Racial Heterogeneity in the U.S. Structural Transformation and Regional Convergence[*]

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Abstract

Structural transformation and regional convergence in U.S. income have been long-standing trends. Caselli and Coleman (2001) discovered that 60% of regional convergence between the U.S. South and North from 1940 to 1990 is due to structural transformation. Our replication confirms these robust findings. Examining black and white populations separately, we find the magnitude of the regional income convergence was much larger for the black workers and structural transformation explains most regional income convergence for white workers but only 30% for black workers. Extending the analysis until 2020, we observe income convergence among black workers and divergence among white workers. Structural transformation's role in income convergence or divergence from 1990 to 2020 is negligible.

Keywords: Structural Transformation, Regional Convergence, Racial Heterogeneity
JEL Codes: O1, R1

1 Introduction

Structural transformation and regional convergence in wages are the two well-documented long-run trends observed in the U.S. economic growth in the last century. In a joint study of these two phenomena, Caselli and Coleman (2001) decompose the convergence of labor income between the North and the South into three channels. The first one is the *labor reallocation* channel, which captures the convergence of labor force composition. Since the South was more abundant in agricultural labor force, it had more workers escaping from low-wage agriculture. The second one is the *between-industry* channel, which captures the economy-wide convergence of agricultural wages to non-agricultural wages between 1940 and 1990. Since the South was more agriculture-intensive, higher agricultural wages further contributed to the convergence of southern incomes to northern incomes. Lastly is the *within-industry* channel, which captures the convergence of wages that occur within industry. This refers to the catching-up of southern wages to northern wages within agriculture and non-agriculture.

The advantage of such a decomposition is that it allows us to assess the role of structural transformation on the convergence of regional incomes. Structural transformation, regardless of the mechanism it is driven by, is characterized by (i) workers escaping the low-wage agriculture sector, and (ii) increasing relative wage of the agricultural sector. In this sense, the first two channels of the decomposition, the labor reallocation and between-industry channels, quantify to what extent structural transformation also contributed to the convergence of income between the North and the South. In their empirical exercise, Caselli and Coleman (2001) find that more than half of the regional convergence between the U.S. South and the North from 1940 and 1990 is attributed to structural transformation.[1]

In this paper, we first conduct a narrow replication and confirm that these results are accurate and robust. Then, we conduct a broad replication by revisiting these results in two ways. First, we examine the contribution of structural transformation on the regional convergence separately for black and white populations. While the heterogeneous effects of structural transformation has been studied in the recent literature (e.g., Buera and Kaboski (2012)) on skill premium and wage

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[1]Caselli and Coleman (2001) also provides a theoretical model to reconcile their empirical findings. In this paper, we primarily focus on their empirical results.

inequality, Ngai and Petrongolo (2017) on gender wage gap), little is known about how structural transformation affected black and white workers differently in the U.S.

We confirm that structural transformation played a major role for the convergence of the southern incomes to northern income at the aggregate level. However, the racial decomposition exercise suggests that such phenomenon was mostly prevalent for the white workers. First, the magnitude of regional convergence was much more pronounced among the black workers. Between 1940 and 1990, the decline in the income differential between the South and North was 3.5 times larger for the black workers. Second, the contribution of structural transformation for the regional income convergence also vastly varies between white and black workers. For white workers, structural transformation explains 93% of the South-North wage convergence between 1940 and 1990. For black workers, on the other hand, it only explains 30% of this convergence. For black workers, southern incomes converged to northern income between 1940 and 1990 mainly because of South-North convergence of within-sector incomes, i.e., convergence of southern and northern black incomes within agriculture and non-agriculture. We interpret these results to be consistent with a faster decline in racial discrimination against black workers in the South, which includes employer bias and barriers to educational attainment and acquiring human capital.

Although the degree of racial discrimination was significant in both the North and the South, it also varied considerably between the two regions. Until 1940, southern black workers faced a higher degree of discrimination in the labor market and were more segregated than northern black workers (Sundstrom 1994). With the implementation of civil rights laws in the 1960s, the conditions for black workers in the South underwent a dramatic change, and the disparity in the degree of racial discrimination between southern and northern black workers rapidly diminished as well. Our results suggest that for black workers, the main driver behind the convergence of income between the North and the South was not structural transformation, but rather the faster resolution of racial discrimination in the South.

We extend the observation period up until 2020. Noticeable trends emerged in the post-1990 U.S. economic growth are slowdown of both structural transformation and regional convergence.

Figure 1: Convergence of South and North Average Wages, 1940-2020
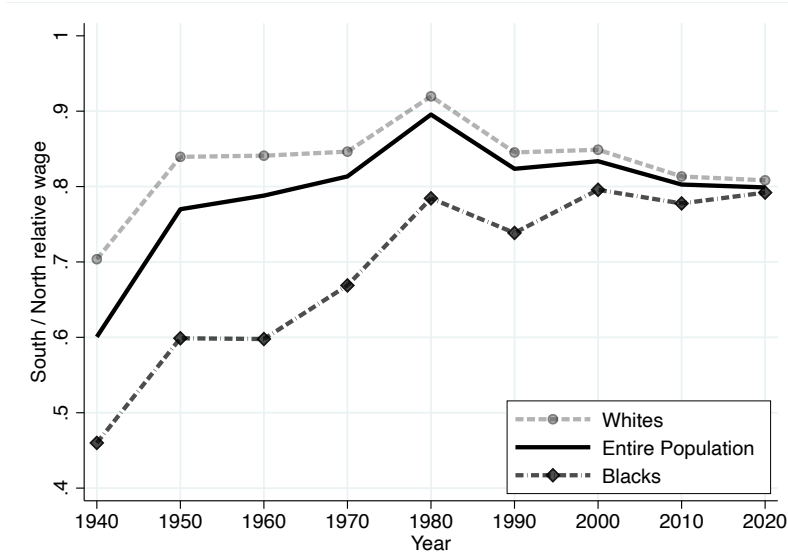
Note: This figure shows the average relative wages of southern workers to that of northern workers from 1940 to 2020 by race. For the data source and sample restrictions, see Section 2.

Table 1 summarizes these two features. As seen in the first row of Panel A, agricultural share of employment in the U.S. steadily declined until 2000 but the trend is reversed post 2000.[2] The same reversion is observed in the regional relative wages. South-North relative wage in Panel B had been converging until 1980, but has been diverging since then. The divergence of regional income is not only observed between the North and South. Midwest-North and West-North ratio of labor income has also diverged since 1980. A natural question is whether the slowdown of structural transformation contributed to regional divergence.

We also find differential patterns of regional convergence between black and white workers in recent years. While the South-North income gap has broadened among white workers between 1990 and 2020, the gap between southern black workers and northern black workers has been further reduced in the same period. Figure 1 illustrates the racial heterogeneity in South-North income convergence in the recent period. While the South-North income gap is observed to be reduced for both races until 1980, only black workers show the continued pattern post-1980. Decomposing the total convergence between 1990 and 2020, we find that structural transformation

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Table 1: Structural Transformation and Regional Convergence in the United States

	1940	1960	1980	2000	2020
	A. Structural Transformation				
Agricultural share of employment	.202	.068	.030	.019	.021
Agricultural relative wage	.36	.54	.70	.71	.68
	B. Regional Convergence				
South/North relative wage	.60	.79	.89	.83	.80
Midwest/North relative	.84	.97	.99	.86	.82
West/North relative wage	.99	1.04	1.03	.96	.92

Notes: This table replicates the Table 1 in Caselli and Coleman (2001) with the extended sample. States in the North are Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. States in the South are Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. States in the Midwest are Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, South Dakota, and Wisconsin. States in the West are Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

is attributed to a mere 0.1 and 0.2 percentage point reduction in the South-North income gap for white and black workers, respectively. Structural transformation still helped to narrow the regional income gap, but its effect was insufficient to offset the opposing force.

The rest of the paper is organized as follows. Section 2 describes the dataset used for replication exercises. Section 3 revisits the role of structural transformation on the convergence of per capita income between the US South and North from 1940-1990, by conducting the same decomposition exercise done in Caselli and Coleman (2001) but separately for black and white populations. Section 4 then extends the data up to 2020 and investigates the effect of structural transformation in the recent slowdown in the US regional convergence. Section 5 concludes.

2 Data

Following Caselli and Coleman (2001), we extract the individual-level microdata from the integrated public-use microdata series (IPUMS) of the U.S. Census of population, as made available

by the IPUMS project of the University of Minnesota (Ruggles et al. 2023). From 1940 to 1990, we use the exact same sample for each Census year: 1940 General, 1950 General, 1960 General, 1970 Form 1 State, 1980 1% Metro, and 1990 1% Unweighted sample. For 2000, we use 5% General sample. For 2010, we use the 2010 American Community Survey (ACS). For 2020, we use a 5-year sample of the ACS, which uses adjusted weights to mitigate data quality issues caused by the COVID-19 pandemic for the 2020 1-year ACS data.

We have extracted the variables describing age (AGE), wage income (INCWAGE), employment status (EMPSTAT), industry (IND1950), number of weeks worked (WKSWORK2), state of residence (STATEICP), and sampling weight (PERWT). Following Caselli and Coleman (2001), we dropped all individuals who were not employed, whose age was less than 16, and who had worked less than 50 weeks in the previous year.[3] We also dropped individuals who did not report industry or whose industry was non-classifiable (<0.6% of the sample). We use self-identified major race as an identifier and did not assign single race to individuals who reported more than two major races.Agricultural and non-agricultural wage and employment for four regions[4] were calculated in the same way in Caselli and Coleman (2001).

3   Racial Heterogeneity in the US Regional Convergence

We follow Caselli and Coleman (2001) and mostly focus on the convergence between the most and the least farm-intensive of the four regions of the United States: the South (S) and the North (N). For $i = S, N$ we have

$$w_t^i = w_{ft}^i L_{ft}^i + w_{mt}^i (1 - L_{ft}^i) \tag{1}$$

where w_t^i is the average labor income in region i in year t, w_{ft}^i is labor income per worker in agriculture, w_{mt}^i is income per worker outside of agriculture, and L_{ft}^i is the share of the labor force that is employed in agriculture.

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[3]The variable INCWAGE includes only income received as an employee and does not include self-employed income, which is prominent in particularly in agriculture. In this sense, INCWAGE does not fully capture the labor income in agriculture. However, if the bias from excluding self-employment income is roughly constant over time, INCWAGE should provide a reasonable proxy for agricultural labor income.

[4]We assign states into four large regional categories (North, South, Midwest, and West) as in Caselli and Coleman (2001).

Following Caselli and Coleman (2001), we measure convergence by the quantity

$$\frac{w_t^S - w_t^N}{w_t} - \frac{w_{t-1}^S - w_{t-1}^N}{w_{t-1}} \tag{2}$$

where w_t is the economy-wide average labor income. Define $\omega_{jt}^i = (w_{jt}^i - w_{jt})/w_t$ for $i = S, N$, $j = f, m$. Also, let $\omega_t^i = (w_{ft}^i - w_{mt}^i)/w_t$, and $\omega_t = (w_{ft} - w_{mt})/w_t$. We can now decompose this measure of convergence into three terms:

$$\underbrace{\frac{w_t^S - w_t^N}{w_t} - \frac{w_{t-1}^S - w_{t-1}^N}{w_{t-1}}}_{\text{Total Convergence}} = \underbrace{\bar{\omega}_t^S \cdot \Delta L_{ft}^S - \bar{\omega}_t^N \cdot \Delta L_{ft}^N}_{\text{Labor Reallocation}}$$

$$+ \underbrace{\Delta\omega_t \cdot \left(\bar{L}_{ft}^s - \bar{L}_{ft}^N \right)}_{\text{Between Industry}} \tag{3}$$

$$+ \underbrace{\Delta\omega_{ft}^S \cdot \bar{L}_{ft}^s + \Delta\omega_{mt}^S \cdot \left(1 - \bar{L}_{ft}^S\right) - \Delta\omega_{ft}^N \cdot \bar{L}_{ft}^N - \Delta\omega_{mt}^N \cdot \left(1 - \bar{L}_{ft}^N\right)}_{\text{Within Industry}}$$

where $\Delta x_t = x_t - x_{t-1}$ and $\bar{x} = (x_t + x_{t-1})/2$.[5] The left hand side of the decomposition equation is the measure of convergence as in equation 2. The right hand side of the first line of the equation corresponds to *labor reallocation*, which captures the decline of the share in agricultural employment in the South. The next term, *between industry* term, captures convergence of the economy-wide average agricultural wage to the average non-agricultural wage. Lastly, *within industry* term captures the catching up of southern wages to northern wages *within* agricultural and non-agricultural sectors.

Labor reallocation and between industry terms combined capture the role of structural transformation on the regional convergence of income. The two defining features of structural transformation are the movement of labor force out of agriculture, and the catch-up of agricultural wages to non-agricultural wages. Since the South was more abundant in agricultural labor force, it not only experienced a larger reallocation of labor out of agriculture but also an income increase for those who remained in agriculture. Combined together, labor reallocation and between industry capture these two forces of regional income convergence. On the other hand, the within-

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[5] Refer to Appendix B of Caselli and Coleman (2001) for the derivations.

Table 2: Decomposition of Convergence in South to North Income Per Worker

	Total	Labor Reallocation	Between Industry	Within Industry
Period: 1940-1990	(1)	(2)	(3)	(4)
Entire population	.286	.104	0.065	.116
Percentage of total	100%	36.5%	22.8%	40.7%
White	.169	.100	.056	.012
Percentage of total	100%	59.3%	33.4%	7.2%
Black	.599	.111	.066	.422
Percentage of total	100%	18.6%	11.0%	70.4%

Notes: Column 1 is the left hand side of equation 3. Column 2 is the component due to convergence of $L_{f}^{S}t$ to L_{ft}^{N}. Column 3 is the component due to convergence of w_{ft} to w_{mt}. Column 4 is the component due to convergence of w_{ft}^{S} to w_{ft}^{N} and w_{mt}^{S} to w_{mt}^{N}. For the data source and sample restriction, see Section 2.

industry term, captures the contribution of forces not attributable to structural transformation. If there were some frictions or distortions preventing the northern and southern incomes to be equalized, then a reduction of such frictions over time would be captured by the within-industry component.

Table 2 reports the results of the decomposition between 1940 and 1990. The first panel replicates the original results in Caselli and Coleman (2001). Between 1940 and 1990, the South-North labor income differential declined by 28.6 percentage points. Of these, 36.5 percent is due to a faster movement of Southern labor force out of agriculture, and 22.8 percent is due to the nationwide convergence of agricultural wages to non-agricultural wages. Therefore, structural transformation accounts for 59 percent of the South-North income convergence in this period. This closely replicates the results found by Caselli and Coleman (2001), where structural transformation accounts for 60 percent of the South-North income convergence during the same period. Finally, 40.7 percent of the total convergence is accounted for by South-North convergence of within-sector incomes.

We now examine the contribution of structural transformation on the regional convergence separately for black and white populations. The second and third panels of Table 2 show the results

from the decomposition when we focus on black and white population, respectively. Among white population, the South-North labor income differential declined by 16.9 percentage points between 1940 and 1990. Of those, the role of structural transformation was dominant in closing the income gap between the North and the South. Within-industry convergence of wages between North and South accounts for only 7.2 percent of the total convergence, while the rest is attributable to structural transformation.[6]

On the other hand, different patterns are observed among the black population. First thing to note is that black workers in the South experienced much larger income growth in the same period, compared to white workers in the same region. Between 1940 and 1990, the income differential declined by 59.9 percentage points between the North and the South, which is around 3.5 times higher than the decline in income differential among the white workers. Therefore, even though labor reallocation (0.100 for white and 0.111 for black workers) and between industry (0.056 for white and 0.066 for black workers) contributed almost equally to regional convergence, there was an extra boost to the convergence among black workers. Second, structural transformation only accounts for less than 30 percent of this convergence. For black workers, southern incomes converged to northern incomes mainly due to South-North convergence of within-sector incomes.

Given that the within-industry component captures the removal of frictions that prevent factor price equalization across regions, what would be the driving force behind the fact that it is only prominent for black workers? One plausible explanation is a more rapid decline in racial discrimination against black workers in the South, which could be attributed to factors such as employer prejudice or barriers in accessing higher education. It is widely acknowledged that racial discrimination was more prevalent in the South compared to the North during the 1940s (Sundstrom 1994). However, the disparity in racial discrimination between southern and northern black workers decreased significantly between 1940 and 1990 due to the enactment of a series of civil rights laws, including the Civil Rights Act of 1964.

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[6]In other words, 93 percent of the total convergence is attributable to structural transformation. Caselli and Coleman (2001) finds that structural transformation accounts for 81 percent of the South-North income convergence during the 1880-1950 period. Unfortunately, we cannot conduct the decomposition by race during the 1880-1950 period, due to unavailability of employment and wage information by sector and race.

This explanation is consistent with the empirical findings because the faster decline in racial discrimination for southern black workers would manifest as a larger contribution of the within-industry component of regional convergence. As the degree of racial discrimination declined more rapidly for southern black workers, their wages would have increased at a faster rate compared to those of northern black workers. The convergence caused by this is captured by the within-industry term since it occurs independently of the structural transformation. Our findings highlight that such effects were much more prominent for the convergence of income between southern and northern black workers than structural transformation. This interpretation is also consistent with the recent literature which found that institutionalized racial discrimination is correlated with discrimination in economic measures (Cook et al. 2023).

Our findings are also qualitatively and quantitatively robust to different specifications. For instance, our results are not driven by the inflow of migrant workers from the South to the North, which would have put downward (upward) pressure to northern (southern) wages between 1940 and 1990. Appendix A shows the robustness of the results for interstate migrants and elderly workers.

4 Decomposition of Recent Slowdown of US Regional Convergence

Caselli and Coleman (2001) study the structural transformation and regional income convergence until 1990. To what extent can structural transformation explain the declining rate of regional convergence in recent years? We extend the sample to 2020 and run the same decomposition exercise as in the equation 3. Table 3 reports the results of the decomposition analysis, for the entire population and separately for black and white populations. We first focus on the results from the aggregate population and white workers. As discussed, the results are consistent with the regional divergence of income observed in recent years as shown in Figure 1. Between 1990 and 2020, the South-North income gap has been *widened* by 3.3 percentage points for the entire population, and 5.1 percentage points for the white population. The bulk of the divergence in labor income between the two regions is from the within-industry component, as seen in the last column of the Table. Unlike the 1940-1990 period, little convergence stemmed from structural

Table 3: Decomposition of Convergence in South to North Income Per Worker

	Total	Labor Reallocation	Between Industry	Within Industry
Period: 1990-2020	(1)	(2)	(3)	(4)
Entire population	-.033	.001	-.000	-.034
Percentage of total	100%	-4.16%	1.07%	103.09%
White	-.051	.001	-.000	-.052
Percentage of total	100%	-2.82%	0.64%	102.17%
Black	.061	.002	.000	.059
Percentage of total	100%	3.06%	0.79%	96.14%

Notes: Column 1 is the left hand side of equation 3. Column 2 is the component due to convergence of $L_f^S t$ to L_{ft}^N. Column 3 is the component due to convergence of w_{ft} to w_{mt}. Column 4 is the component due to convergence of w_{ft}^S to w_{ft}^N and w_{mt}^S to w_{mt}^N. For the data source and sample restriction, see Section 2.

transformation. Labor reallocation and between-industry component combined are attributed to a mere 0.1 percentage point reduction in the labor income gap between North and South, both for all workers and white workers. Although the structural transformation was exerting forces to close the income gap between the North and South, its magnitude was insufficient to offset the increase in the regional income gap caused by within-industry divergence of regional income.

Once again, however, different patterns are observed for the black population. Unlike for all workers or white workers, the income gap between Northern and Southern black workers has further declined by 6.1 percentage points between 1990 and 2020. Unlike white workers where southern and northern incomes diverged within the agricultural and non-agricultural sectors, labor income of southern and northern black workers converged by 5.9 percentage points. Overall, South-North income convergence is still observed between 1990 and 2020 among black workers, although the magnitude of this change is diminished when compared to 1940 to 1990.

Taken together, our findings are consistent with the culmination of structural transformation since 1980, as discussed in Table 1. For both black and white workers, structural transformation played a role in closing the South-North income gap, but compared to the 1940 and 1990, its effect has been largely mitigated. Moreover, combined with the weakened force of structural

transformation, the within-industry divergence of southern and northern incomes is attributable to the recent divergence of northern and southern incomes.[7]

Our results also reveal that among black workers, South-North income gap has been *narrowing* even in the recent period, although the magnitude of the convergence is smaller compared to 1940-1990. The decomposition exercise suggests that structural transformation contributed little to this convergence, as observed among white workers. Unlike white workers, however, within-industry income gap between southern and northern black workers has also been narrowed between 1990 and 2020. One interpretation for this is a continued reduction in frictions between North and South, such as a steeper reduction in racial discrimination in the South relative to the North. This is consistent with a large body of research documenting that taste-based discrimination declined more in the South after 1980 (Charles and Guryan 2008; Bobo et al. 2012; Hurst, Rubinstein, and Shimizu 2021).[8]

5 Discussion and Conclusion

Structural transformation and regional convergence in wages are well-documented long-term trends that have been observed in the economic growth of the United States throughout the past century. Our findings confirm that structural transformation has played a significant role in the convergence of southern incomes with northern incomes at the aggregate level over the last century, while it played a negligible role after 1990.

However, the racial decomposition exercise in this paper suggests that there is a significant amount of heterogeneity across the black and white workers in both the size of regional convergence and the role of structural transformation. For black workers, southern incomes converged

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[7]Several studies have documented the slowdown of regional income convergence since 1980s (Ganong and Shoag 2017; Giannone 2022), but these studies focused on income convergence across states. Our results confirm that regional divergence is also observed at a more aggregated level, between the South and the North, for example, and it was enforced by the end of structural transformation. Ganong and Shoag (2017) find that deterred migration due to rising housing prices slowed down regional convergence after 1990. Giannone (2022) identifies skill-biased technological change as a main channel behind the slowdown. Both mechanisms are captured in our *within industry* component. Related to those papers documenting recent slowdown of regional convergence, our contribution is to rule of structural transformation from agriculture to non-agriculture as an important driver of the South-North convergence.

[8]Hsieh et al. (2019) estimates the discrimination against black workers (relative to white workers) over time as a time-varying "friction" in the labor market. Although most of the reduction of such friction occurred between 1960 and 1980, a small but further reduction is observed even after 1990. See Figure 2 in Hsieh et al. (2019).

to northern incomes much more than white workers, and the convergence is mainly because of South-North convergence of within-sector incomes. For white workers, the size of the South-North wage convergence is a thirds of that among the black workers, and it is almost entirely explained by structural transformation. We attribute the greater decline in regional income differentials among the black workers and the limited role of structural transformation therein to the faster decline in discrimination in the South than in the North, comes from the fact that discrimination was substantially higher in the South than in the North initially.

Our research highlights the importance of studying the heterogeneous effects of structural transformation among different demographic groups, particularly with regard to race, in the United States. When certain demographic groups are overrepresented in specific sectors within specific regions (such as black workers in agriculture in the South), and experience disproportionate changes in income compared to other groups, the quantitative significance of structural transformation in driving regional convergence varies significantly for that particular group. Our results indicate that studying regional income convergence and structural transformation based solely on aggregate population figures masks the substantial heterogeneity between the two largest racial groups in the United States. Relying solely on evidence from the entire population would greatly overstate the importance of the effect of the structural transformation for black workers.

This paper has several limitations. First, we do not attempt to further dissect the component of within-industry effects, which has been shown to be crucial in understanding the income convergence (or divergence) between the South and the North among black workers from 1940 to 1990, as well as among all workers from 1990 to 2020. Factors such as the accelerated decline in racial discrimination in the South over the past half-century and the faster pace of skill-biased technological change among white workers in the North over the past 30 years could potentially explain these trends. Second, even though our robustness checks considering migrants confirms the original results, our exercise don't deal with potential selection of migrants and general equilibrium effects toward residents. Those limitations are topics that remain to be explored in future research.

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APPENDIX

A Robustness of the Decomposition Analysis

A.1 The Great Migration

Part of the period from 1940 to 1990 overlaps with the period of the "Great Migration," which is characterized by a large migration of the black population from the US South to the North. The influx of migrant workers in the North would have put downward pressure on northern wages, contributing to regional convergence. Indeed, Boustan (2009) argues that black wages in the North would have been 7 percent higher in 1970 if not for the migrant influx between 1940 and 1970. To investigate whether our results are driven by the South-to-North migration of black workers, we re-do the decomposition exercise without including the internal migrants, to check that our empirical results are not driven by internal migration of the southern black workers.

We check the robustness of our results with two additional exercises, with different types of internal migrants. In the first exercise, we exclude all internal migrants in the sample by identifying internal migrants using the migration questionnaire from the Census data. In each survey year, the Census asked the respondent whether he/she lived in the same state five years ago, and if not, whether the respondent migrated from different a county, state, or country. Using this questionnaire for the years 1940 and 1990, we identify the interstate migrants and estimate the decomposition exercise excluding them.[9]

Table A.I shows the results without interstate migrants. The results are similar to the main exercise including interstate migrants, both qualitatively and quantitatively. The contribution of structural transformation on the South-North income convergence slightly declined from 59 percent to 56 percent.

In the second exercise, we specifically attempt to separate out the effects of the Great Migration. To this end, we re-run our 1940-1990 regression without the South-to-North black migrants. If

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[9]Although the migrants identify are not precisely South-to-North migrants, the share of interstate migrants is relatively small. In 1940 and 1990, only 3.2% and 7.1% of the sample are interstate migrants. Given that only a fraction of the interstate migrants are South-to-North migrants, the actual share of South-to-North migrants would be smaller.

Table A.I: Decomposition of Convergence in South to North Income Per Worker (without inter-state migrants)

	Total	Labor Reallocation	Between Industry	Within Industry
Period: 1940-1990	(1)	(2)	(3)	(4)
Entire population	.309	.105	0.069	.135
Percentage of total	100%	34.0%	22.2%	43.8%
White	.191	.103	.060	.028
Percentage of total	100%	54.1%	31.5%	14.5 %
Black	.618	.110	.067	.441
Percentage of total	100%	17.9%	10.8%	71.3%

our results are driven by the migrants, then the contribution of both the Labor Reallocation and the Between Industry channel would be reduced significantly.

The Census provides birthplace information (variable `bpl`) for all respondents since 1850. We identified South-to-North black migrants as workers who were born in the South but working in the North at the time of the survey.

Table A.II: Decomposition of Convergence in South to North Income Per Worker (without South-to-North black migrants)

	Total	Labor Reallocation	Between Industry	Within Industry
Period: 1940-1990	(1)	(2)	(3)	(4)
Entire population	.294	.103	0.065	.126
Percentage of total	100%	35.1%	22.2%	42.7%
White	.169	.100	.056	.012
Percentage of total	100%	59.3%	33.4%	7.25 %
Black	.697	.091	.056	.551
Percentage of total	100%	13.0%	8.0%	79.0%

Table A.II shows the results of the 1940-1990 regression without South-to-North black. The re-

sults are similar to the main exercise both qualitatively and quantitatively. The contribution of structural transformation on the South-North income convergence slightly declined from 59 percent to 57 percent for the entire population. For the black workers, the contribution of structural transformation is reduced from 29% to 21%.

A.2   Elderly Population

The period from 1940 to 1990 is also the time when the pension system was developed and introduced to the public. Due to the introduction of the pension system, the labor force participation rate of older workers (workers over age 65) had dramatically reduced during this period.[10] We re-do the decomposition exercise without including the elderly population (age 65 or above) to verify that our empirical results are not affected by the change in labor force participation rates among the elderly population due to non-economic reasons (e.g. the pension system).

Table A.III: Decomposition of Convergence in South to North Income Per Worker (working-age adults only)

	Total	Labor Reallocation	Between Industry	Within Industry
Period: 1940-1990	(1)	(2)	(3)	(4)
Entire population	.279	.102	0.063	.114
Percentage of total	100%	36.5%	22.7%	40.6%
White	.163	.098	.055	.010
Percentage of total	100%	60.2%	33.8%	6.0 %
Black	.585	.108	.062	.414
Percentage of total	100%	18.4%	10.6%	70.9%

Table A.III shows the results only focusing on working-age population (age 16 to 65). The results are similar to the main exercise, both qualitatively and quantitatively. The contribution of structural transformation on the South-North income convergence remains unchanged at 59 percent.

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[10]U.S. Social Security benefits to retired workers havemore than tripled between 1940 and 2000. See McGrattan and Rogerson (2004) for details.