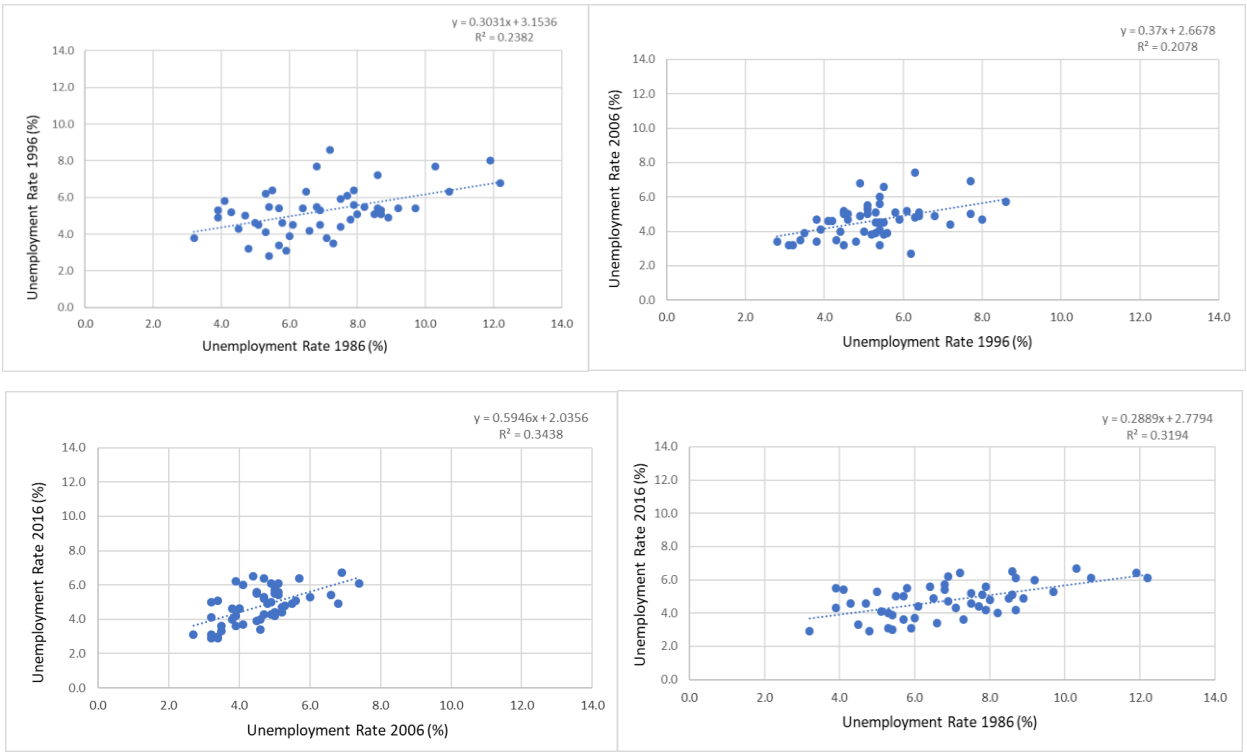


Persistence in unemployment rates over the long term. Figure 4 shows the relationship seems to have changed soon after the Blanchard and Katz finding, though. Unemployment rates in 1986 do have a reasonable predictive power for those in 1996. For every one percentage point above the national average in 1986, a state was likely to be 0.3 percentage points above the national average in 1996, and this alone could explain 24 percent of the variation in unemployment rates across states in 1996. The relationship appears similar over the following decade, and by 2006 to 2016, the outcomes are highly persistent. Either a wave of shocks are hitting the same states over and over, or unemployment is not fading back to the national average at the same rate as before. The flexibility of the United States labor market seems to have faded sharply.

One can instead look at county level persistence in unemployment rates. There are county data prior to 1996, but there are some issues with comparing census with CPS-based

[3] See Dao et al (2017) for updated discussion.

Figure 4: Changes in State Unemployment Rates 1986-2016



Source: U.S. Bureau of the Census LAUS, via FRED

unemployment rates, so we focus first on the 1996-06 and 2006-16 county-level results. The results for 1996-2006 at the county level show persistence similar to the state level, but the results from 2006-2016 are the most extreme. A higher level of the unemployment rate in 2006 suggests a nearly one-for-one higher unemployment rate in 2016. This is the only scatter plot that shows a hint of a positive nonlinear relationship. The counties with the highest unemployment rates in 2006, if anything appear to have an even higher unemployment rate in 2016. Unemployment in 2006 can explain 47% of the variation of unemployment rates in 2016. Places that are struggling continue to struggle.

A possible reason for the increasing persistence is declining labor mobility across the United States. Molloy et al (2016) document the decline in mobility across a wide range of measures. Nunn et al (2018) also show that even when there is mobility out of counties with lower economic vitality, it is generally to other weak counties. People from lower-vitality counties simply do not move to top-performing counties. Only 13 percent of those leaving counties in the lowest quintile of economic vitality are moving to counties with a high vitality

Figure 5: County-Level Unemployment Rate 1996 v. 2006 (%)

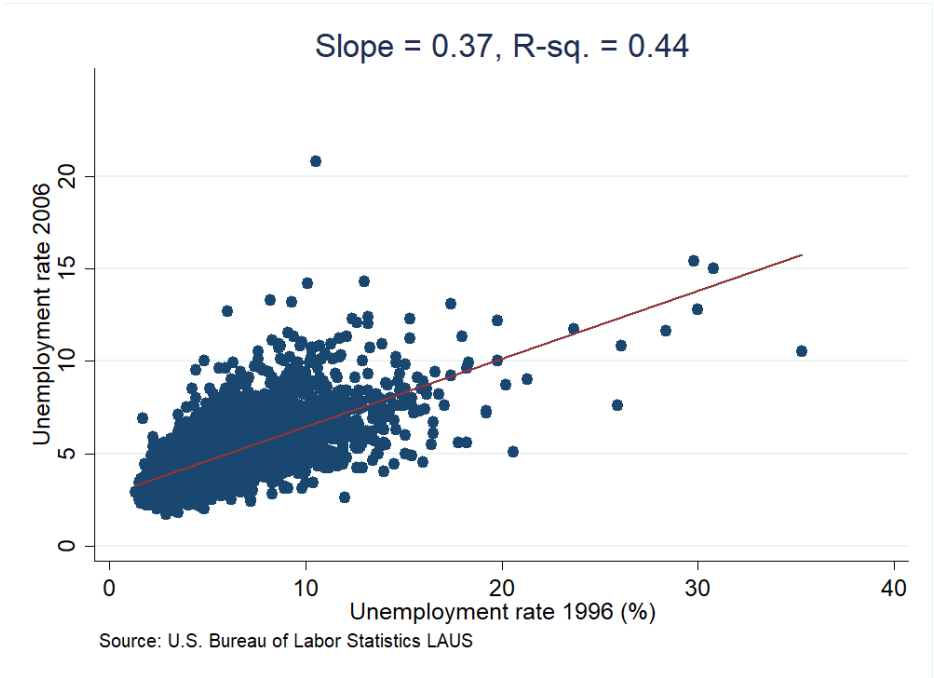


Figure 6: County-level unemployment rate 2006 v. 2016 (%)

index, while 34% actually move to other low-vitality counties.

In a recent paper, Dao et al (2017) find that the migratory response is less important than previously estimated, leaving a large change in the unemployment rate after a local labor demand shock. They also find, though, that in the past two decades, the response of population to shocks has decreased, taking away an important margin that lowers the unemployment rate after a shock.

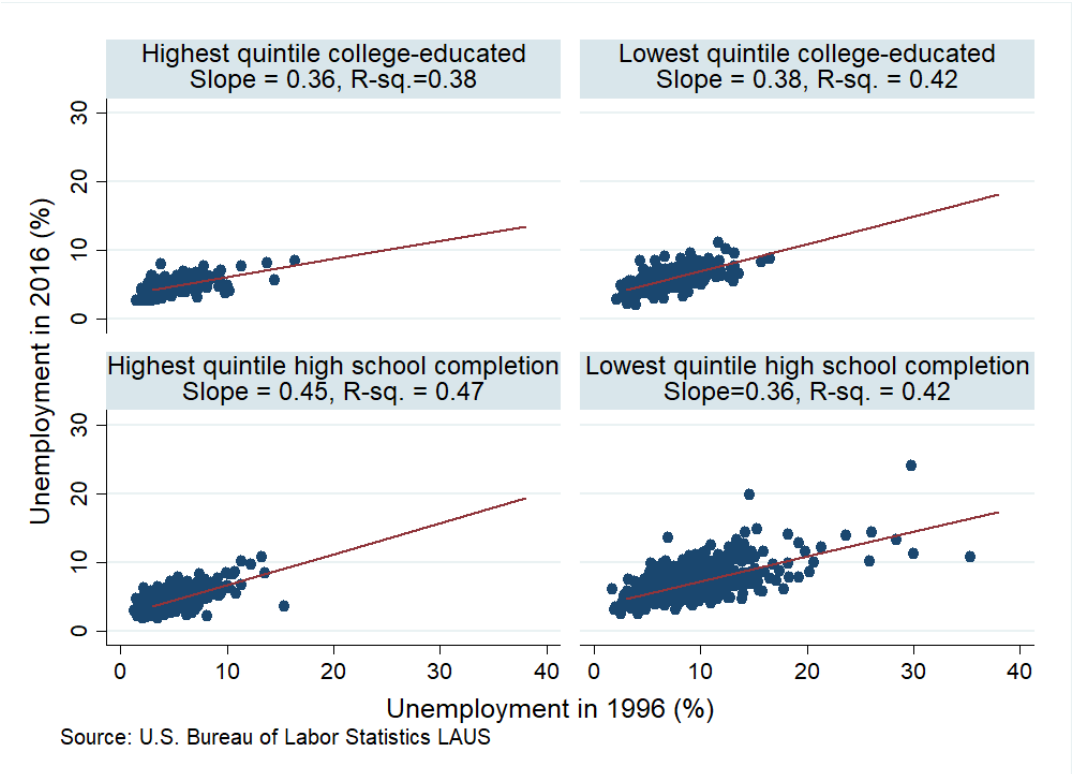
There are a number of reasons that have been advanced for the lower mobility. Two important results regarding the topic of this paper are that of Ganong and Shoag (2017), who find that increasing land use restrictions in top counties has limited inflows of people from less prosperous counties. Their results suggest that convergence has continued amongst the set of counties that have not restricted housing supply via land-use restrictions but has effectively ended between struggling counties and those who have restrictions. A different explanation – especially for the failure of people to move from weak to strong counties – comes from Autor (2019). In his AEA address, he shows that returns for less-educated workers are no longer higher in urban locations than they are in rural locations. Unlike highly educated workers who extract a large urban premium, less-educated workers may face high costs of living, but not higher wages in urban locales. This may mean that it is in fact not rational for a less-educated worker to move towards a high-vitality place, even if the average returns there appear higher.

It could be that increased persistence of unemployment at the local level – the failure of the American labor market to smooth shocks – is tied to lower mobility of less-educated workers. This would fit a number of results in the literature: first, the findings of Autor (2019) regarding urban premiums could explain why workers do not leave weaker regions; next, the findings of Eriksson et al (2019) – detailed shortly – that adverse trade-related shocks to manufacturing industries increasingly have been concentrated in low-education areas; further, the findings of Eriksson et al (2019) that the China Shock left lighter scars on places with a more highly educated adult population, and the related finding by Bloom et al (2019) that places with more highly educated workers were better able to pivot to non-manufacturing industries; and finally, the finding of Molloy et al (2016) that mobility is lower for places with a less-educated population. These all relate in a sense to the work of Skinner and Staiger (2007) showing that certain places in the United States are better able to adopt new innovations, and that these places

tend to have both higher social capital and higher education. All of these results suggest that the increasing persistence may be focused in counties with a lower level of educational attainment in the adult population.

At first glance, though, it does not appear that the increased persistence is only taking place in regions with less-educated workers. Looking at the most recent data (1996-2016), there is little difference in persistence across educational levels. In Figure 7, we divide counties into quintiles by both share of adults with a BA or more and share of adults without a high school degree. We then look at the top and bottom quintiles in each category. There is little difference in the degree of persistence across these groups when regressing 2016 unemployment rates on 1996 unemployment rates.

Figure 7: County Unemployment Rates 2016 v. 1996, by County Education Levels



In fact, if anything, there is a slight hint that there is more persistence in the places with a high fraction of adults who completed high school (measured as having at least 12 years of education). A crucial difference though, comes from looking at the numbers. The maximum unemployment rate for the top quintile counties for both ways of signaling high education is in

the 10-15 percent range. In neither 1996 nor 2016 are there many counties with even above 10 percent unemployment. In contrast, places with lower levels of education, there are many counties with between 10-20 percent unemployment rates, and in fact, even some higher than that.

A closer look, though, shows that the persistence is related to education in a crucial way. Despite the differences in mobility for adults with greater or less education, it is not the case that high-education places have persistent rates of unemployment or vice versa. Instead, we find that places with a greater fraction of adults with a high school and especially a college education are less likely to get stuck in bad outcomes (with high unemployment relative to the most of the country), and instead are likely to stay in very good outcomes, while places with a less-educated adult population are likely to get stuck in outcomes with a high local rate of unemployment and unlikely to have persistently low unemployment rates.

To demonstrate this, we look at transition matrices across quintiles of unemployment rates. That is, we divide all counties in a given year into quintiles of unemployment rates and test the extent to which counties are likely over a decade or two decades to shift to a different quintile. For simplicity, we focus on the percentage of counties that were in the lowest unemployment rate quintile that remain in that bin, and the percentage of high unemployment rate counties that stay in that bin. First, in Table 2, we show the results for all counties across two different time horizons. Looking at census data from 1970-80, we see roughly half of counties in the top quintile stayed there and similarly, roughly half that were in the poor outcome (defined as having an unemployment rate in the highest quintile) stayed there. The persistence is actually slightly higher from 1970 to 1990.

Looking across different groups for 1970-80, it is clear that there is somewhat more persistence in the poor outcomes for low education counties.[4] Those with low rates of education measured by either share with high school degrees or college degrees are likely to stay in bad outcomes, but rather unlikely to maintain with good outcomes, and conversely, low odds of persistence for low-education places to remain with good outcomes. Places with high levels of college degrees are relatively low persistence, but in a balanced manner. And, the areas with

[4] We use the unemployment rate bins defined to divide the full sample into unemployment rate quintiles. That is, we are testing whether counties stay in the top quintile of the full country sample, not the education subgroup.

Table 2: Probability that a County Begins and Ends in a High- or Low-Unemployment Outcome

		1970-1980	1970-1990
Full sample	All Counties		
	Stay in lowest quintile of unemployment	48	55
	Stay in highest quintile of unemployment	56	56
Places with high levels of education in 1970	Counties in highest quintile, fraction of college-educated adults		
	Stay in lowest quintile of unemployment	49	72
	Stay in highest quintile of unemployment	37	22
	Counties in lowest quintile of adults not finishing high school		
	Stay in lowest quintile of unemployment	52	70
	Stay in highest quintile of unemployment	46	21
Places with low levels of education in 1970	Counties in lowest quintile, fraction of college-educated adults		
	Stay in lowest quintile of unemployment	36	35
	Stay in highest quintile of unemployment	58	64
	Counties in highest quintile of adults not finishing high school		
	Stay in lowest quintile of unemployment	22	24
	Stay in highest quintile of unemployment	55	73

Source: U.S. Bureau of Labor Statistics LAUS and Census County Data Books (ICPSR)

fewer individuals dropping out of high school (having less than 12 years of schooling) do have some tendency to persist in the good state, but not in a dramatic fashion.

The real differences come when one views the right column of the table and sees the outcomes over a longer period of time (1970-1990). For these outcomes, there is a clear divide by education. Relative to other places, the counties in the lowest quintile of adult high school and college education are highly likely to persist with high unemployment and yet not likely to remain at low levels of unemployment, and the opposite holds for high-education places. In some ways, it is surprising that the persistence can actually grow over a longer horizon when there is more time for counties to shift from one outcome to another. It may be that there was something about the shocks in the 1970s, whether they be the oil shocks, the macroeconomic chaos of high inflation, or the trade shock of rapidly rising imports from Japan, that led to a reshuffling of economic outcomes, but by 1990, things had in part returned to a status quo.

Table 3 shows a similar pattern in the later period, 1996-2016, perhaps with even more intensity with respect to initial levels of education if we take the fraction of adults in the county with a high school education in 1990 as a benchmark, rather than 1970. About two-thirds of counties with the lowest fraction of high-school or college-educated adults that are in the top quintile of county unemployment rates remain in this state of high unemployment, making them twice as likely to get stuck in a bad state compared to counties with the highest levels of education.

Table 3: Probability that a County Begins and Ends in a High- or Low-Unemployment Outcome

		1996-2016
Full sample	All Counties	
	Stay in lowest quintile of unemployment	60
	Stay in highest quintile of unemployment	61
Places with high levels of education in 1990	Counties in highest quintile, fraction of college-educated adults	
	Stay in lowest quintile of unemployment	53
	Stay in highest quintile of unemployment	30
	Counties in lowest quintile of adults not finishing high school	
	Stay in lowest quintile of unemployment	69
	Stay in highest quintile of unemployment	38
Places with low levels of education in 1990	Counties in lowest quintile, fraction of college-educated adults	
	Stay in lowest quintile of unemployment	25
	Stay in highest quintile of unemployment	64
	Counties in highest quintile of adults not finishing high school	
	Stay in lowest quintile of unemployment	29
	Stay in highest quintile of unemployment	67

Source: U.S Bureau of Labor Statistics LAUS and U.S. Census County Data Book (ICPSR)

In short, the high persistence in county outcomes is not a feature just of counties with low or high levels of education, nor is it the case that the persistence is similar across different educational levels. High education places that have good outcomes are likely to remain, while those with bad outcomes seem to escape them. The opposite is true of low education places.

Education and places with the highest unemployment. Another way to see this persistence is looking at the share of counties in the highest and lowest quintile of unemployment rates across the different educational subgroups. Figures 8 and 9 show the share in 1970, 1980, 1990, 1996, and 2016 for the different educational quintiles, with educational quintiles defined using county-level data in 1970. A large share of those counties with a high share of adults without a high school degree are in the high-unemployment quintile throughout the period. Based on thetransition matrices, it seems once a county faces high unemployment relative to the rest of the country, it is unlikely to shift out of it unless a high fraction of the population has a high school or college education. This leads to a higher prevalence of the counties with the least-educated population being disproportionately represented among counties with the highest unemployment rates, while counties with the highest prevalence of high-school- and college-educated adults grow less likely to experience the most severe joblessness. The growing gap suggests that economic outcomes are far more sorted by education than they were in 1970 or 1980.

In summary, we argue that regional convergence has stopped and in some respects reversed in recent decades. We note that counties overall, if they begin in a very high- or low-unemployment state relative to other counties in 1970, appear roughly equally likely to remain in that state 20 or even more than 45 years later. Finally, we show that the likelihood of persisting in a condition of high unemployment if a county had a high unemployment rate in 1970 (or of falling into a condition of high unemployment if they did not) is much higher for counties with low levels of high-school- and college-educated adults than their chance of persisting in a good state or getting out of a bad one. The picture is much rosier for counties with a higher fraction of high-school and college-educated adults. This means that counties with low levels of education are now roughly five times more likely to be among the U.S. counties with the highest levels of unemployment than counties with the most educated populations, but about one-fifth as likely to be among the strongest U.S. labor markets. The strength of local labor markets is stratified by education.

One might suspect that the stratification of labor market strength by education may be related to long-run shifts in technology in what is referred to as a skill-biased manner. This "skill-biased technological change" (SBTC) suggests that technological advances in the last few decades have typically been to the advantage of those with high levels of education, while

Figure 8: Percentage of U.S. Counties in Bottom Quintile of Unemployment Rate,

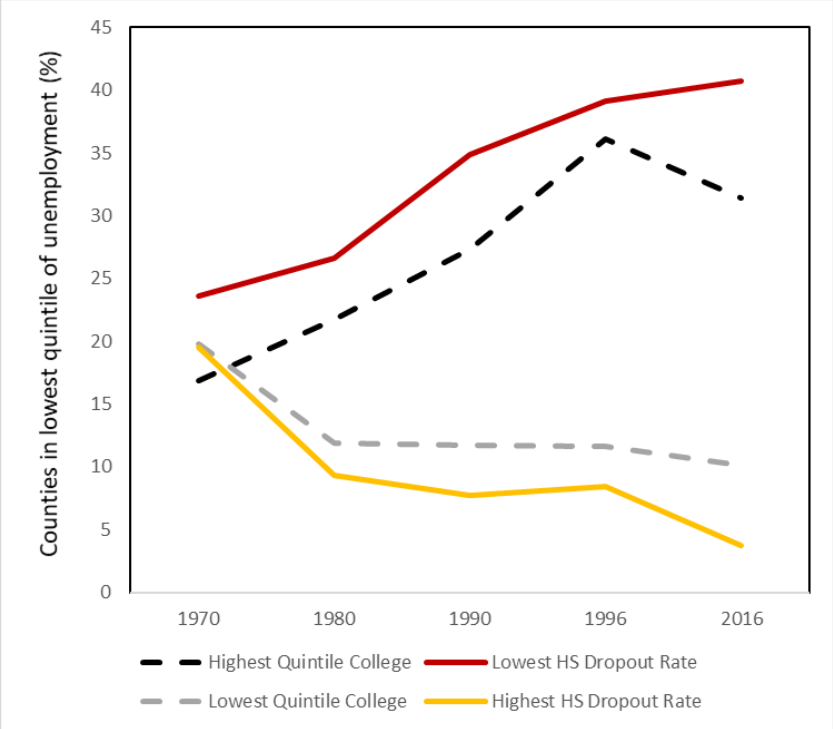
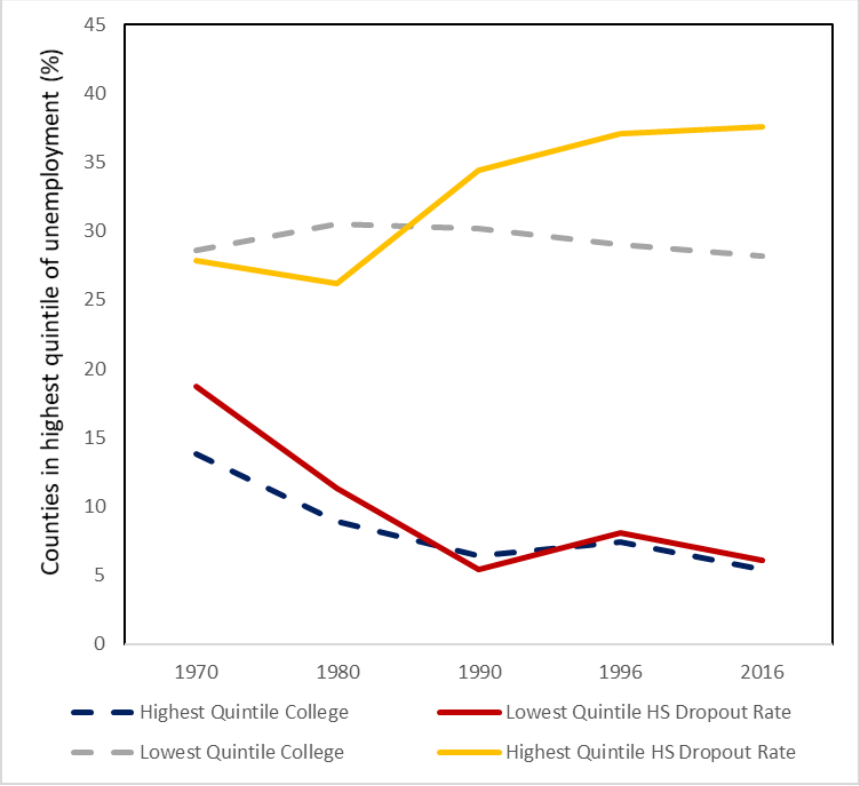


Figure 9: Percentage of U.S. Counties in Top Quintile of Unemployment Rate



often making redundant the skills and training of those with less education. In this interpretation, managers, scientists, and computer programmers have seen their skills increase in value while those with less education may have found their skills less valuable. See Goldin and Katz (2008) for an extensive treatment of the issue and evidence on the increase in skill and educational premiums from 1980-2005. While this is almost certainly an underlying force, the next section highlights another channel: trade shocks and the shifting manufacturing landscape in the United States.

3. Trade Shocks

We posit that either the incidence or impact of other types of shocks may also be stratified by education. Recent trade-related manufacturing shocks have often been concentrated on places with a less-educated workforce, in ways that differ from prior trade shocks to manufacturing. As shown in Eriksson et al (2019), manufacturing employment in the United States used to be clustered in higher-education areas. In Table 4 below (drawn from Table 1 of Eriksson et al (2019)), one can see that shares of workers involved in manufacturing were positively correlated with both education and patenting activity across commuting zones. By 1990, though, there is no correlation with education and very little with patenting. Manufacturing employment generally lost its historically strong link with high-education, high-innovation areas.

Table 4: Correlations with Historical County Employment Shares in Manufacturing Industries

	1910	1960	1990
Patents per capita 1890-1910	0.36***	0.29***	0.09***
Patents per capita 1970-1975	0.39***	0.33***	0.10***
Education% 6-14-year-olds enrolled in school	0.21***		
% pop. age 25+ with HS or college		-0.05	0.03

Source: Reproduced from Eriksson, Russ, Shambaugh, and Xu (2019)

This shift in the overall location of manufacturing understates the types of areas hit by manufacturing-related trade shocks. While some industries may gain a connection with a particular area and the centrifugal forces of agglomeration effects can keep activity in a

particular area for considerable periods of time Krugman and Venables (1995), individual industries do move across the United States over time. We again look to the results of Eriksson et al (2019) to show the way the U.S. production location of those products that China began exporting to the rest of the world in large quantities shifted over time. In the figure below, we show the rank of exposure to the "China Shock" industries based on the employment shares at the commuting-zone-level of those goods most exposed to the China Shock. We show the evolution of these locations from 1910 to 1990. In 1910, these goods are highly concentrated in New England and the Great Lakes manufacturing belt. By 1960, there has been some shift towards the Appalachian region around Tennessee and North Carolina, but by 1980 and especially 1990, the shift has been quite dramatic. By then, much of New England and the Great Lakes regions have shifted to other types of production, while Alabama, Tennessee, North Carolina, and Mississippi have substantial exposure to the China Shock.

Replicating the Table 4 above, but with exposure to the China Shock industries, instead of manufacturing overall, one can see a more extreme shift to areas with less innovative activity and where adults have less education.[5]

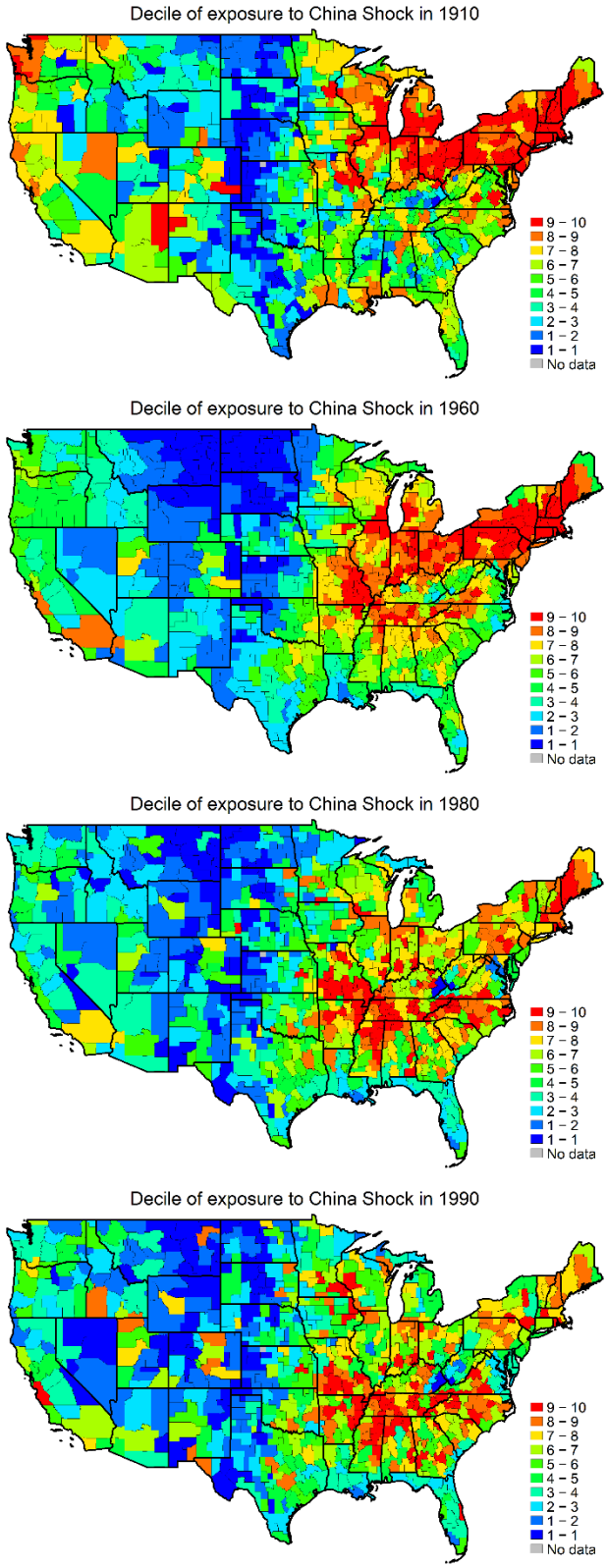
Table 5: Correlations with Historical Employment Shares in 1990-2007 China Shock Industries

	1910	1960	1990
Patents per capita 1890-1910	0.48***	0.34***	0.06
Patents per capita 1970-1975	0.44***	0.32***	0.05
Education% 6-14-year-olds enrolled in school	0.29***	.	.
% pop. age 25+ with HS or college	.	-0.05	-0.19***

Source: Reproduced from Eriksson, Russ, Shambaugh, and Xu (2019)

[5] It is important to note that Autor Dorn and Hansen (2013) control for education as well as many other local characteristics, so their results are not driven by this fact. These observations are not intended to comment on their results as much as note the challenges faced nationally when a sizable shock is concentrated in weaker economic areas.

Figure 9: Rank of exposure to China shock 1910-1990, by commuting zone



Source: Reproduced from Eriksson, Russ, Shambaugh, and Xu (2019)

It is worth noting that this shock, which began around 1990, looks quite different than what could be called the Japan Shock that came in the 1970s.[6] As shown in Eriksson et al (2019), Table 5 below illustrates that exposure to the Japan Shock is positively correlated with both patent activity and education up through 1990. The areas that were facing the shock were not disproportionately lower in education like those facing the China Shock, and they were closer to centers of innovation. Batistich and Bond (2019) also find no aggregate effect of the Japan shock on manufacturing employment. Rather, they find the effect is stratified, with manufacturing employment declining among black workers without a high school education and increasing among college-educated white workers.

Table 5: Correlations of Historical Employment Shares in Japan Shock Industries

	1910	1960	1990
Patents per capita 1890-1910	0.38***	0.42***	0.15***
Patents per capita 1970-1975	0.38***	0.41***	0.23***
Education% 6-14-year-olds enrolled in school	0.19***	.	.
% pop. age 25+ with HS or college	.	0.00	0.14***

Source: Reproduced from Eriksson, Russ, Shambaugh, and Xu (2019)

The fact that the trade shocks of the 1990s and 2000s were more focused on places with high shares of workers with less education likely contributed to a response involving less mobility and higher persistence, based on both the results in Bound and Holzer (2000) that adults with less education were less likely to move in response to negative labor market shocks and the results in Malloy et al (2016) that individuals with less education were less likely to move overall.

Batistich and Bond (2019) note the difference in the impact of the Japan Shock and the China Shock on U.S. manufacturing, "our evidence suggests that Japanese competition led to a change in the skill composition of manufacturing; for China the negative effects have been felt at all skill levels (Autor et al., 2013)." To us, this suggests a difference in the nature of the industries hit by the two shocks. In Eriksson et al (2019) we posit that the best way to interpret the shifts in

[6] The collection of industries exposed to imports from Japan created in the same manner as the China Shock is in Autor Dorn and Hansen (2013). See Eriksson et al (2019) for details.

production across locations within the United States is to consider a domestic product cycle model along the lines of Vernon (1966), Krugman (1979), and Grossman and Helpman (1991).

The formulation in Krugman (1979) provides a concise, tractable model to formalize the ideas. In the international context, advanced economies with higher education and better developed innovation systems concentrate on research and development, innovation, and the creation of new products. Once these products become more routinized, their manufacturing shifts towards countries with lower levels of education and lower manufacturing wages. Identifying such a shift within a country has challenges because one needs some exogenous mark of what are in fact late-stage product cycle goods.[7] Manufacturing goods in general show some degree of this pattern, but manufacturing includes a wide range of both new and innovative and older and routinized products at any given point in time. In Eriksson et al (2019) we use the assumption that goods China produced and sent to the rest of the advanced economies beginning in 1990 are in fact late-stage products – given that they moved production from high-income countries to the, at the time, much poorer China.

The shift of these products from high-education areas to low-education areas follows the intuition of the product cycle. That same logic, though, highlights that if there are trade shocks from countries that are exporting either new and innovative – or a mix – of products, that trade shock will be either concentrated in its effect on higher-education, higher-innovation areas, or it will be spread across the country. This maps the 1970s into the early 1980s Japan shock. If instead, a trade shock is concentrated on late stage products, it will primarily hit lower-education areas that are specializing in these products.

Compounding the fact that the shocks are concentrated in low-education areas, the results in Eriksson et al (2019) show that conditional on the size of the China shock, it is worse in the low-education areas. This makes sense if these areas are less well-prepared to innovate out of shocks and shift to new products.[8] Bloom et al (2019) find that in high-education areas there is a more rapid shift to non-traded activity that cushions the China Shock. It is not just these areas

[7] Lacking some exogenous mark of late stage products, one is caught in a tautology where goods produced in low education areas are late stage products, and hence the relationship holds.
[8] Skinner and Staiger (2007) show that the same areas of the United States consistently are early adopters of new innovative technologies and that this greater innovative capacity appears linked to education and social capital in these areas.

that are hurt, though. Other areas that face disproportionately large impacts from a given exposure to the China shock are those with high manufacturing wages (those most likely to be ripe for new competition) and those that were reducing their focus on China Shock industries before the shock hit. These are places that perhaps should have already shed an industry based on its match for their local area, but had not yet done so and were quite vulnerable to a shock.

One way to interpret the particularly large impact from the China Shock is that it has in some ways shortened the product cycle within the United States that had operated for the bulk of the 20th Century. High-income, high-education, and high-innovation places are still able to play the core role in the economy they have always played: generating new ideas and new goods and services. But, rather than the production of those products shifting over time to areas inside the United States that have a higher share of adults with lower levels of education, they may now be shifting directly overseas, skipping one stage in the domestic product cycle, and crucially, the stage that brought the most benefit to these areas. If so, then these areas, once struck with a shock, will find it particularly hard to switch to a new type of industry or production, and could stay in depressed economic outcomes for protracted periods of time due, in part, either to the lower mobility of less-educated workers in these regions or to lower levels of innovative capacity. Fort et al (2018) and Bloom et al (2019) observe this type of switching in areas that proved the most resilient to import competition from China.

4. Policy Implications

Before exploring the policy implications, it is important to remember a number of facts about the nature of the China Shock. First, the shock itself is evolving. As China grows richer, better educated, and more focused on high-tech products (as in the Made in China 2025 plan), the impact of imports from China will shift towards areas of the United States with higher levels of education. While not minimizing the impacts on those areas, it suggests that broader national policy responses may be sufficient to help these areas if the shock is more diffuse and the areas are less dependent on any one given type of production.

In addition, some argue that the "shock" from import competition will not be repeated on such a large scale. Proponents note that there is simply no other economy that is both as large

and as disconnected from the world economy that could suddenly enter into world trade. There are other huge labor markets (India, for example) or others that are shut off from the world (North Korea), but no individual country has the dual aspects that a China in 1980 possessed.

It is also the case that another shock to manufacturing would likely have a different set of impacts on the United States. Manufacturing is a smaller share of employment, and is far more oriented towards higher education workers than in the past. This may mean that communities and workers in manufacturing industries may be less vulnerable to protracted damage from manufacturing shocks than in the past.[9]

But, there still remains a major issue of how to support those communities that have been left behind by technology and trade. The prime-age employment rate in the lowest quintile counties (ranked by employment rate) was just 67 percent from 2012 to 2016 compared to 83 percent in top performing counties. Unemployment rate shocks are increasingly persistent. Places with high rates of unemployment maintain them for decades, suggesting labor markets that are not self-equilibrating. As noted above, places with high unemployment rates – especially those with low levels of education – remain the counties with the highest unemployment rates over protracted periods of time. Policies that only focus on the domestic macroeconomy as a solution to unemployment seem to fail to reach these communities.

A range of place-based policies, in particular those that focus on labor demand in depressed areas, seem to provide opportunities to improve the lives of millions of Americans. People either seem to not want to leave struggling communities, or their opportunities in thriving regions are limited or inaccessible. It is almost certainly the case that some people in struggling regions would prefer better ability to move to other places. For these people, improved educational options via better access to colleges and universities outside their home region as well as increased housing supply in booming regions to accommodate new workers would both likely make sizable improvements in many peoples' lives. But policies cannot assume that people will simply leave when a region is struggling. Many people are attached to a place, to

[9] It is an open question what effects services offshoring may have in the future.

family and friends, or to a personal history to want to move simply because their economic fortunes have changed.[10]

For those that either prefer not to move or have limits on their ability to move, the question is how to direct economic activity to struggling places. Improving education in these places would almost certainly make sizable improvements in many peoples' lives. Better funding both for K-12 education and better options for accessing higher education are crucial, as are improved training and community college options that can generate better employment options. Given the degree to which high unemployment rate outcomes are clustering in places with populations that have lower levels of education, it seems important to address those educational gaps.

At the same time, improved labor demand via subsidy aimed at workers in struggling places (e.g. Fajgelbaum and Gaubert 2018, Austin et al 2018, Neumark 2018, and Bartik 2019) and improved access to science and technology (e.g. Baron et al (2018)) can improve peoples' employment prospects. Investments in infrastructure may improve market access for local ventures, which Donaldson and Hornbeck (2016) and Jaworski, Kitchens, and Nigai (2018) show has been an important protagonist for economic growth in regions that previously were harder to reach from key ports or land routes. Reducing impediments to transport such as the Jones Act may have a similar effect (Olney 2019; Grabow, Manak, and Ikenson 2018). Others have proposed targeted immigration policies that might prevent a declining population from reducing vitality in a place (EIG 2019). There is no magic solution to the struggles in these communities, and many previous attempts have failed, or primarily shifted benefits to landowners able to capture the gains, but given the scope of the problem and lack of convergence or mobility compared to many decades ago, it seems continued policy experimentation is warranted.

5. Conclusion

The United States has always been a collection of different regions, cultures, and economies. Sizable gaps in economic outcomes have been part of the country for centuries. At the same time, it seems the income gaps across regions are no longer closing and if anything

[10] See Florida (2019) for discussion.

could be growing. Likewise, local unemployment rate gaps have become more persistent and a number of places have maintained stubbornly high unemployment rates for a protracted period of time. High-education places are more likely to persist with very low unemployment while low education places seem to cycle out of low unemployment rates but instead stay in a high unemployment rate state once they are there.

Areas with lower levels of education in the United States have faced the worst of both outcomes and persistence in recent decades. Part of this likely represents long term trends in skill biased technological change, but it may also be reflective of a changing nature of trade shocks over time. The China Shock hit lower education areas disproportionately, appearing to disrupt a domestic product cycle by providing competition for late stage product cycle goods and putting extreme pressure on those regions that specialized in these goods relative to those areas that tended to generate new innovations and new products.

In the end, it is important for American policymakers to recognize that income convergence has stopped and labor market flexibility no longer equilibrates unemployment rates across regions. Recognizing that different types of shocks hitting the country may affect different regions, and importantly have different degrees of permanence, will be crucial to understanding the degree to which a national macroeconomic policy response is sufficient or if more targeted policies are needed.

References:

Allen, Treb and Dave Donaldson (2018), "The Geography of Path Dependence," unpublished working paper.

Austin, Benjamin, Edward Glaeser, and Lawrence Summers. 2018. "Saving the Heartland: Place-based Policies in 21st Century America." Brookings Papers on Economic Activity (2018)

Autor, David H., David Dorn, and Gordon H. Hanson. 2013. "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." American Economic Review 103 (6): 2121–68.

Autor, David. 2019. "Work of the Past, Work of the Future." Allied Social American Economics Association Annual Meeting Richard T. Ely Lecture. 4 January. https://www.aeaweb.org/webcasts/2019/aea-ely-lecture-work-of-the-past-work-of-the-future

Bartik, Timothy J. 1991. Who Benefits from State and Local Economic Development Policies? W.E. Upjohn Institute.

Bartik, Timothy J. 2019. "Should Place-Based Jobs Policies Be Used to Help Distressed Communities?" Upjohn Institute Working Paper no.19-308. 7-31-2019.

Batistich, Mary Kate, and Timothy Bond (2018) Symptoms Before the Syndrome? Stalled Racial Progress and Japanese Trade in the 1970s and 1980s. Working Paper

Berry, Christopher R. and Edward L. Glaeser. 2005. "The divergence of human capital levels across cities," Papers in Regional Science 84(3): 407-444.

Blanchard, O. J. and L. Katz (1992): "Regional Evolutions," Brookings Papers on Economic Activity, 1–75.

Dao, Mai, Davide Furceri, and Prakash Loungani. 2017. Regional Labour Market Adjustment in the United States: Trend and Cycle. Review of Economics and Statistics 99(2): 243-257.

Economic Innovation Group, 2016, "The New Map of Economic Growth and Recovery."

Eriksson, Katherine, Katheryn Russ, Jay Shambaugh, and Minfei Xu, (2019) "Trade Shocks and the Shifting Landscape of U.S. Manufacturing," NBER Working Paper no 25646.

Florida, Richard, "Don't Move People Out of Distressed Places. Instead Revitalize Them." Citylab, 9-12-2019

Fort, Teresa, Justin Pierce, and Peter Schott (2018), "Perspectives on the Decline of US Manufacturing Employment," Journal of Economic Perspectives, Vol 32. No.2 (Spring 2018)

Ganong, Peter, and Daniel W. Shoag. 2017. "Why Has Regional Income Convergence in the U.S. Declined?" Journal of Urban Economics 102 (November): 76–90.

Goldin, Claudia and Lawrence Katz. 2008. The Race Between Education and Technology. Belknap Press for Harvard University Press.

Grabow, Colin, Inu Manak, and Daniel Ikenson. 2018. "The Jones Act." Cato Institute Policy Analysis No. 845. 28 June 2018.

Hendrikson, Clara, Mark Muro, and William Galstone, 2018, "Countering the Geography of Discontent," Brookings Metro Report.

Krugman, P. and A. J. Venables (1995): "Globalization and the Inequality of Nations," The Quarterly Journal of Economics, 110, 857–880.

Krugman, Paul. 1979. "A Model of Innovation, Technology Transfer, and the World Distribution of Income." Journal of Political Economy 87(2): 253-266.

Mitchener, Kris J. and Ian W. McLean. 1999. U.S. Regional Growth and Convergence 1880-1980. The Journal of Economic History 59(4): 1016-1042.

Molloy, Raven, Riccardo Trezzi, Christopher L. Smith, and Abigail Wozniak. 2016. "Understanding Declining Fluidity in the U.S. Labor Market." Brookings Papers on Economic Activity 2016 (Spring): 183–259

Moretti, Enrico. 2011. "Local Labor Markets." Handbook of Labor Economics. Eds. Ashenfelter, Orley and David Card. Elsevier, North Holland.

Nunn, Ryan, Jana Parsons, and Jay Shambaugh (2018), "The Geography of Prosperity," in Ryan Nunn and Jay Shambaugh ed., Place Based Policies for Shared Economic Growth, The Hamilton Project.

Olney, William. 2019. Cabotage Sabotage? The Curious Case of the Jones Act. Department of Economics Working Papers 2019-03, Department of Economics, Williams College.

Staiger and Skinner 2007, "Technology Adoption from Hybrid Corn to Beta Blockers", in Ernst R. Berndt and Charles R. Hulten, eds., Hard-to-Measure Goods and Services: Essays in Honor of Zvi Grilliches, University of Chicago Press and NBER, Chicago, IL, 2007

Vernon, R. (1966): "International Investment and International Trade in the Product Cycle," The Quarterly Journal of Economics, 80, 190–207.