Demand Shocks, Shifts in Welfare Policy Regime, and the Well-Being of Workers and Their Families

by

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Abstract

This dissertation examines through three stand-alone papers how changes in product demands and shifts in welfare policy regime affect the well-being of workers and their families. The first paper, presented in chapter 2, investigates empirically how the industrial structure of local labor market affect manufacturing workers' adjustment to import competition. The second paper of the dissertation, presented in chapter 3, studies the relationship between the decline of traditional cash welfare between 2001 and 2015 and two direct measures of well-being among households with children: household food insecurity and public school child homelessness. The final paper, presented in chapter 4, explores the theoretical role of migration in labor market adjustment to regional demand shocks and investigates empirically how migration frictions have evolved between 1940 and 2000 and its implications. The findings from this dissertation highlight the significance of local socioeconomic factors in the well-being of workers and their families. In developing policing that aim to address economic hardships, it is therefore crucial to pay attention to local context and the variation in economic opportunities and public resources across place and time.

Chapter 1

Introduction

This dissertation examines through three stand-alone papers how changes in product demands and shifts in welfare policy regime affect the well-being of workers and their families. The first paper, presented in chapter 2, investigates empirically how the industrial structure of local labor market affect manufacturing workers' adjustment to import competition. The second paper of the dissertation, presented in chapter 3, studies the relationship between the decline of traditional cash welfare between 2001 and 2015 and two direct measures of well-being among households with children: household food insecurity and public school child homelessness. The final paper, presented in chapter 4, explores the theoretical role of migration in labor market adjustment to regional demand shocks and investigates empirically how migration frictions have evolved between 1940 and 2000 and its implications.

One of the strongest forces shaping the job market prospect of workers is changes in product demand that shift jobs to or away from certain industries. In a large country like the United States where there is distinct industrial specialization pattern across space, as product demand changes, it inevitably influences some areas more than others. Consequently, we see some cities prosper and others fall. This force characterizes a major factor behind the stories we are familiar with about poverty and the decline of cities in the Rust Belt, Appalachia, among others where exodus of industries and factories has created long-term consequences. A question that follows naturally for social scientists

and policymakers: How do cities adjust to adverse demand shocks? Nested inside this broader inquiry, in chapter 2 and chapter 4 of this dissertation, I explore factors contributing to successful adjustment to local demand shocks.

In chapter 2, I investigate how local outside employment options affect adjustment to import competition for the U.S. manufacturing sector. In the last twenty years, the rising import competition from emerging economies and the rapid technological advancement in production techniques have fundamentally changed the manufacturing sector in the U.S. Between 2000 and 2016, the manufacturing sector in the U.S. has lost 4.9 million jobs, nearly 30% of its initial employment size and comparable to half of the job losses from the Great Recession. Previous research has shown that the exposure to import competition varies across geographic locations, nevertheless, the literature provides limited evidence on how the adjustment to import competition is shaped by local labor market environment. The knowledge is particularly crucial given that worker adjustment is predominantly a localized activity due to limited geographic mobility response among affected workers. The first chapter marks my attempt to fill this gap by studying the relationship between local industrial structure, outside employment options, and worker adjustment to import competition.

In chapter 4, my coauthors and I explore the theoretical role of migration in regional labor market adjustment to demand shocks. The inter-state migration rates in the U.S. has grown in much of the twentieth century. This geographic fluidity is often regarded as a characterizing feature of the U.S. labor market, symbolizing its internal capability to adjust to demand shocks. Nevertheless, the upward trend has been reversed since the 1980s, causing concerns for the dynamism of U.S. labor market. In recent years, a growing number of studies have devoted their attention to understanding the cause behind this decline. In this paper, we contribute to the literature by examining through the lens of a dynamic discrete choice labor supply model the theoretical linkage between labor

mobility friction and indicators of market integration, providing an often-missing theoretical underpinning for this literature. Besides the theoretical discussion, empirically, we investigate the historical changes in mobility frictions between 1940 and 2000 and their implication for market integration.

In addition to market forces, the well-being of workers and their families is also closely tied with government policies, particularly for those relying on non-market means to supplement their income from the labor market. For these poor families, the welfare reform in 1996 marked a fundamental change in both the availability and the form of public assistance. The line between deserving and undeserving poor was redrawn, shifting government funding to families capable of maintaining minimal attachment to the labor market and leaving those unable to work, often single mother households, with less resource and even less resource in the form of cash. In chapter 3, my coauthors and I examine how the decline in cash assistance has affected households with children using two direct measures of well-being: household food insecurity and child homelessness. We focus our study on years since the early 2000s, when declines to the cash assistance rolls were no longer matched by increases in maternal employment and find that the decline in cash assistance during this period was associated with increases in both forms of hardship.

If the goal of welfare policy is to address poverty, lifting people who have fallen through the cracks of the market system, then the effectiveness of any policy reform would necessarily depend on how well it factors in the forces shaping poverty today. In writing parts of this dissertation, I have broadened my understanding about shifts in product demand and the factors influencing labor market's adjustment to these shifts. Moving forward, my goal is to combine the interest in poverty and these knowledge, and investigate how shifts in product demand affect the dynamics of poverty and its implication for welfare policy.

Chapter 2

The Effects of Local Industrial Structure on Labor Market Adjustment to Trade Competition

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Abstract: Using data from the Quarterly Workforce Indicator and the Current Population Survey, the paper investigates the role of local industrial structure in determining labor market adjustment to trade competition for the U.S. manufacturing sector between 2000 and 2016 . For employment adjustment, I find that proximity to external job opportunities in sectors with lower entry barriers facilitates faster employment adjustment for the affected industries and can reduce the incidence of employment discontinuity for individual manufacturing workers. For wage adjustment, the empirical results indicate that both the quantity and wage rates of external job opportunities in the local non-manufacturing sector play an important role in wage adjustment. With the same exposure to import competition, manufacturing industries in areas with lower level of manufacturing clustering and higher external wage premium on average see lower impact of the competition on their wage growth. The findings from this paper highlight the relevance of local labor market structure and outside options in labor market adjustment to demand shocks that are correlated across industries.

1 Introduction

Over the last twenty years, the U.S. labor market has experienced an accelerated decline in the manufacturing sector, a phenomenon driven partially by the growing trade competition from emerging economies. In this paper, I investigate the role of local industrial structure and the distribution of outside opportunities in determining labor market adjustment to trade competition for U.S. manufacturing sector between 2000 and 2016. The study provides the first empirical evidence on how trade shocks interact with local industrial structure to affect labor market adjustment outcomes.

Decline in Manufacturing and Import Competition

Between 2000 and 2016, the manufacturing sector in the U.S. has lost 4.9 million jobs, nearly 30% of its initial employment size. The decline rate during this period has doubled from the previous decade and the number of jobs lost is comparable to over half of the job losses from the Great Recession. Yet, unlike job fluctuation over business cycles, the lost manufacturing jobs have shown no sign of real recovery. A growing literature has detailed the effects of import competition from low-income countries during this period, especially after China's accession into WTO, as a major driver of the observed decline in manufacturing[1]. While the linkage between the decline in manufacturing and import competition is being established, a policy question that naturally follows is: How can we help manufacturing workers adjust to the new economic environment?

To answer that question, it requires the knowledge of labor market adjustment to trade competition and its shaping factors. Recent research has found that overall it is costly for workers to switch between sectors, and as a consequence, the labor market ad-

[1]At the worker level, workers in industries that compete head-to-head with Chinese imported goods have seen negative long-term effects on their earnings and employment (Keller and Utar, 2016; Autor et al., 2014; Utar, 2018). At the firm level, import competition is found to have negative impact on firm employment, value-added, intangible assets, and survival rates (Bernard et al., 2006; Utar, 2014). At the regional and national level, the decline in manufacturing employment in U.S. and across local labor markets has been partially attributed to import competition as well (Acemoglu et al., 2016; Autor et al., 2013; Caliendo et al., 2015).

justs sluggishly after trade shocks (Artuç et al., 2010; Dix-Carneiro, 2014). Furthermore, there exists substantial heterogeneity across individual-level characteristics in workers' adjustment response. For example, workers with more manufacturing-centered skill sets systematically face higher mobility barriers to enter non-manufacturing jobs and see bigger impact of trade competition on their long-term labor market outcomes (Traiberman, 2018; Utar, 2018). Similarly, workers with lower earnings disproportionately stay in the manufacturing sector following exposure to trade competition and experience more sizable long-term earnings loss (Autor et al., 2014).

However, the literature provides limited evidence on how labor market adjustment is shaped by local labor market environment, or the interaction effects between trade shocks and local factors. The knowledge is particularly crucial given that worker adjustment is predominantly a localized activity due to limited geographic mobility response among affected workers (Autor et al., 2013, 2014; Dix-Carneiro and Kovak, 2017). [2] This suggests that for the majority of manufacturing workers, their adjustment is constrained within their current local labor market and subject to the influence of local factors. To bridge this gap in literature, in this paper, I investigate empirically the role of local industrial structure in determining the labor market response to trade competition in the manufacturing sector.

The Role of Local Industrial Structure

The local industrial structure, here referring to the local employment distribution across industries, influence labor market adjustment to trade competition through affecting the distribution of outside options for the affected workers. In the U.S. labor market, more than 96% of the hiring is accounted for by replacement hiring[3], which is hiring to fill openings created by regular worker turnover, instead of from net employment

[2] According to calculation by Autor et al. (2014), the five-year mobility rate across commuting zones for manufacturing workers in the U.S. is less than 15%, which is comparable to the national rate calculated with census data by Molloy et al. (2011).

[3] Author calculation using QWI state and industry-level hiring, separation, and employment statistics.

growth. This suggests that in the short run, the local industrial structure largely governs the distribution of local job vacancies across industries.

For the affected workers, this means that depending on where they are, they face outside options of varying degrees of accessibility and compensatory appeal, which could affect their ability to leave the affected industry for external job opportunities, or to influence their bargaining power in wage negotiation following the exposure to trade competition. For example, greater accessibility suggests that it is relatively easier for workers to find alternative employment outside of their current industry, which could facilitate more speedy labor supply adjustment and ameliorate the adverse wage effects from the decline in demand. Furthermore, at the individual worker level, accessibility of outside option may reduce the incidence of unemployment or non-employment as a result of trade competition. Similarly, greater compensatory appeal from external job opportunities may induce faster labor supply adjustment and could also increase the bargaining power of workers in wage negotiation by increasing the monetary value of their alternative options.

Nevertheless, unlike idiosyncratic demand shocks that affect industries or firms randomly, an important feature of the decline in manufacturing is that it is driven by forces that are skill-biased and correlated across industries, such as import competition. This feature complicates the role of local industrial structure on worker adjustment to trade competition, in particular the effects of proximity to other manufacturing industries, or manufacturing clustering. For manufacturing workers, while jobs in other manufacturing industries are most accessible in terms of their skill requirement, these jobs are often concurrently subject to the pressure of workforce reduction. As a result, it is empirically ambiguous whether being surrounded by other manufacturing industries exert positive or negative influence on worker adjustment to trade competition. For example, in terms of employment, despite having the lowest skill gaps, manufacturing clustering could depress the total number of external job openings, thus making it harder for workers to reallocate away from the affected industries or to remain in the labor market. In

terms of wages, manufacturing clustering could weaken workers' outside options both within and outside of the manufacturing sector and therefore their bargaining power, or aggravate the adverse wage effects through sluggish labor supply adjustment.

In this paper, I empirically test how local industrial structure interacts with trade competition to affect labor market adjustment, measured by changes in industry wage rates and industry employment, for U.S. manufacturing industries. Because of the above-mentioned complication from demand correlation across manufacturing industries, in the analysis, I separate the the manufacturing industries from the non-manufacturing industries, and test how labor market adjustment is affected by the following local industrial characteristics: accessibility of local non-manufacturing sector, wage differentials of local non-manufacturing sector, and manufacturing clustering.

Preview of Results and Paper Outline

To preview the results, I find that there is a strong linkage between local industrial structure and labor market adjustment to trade competition. For employment adjustment, proximity to external job opportunities in sectors with lower entry barrier, such as the construction sector, retail and wholesale trade sector, IT sector, and the professional services sector, facilitates faster employment adjustment and reduces the incidence of employment discontinuity for individual manufacturing workers. For wage adjustment, unlike previous findings in the literature, I find that manufacturing wage does respond to the impact of trade competition. Moreover, the extent of the response is affected by both the quantity and wage rates of external job opportunities in the local non-manufacturing sector. With the same exposure to import competition, manufacturing industries in areas with lower level of manufacturing clustering and higher external wage premium on average see lower impact of the competition on their wage growth, which is consistent with the prediction of the labor search and bargaining theoretical framework.

The rest of this paper is organized as follows: Section 2 reviews current literature on the topic and the contextual position of this paper in the literature. Section 3 presents stylized facts on worker mobility and local industrial structure in the U.S. Section 4 develops the empirical model used in testing the relationship between labor market adjustment and local industrial structure. Section 5 reports the estimation results of the empirical models. Section 6 concludes.

2 Literature Review

The paper is related to a few emerging strands of literature in trade economics and labor economics. The empirical interest of this study on labor market adjustment to trade shocks is closest related to Autor et al. (2013), Autor et al. (2014) and Utar (2018). These studies look at the labor market adjustment outcome of both regional markets and individual workers after being subjected to trade shocks. In the latter two studies, they also look into the heterogeneity in adjustment response across individual characteristics. Autor et al. (2014) find that while higher-wage workers are more successful in recovering their lost earnings through employment outside of manufacturing, lower-wage workers tend to stay in manufacturing and are more inclined to see continual earnings losses both inside and outside of manufacturing. Utar (2018) finds that while trade shocks increase the probability of employment in the service sector across workers of all education levels and occupations in the Danish manufacturing worker sample, workers with manufacturing-specific education and occupation are less able to secure stable employment in the service sector and face worse long-term outcomes. This paper complements the two studies by showing the effects of community-level factors that could lead to heterogeneous adjustment outcomes for manufacturing industries.

This paper is also informed by a second strand of the trade literature which examines the impact of trade shocks on labor market dynamics through structural modeling. Artuç et al. (2010) quantifies the between-sector bilateral switching costs for workers and the implications of high mobility costs on labor market adjustment to trade

shocks. Dix-Carneiro (2014) estimates a rich structural dynamic equilibrium model for the Brazilian labor market and finds high cost to switch sector and high dispersion of the costs across worker demographics, which indicates that the welfare effects from trade liberalization are uneven on workers depending on their initial sector and demographics. Caliendo et al. (2015) develop a dynamic model featuring spatially distinct local labor markets and both sectoral and geographic mobility frictions. Their model predicts that the U.S. gains as a country from the increasing trading with China, but due to the different exposure to international trade and mobility frictions, the welfare and employment effects of import competition vary across U.S. states. Within this literature, this study shares the interests of understanding the spatial heterogeneity in trade impacts (Caliendo et al., 2015) and the role of between-sector bilateral switching costs (Artuç et al., 2010; Dix-Carneiro, 2014). However, instead of structural modeling, the focus of this study is empirically how locations, through variation in outside options and switching costs, see different industry adjustment response to trade shocks.

Lastly, the paper is built on a newly emerged literature studying how local industrial structure influences labor market outcomes of individual workers and industries. At the individual worker level, Macaluso (2017) combines the interests in specific human capital and spatial distribution of skill demands and shows that displaced workers have more favorable outcome in local labor markets where their skill sets have a higher representation in local employment structure. At the regional market level, Beaudry et al. (2012) develop a search and bargaining model to demonstrate the significance of local industrial composition in wage determination and provide empirical evidence consistent with the prediction of the model. In this paper, I share the joint interests in the spatial features of local markets and labor market outcomes, and extend the literature by showing empirically how local industrial structure influences industries' adjustment response to demand shocks when the shocks are skill-biased and correlated across industries.

3 Stylized Facts

Employment Adjustment of U.S. Manufacturing Workers

Table 2.1: Annual Employment Adjustment for U.S. Manufacturing Workers: 2000-2016

	Share
Stayed in Manufacturing	70.4%
–Same Industry	*45.8%*
–Different Industry	*24.6%*
Reallocated to Other Sectors	22.6 %
Non-working	7.0%

Source: IPUMS Current Population Survey Linked Outgoing Rotation Groups: 2000-2016. Sample consisted of manufacturing workers aged 20-60 employed at the initial observation at t and stayed in the labor force and their original MSA at $t+1$. Industry coded at the 3-digit level.

Between 2000 and 2016, according to data from the Current Population Survey (CPS), every year, on average nearly 46% of U.S. manufacturing workers have left their current industry (coded at the 3-digit level) and reallocated, whether permanently or temporarily, to employment in other industries or to non-employment. Because of the mixed use of independent interviewing and dependent interviewing procedure across a one-year time frame in the CPS survey design, the switching rates are subject to concerns of coding errors and the level of the rates is likely inflated. The average switching rate here is comparable to rates calculated using the originally coded PSID data, which is also subject to coding errors from independent interviewing technique, and is about twice as high as those obtained trough the PSID Retrospective Files (A detailed discussion of the use of CPS in studying worker mobility can be found in Kambourov and Manovskii

(2013)). Another source of reference is the LEHD job separation rates which is about 24-28% per year, which could be viewed as the upper limit of the real industry switching rates. Nevertheless, what matters for the purpose of the discussion here is the *relative* share of the receiving sectors. Among the workers who switched industries, over half have stayed in the manufacturing sector, showing that workers face the least bilateral friction switching between industries that are both in the manufacturing sector.

The Spatial Distribution and Accessibility of Non-Manufacturing Sectors

Table 2.2: Sector Employment Share and Sector Reallocation Rate: 2004-2016

	% Emp. Share (S.D.)	% Reallocation	Accessibility
Construction	5.2 (1.8)	10.7	2.1
Retail and Wholesale Trade	18.1 (1.7)	31.0	1.7
Utilities, Transportation and Warehousing	4.3 (1.5)	6.4	1.5
Professional Services and Management	10.0 (3.4)	17.2	1.7
Information	2.9 (1.4)	3.3	1.1
Finance and Real Estate	7.3 (2.1)	3.0	0.4
Administrative Support	7.0 (1.5)	6.6	0.9
Education and Health Care	17.9 (3.8)	7.3	0.4
Entertainment and Accommodation	11.5 (2.4)	4.8	0.4
Other Services	4.6 (0.7)	4.7	1.0

Source: Census Bureau County Business Patterns: 2004-2016 and IPUMS Current Population Survey Linked Outgoing Rotation Groups: 2004-2016. Sample consisted of manufacturing workers who have switched sector between the initial observation at t and the second observation at $t+1$. Agriculture, mining, and public sectors are excluded.

Across non-manufacturing sectors, there also appears to be substantial variation in their accessibility for former manufacturing workers. Table 2.2 shows the average employment share of ten non-manufacturing sectors in U.S. metropolitan areas and the average percentage of workers reallocated to these sectors among those who left the

manufacturing sector between 2004 and 2016[4]. As discussed earlier in the introduction, the existing employment share of industries serves as a good indicator of their hiring capacity, as the vast majority of hiring in the U.S. is accounted for by replacement hiring. Nevertheless, not all job openings are equal for manufacturing workers. In column 3 of table 2.2, I construct an accessibility index by dividing the percent of workers reallocating to a sector by the average employment share of the sector. The results suggest that, conditional on their hiring capacity, the construction sector, the retail and wholesale trade sector, the professional services sector, and the utilities and transportation sector are much more accessible to former manufacturing workers than jobs in the other sectors. Because of the dispersion in sector employment share across local labor markets and the variation in sector accessibility, when the manufacturing sector is undergoing adverse demand shock, the affected workers may face varying levels of barrier to find alternative employment opportunities outside of the manufacturing sector.

4 Empirical Method

This section contains the empirical method used in testing the relationship between worker adjustment to trade competition and local industrial structure, including the empirical model, definitions of key variables, the data description.

Model

$$\begin{aligned} Outcome_{z,i,t} = \alpha_0 &+ \alpha_1 \text{Import Shock}_{z,i,t} + \alpha_2 \text{Local Industrial Characteristic}_{z,i,t} \\ &+ \alpha_3 \text{Import Shock}_{z,i,t} \cdot \text{Local Industrial Characteristic}_{z,i,t} \\ &+ X_{z,i,t} Z + \lambda_t + \epsilon_{z,i,t} \end{aligned} \tag{2.1}$$

Equation 2.1 is the primary estimating equation, in which the outcome variables are changes in industry employment and changes in industry wage rates between year t

[4]CBP and CPS have different MSA classification schemes before 2004. The sample here hence excludes year 2000 to 2003 for the consistency of comparison.

and year $t+1$. In the model, the subscript i refers to a NAICS four-digit manufacturing industry, z refers to a U.S. metropolitan area, and $X_{z,i,t}$ is an industry-location-time-specific vector of controls including local industry wage level, local wage level in all other industries, local sector-level exposure to Chinese import competition, local labor force growth, log MSA labor force size, and local unemployment rate. The identification strategy here relies on the exogeneity of the variable of interest, the interaction term, which is the product of the exogenous import shock and the possibly endogenous local industrial characteristics. The variable estimates if labor market response to import competition varies across local labor markets by their local industrial characteristics.

An important feature of the equation is that the outcome variable is measured at the detailed NAICS four-digit industry level instead of at the sector level. Because labor market performance and labor market response to Chinese import competition vary significantly across manufacturing industries (see table X in Appendix), and industries are not randomly distributed across locations, this choice of measurement allows me to rule out the possibly confounding impact of industry composition through controlling for industry-level variation in adjustment response in robustness check. For example, employment in the motor vehicle manufacturing industry is both more likely to concentrate in manufacturing clusters and less sensitive to the impact of Chinese import competition. Without accounting for the differences in industry composition, we may reach the inaccurate conclusion that import competition has weaker impact in manufacturing clusters while this result is only driven by differences in industry composition within the sector and not by differences in outside options.

Definition of Key Variables

Import Shock

The variable Import Shock$_{z,i,t}$ measures the per worker increase in exposure to Chinese imported goods between $t-1$ and t for each industry i in location z. Specifically, denote $V_{\kappa,t}^{CN}$ the value of Chinese importation for North American Industry Classification

System (NAICS) six-digit level manufacturing good κ in year t (in thousands), $L_{\kappa,t}$ the national employment in good κ at t, and $\lambda_{z,\kappa,t}$ the local share of good κ's employment in the four-digit manufacturing industry i in metropolitan statistical area (MSA) z at time t, the variable *Import Shock*$_{z,t}$ is defined as:

$$\text{Import Shock}_{z,i,t} = \sum_{\kappa \in i} \frac{V^{CN}_{\kappa,t} - V^{CN}_{\kappa,t-1}}{L_{\kappa,t-1}} \cdot \lambda_{z,\kappa,t-1} \tag{2.2}$$

Admittedly, by using the realized U.S. imports from China in equation 2.2, the measure is subject to the concern that there is unobserved domestic product demand shocks positively correlated with both the value of imports and industry employment (wages), such that the OLS estimate of the impact of import shocks may be biased downward in magnitude (Autor et al., 2013) . To address the concern and circumvent the impact of domestic product demand shocks, previous research instrumented the realized imports from China to the U.S. with the realized imports from China to other OECD countries. However, this approach is not attainable here because data on the value of Chinese importation to other OECD countries are not available at the detailed NAICS five- or six-digit level for the construction of the import shock measure here. Although the bias is acting against the predicted direction of the effects of import competition and does not invalidate the empirical results, readers should be cautious in interpreting the magnitude of the coefficient in the findings.

A second concern regarding the import shock variable is that there may be unobserved domestic labor supply shocks such that changes in workers' taste for industry of employment has been driving the demand for imported goods. This potential endogeneity concern, nevertheless, is unlikely to pose a strong threat to identification for two reasons. First, because of the loss of manufacturing wage premium and industry-specific human capital, manufacturing workers who left their current industry, either to other manufacturing industries or the non-manufacturing sector, on average saw losses

in earnings, and many became unemployed. There is no strong reason to suspect that there is systematic national level supply-side taste shock driving workers to leave their current manufacturing industry for other jobs. Secondly, the import shock variable here measures the changes in import values preceding the observed changes in industry employment and wage rates. This modeling design ensures that the observed outcome follows the changes in import values in time-line and reduces the possibility of reverse causality.

Accessibility of Local Non-Manufacturing Sector

The first local industrial structure characteristic, accessibility of local non-manufacturing sector, measures the average accessibility of local non-manufacturing private sector job opportunities for manufacturing workers. Here I have excluded external manufacturing industries and focus only on non-manufacturing sectors. Due to the general decline in the sector and the demand correlation across manufacturing industries, employment share of the manufacturing sector may not reflect the actual hiring capacity of the sector. Similarly, the external wage rates in the manufacturing sector may be a weak indicator of the actual wage offers from the sector. Hence in examining the role of the accessibility and wage differentials of outside options for manufacturing workers, I have restricted the analysis to only non-manufacturing sectors, and tested the role of external manufacturing share separately using the third local industrial structure characteristic *manufacturing clustering*.

As shown in Table 2.2, there is significant variation across non-manufacturing private sectors in terms of worker mobility from the manufacturing sector, reflecting not only the dispersion in sector sizes, but also the different bilateral mobility friction from the manufacturing sector. To capture the average accessibility of local non-manufacturing sector, I construct an accessibility index defined as:

$$Accessibility_{z,t} = \frac{\sum_{j,t} s_{z,j,t} \cdot \frac{m_j}{s_j}}{\sum_{j,t} s_{z,j,t}} \tag{2.3}$$

where $s_{z,j,t}$ is the share of non-manufacturing sector j[5] in location z at time t and m_j is the average share of manufacturing workers moving into sector j across the entire sample, and s_j is the average employment share of sector j in the whole sample. Intuitively, the term $\frac{m_j}{s_j}$ measures the sector-specific accessibility of each sector j, taking into consideration differences in sector sizes, and the index is simply the weighted average of sector accessibility across non-manufacturing sectors in location z at time t, where the weight comes from sector employment shares.

External Wage Differentials

The second local industrial structure characteristic, external wage differentials, is defined as the log wage difference between the local non-manufacturing sector and own NAICS four-digit manufacturing industry. The variable captures the compensatory appeal of external employment opportunities outside of the manufacturing sector.

Manufacturing Clustering

The third local industrial structure characteristic, manufacturing clustering, measures the degree of concentration of the manufacturing sector in the local area. The variable is defined as the total employment share of the manufacturing sector in the local metropolitan area minus the employment share of own NAICS four-digit industry.

Data

In the empirical estimation, each location z in the model refers to a U.S. metropolitan statistical area (MSA). The estimation strategy relies on observing the following: 1)

[5] In calculating the non-manufacturing sector, I have excluded the primary sector, which includes the agricultural and mining industries, due to its rarity of occurrence in local industrial structure in the sample.

Industry-level wage rates across MSAs, 2) Industry-level employment across MSAs, 3) Changes in the value of Chinese imported goods at detailed NAICS six-digit level, and 4) Worker-level industry transition across MSAs for the construction of accessibility index. Below is a detailed description of the data sources.

Industry-level Wage Rates

The wage rate measure is obtained through the Quarterly Workforce Indicator (QWI) database. The wage rate measure is calculated as the annual average of the quarterly wage rates data by industry and location, where industries are aggregated to NAICS four-digit level.

The availability of the historical wage data prior to year 2010 varies by state, the number of states (including Washington D.C.) where data is available prior to 2010 ranges from 42 states in 2000 to 50 states in 2009. For the majority of state, data has been made available from year 2004 onward. Across states and time, a total of 930 metropolitan and micropolitan areas are included in the sample.

Industry-level Employment

Because employment data in QWI is much less complete than its wage data, the industry-level employment level measure is obtained from the Census Bureau's County Business Patterns (CBP) data set. For year 2000 and 2001, where data at the metropolitan area was recorded under a different geographic classification system, the metropolitan-level employment information is aggregated from county-level data using crosswalk provided by the Census Bureau.

Value of Chinese Imported Goods

The value of Chinese imported commodities by detailed NAICS schedule and time is acquired from the U.S. Census Bureau Foreign Trade Program.

Individual-level Industry Transition

The information on individual worker's annual employment status change is obtained from the Integrated Public Use Microdata Series, Current Population Survey (Flood et al., 2018) matched outgoing rotation groups, 2004 to 2016. The design of the CPS allows individual respondents to be matched longitudinally during the 16-month period when they are in the sample, thus providing information on their employment history during this short period of time. Additionally, the data is restricted to manufacturing workers between age 20 and 60 from year 2004 to 2016, during which time the CPS provides a coherent coding scheme of the metropolitan area status consistent with the other data sources used in this study.

Summary Statistics

Table 2.3: Summary Statistics

	Mean	S.D.
$\Delta \ln employment$	-0.0598	0.3026
$\Delta \ln wage$	0.0025	0.0915
Import Shock: Industry (in thousands)	1.0505	7.7559
Non-Mfg Accessibility	1.0702	0.0535
External Wage Differentials	-0.1635	0.3866
Manufacturing Clustering	0.1202	0.0688

Table 2.3 provides the summary statistics of the key variables in the analysis. On average, manufacturing employment declined by nearly 6% a year and wage rates grew by

0% during the study period. At the same time, the value of Chinese imported goods increased by a bit over one thousand dollars per year per manufacturing worker. In the actual estimation, the variable Import Shock$_{z,i,t}$ is normalized to have zero mean and unit variance, and each unit increase in import competition represents about $7756 dollar amount increase in per worker exposure to competition. The average external wage differentials is -16%, showing that manufacturing wage rates are generally higher than the non-manufacturing sector, with a variance of 39% across locations and manufacturing industries. Lastly, the average level of manufacturing clustering is 12% in the sample, which represents the share of manufacturing sector in local labor markets (minus own industry share).

5 Empirical Results

Average Effects of Import Competition

Table 2.4: Effects of Import Competition on Industry Employment and Wage Rates

	(1) $\Delta \ln employment$	(2) $\Delta \ln wage$
Import shock	-0.0088***	-0.0003
	(0.0025)	(0.0004)
Sector-level import shock	-0.0020	0.0011*
	(0.0020)	(0.0005)
Log wage rate (own industry)	0.0065	-0.0331***
	(0.0041)	(0.0036)
Log wage rate (all other industries)	-0.0181	0.0058
	(0.0155)	(0.0055)
Labor force growth	0.5066***	0.0372
	(0.0901)	(0.0258)
Log labor force size	0.0122***	0.0016**
	(0.0015)	(0.0005)
Unemployment rate	-0.2575**	0.0128
	(0.0909)	(0.0330)

† for $P < 0.1$, * for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$. Sample weighted by industry employment. Standard errors clustered at MSA level.

Before showing the estimation results from equation 2.1, table 2.4 reports the estimated effects of import competition on the selected labor market adjustment outcomes without the interaction effects with local industrial characteristics and the estimated coefficients for all the control variables. The results suggest that an one-standard-deviation

increase in industry exposure to Chinese import competition leads to a 0.9% annual decline in industry employment level but has no significant effect on the average industry wage rates. The table also presents the coefficient estimates of the control variables. The estimates suggest that employment growth is positively correlated with the growth rate and size of the local labor force and negatively correlated with local unemployment rates. As for wage growth, it is positively correlated with local labor force size and negatively correlated with the existing wage rates. The results are consistent with previous empirical evidence in the literature, which has found that the increase in exposure to Chinese import competition has significant negative effects on manufacturing employment but no significant effect or positive effects on manufacturing wage rates (Autor et al., 2013). There is, nevertheless, much heterogeneity in the adjustment response across local labor markets.

Local Industrial Characteristic 1: Accessibility of Outside Options

Table 2.5: Interactive Role of Outside Option Accessibility on Industry Employment and Wage Growth

	(1)	(2)	(3)	(4)
	$\Delta \ln employment$	$\Delta \ln wage$	$\Delta \ln employment$	$\Delta \ln wage$
Import shock	0.0960**	-0.0091	0.0500	0.0189
	(0.0324)	(0.0075)	(0.0458)	(0.0107)
Accessibility	0.0545	-0.0083	0.0486	-0.0042
	(0.0381)	(0.0086)	(0.0351)	(0.0091)
Import shock×Accessibility	-0.0985**	0.0083	-0.0839*	0.0041
	(0.0309)	(0.0070)	(0.0332)	(0.0063)
Industry FE			yes	yes
Import shock×Industry FE			yes	yes

† for P $<$ 0.1, * for P $<$ 0.05, ** for P $<$ 0.01, *** for P $<$ 0.001. Standard errors clustered at MSA level. Dummies for each NAICS three-digit industry are included to control for industry fixed effects.

Table 2.5 reports the regression estimates of equation 2.1, in which the local industrial characteristic is the accessibility of local non-manufacturing sector. The variable of interests is the interaction term between import competition and the the accessibility of local non-manufacturing sector, which estimates if labor market responds differently depending on the accessibility of job opportunities outside of the manufacturing sector.

For employment (column 1), at the mean accessibility level, a one-standard-deviation increase in industry exposure to Chinese import competition is estimated to reduce industry employment level by 0.9%. The negative interaction term (-0.0985) suggests that being surrounded by jobs more accessible to manufacturing workers facilitate faster employment decline in the affected industries. For every five-percentage-point increase

in local non-manufacturing accessibility, employment would decline by 0.5 percentage point more for a one-standard-deviation increase in import competition, accelerating the decline rate by more than 50% from its mean level. For wage growth (column 2), at the mean accessibility level, a one-standard-deviation increase in industry exposure to Chinese import competition is estimated to reduce industry wage rates by 0.02%, and for every five-percentage-point increase in local non-manufacturing accessibility, the decline rate will slow down by 0.04 percentage point. Both the main effect and the interaction effect are not statistically significant at the 0.10 level.

As discussed in the modeling section, industries are selected into locations of different industrial structures. To verify that the observed variation in employment adjustment is not driven solely by different industry composition across locations, column (3) and (4) report the estimation results with additional controls of NAICS three-digit industry fixed effects and the interaction between industry fixed effects and import shocks. While the inclusion of these variables absorbs much of variation in exposure to import competition across industries, the interaction term in column 1 suggest that, *within* each industry, the speed of employment adjustment still increases significantly with the level of job accessibility in the local labor market and selection at the industry level is not a key factor behind the results in column (1) and (2).

Table 2.6: Interactive Role of Non-Manufacturing Accessibility on Worker Employment

	(1) P(Switched Sector)	(2) P(Switched Sector)	(3) P(Switched Sector)
Sample	Pooled	Non-College	College
Import shock×Accessibility	0.2709**	0.3520**	0.0813
	(0.1001)	(0.1070)	(0.1834)
	(4) $P(Nonemployed)$	(5) $P(Nonemployed)$	(6) $P(Nonemployed)$
Sample	Pooled	Non-College	College
Import shock×Accessibility	-0.1111†	-0.1595*	-0.0578
	(0.0590)	(0.0665)	(0.0926)

† for P $<$ 0.1, * for P $<$ 0.05, ** for P $<$ 0.01, *** for P $<$ 0.001. Standard errors clustered at MSA level. Sample restricted to workers aged 20-60 and worked in the manufacturing sector in the first observation between 2004 and 2016.

Is the accelerated decline in employment driven by more workers finding alternative employment outside of the affected industry, or more involuntary job loss? To verify the cause, I utilize the individual-level annual job transition information from the linked Current Population Survey data and test if the probability of individual workers switching sector or losing employment as a consequence of import competition varies by local non-manufacturing accessibility.[6]

The results, as shown in table 2.6, indicate that the accessibility of job opportunities outside of the manufacturing sector increases the likelihood of workers switching their sector of employment and reduces the chance of non-employment following workers'

[6]Model includes the standalone import shock variable, the accessibility variable, the interaction between the two, as well as an individual-location-time-specific vector of controls on worker occupation, sex, age, education, race, weekly earnings, and local unemployment rate. Because information on worker's NAICS industry affiliation is not consistently recorded, in estimating this model, the import shock variable is constructed at the sector level across all manufacturing industries and normalized to have zero mean and variance of one. Reported here are the coefficients of the interaction term.

exposure to import competition. The results are especially salient among workers with lower educational attainment, who on average face larger barrier leaving the manufacturing sector and are more vulnerable to the impact of import competition. The supplementary evidence also supports that the accelerated decline reported in table 2.5 is likely due to more workers leaving the affected industry with alternative outside employment opportunities.

In sum, the findings suggest that the accessibility of outside options plays an important role in the employment adjustment for manufacturing workers. Workers who are surrounded by jobs in the construction sector, retail and wholesale trade sector, IT sector, and the professional services sector are more likely to avoid employment discontinuity and have better chance to leave the declining manufacturing sector. The swifter employment adjustment, nevertheless, does not significantly reduces the impact of import competition on manufacturing wage rates. In table 2.5 column 2, the estimated coefficient of the interaction term implies that although on average accessibility is associated with weaker wage effects, as indicated by the positive sign, the difference is small across locations. The result does not lend strong support for the the neo-classical framework in understanding wage-setting in the U.S. manufacturing sector.

Local Industrial Characteristic 2: External Wage Differentials

Table 2.7: Interactive Role of External Wage Differentials on Industry Employment and Wage Growth

	(1)	(2)	(3)	(4)	(5)
	$\Delta \ln employment$	$\Delta \ln wage$	$\Delta \ln employment$	$\Delta \ln wage$	$\Delta \ln wage$
Import shock	-0.0079***	0.0004	-0.0321	0.0219*	0.0401***
	(0.0017)	(0.0004)	(0.0251)	(0.0095)	(0.0097)
Wage Diff.	0.0080	0.0081†	0.0101	0.0075	-0.0005
	(0.0065)	(0.0027)	(0.0069)	(0.0046)	(0.0100)
Import shock×Wage Diff.	0.0028	0.0022**	0.0079	0.0027**	0.0044**
	(0.0071)	(0.0008)	(0.0081)	(0.0010)	(0.0015)
Industry FE			yes	yes	yes
Import shock×Industry FE			yes	yes	yes
MSA FE					yes
Import shock×MSA FE					yes

† for P $<$ 0.1, * for P $<$ 0.05, ** for P $<$ 0.01, *** for P $<$ 0.001. Sample weighted by industry employment. Standard errors clustered at MSA level. Dummies for each NAICS three-digit industry are included to control for industry fixed effects.

Table 2.7 reports the interactive role of external wage differentials on labor market adjustment to import competition. The findings show that external wage differentials, defined as the log difference between non-manufacturing wage rates and own industry wage rates ($\ln wage_{nonmfg} - \ln wage$), has an insignificant interactive role in the employment adjustment to import competition. Unlike job accessibility, which facilitates faster employment adjustment away from the manufacturing sector, workers' employment adjustment responds much less to the compensatory appeal of external job opportunities.

Nevertheless, external wage differentials plays a distinct role in the variation in wage

adjustment response across local markets. The downward wage pressure from import competition is weakened when an affected industry is surrounded by higher-paying non-manufacturing jobs, suggested by the postivie interaction term (0.0022). At the mean wage differentials level, for every forty-percentage-point decrease in wage differentials, a one-standard-deviation increase in import competition is estimated to decrease wage rates by 0.008% more. Similar to findings from table 2.5, the results here do not show significant linkage between the speed of employment adjustment and the magnitude of wage cut. Instead of following the prediction of a neo-classical wage-setting framework, the empirical evidence is more consistent with a *labor search and bargaining model*, in which workers' outside options directly influence their wage bargaining power at current job.

A concern of the validity of this explanation is that manufacturing industries and firms are non-randomly distributed across locations, and one possibility is that those with greater wage resilience are selectively concentrated in areas with higher external wage differentials. To address the selection concern, similar to table 2.5, I include industry-level fixed effects and industry-level interaction with import competition in column (3) and (4) to control for any industry-level selection. Additionally, to control for any location-specific variation in firm adaptability, I include MSA-level fixed effects and MSA-level interaction with import competition in column (5) for further robustness check. The main variable of interest, *Import shock*$\times$*External Wage Differentials*, now measures the remaining within-location, within-industry variation in adjustment response by the external wage differentials. The results, as reported in table 2.7 column (4) and (5), do not suggest that selection at the industry- or MSA-level was the driving force behind the observed interaction effects between import competition and the external wage differentials.

To summarize, the finding in table 2.7 extends the existing literature, which largely found manufacturing wage rates to be irresponsive to import competition, by providing evidence of the wage effects, its spatial variation, and the role external wage differen-

tials in the variation. Nevertheless, the magnitude of the effects is small. For example, at the 25th and 75th percentile of the external wage differentials level (-43% and 2%), a one-standard-deviation annual increase in industry exposure to import competition is estimated to change industry wage rates by -0.05% and 0.04%, respectively, which is a fraction of the employment effect. Despite the statistic significance, the size of the effects again confirms that labor market adjustment to import competition occurs predominantly at the employment margin.

Local Industrial Characteristic 3: Manufacturing Clustering

Table 2.8: Interactive Role of Manufacturing Clustering on Industry Employment and Wage Growth

	(1)	(2)	(3)	(4)
	$\Delta \ln employment$	$\Delta \ln wage$	$\Delta \ln employment$	$\Delta \ln wage$
Import shock	-0.0093**	0.0012	-0.0356	0.0253
	(0.0034)	(0.0007)	(0.0259)	(0.0098)
Mfg Clustering	0.0550*	-0.0355***	0.0658	-0.0360***
	(0.0268)	(0.0075)	(0.0256)	(0.0072)
Import shock×Mfg Clustering	0.0045	-0.0143*	-0.0231	-0.0130*
	(0.0187)	(0.0055)	(0.0218)	(0.0055)

† for $P < 0.1$, * for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$. Sample weighted by industry employment. Standard errors clustered at MSA level. Dummies for each NAICS three-digit industry are included to control for industry fixed effect.

Because of the correlation in demand shocks across manufacturing industries, in previous empirical analysis, I have separated local industries outside of the manufacturing sector from those in the manufacturing sector. In this section, I examine the special case of local industrial concentration in manufacturing and its effects on labor market adjustment to import competition.

Table 2.8 reports the effects of external manufacturing employment share on labor market adjustment to import competition. For employment growth (column 1), the insignificant positive interaction term (0.0045) suggests that being surrounded by jobs in other manufacturing sectors does not facilitate faster employment adjustment in the affected industries, despite that these jobs are most accessible to manufacturing workers. The finding is consistent with the observation that the decline in demand is correlated across manufacturing industries. With the general decline in manufacturing, the sector does not appear to serve as an effective shelter or exit option for workers affected by import competition and has no significant effects on labor supply adjustment to import competition. For wage growth (column 2), the negative interaction term (-0.0144) suggests that manufacturing clustering intensifies the adverse effects of import competition on industry wage rates. At the mean manufacturing clustering level, for every seven-percentage-point increase in external manufacturing employment share, a one-standard-deviation increase in import competition is estimated to decrease wage rates by 0.01% more.

What could explain the observed wage effects? On one hand, industries are non-randomly selected into manufacturing clusters. If industries that tend to locate in manufacturing clusters have lower wage adaptability to import competition, this selection may contribute to the observed wage effects. To verify if the observed effects are results of industry-level selection, in column 4, I include additional industry dummies and their interaction with import competition as robustness check. The results remain substantially similar to the estimated coefficients in column 2, suggesting that adverse selection is not a key mechanism behind the observed spatial difference in wage response.

Table 2.9: Interactive Role of All Three Local Industrial Characteristics on Industry Employment and Wage Growth

	(1) $\Delta \ln employment$	(2) $\Delta \ln wage$
Import shock× Accessibility	-0.0987**	0.0071
	(0.0322)	(0.0072)
Import shock×Wage Diff.	0.0030	0.0021*
	(0.0065)	(0.0008)
Import shock×Mfg Clustering	0.0058	-0.0146**
	(0.0209)	(0.0048)

† for P $<$ 0.1, * for P $<$ 0.05, ** for P $<$ 0.01, *** for P $<$ 0.001. Sample weighted by industry employment. Standard errors clustered at MSA level. Model includes all the main effects of import shocks and local industrial characteristics but only the estimated coefficients of the interaction effects are reported here.

On the other hand, because of the general decline in manufacturing, manufacturing clustering could depress the total number of available external job openings and the level of external wage differentials, with the latter having a significant role in wage adjustment according to results in table 2.7[7]. To test if the aggravated wage effect is driven by lower external wage premium in manufacturing clusters, in table 2.9, I include all three local industrial characteristics to jointly test their roles in the labor market adjustment of manufacturing industries. The results show that there is little change in the estimated coefficients of the interaction effects and that lower external wage premium in manufacturing clusters is not a main driver of the observed wage effects from manufacturing clustering. For wage adjustment, both the size and the wage level of the local non-manufacturing sector matter. Given the same exposure to import competition, the lower the share of local non-manufacturing industries (therefore the higher the share of

[7]Because of the general decline in the manufacturing sector, for the same decline in demand, clustering creates more sizable exodus of manufacturing workers as well as larger reduction in the area income, both of which could put downward wage pressure on the non-manufacturing sector.

external manufacturing industries) and the lower the non-manufacturing wage differentials, the lower the wage growth in the affected manufacturing industries.

In sum, the results from table 2.8 and 2.9 suggest that the presence of external manufacturing industries, which have the lowest skill gap for manufacturing workers, does not facilitate smoother employment adjustment. Furthermore, it intensifies the downward wage pressure from import competition, driven most likely by fewer outside options and consequently the lower bargaining power of workers. These findings confirm that when demand shocks are correlated within the manufacturing sector, manufacturing share has a distinct role in labor market adjustment. Unlike the non-manufacturing sector, a large manufacturing sector does not necessarily translate into more external job opportunities and could drive down workers' bargaining power for those affected by the demand shocks.

6 Conclusion

In this paper, I investigate the role of local industrial structure in labor market adjustment to trade competition for U.S. manufacturing industries between 2000 and 2016. Using data from the Quarterly Workforce Indicator (QWI) and the Census Bureu's County Business Patterns (CBP), the study provides the first empirical evidence on how local industrial structure interacts with trade shocks to influence the employment and earnings adjustment of the affected industries.

For employment adjustment, the findings suggest that proximity to external job opportunities in sectors with lower entry barrier for manufacturing workers, such as the construction sector, retail and wholesale trade sector, IT sector, and the professional services sector, facilitates faster employment adjustment. Manufacturing workers, in particular those with lower educational attainment, are more likely to avoid employment discontinuity and have better chance to leave the declining manufacturing sector if the employment share of these sectors are higher in their local metropolitan area. The

swifter employment adjustment, nevertheless, does not significantly reduces the impact of import competition on manufacturing wage rates.

For wage adjustment, the empirical results indicate that both the quantity and wage rates of external job opportunities in the local non-manufacturing sector play an important role in wage adjustment. With the same exposure to import competition, manufacturing industries in areas with lower level of manufacturing clustering and higher external wage premium on average see lower impact of the competition on their wage growth. This finding is consistent with the prediction of a labor search and bargaining model, in which workers' outside options directly influence their wage bargaining power at current job. The empirical evidence, however, shows that the magnitude of the wage effects is generally small and that there is no strong connection between the speed of adjustment in industry employment and the speed of adjustment in industry wage rates, raising concern for the validity of the neoclassical wage-setting framework that is widely assumed in studying the impact of trade competition on labor markets.

The results of this paper extend the literature by showing the linkage between local industrial structure and labor market adjustment to trade competition. For manufacturing workers, the outside options available in their local area play an important role in both their employment transition and wage bargaining power following exposure to trade competition. While the empirical evidence confirms that labor market adjustment to trade competition happens predominantly at the employment margin, unlike previous findings in the literature, I find that manufacturing wage does respond to the impact of trade competition and that the extent of the response is consistent with the prediction of a labor search framework. These findings carry several policy implications. First, a key mechanism to successful employment adjustment of manufacturing workers is access to selected non-manufacturing sectors with lower entry barriers in their local area. Connecting workers with existing local job opportunities in these sectors is likely to facilitate job matching and reduce the incidence of employment disruption. Secondly, for metropolitan areas where job opportunities are concentrated in sectors with higher

entry barriers, an alternative policy focus should be placed on narrowing the skill gaps and preparing manufacturing workers to take jobs that require new skill sets.

Reference

Acemoglu, Daron, David Autor, David Dorn, Gordon H Hanson, and Brendan Price, "Import competition and the great US employment sag of the 2000s," *Journal of Labor Economics*, 2016, *34* (S1), S141–S198.

Artuç, Erhan, Shubham Chaudhuri, and John McLaren, "Trade shocks and labor adjustment: A structural empirical approach," *American economic review*, 2010, *100* (3), 1008–45.

Autor, David H, David Dorn, and Gordon H Hanson, "The China syndrome: Local labor market effects of import competition in the United States," *American Economic Review*, 2013, *103* (6), 2121–68.

_ , _ , _ , and Jae Song, "Trade adjustment: Worker-level evidence," *The Quarterly Journal of Economics*, 2014, *129* (4), 1799–1860.

Beaudry, Paul, David A Green, and Benjamin Sand, "Does industrial composition matter for wages? A test of search and bargaining theory," *Econometrica*, 2012, *80* (3), 1063–1104.

Bernard, Andrew B, J Bradford Jensen, and Peter K Schott, "Survival of the best fit: Exposure to low-wage countries and the (uneven) growth of US manufacturing plants," *Journal of international Economics*, 2006, *68* (1), 219–237.

Caliendo, Lorenzo, Maximiliano Dvorkin, and Fernando Parro, "The impact of trade on labor market dynamics," Technical Report, National Bureau of Economic Research 2015.

Dix-Carneiro, Rafael, "Trade liberalization and labor market dynamics," *Econometrica*, 2014, *82* (3), 825–885.

_ and Brian K Kovak, "Trade liberalization and regional dynamics," *American Economic Review*, 2017, *107* (10), 2908–46.

Flood, Sarah, Miriam King, Steven Ruggles, and J Robert Warren, "Integrated Public Use Microdata Series, Current Population Survey: Version 5.0," 2018. data retrieved from IPUMS-CPS, https://doi.org/10.18128/D030.V5.0.

Kambourov, Gueorgui and Iourii Manovskii, "A cautionary note on using (March) Current Population Survey and Panel Study of Income Dynamics data to study worker mobility," *Macroeconomic Dynamics*, 2013, *17* (1), 172–194.

Keller, Wolfgang and Hâle Utar, "International trade and job polarization: Evidence at the worker-level," Technical Report, National Bureau of Economic Research 2016.

Macaluso, Claudia, "Skill Remoteness and the Economics of Local Labor Markets." PhD dissertation 2017.

Molloy, Raven, Christopher L Smith, and Abigail Wozniak, "Internal migration in the United States," *Journal of Economic perspectives*, 2011, *25* (3), 173–96.

Traiberman, Sharon, "Occupations and Import Competition." PhD dissertation 2018.

Utar, Hale, "When the Floodgates Open:" Northern" Firms' Response to Removal of Trade Quotas on Chinese Goods," *American Economic Journal: Applied Economics*, 2014, *6* (4), 226–50.

_ , "Workers beneath the Floodgates: Low-Wage Import Competition and Workers' Adjustment," *Review of Economics and Statistics*, 2018, *100* (4).

Chapter 3

The Decline of Cash Assistance and the Well-Being of Poor Households with Children

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[1]

Abstract: Since the early 1990s, the social safety net for families with children in the United States has undergone an epochal transformation. Aid to poor working families has become more generous. In contrast, assistance to the deeply poor has become less generous, and what remains more often takes the form of in-kind aid. A historical view finds that this dramatic change parallels others. For centuries, the nature and form of poor relief has been driven in part by shifting cultural notions of which social groups are "deserving" and "undeserving." This line was firmly redrawn in the 1990s. Did the re-institutionalization of these categorizations in policy have material consequences? This study examines the relationship between the decline of traditional cash welfare between 2001 and 2015 and two direct measures of well-being among households with children: household food insecurity and public school child homelessness. Using models that control for state and year trends, along with other factors, we find that the decline of cash assistance was associated with increases in both forms of hardship.

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1 Introduction

Over the past two and a half decades, the United States has increased its financial investment in the wellbeing of economically vulnerable families with children, even though it continues to lag behind other western industrialized nations (Tach and Edin, 2017; Smeeding and Thevenot 2016). Due to expansions in government-funded health insurance and tax credits benefiting low-income, working parents, the federal government now spends more on relief for such families than ever before. Yet there have been winners and losers of this transformation of the social safety net, a shift that mirrors themes that have played out in debates about poor relief for centuries, namely that policies should do more for those deemed "deserving" and less for those deemed "undeserving."

As Laura Tach and Kathryn Edin (2017) have argued, welfare reform firmly redrew the line between the deserving and undeserving poor, with employment as the litmus test. Research has shown that these policy changes improved the fortunes of those deemed "deserving"—stably employed single mothers and their families. Yet an important part of story of poverty among families and their children since welfare reform is the rise in inequality between those who are able to maintain work, and those who are not (Danziger 2010).

Not only has aid increased for one group and declined for the other, but the form of the assistance offered reinforces this divide. Stably working, low-income families now draw cash aid from refundable tax credits such as the Earned Income Tax Credit, and these benefits actually increase with earnings, up to a point. Such programs carry little, if any, stigma; there are no restrictions on how recipients spend the money; and few transactions costs are imposed on claimants (Halpern Meekin et al. 2015). Meanwhile, single parents who do not work or work only sporadically can only get minimal cash aid from a stigmatizing bureaucracy with strict time limits, work requirements, sharp sanc-

tions, and other punitive rules.

What aid remains for the nation's poorest families increasingly comes in the form of non-cash benefits, rather than cash aid (Fox et al., 2015; Edin and Shaefer, 2015). In recent years, many scholars have moved to treat cash and in-kind aid as equal resources when measuring poverty (Fox et al., 2015). Yet while in-kind benefits provide crucial support to the nation's poorest families, the fungibility of cash aid offers added protection against many hardship, especially to the growing number of families with extreme low cash incomes (Shaefer et al., 2018).

Has the decline of cash welfare increased hardship among households with children? This question is critically important for social scientists, and sociologists in particular, for a number of reasons. Given the vulnerability of those most affected by these changes—namely children—there is an obligation to deepen our understanding of its consequences. Furthermore, it is important to more fully contextualize how the changes to the safety net in the 1990s relate to the history of government relief, and to understand the extent to which it has reproduced structural themes of deservingness that have played out for centuries. Finally, given trends in poverty measurement that treat in-kind and cash aid as indistinguishable, it is important to assess more fully whether in-kind aid has filled the gap left by the decline of the cash assistance.

This study brings new data and new methods to these questions, using direct measures of well-being as outcomes and concentrating on years since the early 2000s, when declines to the cash assistance rolls were no longer matched by increases in maternal employment (Black, Schanzenbach and Breitwieser, 2017). We use data from this the post-2000 period to examine the relationship between declines in the reach of cash assistance and two hardships measured over multiple years: household food insecurity and homelessness and housing insecurity among children in the nation's public

schools. Due to the fact that the federal welfare reform legislation gave states wide latitude to shape and administer their cash assistance programs—both at the outset and in the years since—there is considerable state-to-state variation in the rate of decline in the cash aid rolls over time. Utilizing this variation across states and time, we estimate models that control for state and year trends, along with other factors, and find that the decline of cash assistance is associated with increases in both forms of hardship among households with children. This analysis deepens our understanding of the implications of a redrawing of the line that separates the deserving and undeserving poor.

2 Background and Literature Review

Throughout its history, America's system of poor relief has shifted in response to economic and demographic changes such as industrialization, urbanization, and immigration. At a number of key junctures, changing cultural notions of deservingness have also contributed to the re-shaping of the contours of aid for the poor (Gordon, 1994).

During the colonial period, destitute widows could claim meager, in-kind "outdoor relief," often in the form of bread or coal (but not both), from their "place of settlement." Both widows and their children were expected to work for their keep. In the 19th century, relegation to a poorhouse became the policy de jour for needy families (Katz, 1996). Late in the century, advocates of "scientific charity" viewed family breakup as the solution, relegating the children of pauper mothers to orphanages or foster care while their mothers tried to support themselves through employment.

A sea change in policy occurred in the early 20th century as progressive reformers began to advocate for a "wage" or "pension" that would allow destitute mothers to care for their children in their homes. State-run, locally-administered Mothers' Aid programs were enacted in 46 of 48 states between 1910 and 1932. These programs reflected new

cultural notions about the proper roles of mothers and children. Mothers should be dedicated to full-time parenthood rather than employment. Children, who were formerly conceived as "little adults" and prized mainly for their economic value, came to be viewed as "economically worthless but emotionally priceless" (Zelizer, 1994), a social construction of childhood that meant, among other things, that poor families could no longer supplement household income with earnings from their children's labor. Ironically, only a handful of localities offered stipends generous enough for families to survive, making maternal employment imperative. Work had to be limited to in-home labor such as laundry or piece work, however (Skocpol, 1995).

Prohibitions against maternal employment were strengthened in the first federal response to the plight of single mothers, the Aid to Dependent Children (ADC) program. ADC (later renamed AFCD, adding "families" to the title) supplanted the state Mother's Aid programs, which were overwhelmed by the Great Depression. It provided a stipend to those deemed both economically needy and morally worthy (i.e., it was mostly limited to widows and those who were not domestic or agricultural workers—usually whites). Work of any kind among recipients was prohibited, yet once again stipends were too small to survive on. In what historian Linda Gordon calls a "pincer's trap," families engaged in in-home production to supplement low benefits.

By the 1970s, through a combination of legal challenges to restrictions that were often racially motivated, along with welfare-rights activism, AFDC had evolved into a legally-enforceable federal entitlement. Single mothers who demonstrated need could not be denied benefits regardless of their perceived moral standing and other factors such as marital status and race. These changes coincided with a growing number of single mothers, due mostly to increases in desertion and divorce. As a consequence, the AFDC rolls grew dramatically. Contextualized in the arc of the history of U.S. social welfare policy, it is clear that the existence of this cash aid entitlement was anomalous,

and not surprisingly, brought about as a result of judicial and administrative rather than legislative actions. And indeed, it would prove to be short-lived.

Another significant cultural change during this era challenged the notion that a mother's place was at home. A rise in middle class mothers' labor force participation began in earnest in the 1970s and accelerated in the 1980s. The rise weakened the briefly-held presumption—codified in the federal entitlement to aid—that all mothers who could demonstrate need ought to receive government support to stay home with their children. In keeping with the shift, the first meaningful work requirements were added to AFDC in the late 1980s. But the most fundamental changes in the nation's approach to aiding single mothers and their children was yet to come. A suite of changes throughout the 1990s, often referred to as "welfare reform", responded decisively to these changing demographic trends. Taken together, these changes firmly redrew the line between who was deserving and undeserving of assistance (Tach and Edin, 2017).

In 1993, the Earned Income Tax Credit (EITC) underwent a massive expansion. The EITC is now a large, fully refundable tax credit targeting low-wage workers. Eligible income tax filers with a negative tax liability receive the credit even if it is greater than their income tax liability. The EITC had previously been a fairly tiny credit meant to compensate low-wage workers for regressive taxes. After the 1993 expansion, it was large enough to ensure that, for the first time in U.S. history, single parents who worked full-time and full year at a low wage job would be lifted above the poverty line when refundable credits are counted (Halpern Meekin et al. 2015). In order to claim it, mothers had to be employed. This new credit was explicitly pro-work—mothers could seldom claim maximum benefits unless they worked year-round and full time. The program, coupled with the refundable child tax credit also expanded in the late 1990s, has been found to have significant positive effects on infant health and child achievement, and is associated with little social stigma for recipient families (Halpern Meekin et al. 2015;

Hoynes, Miller, Simon 2015; Strully, Rehkopf, and Xuan 2010; Sykes et al. 2015).

However, the landmark Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PROWRA) ended the legal entitlement to cash aid enshrined in AFDC, replacing it with Temporary Assistance for Needy Families (TANF), with federally-mandated time limits, work requirements, and strict sanctions for noncompliance (Danziger 2010). Importantly, TANF came in the form of block grants, offering states wide latitude on how they could spend the money, allowing them to divert it to other purposes if they chose. Due to these factors and an exceptionally strong economy, caseloads plummeted (Danziger, 2010).

This policy shift created a new demarcation among the poor that Tach and Edin (2018) argue was directly in line with new notions that work, not need, should be the litmus test of deservedness. Dollars flowing to those nearest to the the poverty threshold (e.g. workers) grew, while dollars flowing to those unable to find or maintain work declined (Moffitt, 2015). Aid to the new "deserving" group was federally administered, came in the form of cash, involved little procedural burden and imposed little, if any, stigma. In contrast, cash welfare was increasingly devolved to the states. While time limits and work requirements were mandated at the federal level, states were free to apply additional restrictions and enforce more stringent time and work requirements than stipulated in federal policy. Many states did so.

Furthermore, echoing the outdoor relief of the Colonial period, what aid remained was typically no longer provided in cash, but as in-kind benefits. Today the most important program for the poorest families is the Supplemental Nutrition Assistance Program (SNAP), formerly the Food Stamp Program, which provides a critical floor of support for eligible families. While poverty measurement scholars have increasingly treated cash and in-kind benefits as equal resources, the fact that SNAP benefits are restricted to the

purchase of food imposes major limits on the extent to which these benefits can provide adequate support for families, especially the growing share with extremely low cash resources (Edin and Shaefer, 2015; Shaefer et al., 2018). Paying for housing, for instance, has become increasingly challenging for families at the bottom of the distribution, yet housing assistance program help only about one in four eligible households (Joint Center for Housing Studies, 2013).

Effects of Reform on Well-Being

It is a mistake to merely envision this shift in social policy, which is often colloquially referred to as "welfare reform", as occurring at a single point in time (Tach and Edin 2018). Rather, ongoing changes in state policies and proceedures and ongoing declines in caseloads each year since TANF's inception indicate that it is a living force that continually underlines new notions of work as the mark of deservingness. Behind this force is a shift in public discourse and belief about poverty, enabling the steady decline of the old policy regime (Somers and Block 2005; Steensland 2008).

An extensive literature seeks to understand the effects of welfare reform on the well-being of low-income families, women, and children. Even in the early years after reform, research indicated that while some families gained from welfare reform and the waivers that preceded it, the most economically needy were harmed (Danziger 2010). Multi-site random assignment studies of state welfare-to-work programs implemented in the run-up to the 1996 welfare law produced evidence that such programs can reduced poverty for some while increasing deep poverty for others (Freedman et al. 2000). Analyses exploiting data from both the welfare waivers under the AFDC regime, and the differential implementation of TANF across states in the mid-1990s, suggested that reductions in benefit levels and the imposition of strict policies such as family caps and full-family sanctions increased the number of children in foster care (Bitler, Gelbach, and Hoynes

2006; Paxson and Waldfogel 2002, 2003). Studies exploring the effects of the reform on prenatal health saw breastfeeding fall and an association between caseload reduction, modest reductions in prenatal care and increased risk of low birthweight (Haider, Jacknowitz, and Schoeni 2003; Kaestner and Lee 2005). Studies also documented the rise of single mothers "disconnected" from both work and welfare, and the difficulties they faced (Blank and Kovak 2008; Brock et al. 2002; Corcoran et al. 2000; Loprest and Nichols 2011; Sandstrom et al. 2014; Seefeldt 2008; Turner, Danziger, and Seefeldt 2006; Wood and Rangarajan 2003; Zedlewski et al. 2003).

As noted earlier, few studies of TANF have considered the impact of changes in the rolls since the 1990s and the early 2000s, despite the falloff in single mothers' employment after 2000 and ongoing contraction of TANF caseloads. Yet the omission of data after the 1990s and the earliest years of the 2000s is significant. In a comprehensive recent review of the literature, Ziliak (2015: 66-67) concluded that research using a variety of data and methods suggests "that many women were worse off financially after welfare reform, especially at the bottom of the distribution. But this result becomes clear only if data post-2000 are brought to bear." Ziliak's review underscores the point that few studies have assessed the impact of welfare reform using data after the early 2000s when falling caseloads were no longer driven by rising employment among single mothers but by policy decisions, program implementation, and other factors such as poor information flows (Ziliak 2015). Indeed, over the course of the 2000s single mothers' employment rate began to approach to prereform levels (Black et al., 2017).

Using data from more recent years, Edin and Shaefer (2015) have used both quantitative and qualitative methods to document a sharp rise in the share of households with children reporting extremely low cash incomes through the early 2010s, and Moffitt finds that the stratification in public assistance income sharpened again in 2013 once the temporary SNAP benefit increases during the Great Recession expired. Yet these

and most other studies in this literature rely on family income as the primary outcome, even though sociologists have long understood that income is an imperfect measure of well-being, and is far from perfectly measured in household surveys (Mayer and Jencks 1989). Some have sought to account for the shortcomings of income data by making statistical adjustments, but such adjustments are themselves subject to substantial measurement error (Stevens, Fox and Heggeness 2018). Measuring expenditures might be a reasonable alternative to income, however, scholars do not agree about the reliability of existing consumption data or how it should be treated, in part due to rising debt among the poor (Seefeldt 2015).

To build confidence in extant conclusions about the relationship between a significant policy shift and those impacted by it, we argue that it is important, whenever possible, to move from instrumental and imperfect proxies associated with well-being to direct measures of well-being. This study seeks to do that by using two direct indicators of well-being among households with children: food insecurity and child homelessness. By focusing on more recent years than most studies, and by studying two direct measures of well-being this study offers new evidence about the effects of the welfare reforms on the well-being of poor households with children.

3 Methodology and Results

Using variation in caseloads to assess policy impacts

With numerous factors driving changes in the outcomes of poor families, researchers must seek out ways to directly link changes in policy to changes in well-being. A common technique used for such analyses is a state-by-year fixed effects framework assessing whether arguably exogenous changes in state rules such as time limits, sanctions, and benefit levels that impact caseloads in turn affect markers of well-being. Research using such methods has found that punitive policies and declines in the values of ben-

efits are predictive of poor outcomes, such as the disconnection of single mothers from both work and cash assistance (Hetling, Kwon, and Saunders 2015) and out of home placements (Paxson and Waldfogel 2003). Unfortunately, there is little variation in these TANF rules over the past decade and even fifteen years. States generally set their rules in the early phase of reform. Meaningful changes occurred in some states during TANF's second decade, but alterations to major rules have generally been rare (Fusaro 2017; Giannarelli et al. 2017). Despite stability in program rules, TANF caseloads have continued to decline.

Figure 3.1 presents trends in TANF cases (as calculated by the Center on Budget and Policy Priorities) alongside trends in the number of children in poverty for years 2001-2015. TANF cases began at just under 2.26 million and fell steadily to nearly 1.75 million in 2008. Caseloads increased somewhat during the "Great Recession" to a high of 1.98 million in 2010 but then fell again to a low of 1.50 million in 2015. This represents a caseload decline of about 33.6 percent from 2001 to 2015. The number of poor families with children followed a different path, with 5.31 million families in 2001, rising modestly through 2007, and then spiking up to a high of 7.37 million in 2011, then falling back to 6.48 million in 2015. The result of these trends is that the ratio of TANF cases to families in poverty ("TANF-to-Poverty ratio"), a metric developed by analysts at the Center on Budget and Policy Priorities (Trisi & Pavetti, 2012), drops from 41 (41 cases for every 100 families in poverty) in 2001 to 27 in 2009, holds steady through 2011, and then drops slightly to 23 by 2015.

Figure 3.1: TANF caseloads and families in poverty, 2001-2015

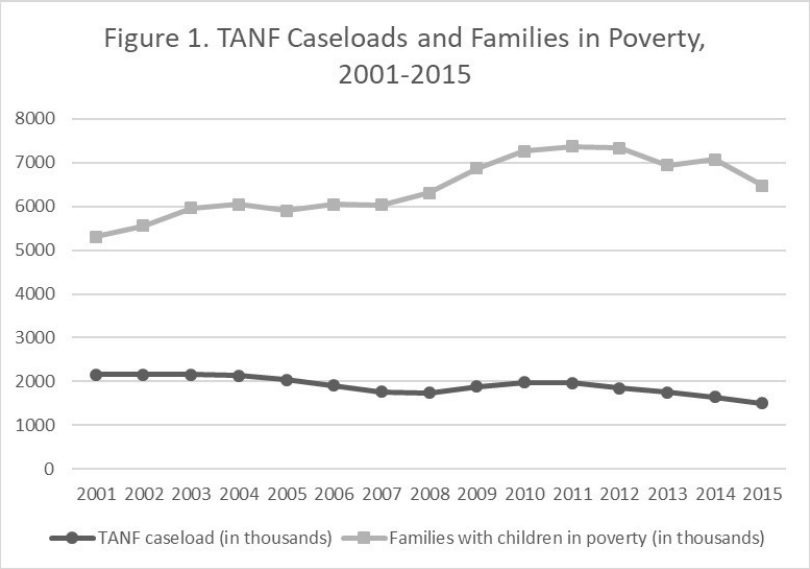
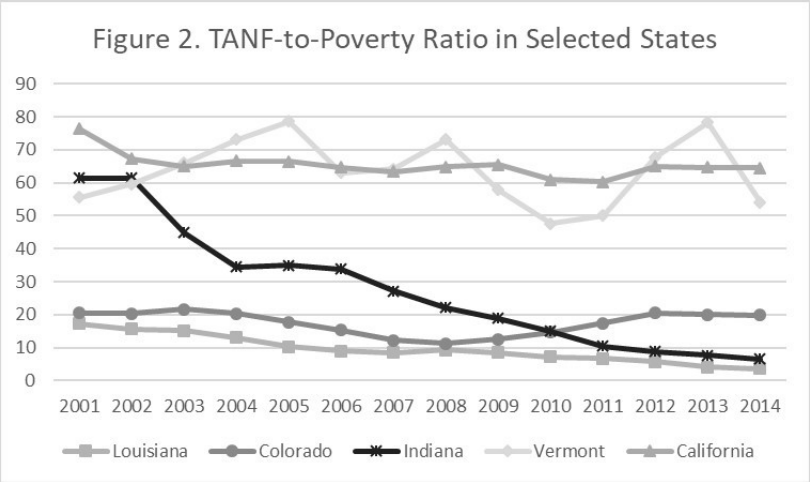


Figure 3.1, however, masks substantial variation across states over the study period. Figure 3.2 illustrates the paths taken by a variety of states over the study period. The TANF-to-poverty ratio in California drops from 76 to 65. In contrast, the decline in Indiana is much more dramatic, falling from 62 to just under 7. In other states, the change follows a very different path, such as Colorado, where the ratio goes from 20 in 2001, down to a trough of 11 in 2008, but rebounds to 20 in 2014. Ratios for Vermont show the most instability but little trend. Our analysis takes advantage of all types of year-to-year variation.

Figure 3.2: TANF-to-poverty ratio in selected states



In this paper we estimate the relationship between variation in the reach of cash assistance through TANF and two measures of well-being: 1) food insecurity and 2) public school student homelessness, controlling for state and year trends. We draw data from household surveys measuring food insecurity and administrative records for student homelessness. Each source has different strengths and weaknesses, but neither relies on self-reported public program participation. We hypothesize that the decline in access to cash income support will be associated with increases in the prevalence of these two measures of hardship. That is, as TANF's reach declines over time, the risk of these hardships will grow. We argue that food security is an "acid" test of sorts because the Supplemental Nutrition Assistance Program (SNAP) and other nutrition assistance programs have broad reach, and because SNAP benefits rise as cash income falls. If the presence of SNAP cannot protect households from rising food insecurity associated with declines in cash assistance, then there is good reason to think that it will not protect households against non-food material hardship.

The residential instability of school children is another domain that may be affected by the declining reach of TANF. Nichols and Gault (2003) argue that a review of descrip-

tive studies across states in the years following the welfare reform "suggests that welfare reform has increased the rates of family mobility, evictions, and the likelihood of sharing housing" (p. 104). A number of other studies find associations between the decline of TANF and homelessness and housing instability (Shaefer et al, 2015; Kalil, Seefeldt and Wang (2002). In the face of the stagnant reach of housing assistance and rising housing costs, we expect the continued decline in TANF caseloads to predict increasing rates of child homelessness.

It is always possible that an unobserved third factor affects both food insecurity, child homelessness, and cash assistance caseloads. The most likely such factor would be an economic downturn or natural disaster. However, hardship and public program participation normally increase in response to such events. This, however, would produce an association precisely opposite of our hypotheses. If caseloads respond to economic downturns, we would expect increases in cash assistance caseloads to be associated with increased hardship. Thus, if we find a relationship between reduced caseloads and increased hardship, the results are fighting against the direction of presumed bias that would be expected if endogeneity were a serious threat to our models.

Outcome: Food Insecurity

In this analysis, we use state and year controls to focus on the relationship between changes within states over time in the coverage of cash assistance and household food insecurity. The dependent variable is binary, so we model the probability of a household experiencing food insecurity using logistic regression ('logit') models in the following form:

$$P(y_{ijt} = 1) = logit^{-1}(\beta u_{jt} + \lambda X_{ijt} + \alpha S_{jt} + \gamma_j + \theta_t + \epsilon_{ijt}) \tag{3.1}$$

Here, y is the binary indicator of food insecurity, where 1 = food insecure and 0 = food secure. The index i references the individual household, j indexes the state, and

t indexes the year. We model the probability of food insecurity, as a function of TANF coverage (u) in state j at time t, a vector of household controls X, and a vector of state-year controls S. We include state (j) and year (t) controls (which would be referred to as state-year fixed effects in a linear model) to account for between-state variation and year-specific shocks that are common across a state, while the error term ϵ represents the remaining unexplained variation. The logit link ensures that predictions remain bounded by 0 and 1.

Household controls in X include household head race/ethnicity, age, and student status; highest educational attainment in the household; number of children in the household; household employment status (0 if no-one is employed and 1 if one or more household members is employed) and an indicator of whether the household includes at least one individual age 65 or older. We control for state-year unemployment rates because some connection between economic cycles and caseloads remains, even though this appears not to be the primary driver of caseload declines in TANF. The key object of interpretation is the coefficient β, the marginal effect of which represents the change in the probability of a household being food insecure as a function of changes in TANF coverage after controlling for other relevant factors.

Data and Sample

We draw household-level data from the Current Population Survey (CPS), particularly the annual Food Security Supplement (CPS-FSS). The CPS is a monthly survey of approximately 60,000 households collected by the U.S. Census Bureau on behalf of the Bureau of Labor Statistics. It offers a nationally representative, multistage, stratified sample of the non-institutionalized U.S. population. Detailed labor market and demographic data are collected on all respondents age 15 years and older. Since 1995, CPS has also fielded an annual supplement to assess the incidence of food security, defined

as a household having stable access to an adequate quantity and quality of food (United States Department of Agriculture Economic Research Service 2015). Household food security status is based on the number of food insecure conditions experienced by a household, such as being unable to afford balanced meals or cutting the size of meals because of too little money for food (Coleman-Jensen et al. 2015). For the primary specification of our food security analyses, we create a binary variable coded 0 if the household scores in the food secure range and 1 if the household scores in the low or very low food security range on this measure.

We create three categories of households for sub-group analysis: households in which the head is married, households headed by an unmarried woman with other adults present, and households headed by an unmarried woman with no other adults present, the group we expect to be most affected by the decline in the reach of TANF. Note that income is imprecisely measured among households headed by unmarried women with other adults present, because the income unit only for poverty rates collected in the CPS-FSS includes those related by blood or marriage. We report models estimated using the full sample of low-income households with children and models stratified by these family composition sub-groups.

Data from the CPS-FSS and the concurrent monthly core CPS were extracted from the Integrated Public Use Microdata Series (IPUMS), a dataset produced by the Minnesota Population Center harmonizing CPS files over time (Flood et al. 2015). The full sample (n= 75,799) consists of households with children below 185 percent of poverty in which the household head is below 65 years of age. We use this imperfect income threshold because the FSS includes an indicator measure at this level. Income data in the month of CPS-FSS administration is otherwise limited[2]. Beyond this income cut-off,

[2]Income data for the CPS-FSS sample is reported categorically, and according to USDA ERS staff not reliably, making for difficult comparisons across time. Continuous income data is collected in the Annual Social and Economic Supplement (ASEC), but only a fraction of respondents participate in both CPS-FSS and ASEC.

we do not rely on any measures involving self-reported public program participation, which suffers from under-reporting. We restricted the sample to the December 2001 to December 2015 CPS-FSS cohorts. Prior to December 2001, the month of FSS administration and screening into the food security module were inconsistent. Including earlier FSS cohorts would lead to additional unexplained variation and the inclusion of overlapping reference frames across years for questions regarding experiences in the past 12 months. All estimates are weighted using FSS probability weights and standard errors are clustered by state. Descriptive statistics for the distribution of household types and other household-level data are provided in Table 3.1.

Table 3.1: Sample Characteristics, Low-Income Households with Children

	All households	Married	Unmarried female, other adults	Unmarried female, no other adults
Percent of all Households	1.00	0.492	0.160	0.249
Food insecure	0.364	0.300	0.419	0.456
Household composition				
1 child	0.338	0.256	0.426	0.389
2 children	0.353	0.377	0.317	0.343
3+ children	0.309	0.367	0.258	0.268
1+ seniors	0.028	0.033	0.056	0.000
1+ employed adults	0.823	0.924	0.827	0.624
Race (household head)				
White non-Hispanic	0.442	0.482	0.376	0.398
Black non-Hispanic	0.200	0.101	0.264	0.361
Hispanic	0.297	0.343	0.304	0.200
Other	0.059	0.071	0.054	0.040
Education (highest in household)				
Less than high school	0.156	0.138	0.127	0.210
High school	0.355	0.380	0.366	0.416
Some college	0.356	0.349	0.403	0.349
Bachelor's+	0.132	0.183	0.091	0.075
Student				
Household head	0.033	0.014	0.053	0.044
Age				
Household head	36.7	37.9	37.7	34.4

Data source: Current Population Survey-Food Security Supplement, 2001–2015.
Notes: Sample is restricted to households with children below 185 percent of poverty with household head below age 65.

State Variables

We merge the household-level data with state-level data, as our hypothesis is a proposition about the relationship between state and household characteristics. The key independent variable is TANF coverage as represented by the TANF-to-poverty ratio, the

count of families receiving cash benefits through TANF divided by the total number of families with children below the poverty threshold. The counts of cash assistance cases are drawn from state administrative data collected by the Center on Budget and Policy Priorities (CBPP), while the number of families with children below poverty is calculated from Current Population Survey data by the CBPP (2016).

To compensate for possible reliability issues, poverty in the varying denominator TANF-to-poverty ratio is a rolling average of the estimated count of families in poverty in state j for years t-1 and t (that is, 2005 values are an average 2004 and 2005 data). While the varying denominator TANF-to-poverty ratio reflects changes in both the supply of and potential demand for cash assistance, it cannot discriminate between trends driven by changes in family poverty from trends driven by changes in the count of TANF cases. In a sensitivity analysis, we therefore create a second version of the TANF-to-poverty variable with a fixed denominator calculated as the average count of families in poverty in every state over the entire study period. This version is used to check whether model results primarily reflect changes in the count of TANF-receiving families or unrelated fluctuations in family poverty.

Results

Full model results are shown in Table 3.2, both for all households with children and for subgroups defined by household composition (married head, unmarried female head with other adults present, unmarried female head with no other adults present)[3]. We

[3]The pseudo R2 values are quite low for these models, suggesting they explain only a small fraction of the variation in the probability of food insecurity. These statistics are calculated using the likelihood ratio index method, 1 minus the ratio of the log likelihood of the fitted model to the log likelihood of the null model (Long 1997). It and similar statistics are subject to a range of limitations (Long 1997), but we find low values regardless of alternative approach used (e.g., in the full sample model, approximately 65% of cases are correctly predicted with a probability cutoff of 0.5—better than chance, but not exceptional). Superficially poor fit statistics are common in other studies using the CPS-FSS and reporting measures of explained variation (e.g., Lombe, Yu and Nebbitt 2009), so our analysis is not unique in that regard. In our case, a likely explanation is that income—one of the strongest predictors of food security (Coleman-

report results as mean marginal effects, which approximate a linear relationship between a predictor and the probability of food insecurity. We also present the predicted probability of experiencing food insecurity graphically at a range of values of TANF cash assistance coverage while holding other variables constant.

Before turning to the primary point estimates of interest, which show the relationship between TANF coverage and food insecurity, we examine some of the other variables in the models to provide an understanding of which sample members are at greater risk of food insecurity. Age of the household head is positively and significantly related to food insecurity—households with an older head are at greater risk—in all models except those with a married household heads. In terms of race, households with heads who are Black have an approximately 0.06 higher probability of experiencing food insecurity compared to white-headed households. The difference is similar for households with a married head but slightly weaker (0.04 higher probability) in households with an unmarried female head but with no other adults present. Perhaps most strikingly, while race and ethnicity are important predictors of food insecurity generally, they are not associated with greater risk of food insecurity in households headed by a single female with no other adults. More education decreases the risk of food insecurity in all household categories, with a college degree being particularly protective. In households where the highest level of education is a bachelor's degree or more, the probability of food insecurity is 0.16 lower than in a household in which no member completed high school. Both high school completion and some college are, again in the all households model, associated with an approximately 0.05 lower probability of food insecurity than households without a member that completed high school. The magnitude of the education relationship is roughly similar in all household subcategories.

Jensen 2012)—is not included as a covariate for both practical (it is coded categorically in the raw data, and not easily adjusted for inflation in a multi-year analysis) and analytical (implicit in our argument is that more accessible cash assistance programs boost income for the most disadvantaged households; income would be entangled with our key predictor variable in the cases for which we'd most expect to observe an effect) reasons.

Compared to having only one child, three or more children is associated with greater food insecurity in married households (0.02 higher probability), households headed by a single female with other adults present (0.04), and households headed by a single female with no other adults (0.02). Two children is associated with an elevated risk of food insecurity only for households headed by a single female with no other adults (0.02) compared to a base of one child. Households with seniors (age 65+) present are less likely to experience food insecurity (0.04 lower probability in the pooled model), but the relationship is not statistically significant for married households. Employment is also a strong predictor of food insecurity, both when considered at the household level and at the state-year level. Among all households with children, those with at least one employed adult have an 0.14 lower probability of food insecurity than those with no employed adult. At the state level, a higher unemployment rate is associated with a greater chance of food insecurity, although the point estimate for female-headed households without other adults is not statistically significant. For households with children overall, married households, and female-headed households with other adults, a one percentage point change in the unemployment rate coincides with an increase in the probability of food insecurity of approximately 0.01.

Table 3.2: Food insecurity logistic regression estimation results (mean marginal effects)

	All households	Married head	Unmarried female head, other adults present	Unmarried female head, no other adults present
Household head characteristics				
Age	0.00129***	−0.000744	0.00373***	0.00445***
	(0.000)	(0.000)	(0.000)	(0.001)
White non-Hispanic (base)				
Black non-Hispanic	0.0608***	0.0586***	0.0365*	0.00383
	(0.008)	(0.012)	(0.016)	(0.012)
Hispanic (any race)	0.0102	0.0276***	0.00652	−0.0155
	(0.007)	(0.008)	(0.012)	(0.014)
Other non-white	−0.00571	0.0125	−0.0530*	−0.000377
	(0.012)	(0.014)	(0.026)	(0.028)
Currently student (age 18–24)	0.00546	−0.0144	0.0300	−0.00720
	(0.015)	(0.029)	(0.029)	(0.020)
Household characteristics				
Highest education less than high school (base)				
Highest education high school	−0.0461***	−0.0551***	−0.0337*	−0.0414**
	(0.006)	(0.009)	(0.014)	(0.014)
Highest education some college	−0.0513***	−0.0602***	−0.0473**	−0.0332**
	(0.007)	(0.008)	(0.018)	(0.012)
Highest education bachelor's+	−0.157***	−0.145***	−0.127***	−0.153***
	(0.010)	(0.012)	(0.016)	(0.021)
1 child (base)				
2 children	−0.0104	−0.00882	0.0128	0.0215**
	(0.006)	(0.009)	(0.015)	(0.008)
3+ children	0.00812	0.0241**	0.0420***	0.0247**
	(0.005)	(0.008)	(0.012)	(0.009)
1+ seniors	−0.0431***	−0.0157	−0.0658**	
	(0.011)	(0.015)	(0.020)	
1+ employed adults	−0.143***	−0.160***	−0.121***	−0.0828***
	(0.010)	(0.012)	(0.019)	(0.010)
State characteristics				
TANF coverage	−0.112**	−0.110	0.0271	−0.165**
	(0.040)	(0.057)	(0.080)	(0.058)
Unemployment rate	1.014***	0.948**	1.127	0.573
	(0.251)	(0.363)	(0.610)	(0.623)
N	73,978	37,635	11,426	17,940
Pseudo R^2	0.026	0.026	0.028	0.018

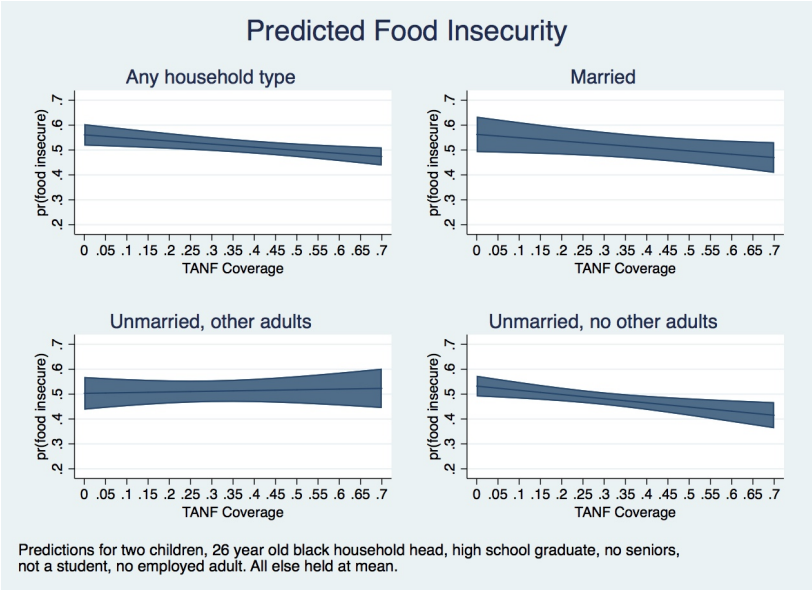
Data source: Current Population Survey-Food Security Supplement, 2001–2015.
Notes: Models are logistic regression models with bivariate outcome food insecurity = 1.
Sample restricted to households with children below 185 percent of poverty with household head below age 65. State and year indicators included in models but not reported. Effect of household head age estimated with a quadratic term.
Values are mean marginal effects.
Cluster robust standard errors in parentheses.
*p < 0.05; **p < 0.01; ***p < 0.001.

Our primary interest is the relationship between TANF coverage and food insecu-

rity. For all households, TANF is associated with a decreased risk of food insecurity. A ten percentage point increase in TANF coverage coincides with an 0.011 decrease in the probability food insecurity. The relationship is similar for married households. It is greatest for single-female headed households without other adults, where the same ten percentage point increase in cash assistance coverage is associated with an 0.016 point lower probability of food insecurity. Importantly, this is the group—single mothers with no other adults—for whom we would most expect to see a relationship between traditional cash benefits accessibility and hardship.

Figure 3.3 visually presents the predicted probabilities of food insecurity across a range of values of TANF coverage. The probabilities were predicted for a household headed by a 26 year old person who is black, where high school graduate is as the highest level of education in the household, there are no seniors, and no employed adults. All other values were held at the sample means. The observed relationships illustrate the previously-discussed patterns; as TANF coverage increases, the probability of food insecurity is reduced for households generally and for married households. No relationship is seen in households with an unmarried female head but other adults present. The steepest slope is seen for households with a female head and no other adult present.

Figure 3.3: Predicted relationship between TANF coverage and food insecurity over a range of values



Sensitivity tests

Our hypothesis reflects a causal argument, that TANF coverage reduces the risk of hardship for a low-income household. Conversely, we hypothesize that declines in TANF coverage would increase the risk of food insecurity. The models include state controls (which should remove the confounding influence of any unobserved, time-invariant state-level factors) and year controls (which should address within-year common shocks). The model is causally identified if—and only if—the condition of strict exogeneity is met. There cannot be a third, unobserved factor that simultaneously increases the probability of a household experiencing food insecurity and lowers TANF caseloads.

Intuitively, the strict exogeneity condition appears to be met. As previously discussed, there are reasonable scenarios in which an unobserved third factor increases food insecurity while increasing cash assistance caseloads, such as an economic downturn or natural disaster. Our results run counter to the expected relationship between

TANF coverage and hardship in these cases, however. Further, if there were some unobserved factor both increasing the risk of food insecurity in low-income households and decreasing caseloads, then TANF coverage would likely also be predictive of changes in food insecurity for households meeting the income criteria but unaffected by TANF cash benefits policy. Re-estimating the food insecurity models in a subsample drawn from the same CPS-FSS cohort but now only including households without children (household head still restricted to under age 65 and income to less than 185 percent of poverty) provides no evidence of a relationship between TANF coverage and food insecurity. The same pattern holds for a model restricted to households with incomes above the low-income threshold.

We conduct a second sensitivity test to address a threat to the validity of our analysis. TANF coverage has two components (TANF cases and families in poverty) that vary longitudinally, and results could be influenced by changes in either value. If results of the analyses presented previously were primarily a product of changes in family poverty rather than changes in TANF coverage, using the fixed denominator version of the coverage variable should produce quite different results. Mean marginal effects for models using fixed-denominator TANF coverage are presented in Table 3.3. In the interest of parsimony, only the coverage results are presented; patterns of sign, significance, and approximate magnitude on all other variables are otherwise identical to the baseline specification. TANF coverage is again significantly and negatively related to the probability of food insecurity for pooled households, married households, and households headed by a single female with no other adults present (by magnitude, once again the strongest relationship).

Table 3.3: Abbreviated Logistic Regression Estimation Results (Mean Marginal Effects), Static Denominator TANF Coverage

	All households	Married head	Unmarried female head, other adults present	Unmarried female head, no other adults present
TANF coverage (static denominator)	−0.185**	−0.180***	0.013	−0.214**
	(0.047)	(0.051)	(0.108)	(0.078)
N	73,978	37,635	11,426	17,940
Pseudo R^2	0.026	0.026	0.028	0.018

Data source: Current Population Survey-Food Security Supplement, 2001–2015.
Notes: Models are logistic regression models with bivariate outcome food insecurity = 1. Sample restricted to households with children below 185 percent of poverty with household head below age 65. State and year indicators included in models but not reported.
Values are mean marginal effects.
Cluster robust standard errors in parentheses.
*p < 0.05; **p < 0.01; ***p < 0.001.

Outcome: Homelessness among public school children

In this analysis, we examine the relationship between changes within states, over time in the prevalence of cash assistance receipt, and counts of homeless public school children. These counts include students who are temporarily doubled up, those in homeless shelters, and those unsheltered. We rely on the significant variation over time in TANF caseloads to assess associations between TANF caseload levels and homelessness among children in public schools, collected at the state level. Because we lack individual-level data, our estimating equation is:

$$Y_{j,t} = \beta TANF_{j,t} + \alpha P_{j,t} + \gamma_j + \theta_t + \epsilon_{j,t} \tag{3.2}$$

where Y is the total number of homeless students by state, year. Our key independent variable, TANF, is the annual average of the number of TANF cases in a given state in year t. (For every year, we assign caseloads in year t to school year homelessness counts collected in school years t and t+1. For example, we assign school year 2013-

2014 to TANF caseloads in year 2013). $P_{j,t}$ is a vector of controls related to the welfare of children in the state, including a control for the total number of children in poverty, and the total number of children overall. Once again we average these counts over two years to smooth volatility in CPS estimates. The subscripts j and t represent the state and year of each observation, while and represent time-invariant state fixed effects and time fixed effects; epsilon indicates the unexplained variation. Thus is the change in the total count of homeless school children associated with corresponding changes in the number of TANF cases within a state, over time.

Data and Sample

As with our previous analysis, the main independent variable of interest—the number of TANF cases—was extracted from the Center on Budget and Policy Priorities' (CBPP) TANF-to-Poverty database, which compiles the annual averages of the number of cash assistance cases in each state, adjusting for accuracy across states and time. We draw estimates of the number of children in poverty, and the number of children overall, from Current Population Survey ASEC data extracted from the Integrated Public Use Microdata Series (IPUMS-CPS ASEC) (Flood et al. 2015).

For the number of homeless students, we used annual reporting by the National Center for Homeless Education, which provides a summary of data collected by the McKinney-Vento Education for Homeless Children and Youth (EHCY) Program on the number of homeless students from pre-Kindergarten age (3 to 5 year olds) reported as enrolled in public school districts by state educational agencies (SEAs) in School Year 2006-2007 to School Year 2014-2015. Analyses using data in New York and Michigan have found that this marker of homelessness is associated with a series of poor educational outcomes (Cowen, 2017; Institute for Children, Poverty and Homelessness, 2016). Students are considered homeless if they are doubled up temporarily, sheltered, or un-

sheltered. During the early years of the McKinney-Vento data, many schools did not fully report data. We find that as of 2006-2007, 78 percent of school districts were reporting, and in the remaining years of our sample reporting is near or above 90 percent. We control for the remaining increased reporting over the study period with state and year controls. We also run sensitivity tests to confirm that results are not sensitive to the inclusion of 2006-07. This analysis uses counts (number of homeless children) rather than a rate (of homeless children) because of ambiguity about the proper denominator for such a rate and imprecision in the available possible denominators. However, in an alternative specification, we use an outcome variable of homeless students over children in poverty, which yields substantively similar results.

Results

Table 3.4 assesses the relationship between increases in the TANF caseload and the number of homeless students.

Table 3.4: TANF Caseloads and Homeless Public School Children, Estimation Results

	(1)	(2)	(3)
TANF caseloads	−0.0122	−0.1216	−0.1494*
	(0.1106)	(0.0911)	(0.0580)
Number of children in poverty (2-year average)		0.0615**	0.0643**
		(0.0201)	(0.0191)
Number of children (2-year average)			−0.0185
			(0.0322)
Observations	456	456	456
R-squared	0.9504	0.9635	0.9642

Data sources: McKinney-Vento Education for Homeless Children and Youth (EHCY) Program, TANF administrative caseloads and Current Population Survey ASEC data, 2006–07 to 2014–15. School year 2009–2010 and 2014–2015 for state California were dropped because of reporting errors.
Notes: Models are ordinary least squares regression models with the outcome being state-year counts of homeless children. State and year dummies included in models but not reported Robust standard errors in parentheses
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.5$.

The first column of Table 3.4 reports estimates without controlling for the state poverty level. When child poverty increases, we would expect the number of public assistance cases to rise in response to the growth of the number of children at risk, and in fact that is what we observe. This leads to a spurious relationship where increases in cash assistance is associated with increases in homelessness, with the coefficients of the public assistance programs being biased upwards. The statistically insignificant estimate of -0.012 in column 1 potentially reflects this upward bias, and the effects of TANF are ambiguous in this case.

In the second and third columns, we further include controls for the number of children in poverty as a measure to control for the population of children at risk of being homeless in the state and controls for the overall population of children to account for overall population growth. With the inclusion of controls for changes in the number of homeless children, the upward bias in our coefficient estimate of the relationship be-

tween TANF caseloads and student homelessness decreases but remains statistically insignificant. The bias further decreases with the addition of a control for the total number of children. The coefficient estimate of -0.149 in column 3 can be interpreted as indicating that for each 100 case decrease in the number of TANF cases, there is an associated 14.9 person increase in the number of homeless students. Because this estimate is still subject to upward bias, the unbiased correlation between the number of TANF cases and homeless students may be somewhat larger.

Sensitivity tests

The effects of TANF cash transfers on the risk of homelessness are unlikely to be completely contemporaneous. It takes a period of deterioration in families' financial well-being to destabilize living arrangements. We test this lagged effect by regressing the number of homeless students on the average TANF caseloads in the calendar year before the school year. The result suggests that there is a strong and significant lagged effect of TANF cash assistance on the number of homeless students.

To verify that our results capture the period-specific effects of the TANF caseload, instead of some unobserved factor causing an overall rise in homeless students after a fall in TANF caseloads, we conduct a falsification test by regressing current number of homeless students on TANF caseloads in the two following calendar years. The coefficient estimates do not provide strong evidence for this alternative hypothesis. In addition, we included interaction effects with the state-level TANF benefit amount, which do not show any trend of change during this period. The results conform with estimates from our main homeless students model.

To further test whether expansions of other parts of the safety net may explain our core results, we estimated a model that includes the number of households receiving

SNAP by state year. Our results remained consistent. SNAP, being more cyclically sensitive than cash assistance under TANF, shows the endogenous relationship between SNAP caseloads and homelessness. Increased caseloads are associated with increased student homelessness. However, the relationship between TANF cases and student homelessness remains substantively similar to that presented in our baseline model.

4 Conclusion

The transformation of the safety net in the 1990s capitalized on changing cultural notions about a mothers' role in the family, and redrew the line between those perceived as "deserving" and "undeserving." Put in historical perspectives, this transformation fit directly into long-term themes that permeate the history of policy debates about aid to the poor. If anything is anomalous about American welfare history, it was that the poorest families with children in the United States had a short-lived "entitlement" to cash assistance for roughly three decades. This entitlement was brought about not by legislative change, but rather by judicial and administrative actions that broadened eligibility and struck down discriminatory state practices designed to neutralize access to aid by types of families deemed undeserving. Indeed, scholars examining the long-term arc of policy making might have predicted that such a policy construct would be short lived.

This study finds significant associations between cash assistance caseloads and two measures of hardship. In the case of household food insecurity, the relationship is concentrated among single mothers living independently with their children. This is the group we would expect to be most affected by changes in TANF coverage. We note the especially strong associations between caseload reductions and increases in student homelessness, suggesting that a primary way welfare reform has impacted children is through destabilizing their living situations. This outcome is of particular con-

cern as housing instability is strongly related to school instability, and instability in the household roster over time is associated with sharply lower rates of high school graduation (Perkins 2019). Scholars have also identified links between homelessness and substantiated cases of child maltreatment and out of home placement (Berger et al. 2015). Housing instability may be a pathway through which such deleterious outcomes flow. If cash assistance aids in stabilizing housing, the withdrawal of cash assistance is particularly concerning given already-limited housing assistance in the U.S. (Edin and Shaefer, 2015).

We also note several limitations of these analyses. We cannot rule out the possibility that concurrent policy changes that accompanied changes in TANF caseloads are driving some of our results. However, these shifts were much more common in the first decade of TANF's development than in its second decade, which is the period we examine here. Furthermore, caseload patterns that are responsive to aggregate need would yield a relationship exactly opposite to the one we obtain for TANF. Both models are robust to the inclusion of annual SNAP caseloads as an additional control variable. Further, for the food insecurity models (for which we are able to conduct this test), the relationship between cash assistance coverage and hardship holds only for households with children. This additional test rules out spurious relationships produced by a third omitted variable—such as an unobserved policy change or a change in the state's social, political, or economic context—affecting all low-income households.

This study contributes to the literature on public assistance by using more recent data, new data, and new methods to contextualize more fully how the changes to the safety net in the 1990s relate to the history of government relief. It further offers evidence that these changes reproduced structural notions of deservingness that have played out for centuries. We argue that examining direct measures of wellbeing rather than indirect measures such as income is an evidence-based way to adjudicate thorny

questions about the best ways to measure poverty (an income-based measure, a consumption measure, a measure that assigns a cash value to in-kind transfers, and so on), especially in light of recent trends in poverty measurement that treat cash aid and in-kind transfer equally. Despite the importance of benefits from in-kind programs as SNAP and housing assistance, we find evidence that the retrenchment of cash assistance has been associated with increased food and housing hardship. As indicated at the outset of the conclusion to this paper, we anticipate that this approach could be used to test a broad range of opposing claims about how best to measure poverty, and whether the War on Poverty was lost or won.

Scholars can expect that cultural notions of deservingness will weigh heavily on any policy debate concerning aid to the poor We argue that scholars have an obligation to fully examine the material consequences of resulting policies for those deemed the least worthy. We hope others will test the utility of our approach on other measures of the wellbeing of poor households with children, such as parental stress, child development, academic achievement and behavior problems, and adult outcomes, including economic wellbeing and mobility.

Reference

Berger, Lawrence M., J. Michael Collins, Sarah A. Font, Leah Gjertson, Kristen S. Slack, and Timothy Smeeding. 2015. "Home foreclosure and child protective services involvement." Pediatrics 136(2):299–307.

Bitler, Marianne P., Gelbach Jonah B., and Hoynes Hilary W. 2006. "Welfare Reform and Children's Living Arrangements." Journal of Human Resources 41(1):1–27.

Black, Sandra E., Schanzenbach Diane Whitmore, and Breitwieser Audrey. 2017. "The Recent Decline in Women's Labor Force Participation." The Hamilton Project Framing Paper, https://www.brookings.edu/wp-content/uploads/2017/10/

es_10192017_decline_womens_labor_force_participation_blackschanzenbach.pdf.

Blank, Rebecca M., and Kovak Brian. 2008. Helping Disconnected Single Mothers . Washington, DC: Brookings.

Brock, Thomas, Claudia Coulton, Andrew London, Denise Polit, Lashawn Richburg-Hayes, Ellen Scott, and Nandita Verma. 2002. Welfare Reform in Cleveland: Implementation, Effects, and Experiences of Poor Families and Neighborhoods . New York: MDRC.

Center for Budget and Policy Priorities. 2016. "Chart Book: TANF at 20." Washington, DC: Center on Budget and Policy Priorities. http://www.cbpp.org/research/family-income-support/chart-book-tanf-at-20.

Coleman-Jensen, Alisha. 2012. "Predictors of U.S. Food Insecurity Across Nonmetropolitan, Suburban, and Principal City Residence During the Great Recession." Journal of Poverty 16(4):392–411.

Coleman-Jensen, Alisha, Rabbitt M. P., Gregory C., and Singh A. 2015. "Statistical Supplement to Household Food Security in the United States in 2014. In.: AP-069, USDA." Economic Research Service. Http://www/ers.Usda.Gov/publications/ap-Administrative-publication/ap069.

Corcoran, Mary, Danziger Sandra K., Kalil Ariel, and Seefeldt Kristin S. 2000. "How Welfare Reform Is Affecting Women's Work." Annual Review of Sociology 26(1):241–269.

Cowen, Joshua. 2017. "Who Are the Homeless? Student Mobility and Achievement in Michigan 2010–2013." Education Researcher 46(1):33–43.

Danziger, Sandra K. 2010. "The Decline of Cash Welfare and Implications for Social Policy and Poverty." Annual Review of Sociology 36:523–545.

Edin, Kathryn J., and Shaefer H. Luke. 2015. $2.00 a Day: Living on Almost Nothing in America . Houghton Mifflin Harcourt.

Flood, Sarah, King Miriam, Ruggles Steven, and Warren J. Robert. 2015. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0. Minneapolis: University of Minnesota. http://doi.org/10.18128/D030.V4.0.

Fox, Liana, Wimer Christopher, Garfinkel Irwin, Kaushal Neeraj, and Waldfogel Jane. 2015. "Waging war on poverty: Poverty trends using a historical supplemental poverty measure." Journal of Policy Analysis and Management 34(3):567–592.

Freedman, Stephen, Friedlander Daniel, Hamilton Gayle, Rock JoAnn, Mitchell Marisa, Nudelman Jodi, Schweder Amanda, and Storto Laura. 2000. Evaluating Alternative Welfare-to-Work Approaches: Two-Year Impacts for Eleven Programs. National Evaluation of Welfare-to-Work Strategies . New York: MDRC.

Fusaro, Vincent 2017. "The Spirit of '96: States & the Implementation of Temporary Assistance for Needy Families." PhD dissertation, School of Social Work and Department of Political Science, University of Michigan.

Giannarelli, Linda, Heffernan Christine, Minton Sarah, Thompson Megan, and Stevens Kathryn. 2017. Welfare Rules Databook: State TANF Policies as of July 2016, OPRE Report 2017-82 . Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Gordon, Linda. 1994. Pitied but Not Entitled: Single Mothers and the History of Welfare . New York: Free Press.

Haider, Steven J., Jacknowitz Alison, and Schoeni Robert F. 2003. "Welfare Work Requirements and Child Well-Being: Evidence from the Effects on Breast-Feeding." Demography 40(3):479–497.

Halpern-Meekin, Sarah, Edin Kathryn, Tach Laura, and Sykes Jennifer. 2015. It's Not Like I'm Poor: How Working Families Make Ends Meet in a Post-Welfare World . Berkeley, CA: University of California Press.

Hetling, Andrea, Kwon Jinwoo, and Saunders Correne. 2015. "The Relationship between State Welfare Rules and Economic Disconnection among Low-Income Single Mothers." Social Service Review 89(4):653–685.

Hoynes, Hilary, Miller Doug, and Simon David. 2015. "Income, The Earned Income Tax Credit, And Infant Health." American Economic Journal: Economic Policy 7(1):172–211.

Institute for Children Poverty and Homelessness. 2016. "The Atlas of Student Homelessness in New York City 2016". http://www.icphusa.org/new_york_city/on-the-map-the-atlas-of-studenthomelessness-in-new-york-city-2016 (accessed January 30, 2018).

Joint Center for Housing Studies. 2013. America's rental housing: Evolving markets and needs . Cambridge, MA: Harvard Kennedy School.

Kaestner, Robert, and Lee Won Chan. 2005. "The Effect of Welfare Reform on Prena-

tal Care and Birth Weight." Health Economics 14(5):497–511.

Kalil, Ariel, Seefeldt Kristin S., and Wang Hui-chen. 2002. "Sanctions and Material Hardship under TANF." Social Service Review 76(4):642–662.

Katz, Michael B. 1996. In the Shadow of the Poorhouse: A Social History of Welfare in America, Tenth Anniversary Edition . New York: Basic Books.

Lombe, Margaret, Yu ManSoo, and Nebbitt Von. 2009. "Assessing Effects of Food Stamp Program Participation on Food Security in Female-headed Households: Do Informal Supports Matter?" Journal of Policy Practice 8(4):301–316.

Long, J. Scott. 1997. Regression Models for Categorical and Limited Dependent Variables . Thousand Oaks, CA: Sage Publications.

Loprest, Pamela, and Nichols Austin. 2011. Dynamics of Being Disconnected from Work and TANF . Washington, DC: Urban Institute.

Mayer, Susan E., and Christopher Jencks. 1989. "Poverty and the distribution of material hardship." Journal of Human Resources 24(1):88–114.

Moffitt, Robert A. 2015. "The Deserving Poor, the Family, and the US Welfare System." Demography 52(3):729–749.
Nichols, Laura, and Barbara Gault. 2003. "The Implications of Welfare Reform for Housing and School Instability." Journal of Negro Education 72(1):104–116.

Paxson, Christina, and Waldfogel Jane. 2002. "Work, Welfare, and Child Maltreatment." Journal of Labor Economics 20(3):435–474.

Paxson, Christina, and Waldfogel Jane. 2003. "Welfare Reforms, Family Resources, and Child Maltreatment." Journal of Policy Analysis and Management 22(1):85–113.

Perkins, Kristin L. 2019. "Changes in Household Composition and Children's Educational Attainment." Demography . https://doi.org/10.1007/s13524-018-0757-5.

Sandstrom, Heather., Seefeldt Kristin, Huerta Sandra, and Loprest Pamela. 2014. Understanding the Dynamics of Disconnection from Employment and Assistance Final Report. OPRE report 2014–42. Washington, DC: Office of Planning, Research and Evaluation, Department of Health and Human Services.

Seefeldt, Kristin S. 2008. Working after Welfare: How Women Balance Jobs and Family in the Wake of Welfare Reform. WE Upjohn Institute.

Seefeldt, Kristin S. 2015. "Constant Consumption Smoothing, Limited Investments, and Few Repayments: The Role of Debt in the Financial Lives of Economically Vulnerable Families." Social Service Review 89(2):263–300.

Shaefer, H. Luke, Sophie Collyer, Greg Duncan, Kathryn Edin, Irwin Garfinkel, David Harris, Timothy M. Smeeding, Jane Waldfogel, Christopher Wimer, and Hirokazu Yoshikawa. 2018. "A Universal Child Allowance: A Plan to Reduce Poverty and Income Instability Among Children in the United States." RSF: A Journal of the Social Sciences 4(2):22–42.

Shaefer, H. Luke, Edin Kathryn, and Talbert Elizabeth. 2015. "Understanding the Dynamics of $2-a-Day Poverty in the United States." RSF.

Skocpol, Theda. 1995. Protecting Soldiers and Mothers: The Political Origins of Social Policy in United States . Cambridge Massachusetts: Belknap Press.

Smeeding, Timothy, and Thévenot Céline. 2016. "Addressing Child Poverty: How Does The United States Compare With Other Nations?" Academic Pediatrics 16(3):S67–S75.

Somers, Margaret R., and Block Fred. 2005. "From Poverty to Perversity: Ideas, Markets, And Institutions Over 200 Years Of Welfare Debate." American Sociological Review 70(2):260–287.

Steensland, Brian. 2008. "Why Do Policy Frames Change? Actor-Idea Coevolution In Debates Over Welfare Reform." Social Forces 86(3):1027–1054.

Stevens, Kathryn, Fox Liana E., and Heggeness Misty L. 2018. "Precision in Measurement: Using State-Level SNAP Administrative Records and the Transfer Income Model (TRIM3) to Evaluate Poverty Measurement." US Census Bureau Social, Economic, and Housing Statistics Division Working Paper 15. https://www.census.gov/content/dam/Census/library/working-papers/2018/demo/SEHSD-WP2018-15.pdf

Strully, Kate W., Rehkopf David H., and Xuan Ziming. 2010. "Effects Of Prenatal Poverty On Infant Health: State Earned Income Tax Credits And Birth Weight." American Sociological Review 75(4):534–562.

Sykes, Jennifer, Križ Katrin, Edin Kathryn, and Halpern-Meekin Sarah. 2015. "Dignity And Dreams: What The Earned Income Tax Credit (EITC) Means To Low-Income Families." American Sociological Review 80(2):243–267.

Tach, Laura, and Edin Kathryn. 2017. "The Social Safety Net After Welfare Reform: Recent Developments and Consequences for Household Dynamics." Annual Review of

Sociology 43(1):541–61.

Trisi, Danilo, and Pavetti Ladonna. 2012. TANF Weakening as a Safety Net For Poor Families . Washington DC: Center for Budget and Policy Priorities.

Turner, Lesley J., Danziger Sheldon, and Seefeldt Kristin S. 2006. "Failing the Transition From Welfare To Work: Women Chronically Disconnected From Employment And Cash Welfare." Social Science Quarterly 87(2):227–249.

Wood, Robert G., and Rangarajan Anu. 2003. "What's Happening to TANF Leavers Who Are Not Employed." Trends in Welfare to Work 6.

Zedlewski, Shiela, Sandi Nelson, Kathryn Edin, Heather Koball, Kate Pomper, and Tracy Roberts. 2003. "Families Coping Without Earnings or Government Cash Assistance." Assessing the New Federalism, an Urban Institute Program to Assess Changing Social Policies. Occasional Paper Number 64. Washington, DC: The Urban Institute.

Zelizer, Viviana. 1994. Pricing the Priceless Child: The Changing Social Value of Children . Princeton, NJ: Princeton University Press.

Ziliak, James P. 2015. Temporary Assistance for Needy Families . National Bureau of Economic Research.

Chapter 4

U.S. Labor Market Integration, 1940-2000

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Abstract: We develop a dynamic model of migration across regions and occupations to quantify the impact of migration frictions on the spatial integration of the U.S. labor market over time. We propose three simple measures of labor market integration based on changes to the local labor supply curve from removing frictions, holding all else constant, that can be computed using data on labor market flows alone. These measures reflect how frictions affect the size of regions, gross flows across regions and the elasticity of the regional labor supply curve. We apply our approach to U.S. Census data between 1940-2000 and find that labor market integration has followed an inverted U-shape over this time period.

1 Introduction

Barriers to geographic mobility have important implications for regional development and long-run economic growth (Breinlich et al., 2014). To the extent that migration across international borders or within a country is costly, labor inputs and the related human capital may not be allocated efficiently. Historically, the United States has exhibited high rates of internal migration (Rosenbloom and Sundstrom, 2004) and over time this was associated with rapid gains in per capita income as well as income convergence across regions (Barro et al., 1991; Barro and Sala-i Martin, 1992; Mitchener and McLean, 1999). More recently, migration rates have decreased and this has led to a large literature that aims to understand the determinants and consequences of declining migration (Molloy et al., 2011, 2016; Kaplan and Schulhofer-Wohl, 2017).

In this paper we develop a general equilibrium of migration across geographic locations and occupations in order to quantify the impact of migration frictions on the spatial integration of the U.S. labor market over time. Migration is modeled as a dynamic discrete choice with stochastic unobserved heterogeneity in location-occupation preferences and one-time utility costs of migration. The model implies an upward-sloping short and long-run local labor supply curve for each location-occupation cell, the shape of which is affected by migration frictions as well as the geography of local "fundamentals" (productivities, amenities and initial populations).

We propose three simple quantitative measures of labor market integration based on the counterfactual changes to the local labor supply curve from removing migration frictions, holding constant the value of locating in each cell (i.e. completely elastic labor demand). The first is the change in net flows across labor markets, which measures the extent to which frictions cause some cells to be the wrong size. The second is the change in gross flows, which measures the extent to which people are misallocated

across markets. The third is the counterfactual relative labor supply elasticity, which measures the extent to which frictions reduce the responsiveness of migration to local demand shocks. These measures are a useful approximation to the true counterfactual changes when the true labor demand curve is completely elastic, and can conveniently be calculated from labor market flow data without estimation of "deep" model parameters. These measures allow us to decompose historical changes in the local labor supply curve into those driven by changing frictions and those driven by other changes in economic fundamentals.

We use this framework to measure the evolution of labor market integration in the U.S. from 1940 to 2000. Our results suggest that migration frictions play a crucial role in labor market integration. Between 1940 and 2000, the overall mobility frictions in the U.S. have shown a V-shaped trend, caused by a decrease in sensitivity to migrate long distance from own state during the first three decades and an increase in the relative costs of leaving current state of residence in the later three decades. Driven by these changes in migration frictions, our counterfactual gross flows measure and the counterfactual relative labor supply elasticity measure exhibit parallel trends in terms of market efficiency, showing an improvement in efficiency between 1940 and 1970 followed by a decline in efficiency between 1970 and 2000. The counterfactual net flows measure, nevertheless, appears to be strongly influenced by the initial distribution of population in the economy and does not reflect well the changes in frictions.

This is work in progress. Future work will proceed in two directions. First, we will incorporate additional data, both to extend the time period up to present day and to incorporate estimates of the occupational mobility frictions that are missing from this draft. Second, we will develop and estimate a full dynamic general equilibrium model with flexible labor demand. We anticipate three contributions here. First, we have a new estimation strategy that avoids some of the questionable assumptions in the previous

literature. Second, we will use the full model to assess the quality of the simpler measures as an approximation. Third, we can use the estimated model to provide welfare analysis of the benefits of reducing frictions.

Literature Review

Our work relates to the migration and labor market integration literature that studies the role of migration in labor market adjustment to local demand shocks. In the seminal paper of this literature, Blanchard and Katz (1992), find that, in the U.S., labor market adjustment to regional demand shocks happens predominantly through the channel of interstate migration in the first year following the shock. The strong response in population thus reduces the long-run effects of demand shocks on local wage rates, unemployment rates, and participation rates. Building on their method, **?** employ newer data sources and an IV approach and show that, in the short run, the contribution of interstate migration to labor market adjustment is lower than previously estimated in Blanchard and Katz (1992). In addition, they find that the short-run response of net migration to demand shocks has decreased since the early 1990s, driven by lower outmigration from states exposed to adverse labor demand shocks. The response of net migration, nevertheless, is countercyclical and increases during recessions, which stands in contrast with the observed gross migration patterns. Similarly, Partridge et al. (2012) find that the responsiveness of net migration and relative population growth to regional demand shocks has declined after 2000, and at the same time, the responsiveness of local labor supply has increased, suggesting a shift in the adjustment mechanism to regional asymmetric shocks. The role of labor mobility in labor market integration has also been investigated in the growth literature, particularly in studying the historical convergence of income across states and regions. Barro et al. (1991); Barro and Sala-i Martin (1992) develop a model in which labor mobility serves to facilitate the convergence of wage and per capita output. However, empirically, they find that net migration

plays a minor part in the regional convergence in the U.S. The same empirical finding is reported in Mitchener and McLean (1999). They propose that the interplay between demographic composition and migration could have potentially dampened the effects of migration in smoothing regional income differentials.

In recent years, prompted by the observed trend decline in U.S. internal gross migration rates and its potential implication for market integration, a growing number of studies have devoted their attention to the causes behind the decline. They approach the question with two sources of explanations: changes in demographic composition and changes in fundamental economic factors of migration. The demographic composition in the U.S. has gone through considerable change in recent decades in terms of the age distribution, educational attainment, female labor force participation, and family structure, all of which crucial factors in mobility propensities. Nevertheless, researchers find that within each subpopulation group, migration rates have also fallen. As a result, compositional changes have limited explanatory power in accounting for the observed decline in mobility (Molloy et al., 2011, 2014; Kaplan and Schulhofer-Wohl, 2017). Other studies focus on changes in the fundamental economic factors behind migration, such as the returns to migration, costs of migration, and changes in labor market adjustment mechanisms. Kaplan and Schulhofer-Wohl (2017) propose that the decline in geographic specificity of returns to occupations and the improvement in information have resulted to the fall in migration rates and present micro data evidence on earnings and occupations in support of the claim. However, using individual earnings data from administrative records, Hyatt et al. (2018) find that earnings gains from migration and the costs of migration have not exhibited clear trends that would appreciably account for the falling in aggregate migration in recent decades.

In the market integration literature, indicators of market integration used include the responsiveness of wage rates, unemployment rates, participation rates, and net popu-

lation change to regional demand shocks, as well as income differentials across states and regions. Migration, and the removal of migration barriers, serve to reduce the impact of demand shocks on local wages and employment and to facilitate regional convergence in output and income. In the gross mobility literature, the level of gross flows between states is used, often implicitly and without specifying the theoretical connection, as an indicator of market integration and dynamism. Our paper contributes to the two literature by re-examining through the lens of a dynamic discrete choice labor supply model the linkage between labor mobility friction and these indicators of market integration. Our modeling results suggest that the relationship between labor mobility friction, which theoretically hinders market integration, and these indicators for integration is less straightforward than previously believed. We then investigate empirically how fundamental parameters governing migration have evolved in the last 70 years and their implications for market integration and the observed migration patterns.

Besides the above-mentioned studies, the method used in this paper is informed by the literature on migration dynamics. In these studies, migration is often treated as a rational expectation problem, in which forward-looking workers choose their location to maximize expected lifetime utility (Borjas et al., 1992; Bishop, 2008; Coen-Pirani, 2010; Kennan and Walker, 2011; Bayer and Juessen, 2012). Additionally, the discrete choice model we develop for this paper is much influenced by recent development in structural modeling in the trade literature for studying factor mobility and the welfare gains from international trade (Artuç et al., 2010; Dix-Carneiro, 2014; Caliendo et al., 2015; Traiberman et al., 2017). Similar to these studies, in this paper, we use a discrete choice model to model labor supply decisions in the presence of imperfect factor mobility, in our case arising from the geographic barriers for workers to move across space. We contribute to this literature by applying this model to a new context, exploring through the model the theoretical relationship between factor mobility and labor market integration.

2 Theory

Dynamic Model of Labor Supply

There are a set of geographic locations $i, n \in N$, a set of occupations $z, k \in K$, and a number of time periods $t \in T$. Each worker starts period t in a given location n and an occupation z. With probability λ she then draws a vector of i.i.d. idiosyncratic utility shocks, one for each location-occupation pair, from a normalized[1] Type I extreme value distribution: with probability $1 - \lambda$ she does not consider moving at all. If she received the shock, she then chooses a new location-occupation pair in order to maximize her resulting expected lifetime utility, subject to iceberg moving costs that are paid in utility. She then executes any move across cells, and receives the flow utility associated with working and consuming in her (potentially) new cell. Workers who were not shocked simply live and work in their old cell.

The maximization problem of a shocked worker ℓ who starts in n, z at time t is

$$\max_{i \in N,\ k \in Z} \quad \ln V_{i,k,t} - \tau_{ni} - \mu_{zk} + \frac{1}{\theta} \cdot \epsilon_{ik,t,\ell} \tag{4.1}$$

where $V_{i,k,t}$ is the common component of the value of being in cell i, k at time t,[2] τ_{ni} is the one-time migration cost of moving from n to i, μ_{zk} is the one-time occupational mobility cost, and $\epsilon_{i,k,t,\ell}$ is the realized shock for time t. We assume that $\tau_{nn} = 1,\ \forall n$ and $\mu_{zz} = 1,\ \forall z$. The parameter θ scales the variance of the idiosyncratic shocks. The nature of $V_{i,k,t}$ will depend on the dynamics of the model; for now, we simply assume that it exists and is well defined.[3]

[1] That is, with mean equal to the Euler - Mascheroni constant and variance equal to $\pi^2/6$.

[2] This is the expected lifetime utility of a worker who moves to i, k without knowing her $\epsilon_{i,k,t,\ell}$, net of migration costs. Since the natural log is a monotonic transformation, we can refer to either $V_{i,k}$ or $\ln V_{i,k}$ as the expected lifetime utility, or "value."

[3] See **?**Caliendo et al. (2015); Traiberman et al. (2017) for examples of this framework. The introduction

Given these assumptions, the unconditional probability of observing a given worker moving from n, z to i, k (suppressing the t subscripts) is

$$\pi_{ni,zk} = \lambda \cdot \frac{V_{i,k}^{\theta} \cdot (\tau_{ni} \cdot \mu_{zk})^{-\theta}}{\sum_{h \in N} \sum_{q \in K} V_{h,q}^{\theta} \cdot (\tau_{nh} \cdot \mu_{zq})^{-\theta}}, \quad \forall n \neq i \in N \;\&\; z \neq k \in Z, \tag{4.2}$$

$$\pi_{nn,zz} = (1-\lambda) + \lambda \frac{V_{n,z}^{\theta}}{\sum_{h \in N} \sum_{q \in K} V_{h,q}^{\theta} \cdot (\tau_{nh} \cdot \mu_{zq})^{-\theta}}, \quad \forall n \in N, \; z \in Z. \tag{4.3}$$

By multiplying both sides of equations (4.2) and (4.3) by the initial number of workers in n, z, $L_{n,z}^{*}$, then summing across origin cells n, z, we get the total inflows into i, k, or

$$L_{i,k} = (1-\lambda) L_{i,k}^{*} + \lambda \cdot V_{i,k}^{\theta} \cdot \underbrace{\sum_{n \in N} \sum_{z \in K} \frac{(\tau_{ni} \cdot \mu_{zk})^{-\theta}}{\sum_{h \in N} \sum_{q \in K} V_{h,q}^{\theta} \cdot (\tau_{nh} \cdot \mu_{zq})^{-\theta}} \cdot L_{n,z}^{*}}_{\textit{Labor Market Access}} \tag{4.4}$$

Equation (4.4) is the labor supply equation of the model. Given parameters τ_{ni}, μ_{zk} θ, and the initial cell populations $L_{n,z}^{*}$, and holding the value $V_{n,k}$ of being in every other cell constant, it traces out the relationship between the average value $V_{i,k}$ of being in cell i, k and its equilibrium population in the short run.[4] Adding up across occupations k and considering a common (across occupations) change in value V_i gives the total labor supply curve for location i.

The labor supply curve (4.4) has an inelastic portion, comprised of people who cannot move (in the short run) and an elastic portion. The elastic portion is the product of two terms: a term that is constant elasticity in $V_{i,k}$ and a term that summarizes the accessibility of i, k to workers in other cells. The latter term, which we refer to as i, k's "labor market access," differs across cells precisely because of the frictions τ_{ni} and μ_{zk}. It reflects the "distance" between i, k and n, z, the number of workers in n, z, and the other

of λ, the probability of being shocked, makes our version somewhat different. But we can show that under the usual assumptions $V_{i,k}$ is well defined and satisfies the usual recursions.

[4] If we imposed the steady state condition that $L_{n,z} = L_{n,z}^{*}$ then this relationship would define the long-run labor supply curve.

location options that workers in n, z enjoy.

Labor Market Integration and Labor Supply

We now examine the relationship between labor market integration, which refers to a reduction in frictions τ_{ni} and/or μ_{zk}, and the shape of the labor supply curve. We focus on comparing the actual labor supply curve (4.4) and the *counterfactual* labor supply curve that would result from removing all frictions but holding the values $V_{i,k}$ and initial populations : $L^*_{i,k}$ constant, given by

$$L^c_{i,k} = (1-\lambda)L^*_{i,k} + \lambda \cdot V^\theta_{i,k} \cdot \underbrace{\sum_{n\in N}\sum_{z\in K} \frac{1}{\sum_{h\in N}\sum_{q\in K} V^\theta_{h,q}} \cdot L^*_{n,z}}_{\textit{Counterfactual Labor Market Access}}. \tag{4.5}$$

Doing so will allow us to separate properties of the labor supply curve and the associated migration flows that are "efficient," i.e. present in a world without frictions, from those that are driven by the frictions themselves. Based on our analysis we develop three simple quantitative measures of labor market integration, each of which captures a different effect of removing frictions on the labor supply curve. These measures provide principled and transparent ways to assess how a given set of frictions, which by themselves are not especially meaningful, affect the performance of labor markets.

It is important to note that equation (4.5) defines a true counterfactual only in a restricted sense. In general, one expects that the $V_{i,k}$s will respond to changes in the frictions as well, due to both static (downward sloping labor demand) and dynamic (changes in option value of migration) considerations. There are a couple of ways of understanding this exercise: 1) an exact counterfactual under restrictive assumptions about labor demand and expectations,[5], 2) a useful low-information approximation

[5]Specifically flat local labor demand and expected once-and-for-all migration. The latter assumption is naturally satisfied in a static model.

when $V_{i,k}$ is not very sensitive to migration frictions, and 3) an accounting "decomposition." What is attractive about this particular counterfactual is that it requires very little data to compute, as we will see below.

Removing frictions shifts the labor supply curve in each location by the quantity

$$L^c_{i,k} - L_{i,k} = \lambda V^{\theta}_{i,k} \cdot \Delta LMA_{i,k}, \tag{4.6}$$

where

$$\Delta LMA_{i,k} = \sum_{n \in N} \sum_{z \in K} \left(\frac{1}{\sum_{h \in N} \sum_{q \in K} V^{\theta}_{h,q}} - \frac{(\tau_{ni} \cdot \mu_{zk})^{-\theta}}{\sum_{h \in N} \sum_{q \in K} V^{\theta}_{h,q} \cdot (\tau_{nh} \cdot \mu_{zq})^{-\theta}} \right) \cdot L^*_{n,z} \tag{4.7}$$

is the change in labor market access due to removing frictions. The magnitude of the shift, which will be positive for some locations and negative for others, reflects two opposing forces. On the one hand, reductions in the cost of moving *into* location i,k will tend to shift its supply curve out; on the other hand, reducing the cost of moving *out* of i,k will shift the labor supply curve inward. Note that these shifts must sum to zero in the aggregate, $\Delta LMA_{i,k}$ cannot always be positive. Note also that high frictions do not necessarily imply large net shifts in the labor supply curve, precisely because it may be that these two opposing forces cancel each other out.[6] Nonetheless, the degree to which counterfactual labor supply curves are shifted relative to the actual labor supply curves tells us the degree to which some locations are too large and others too small, relative to the frictionless benchmark.

We can further decompose the shift in the labor supply curve into the change in gross

[6] A simple example is one in which the cells each have identical values and initial populations, and in which the frictions take the form of a common "migration tax" that does not vary by destination (not equal to origin). In that case removing frictions does not shift any labor supply curve.

outflows and the change in gross inflows,

$$L^c_{i,k} - L_{i,k} = \underbrace{\lambda V^{\theta}_{i,k} \cdot \Delta LMA_{i,k} - (\pi^c_{ii,kk} - \pi_{ii,kk})L^*_{i,k}}_{\textit{Change in Gross Inflows}} - \underbrace{(\pi_{ii,kk} - \pi^c_{ii,kk})L^*_{i,k}}_{\textit{Change in Gross Outflows}} \tag{4.8}$$

where $\pi_{ii,kk}$ and $\pi^c_{ii,kk}$ are the unconditional probabilities of staying in the same location. Removing frictions will generally increase both inflows and outflows. Even if the net effect on the labor supply curve is small, the change in the gross flows reveals the extent to which frictions result in the misallocation of individuals across locations. Due to the heterogeneity in location preferences, this type of misallocation imposes aggregate losses that are potentially quite substantial.

The fact that changing frictions reliably lead to changes in observed gross flows make it tempting to use differences in gross flows across time and/or space as indicative of changes in migration costs. However, changes in either the benefits of migration or the distribution of population can also lead to changes in gross flows, holding migration costs fixed. In contrast, looking at the counterfactual change in gross flows in equation (4.8) "controls" for the changes in these other variables and isolates the contribution of migration costs.

Removing migration frictions also changes the slope of the labor supply curve. Log-differentiating equation (4.4) with respect to $\ln V_{i,k}$ and taking the reciprocal, we get the elasticity of the labor supply curve at the observed data,

$$\epsilon_{i,k} \equiv \frac{\partial \ln L_{i,k}}{\partial \ln V_{i,k}} = \theta \left(1 - \frac{(1-\lambda)L^*_{i,k} + \lambda \sum_{n \in N} \sum_{z \in K} (\tilde{\pi}_{ni,zk})^2 \cdot L^*_{n,z}}{(1-\lambda)L^*_{i,k} + \lambda \sum_{n \in N} \sum_{z \in K} (\tilde{\pi}_{ni,zk}) \cdot L^*_{n,z}} \right), \tag{4.9}$$

where $\tilde{\pi}_{ni,zk}$ is the probability of migrating across the cells, *conditional* on receiving an idiosyncratic utility shock. Here θ is the (constant) elasticity when holding labor market access fixed; however, in general an increase in $V_{i,k}$ decreases labor market access as

well. The intuition is simple; the higher the initial probability of migrating from n, z to i, k, the less elastic is the remaining supply of workers in n, z with respect to an increase in the value of i, k. From i, k's perspective, n, z is a "fished-out pond" where workers are increasingly impervious to i, k's charms. This elasticity is minimized when the probabilities are either 1 or zero, and maximized when the probabilities are all small, i.e. "spread out" across sources.

Log differentiating the counterfactual labor supply curve and taking the ratio of the elasticities, we get the counterfactual relative labor supply elasticity,

$$\frac{\epsilon^c_{i,k}}{\epsilon_{i,k}} = \frac{1 - \frac{(1-\lambda)L^*_{i,k} + \lambda \sum_{n \in N} \sum_{z \in K} (\tilde{\pi}^c_{ni,zk})^2 \cdot L^*_{n,z}}{(1-\lambda)L^*_{i,k} + \lambda \sum_{n \in N} \sum_{z \in K} (\tilde{\pi}^c_{ni,zk}) \cdot L^*_{n,z}}}{1 - \frac{(1-\lambda)L^*_{i,k} + \lambda \sum_{n \in N} \sum_{z \in K} (\tilde{\pi}_{ni,zk})^2 \cdot L^*_{n,z}}{(1-\lambda)L^*_{i,k} + \lambda \sum_{n \in N} \sum_{z \in K} (\tilde{\pi}_{ni,zk}) \cdot L^*_{n,z}}}, \tag{4.10}$$

where c denotes the counterfactual values. This ratio indicates how much *more* elastic the frictionless labor supply is than the observed supply curve, for each location-occupation cell, and hence the extent to which migration frictions impede local adjustment to demand shocks.. Since removing migration frictions typically leads to an increase in out-migration and an increase in in-migration from other locations, it tends to diversify each location's sources of workers and therefore this ratio is typically larger than 1.[7]

To summarize, we have described three properties of a cell's labor supply curve *relative* to its frictionless benchmark, each of which reveals a different quantitative measure of the impact of labor market frictions. Conveniently, all of these measures can be calculated from data on bilateral migration flows, populations and bilateral frictions, and none require knowledge of θ or any solution of a complex model.

[7] This is not a theorem, and it is certainly possible that some locations will experience less elastic labor supply in the frictional case.

Measures of Labor Market Integration

We propose the following measures of labor market integration based on our analysis above: the changes in net flows, gross flows, and local labor supply elasticities resulting from removing migration frictions. The first indicates the extent to which frictions cause some cells to be too small and others too large. The second indicates the number of people who are misallocated across cells due to frictions. The third indicates how much more elastic local labor supply curves would be in the absence of frictions.

Our cells have a geographic and an occupation dimension. We focus on the geographic dimension, and therefore net out flows within location, across occupation. We describe how we aggregate the local measures into national averages below. We then compute these measures over time.

1. Counterfactual changes in net flows:

   (a) At the state level, as a percentage of initial population,

$$CNF_i^S = \frac{\sum_{k \in K} L_{i,k}^c - L_{i,k}}{\sum_{k \in K} L_{i,k}^*}. \tag{4.11}$$

   (b) At the national level, as a percentage of initial population,

$$CNF^N = \frac{1}{2} \frac{\sum_{i \in N} \left(|CNF_i^S| \cdot \sum_{k \in K} L_{i,k}^* \right)}{\sum_{i \in N} \sum_{k \in K} L_{i,k}^*}. \tag{4.12}$$

2. Counterfactual changes in gross flows:

   (a) At the state level, as a percentage of initial population,

$$CGF_i^S = \frac{\lambda V_{i,k}^{\theta} \cdot \Delta LMA_{i,k} - (\pi_{ii,kk}^c - \pi_{ii,kk}) L_{i,k}^* + (\pi_{ii,kk} - \pi_{ii,kk}^c) L_{i,k}^*}{\sum_{k \in K} L_{i,k}^*}. \tag{4.13}$$

(b) At the national level, as a percentage of initial population,

$$CGF^N = \frac{1}{2}\frac{\sum_{i\in N}\left(CGF_i^S \cdot \sum_{k\in K} L_{i,k}^*\right)}{\sum_{i\in N}\sum_{k\in K} L_{i,k}^*}. \tag{4.14}$$

3. Counterfactual changes in the slope of the local labor supply curve:

(a) At the state level,

$$CSE_i^S = \frac{\sum_{k\in K} \epsilon_{i,k}^c \cdot L_{i,k}}{\sum_{k\in K} \epsilon_{i,k}^c \cdot L_{i,k}}. \tag{4.15}$$

(b) The national-level simple average,

$$CSE^N = \frac{\sum_{i\in N} CSE_i^S}{N} \tag{4.16}$$

3 Identification and Estimation

In this section we describe our our estimation of the frictions and the cell-level values $V_{i,k}$ from of equations (4.2) and (4.3), using a single cross section of labor market flows at time t. At this stage our estimation is conditional on an assumed value of $\lambda = 0.5$, the probability of being shocked. While this parameter affects the level of the counterfactual gross and net flows, the changes over time should be relatively insensitive to it.

We are unable to take equations (4.2) and (4.3) directly to the data because we do not directly observe the initial occupation z, only the current occupation (see the data section below). We get around this by aggregating across z in such a way as to preserve the log-linear structure in terms of the location migration barriers τ_{ni}. It can be shown that equations (4.2) and (4.3) imply that[8]

$$E\left[\frac{L_{ni,k,}}{L_{n\to k}}\right] = \lambda \cdot V_{i,k}^{\theta} \cdot (\tau_{ni})^{-\theta} \cdot \kappa_{n,k}, \forall n \neq i \tag{4.17}$$

[8]The crucial property of equations (4.2) and (4.3) is that the geographic and occupational mobility frictions are log separable.

and

$$E\left[\frac{L_{nn,k,}}{L_{n\to k}}\right] = (1-\lambda) + \lambda \cdot V_{n,k}^{\theta} \cdot \kappa_{n,k}. \tag{4.18}$$

Here, $L_{ni,k}$ is the total number of people living in i,k at (the end of) time t who were previously located in n, regardless of their original occupation z when they lived in n. And $L_{n\to k}$ is the total number of people who *started* in n and ended up in occupation k, regardless of both their final destination i and their original occupation z. Note that $L_{n,z}$ is the total number of people *starting* in occupation-location n,z. Thus one way to view the LHS is that it is the fraction of people from n who ended up in occupation k and location i relative to the total number of people who started in n and ended up in occupation k. This quantity depends on how attractive i,k is, relative to all other occupation-location options available to the people living in n. This depends on the distance frictions, but also on the occupational frictions plus the occupational distribution which is captured in the fixed effect $\kappa_{n,k}$. Notice, however, that the LHS sums up to 1 if we sum across destinations i. Therefore, it must be that

$$\kappa_{n,k} = \frac{1}{\sum_h V_{h,k}^{\theta} \cdot (\tau_{nh})^{-\theta}}$$

Equations (4.19) and (4.18) are what we take to the data in order to estimate the determinants of τ_{ni}, which empirically we take to be distance and an origin-specific migration dummy. This estimation procedure estimates the distance elasticity $\tau \cdot \theta$, the origin-specific "border effect" on migration, $\gamma_i \cdot \theta$, and the destination fixed effects (up to scale) $V_{i,k}^{\theta}$. We will interpret the residuals of this equation as measurement error in the dependent variable. We describe our procedure in detail below.

While this procedure is robust to any set of occupational mobility frictions, it does not produce estimates of them. These values are needed for the counterfactuals. In future work, we will estimate these frictions using alternative data sources. For now, we simply assume that there is no occupational mobility (which implies that $L_{n\to k} = L^*_{n,k}$), and conduct counterfactuals with respect to geographic mobility only.

Estimation Procedure

1. Choose $\lambda = 0.5$.

2. Run the specification

$$\frac{L_{ni,k,}}{L_{n\to k}} \cdot \frac{1}{\lambda} = \exp\left[FE^d_{i,k} + FE^o_{n,k} + -\theta\tau \ln distance_{ni} + error_{ni,k}\right], \forall n \neq i \tag{4.19}$$

   to get the estimate of $\theta\tau$. Estimate using Poisson Pseudo-Maximum Likelihood

3. Generate a new dependent variable as follows:

$$\breve{\pi}_{ni,k} = \frac{L_{ni,k}}{L_{n\to k}} \cdot \frac{dist^{\theta\tau}_{in}}{\lambda}, \ \forall i \neq n, \ n \in N \tag{4.20}$$

$$\breve{\pi}_{nn,k} = \left(\frac{L_{nn,k}}{L_{n\to k}} - (1-\lambda)\right) \cdot \frac{1}{\lambda}, \ \forall n \in N \tag{4.21}$$

4. Run the following specification:

$$\breve{\pi}_{ni,k} = \exp\left[FE^d_{i,k} + FE^o_{n,k} + -\theta\gamma_n \cdot \mathbf{1}_{n\neq i} + error_{ni,k}\right], \ \forall i, n \in N \tag{4.22}$$

   where $\theta\gamma_n$ is the "leaver" coefficient. Store the estimated destination fixed effects from step 4, which have the following interpretations: $FE^d_{i,k} = \theta \ln V_{i,k} + C$, where C is an arbitrary constant.

Note that step 2 identifies the distance coefficient from movers only, as we lack a

good measure of the "own-distance" for each state. This implies that the estimated "migration tax" $\exp(\gamma_n)$ is actually the product of the true migration tax τ_m and the inverse of the cost of staying, $distance_{nn}^{-\theta}$. For this reason, the estimated "migration tax" may be negative, i.e. the leaver coefficient may be positive. This is simply a consequence of normalizing the own-distance to equal 1.

4 Empirical Results

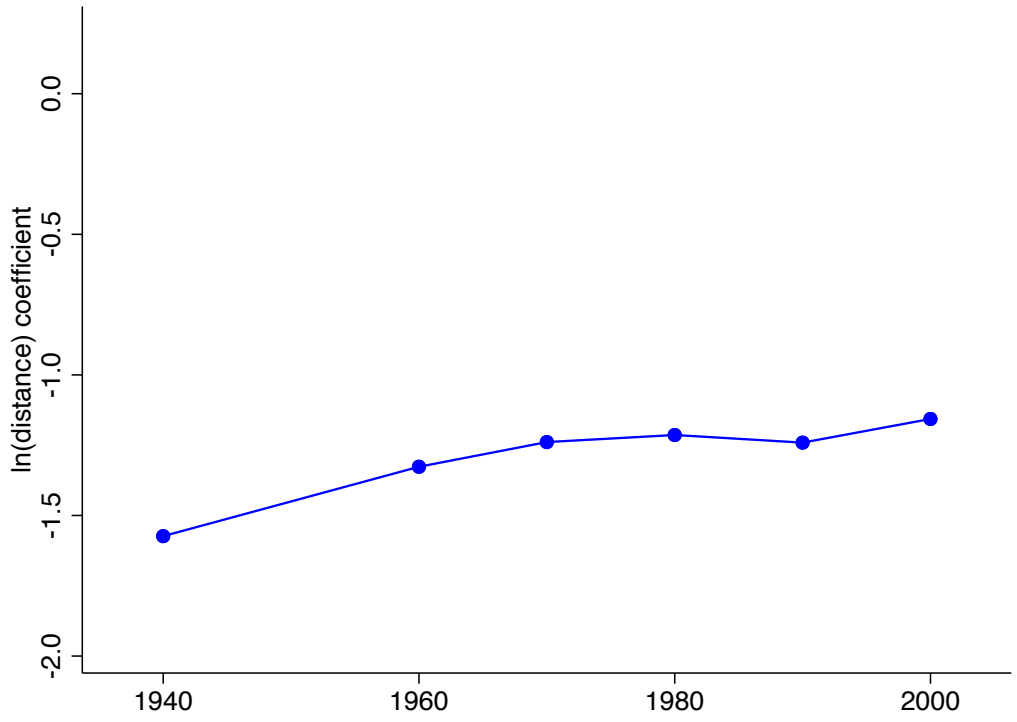
Data

In our estimation, each location n in the model refers to a U.S. state. The estimation strategy relies on observing the interstate migration flows of workers and their occupation at the destination location. For our interests in comparing the changes in migration and market integration over time, we obtain the data through the U.S. Decennial Census for years 1940 to 2000, via the Integrated Public Use Microdata Series (Ruggles et al., 2019). The U.S. Census measures migration by asking the respondent if he or she lived in the same residence five years ago, and if not, where did the respondent live at the time. To ensure variables are defined consistently over the study period for each of the data source, we have made two adjustments to the original data sets. First, we have dropped data from the 1950 Census due to a different retrospective period used for the migration question in that year. Second, Hawaii and Alaska are not counted as states in the 1940 Census, and we continue to exclude them in the sample for the following years. The Census provides information on the current occupation of respondents but not their previous occupation. We harmonized the occupation codes across years using the two-digit Standard Occupational Classification scheme (SOC) to a total of 22 occupations. Finally, for estimation of the moving costs, we construct the bilateral distance between states using the state shape-files from the National Historical Geographic Information System (NHGIS) and compute the distance between state centroid points.

Estimation Results

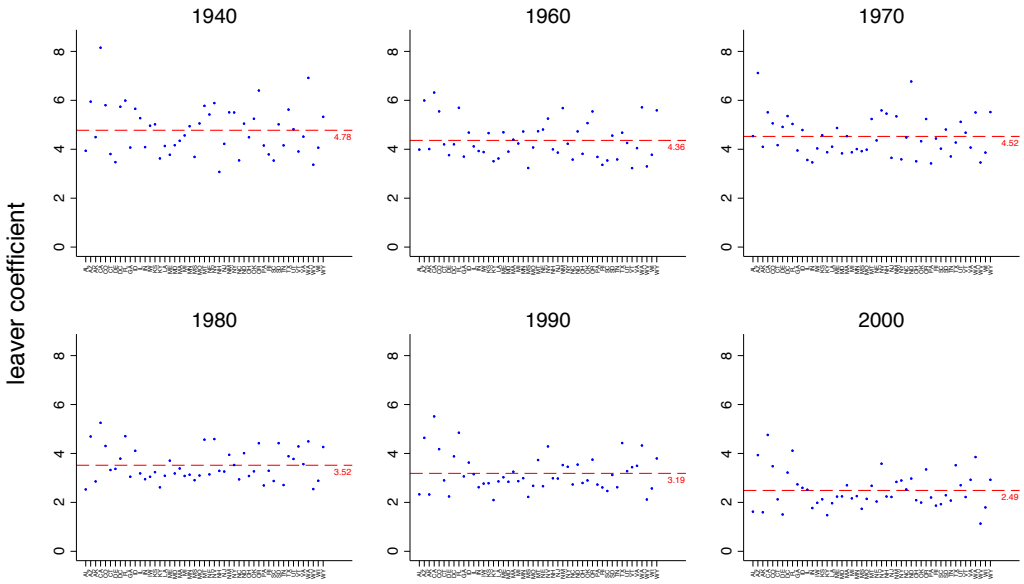
In this section, we present estimation results for the bilateral mobility friction term ${\tau_{ni}}^{-\theta}$. The measure represents the costs incurred for moving between origin state n and destination state i. The costs involve two parts: (1) costs associated with the distance between the origin and the destination state and (2) an origin-specific *leaver* effect, representing the costs associated with leaving own state relative to staying, such that ${\tau_{ni}}^{-\theta} = \exp[-\tau\theta \ln dist_{in} - \theta\gamma_n]$, $\forall n \neq i$, and ${\tau_{nn}}^{-\theta} = 1$. We estimate $-\widehat{\tau\theta}$ and $-\widehat{\theta\gamma_n}$ for each survey year in our sample, and compare the historical evolvement of the parameters and their implications.

Figure 4.1: Estimate of Distance Coefficient using PPML, 1940–2000



Estimates of Distance Coefficient $-\widehat{\tau\theta}$ Figure 4.1 presents changes in the distance coefficient $-\widehat{\tau\theta}$ between 1940 and 2000. The costs of migration associated with the geographic distance between two places have steadily declined in the first three decades of this period, represented by the decrease in the absolute value of the distance coefficients. For the later three decades, the costs have maintained at the same level before slightly going down again in 2000. This suggests that, over time, distance has become a less crucial factor in the migration decision of workers. Conditional on leaving their current state of residence, workers are now more likely to move further away from their immediate surrounding region than in earlier years. This finding is perhaps not surprising given the mass reduction in transportation and information costs in the 20th century. The downward trend in distance costs, nonetheless, should not be interpreted as a decline in the overall migration friction, which is jointly determined by both the distance costs and the fixed costs associated with leaving a worker's current state.

Figure 4.2: Estimate of Leaver Coefficient using PPML, 1940–2000



Estimates of Origin-Specific Leaver Effect $-\widehat{\theta\gamma_n}$ Figure 4.2 shows estimation results of the *leaver* coefficient from 1940 to 2000. Because the leaver coefficient is distinct for each origin state n, we present scatter plots of the state-level estimates as well as their mean values as marked by the red dotted line on each graph to demonstrate changes in both the distribution and the level of the coefficients over time. Between 1940 and 1970, the average leaver coefficients have not shown a clear trend of change. In the three decades following, however, the coefficients swiftly declined from 4.5 in 1970 to 2.5 in 2000. The positive value of the coefficients may be puzzling at first glance. Although conceptually we have framed this coefficient as the fixed cost from leaving a worker's home state, which suggests that it should take a negative sign in terms of utility, in the estimation, it captures the *relative* costs of leaving compared to the costs of staying, and hence could be either positive or negative in value. In our estimates, the downward trend in the leaver coefficient therefore indicates that the utility associated with leaving has dwindled over time, or alternatively, the *relative* costs of leaving has increased during this period of time.

Figure 4.3: Average Overall Migration Costs: 1940-2000

How have migration frictions changed during this period of time? The interplay between the distance coefficient, the leaver coefficient, and the distribution of distance between states determines the overall average migration friction level in the labor market. Nevertheless, figure 4.1 and figure 4.2 present opposite trends in migration costs and leave an ambiguous picture for the overall change in frictions during our study period. To provide a snapshot of changes in migration frictions during this time, we calculated a simple weighted average of the total migration costs for each period $= \frac{\sum_n \sum_i (\tau_{ni}{}^{\theta} L_n)}{L}$ and compare the results across years in figure 4.3.

The V-shaped trend line indicates that, the overall migration frictions have first declined between 1940 and 1970 and then increased back to its 1940 level. As discussed earlier, our estimation for the bilateral migration frictions ${\tau_{ni}}^{-\theta}$ indicates that, migra-

tion costs associated with distance have decreased between 1940 and 1970, and roughly stayed at the same level between 1970 and 2000 (figure 4.1). Meanwhile, the relative costs associated with leaving own state have gradually increased between 1970 and 2000 (figure 4.2). These findings suggest that the initial decline in the overall migration frictions between 1940 and 1970 is likely driven by the decrease in distance costs, and the later increase is a result of hikes in the relative costs of leaving current state of residence.

Measures of Labor Market Integration

Counterfactual Net Flows

Figure 4.4: Change in Net Flows When Removing Friction

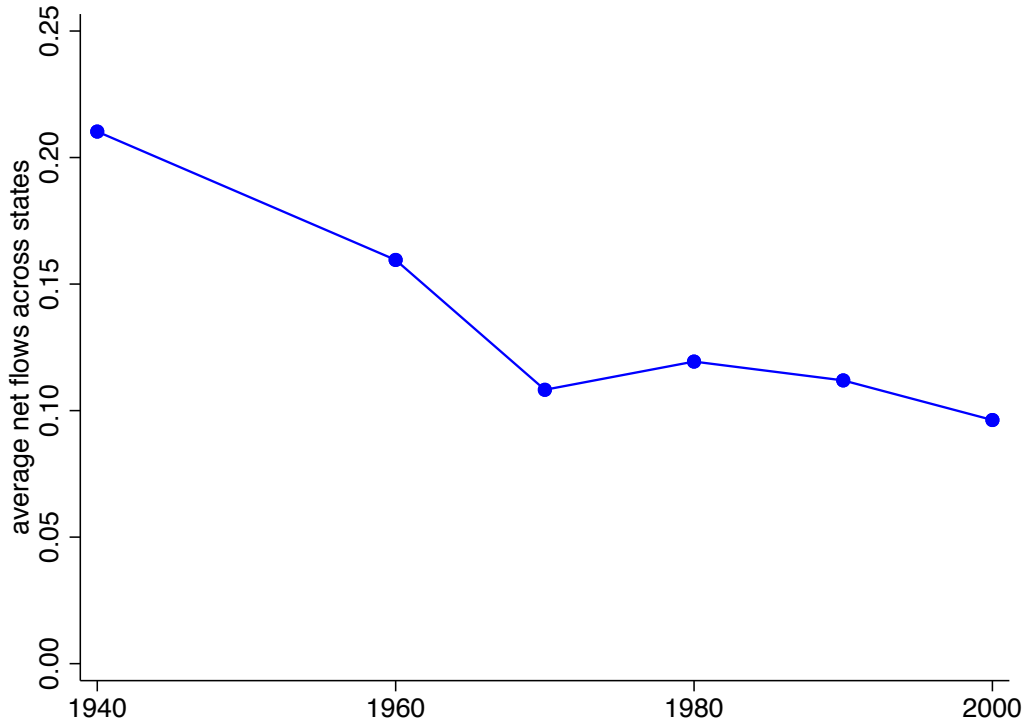


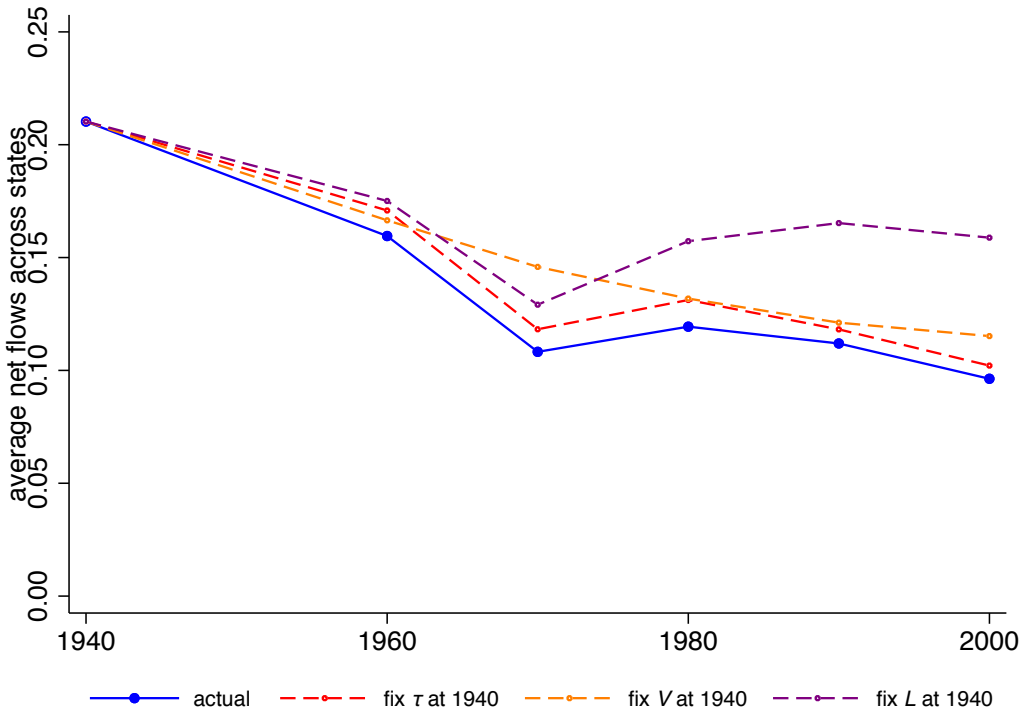
Figure 4.4 shows the sum of absolute changes in population size across all states (as a share of national population) when removing geographic mobility friction, an indicator

of whether population is misdistributed across space due to mobility barriers. The degree of misdistribution, measured by the share of population that would have been in a different state if not for the mobility friction, presents a clear downward trend between 1940 and 2000. In 1940, when removing the geographic mobility friction, 20% population would have changed their state of residence, compared to only 10% in 2000, suggesting a reduction in net misdistribution of workers across space. The trend decline in population misdistribution, nevertheless, does not necessarily indicate that labor market has become more efficient over time. Note from equation 4.6 the gap between $L^C_{i,k}$ and $L_{i,k}$ is a product of the mobility frictions ${\tau_{ni}}^{-\theta}$, as well as the utility associated with each location-occupation choice V^θ and the distribution of the initial population L^*[9] Consider the case that the labor market is gradually reaching a new spatial equilibrium starting from an earlier shock. In that case, the decline in population misdistribution could simply be a result of the market being closer to the equilibrium as time passes by, reflected in the initial distribution of L^* and the V terms, instead of an improvement in labor market's capability to adjust to shocks.

To examine the factors contributing to the trend decline in population misdistribution, we decompose the changes to three possible sources: historical changes in mobility frictions, ${\tau_{ni}}^{-\theta}$, historical changes in the distribution of the location-specific utility , V^θ, and historical changes in the distribution of the initial population. Specifically, we substitute one of the three parameters to its 1940 level for all survey years and compare how the computed population misdistribution level is affected by the choice of parameter for substitution.

[9]The parameter θ represents workers' responsiveness to migration costs and incentives. Right now we cannot separately identify θ from τ and V, and in the decomposition exercise, both the level of friction/utility and workers' responsiveness are fixed at their 1940 level.

Figure 4.5: Decomposition of the Counterfactual Net Flows Measure



The results, as shown in figure 4.5, suggest that while changes in mobility frictions ${\tau_{ni}}^{\theta}$ could explain some of the decline in population misdistribution, marked by the distance between the red dotted line and the blue line, the differences in population misdistribution across years is mostly accounted for by changes in the initial distribution of population, marked by the distance between the purple dotted line and the blue line. This result is consistent with the proposition that the labor market has been reaching a new spatial equilibrium and that the distribution of population has been getting closer to its long-term steady state over time, which is the reason we are seeing less population misdistrubtion in more recent years. The insensitivity of the counterfactual net flows measure to changes in mobility friction also implies that it is a poor indicator for labor market efficiency as it does not reflect the labor market's ability to adapt to changes during the time period.

Counterfactual Gross Flows

Figure 4.6: Change in Gross Flows When Removing Friction

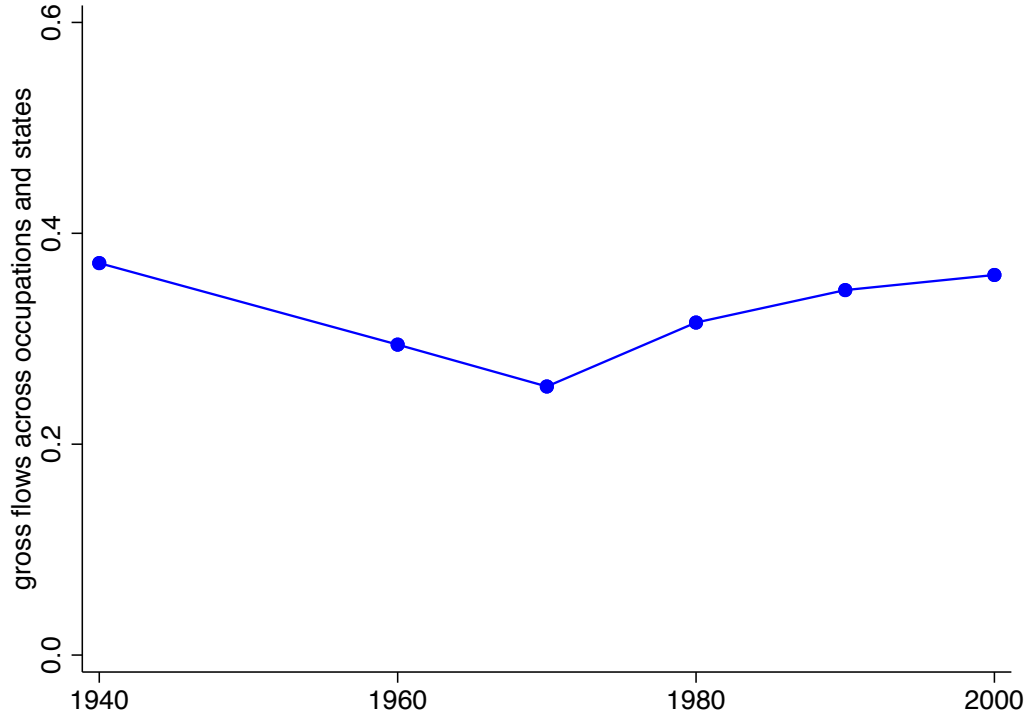
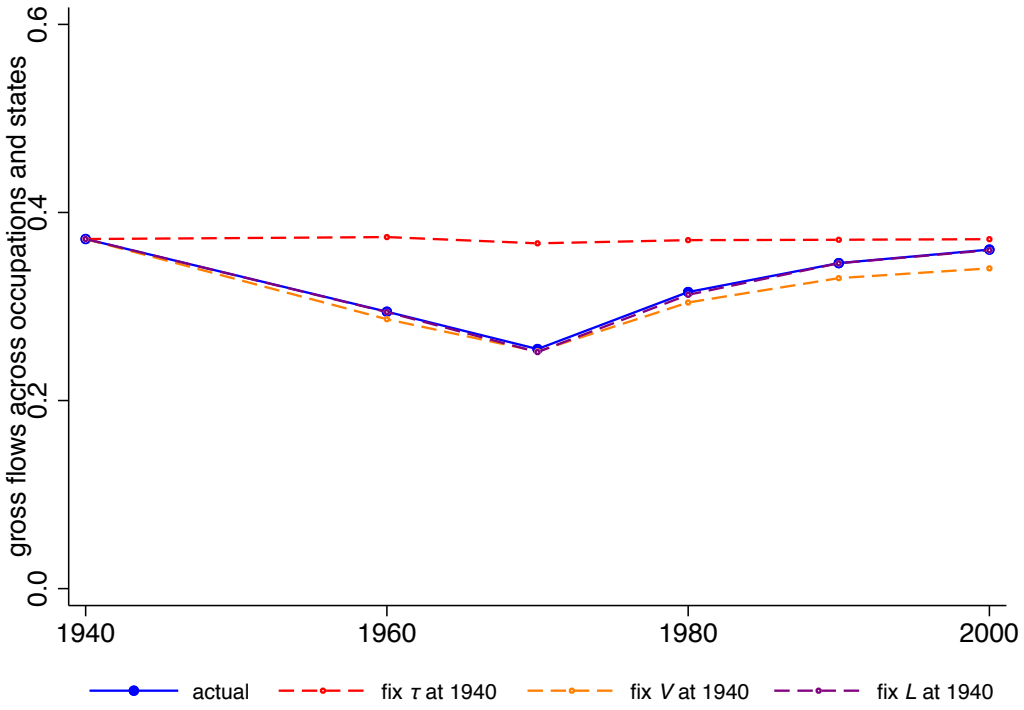


Figure 4.6 shows the changes in interstate gross flows as a share of national population when geographic mobility frictions are removed. Alternatively, we can view the measure as the share of workers prevented from reallocating to their desired locations due to mobility frictions, reflecting the level of market inefficiency in the time period. Between 1940 and 2000, there does not appear to be a monotone trend in worker misallocation. The share of workers misallocated from their optimal location choice declines first between 1940 and 1970 from nearly 40% to about 25%, followed by a gradual increase between 1970 and 2000 to its initial level. This increase in market inefficiency from 1980 onward echos the popular concern over the decline in gross mobility and its

implication for market dynamism in the U.S. for this time period.

Figure 4.7: Decomposition of the Counterfactual Gross Flows Measure



Similar to the counterfactual net flow measure, the gap between the counterfactual gross flow and the predicted gross flow is jointly determined by the mobility frictions, the distribution of the location-specific utility V's, and the distribution of the initial populations. Following the same procedure, we decompose the change to identify the key drivers behind the observed trend in worker misallocation. The results, as shown in figure 4.7, suggest that the historical trend in worker misallocation is primarily accounted for by changes in mobility frictions. When fixing the bilateral mobility friction to its 1940 level, the differences in worker misallocation across years completely disappear. If we consider mobility frictions to be the primary impediment to market integration and efficiency, this close relationship between the counterfactual gross flows measure here

and mobility frictions indicate that the former may be an effective indicator of market efficiency by being sensitive to frictions but not changes in the other parameters.

Counterfactual Relative Labor Supply Slope

Figure 4.8: Relative Labor Supply Slope When Removing Friction

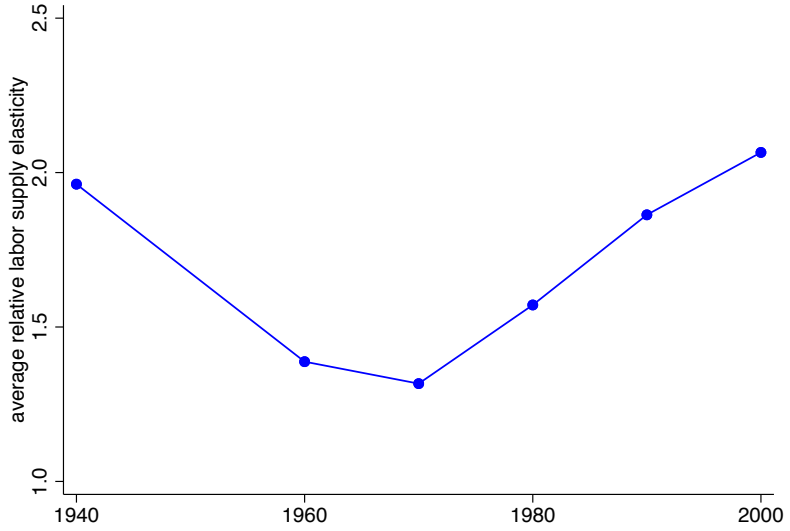
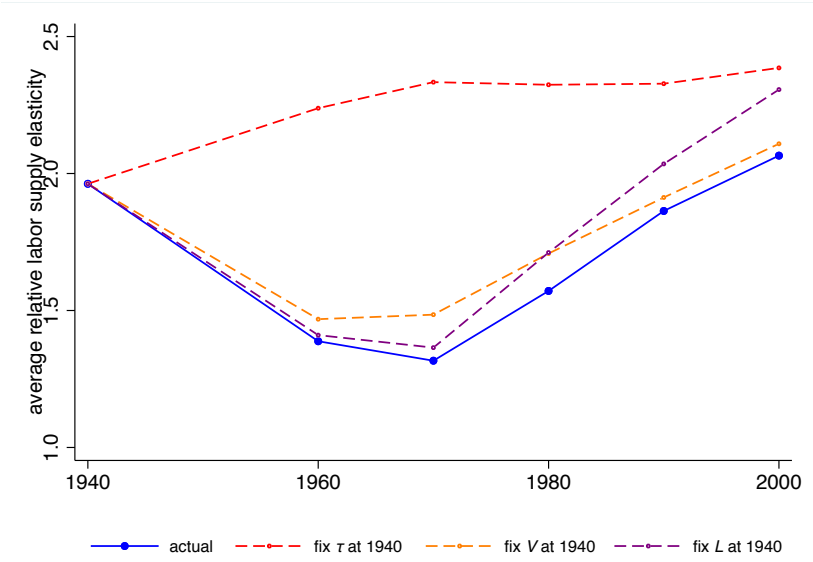


Figure 4.8 shows the counterfactual labor supply elasticity with respect to the location-specific utility V, relative to the observed elasticity. This measure reflects the proportional increase in labor supply's short-run responsiveness to demand shocks if mobility frictions were to be removed. The larger the increase is, the further away the observed elasticity is from the efficiency level. Similar to the counterfactual gross flows measure, here we see an initial improvement in efficiency, indicated by the decline in the relative slope between 1940 and 1970, followed by a deterioration in efficiency in the next three decades, as shown by the steep increase in the measure during the time period.

Figure 4.9: Decomposition of the Counterfactual Relative Labor Supply Slope Measure



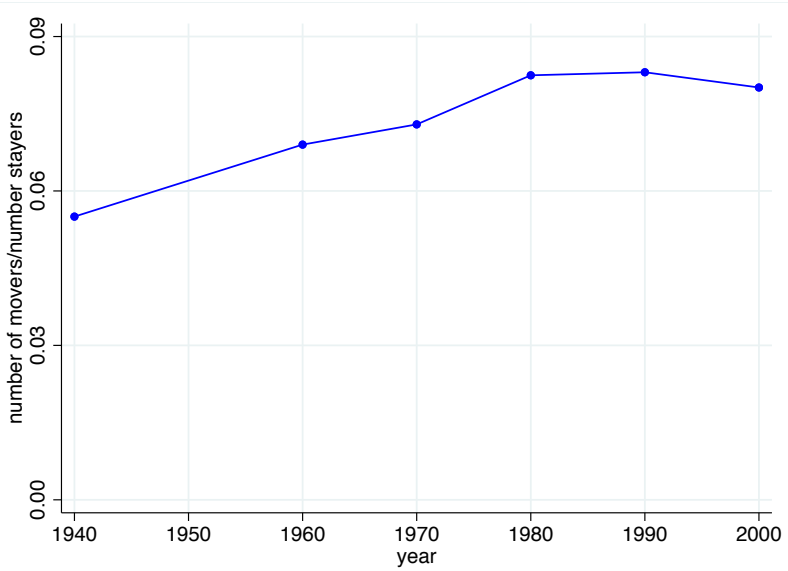
Nevertheless, the decomposition exercise, as shown in figure 4.9, paints a more complicated picture. On one hand, consistent with the counterfactual gross flows measure, the downward then upward trend in market inefficiency between 1940 and 2000 largely disappears when ${\tau_{ni}}^{-\theta}$ is fixed at their 1940 level, suggesting the central role of mobility frictions in determining the level of the measure. On the other hand, mobility friction is not the sole determinant of the measure. Even after controlling for mobility frictions, the level of inefficiency has risen above its 1940 level for all subsequent years, marked by the upward slope of the red dotted line in figure 4.9. This implies that changes in the joint distribution of the initial population and the location-specific utilities over time could have magnified the effects of mobility frictions on labor supply elasticity. For example, if population has become more concentrated in states with relatively lower mobility frictions, labor supply adjustment would depend further more on these states and hence impeding the overall efficiency of adjustment.

Summary of Empirical Results

To summarize, our empirical results suggest that mobility frictions play a crucial role in labor market integration. Between 1940 and 2000, the overall mobility frictions in the U.S. have shown a V-shaped trend, driven by the decline in the costs associated with moving long-distance between 1940 and 1970 and the increase in the fixed costs of moving between 1970 and 2000. These changes in mobility frictions are reflected in two of our labor market integration measures: the counterfactual gross flows measure and the counterfactual labor supply slope measure. The former is an indicator of the share of workers prevented from reallocating to their desired locations due to mobility frictions and the latter is an indicator of the decrease in labor supply's short-run responsiveness to demand shocks as a result of the frictions. Parallel to the trend in mobility frictions, the two measures indicate that the U.S. labor market has experienced an improvement in market efficiency between 1940 and 1970 followed by a decline in efficiency between 1970 and 2000, and the primary cause of this trend over time is exactly changes in mobility frictions.

Our finding is consistent with the popular concern over market efficiency in the U.S. in recent decades, a concern that is often motivated by the observed decline in gross internal worker flows. Nevertheless, our empirical results suggest that the level of gross flows is not a sufficient indicator of market efficiency, as it is a function of mobility frictions as well as the distribution of population and location-specific utilities across space. If we compare the observed gross flows (see figure 4.10) to our measures of market integration, it is clear that an increase in gross flows does not necessarily imply market has become more integrated or efficient. Relying merely on the observed gross flows to make inference about market efficiency is therefore problematic.

Figure 4.10: Gross Interstate Flows in the U.S., 1940–2000



5 Conclusion

Our approach to measuring labor market integration over time provides a theoretically consistent framework that is simple and easy to implement. Our empirical findings paint a complex picture of the spatial integration of U.S. labor markets. On the positive side, distance tends to be less of a migration barrier than it once was, and the amount of net reallocation in response to removing frictions has fallen significantly over time. On the other hand, since the 1970s there is a strong pattern of increasing costs of migration, with the associated increases in counterfactual gross flows and labor supply elasticities. Our estimates locate the beginnings of this dis-integration earlier than a simple analysis based on gross flows would suggest.

In addition to improvements in the treatment of occupational mobility and extending the time frame of the analysis, we see two natural directions for further research. The first is to investigate how closely our measures correspond to the true counterfactuals of a more complex model. The second is to analyze the welfare implications of these

changes, for which we need (at a minimum) an estimate of variance of the idiosyncratic portion of utility. We plan to pursue these lines in the future.

Reference

Artuç, Erhan, Shubham Chaudhuri, and John McLaren, "Trade shocks and labor adjustment: A structural empirical approach," *American economic review*, 2010, *100* (3), 1008–45.

Barro, Robert J and Xavier Sala i Martin, "Convergence," *Journal of political Economy*, 1992, *100* (2), 223–251.

_ , _ , Olivier Jean Blanchard, and Robert E Hall, "Convergence across states and regions," *Brookings papers on economic activity*, 1991, pp. 107–182.

Bayer, Christian and Falko Juessen, "On the dynamics of interstate migration: Migration costs and self-selection," *Review of Economic Dynamics*, 2012, *15* (3), 377–401.

Bishop, Kelly C, "A dynamic model of location choice and hedonic valuation," *Unpublished, Washington University in St. Louis*, 2008.

Blanchard, Olivier Jean and Lawrence F. Katz, "Regional Evolutions," *Brookings Papers on Economic Activity*, 1992, pp. 1–75.

Borjas, George J, Stephen G Bronars, and Stephen J Trejo, "Self-selection and internal migration in the United States," *Journal of urban Economics*, 1992, *32* (2), 159–185.

Breinlich, Holger, Gianmarco IP Ottaviano, and Jonathan RW Temple, "Regional growth and regional decline," in "Handbook of economic growth," Vol. 2, Elsevier, 2014, pp. 683–779.

Caliendo, Lorenzo, Maximiliano Dvorkin, and Fernando Parro, "The impact of trade on labor market dynamics," Technical Report, National Bureau of Economic Research 2015.

Coen-Pirani, Daniele, "Understanding gross worker flows across US states," *Journal of Monetary Economics*, 2010, *57* (7), 769–784.

Dao, Mai, Davide Furceri, and Prakash Loungani, "Regional labor market adjustment in the United States: trend and cycle," *Review of Economics and Statistics*, 2017, *99* (2), 243–257.

Dix-Carneiro, Rafael, "Trade liberalization and labor market dynamics," *Econometrica*, 2014, *82* (3), 825–885.

Hyatt, Henry, Erika McEntarfer, Ken Ueda, and Alexandria Zhang, "Interstate Migration and Employer-to-Employer Transitions in the United States: New Evidence From Administrative Records Data," *Demography*, 2018, *55* (6), 2161–2180.

Kaplan, Greg and Sam Schulhofer-Wohl, "Understanding the long-run decline in interstate migration," *International Economic Review*, 2017, *58* (1), 57–94.

Kennan, John and James R Walker, "The effect of expected income on individual migration decisions," *Econometrica*, 2011, *79* (1), 211–251.

Mitchener, Kris James and Ian W McLean, "US regional growth and convergence, 1880–1980," *The Journal of Economic History*, 1999, *59* (4), 1016–1042.

Molloy, Raven, Christopher L Smith, and Abigail K Wozniak, "Declining migration within the US: the role of the labor market," Technical Report, National Bureau of Economic Research 2014.

_ , _ , and Abigail Wozniak, "Internal migration in the United States," *Journal of Economic perspectives*, 2011, *25* (3), 173–96.

_ , Riccardo Trezzi, Christopher L Smith, and Abigail Wozniak, "Understanding declining fluidity in the US labor market," *Brookings Papers on Economic Activity*, 2016, *2016* (1), 183–259.

Partridge, Mark D, Dan S Rickman, M Rose Olfert, and Kamar Ali, "Dwindling US internal migration: Evidence of spatial equilibrium or structural shifts in local labor markets?," *Regional Science and Urban Economics*, 2012, *42* (1-2), 375–388.

Rosenbloom, Joshua L and William A Sundstrom, "The decline and rise of interstate migration in the United States: Evidence from the IPUMS, 1850–1990," in "Research in economic history," Emerald Group Publishing Limited, 2004, pp. 289–325.

Ruggles, Steven, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas, , and Matthew Sobek, "Integrated Public Use Microdata Series USA: V9.0 [dataset]," 2019.

Traiberman, Sharon et al., "Occupations and Import Competition," in "2017 Meeting Papers" number 1237 Society for Economic Dynamics 2017.

Chapter 5

Conclusion

The findings from this dissertation highlight the significance of local social-economic factors in the well-being of workers and their families. In developing policies aiming to address economic hardships of families, it is therefore crucial to pay attention to local context and the variation in economic opportunities and public resources across place and time. Below is a summary of the major findings from the three papers and their policy implications.

Chapter 2 shows that local labor market structure and outside options play an important role in labor market adjustment to demand shocks. For employment adjustment, proximity to external job opportunities in sectors with lower entry barriers facilitates faster adjustment for manufacturing industries adversely affected by import competition and can reduce the incidence of employment discontinuity for individual manufacturing workers. Similarly, the extent to which manufacturing wage rates respond to import competition also depend on both the quantity and wage rates of external job opportunities in the local non-manufacturing sector. These findings suggest that a key mechanism to successful employment adjustment of manufacturing workers is access to selected non-manufacturing sectors with lower entry barriers in their local area. Connecting workers with existing local job opportunities in these sectors is likely to facilitate job matching and reduce the incidence of employment disruption. As for metropolitan areas where job opportunities are concentrated in sectors with higher entry barriers,

an alternative policy focus should be placed on narrowing the skill gaps and preparing manufacturing workers to take jobs that require new skill sets.

Chapter 3 presents empirical evidence that state-led policy change on cash welfare has significant impact on the material well-being of poor children and their families. Using models that control for state and year trends, along with other factors, we find that the decline of cash assistance between 2001 and 2015 was associated with increases in household food insecurity and public school homelessness, hardships tightly connected with the long-term success of children. On one hand, our findings suggest that changes in the cultural notion of deservedness have clear material consequence on poor children. On the other hand, in light of recent trends in poverty measurement that treat cash aid and in-kind transfer equally, our findings show that the *form* of aid has a distinct role in the well-being of families. With the level of discretion granted to states in the implementation of TANF and the wide variation in cash benefit availability across states, this signifies the importance of local policy decision in the well-being of the most disadvantaged population in our society.

Chapter 4 describes the decline in the internal mobility in the U.S. in recent decades and develops a dynamic model of migration across regions and occupations to quantify the impact of migration frictions on the spatial integration of the U.S. labor market over time. Our finding indicates that labor market integration has followed an inverted U-shape between 1940 and 2000, with decreasing market fluidity starting in the 1980s. With migration becoming a less popular choice in worker adjustment to local economic shocks, our results highlight the growing importance of local factors in determining the well-being of local population. Policies aiming to address the impact of adverse economic shocks must take into consideration local context and pay more attention to the impact of localized economic development initiatives.