Labor Demand Shocks

UniTo, Labor Economics Part II
Christoph Albert

Lecture 8

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

- Monte, Redding and Rossi-Hansberg (2018)
- Defining "local"
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Labor demand shocks

We switch from the supply to the demand side:

- How do local employment, wages or prices respond to shocks in local labor demand? Are the effects transitory or persistent?
- At which margins do local labor markets adjust? Are population movements the main adjustment mechanism?
- How are individual workers, and different groups of workers affected by local demand shocks?
- In what sense are local labor markets "local", and which characteristics may hinder or foster the adjustment process?

Agenda

Introduction

Classic Evidence

Bartik (1991)

Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

Evidence from constructing Trans-Alaska pipeline

Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

Monte, Redding and Rossi-Hansberg (2018)

Defining "local"

Nimczik (2023)

Borusyak, Dix-Carneiro and Kovak (2023)

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

- Monte, Redding and Rossi-Hansberg (2018)
- Defining "local"
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Classic applications

We start by considering two classic applications, which addressed very similar questions:

- Bartik (1991), "Who Who Benefits from State and Local Economic Development Policies?", Upjohn Press
- Blanchard and Katz (1992), "Regional Evolutions." Brookings Papers on Economic Activity

While they agree on some of the basic mechanisms of local labor markets adjustments, they disagree on whether local demand shocks have persistent local effects ("hysteresis").

Bartik (1991)

Bartik (1991), "Who Who Benefits from State and Local Economic Development Policies?", Upjohn Press

Studies the response of U.S. local labor markets (MSAs) to local demand shocks. Nice discussion of empirical strategy in Appendix:

- Measures size of demand shock by local employment growth (motivated in Appendix 4.1)
- Alternatively, construct "Bartik instrument" to isolate variation in employment growth due to industry-level demand shocks (explained in Appendix 4.2)

Bartik (1991)

Estimating equation

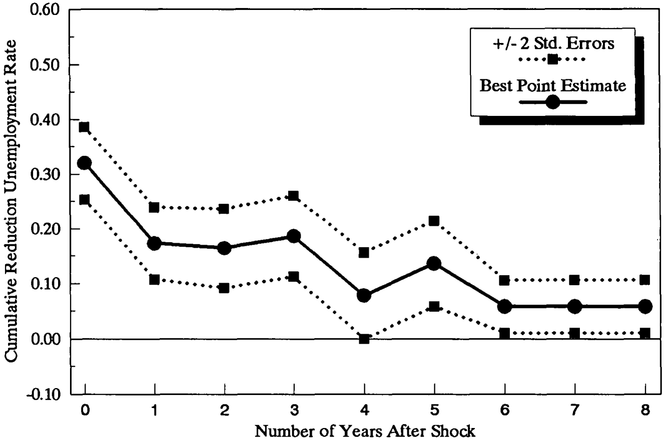
$$\Delta Y_{mt} = \mu_t + \beta_0 \Delta E_{mt} + \beta_1 \Delta E_{mt-1} + \ldots + \beta_8 \Delta E_{mt-8} + \varepsilon_{mt}$$

where ΔY_{mt} is change in outcome in region m at time t, μ_t are time FEs, ΔE_{mt} is employment growth, ε_{mt} is an error term,

- In some specifications, instruments for local employment change ΔE_{mt} with "Bartik instrument"
- Studies response in local unemployment rate, employment rate, prices and real wages
- Uses both aggregate and micro data. **What are the advantages of each type of data? How does the equation need to be changed for the use of microdata?**

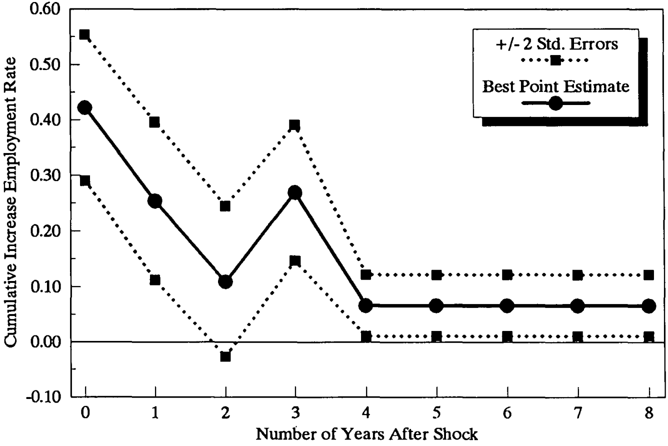
Bartik (1991)

Figure 4.1
Estimated Cumulative Effects of a 1 Percent Shock to Local Employment on Average Local Unemployment Rate, Using Aggregate Data



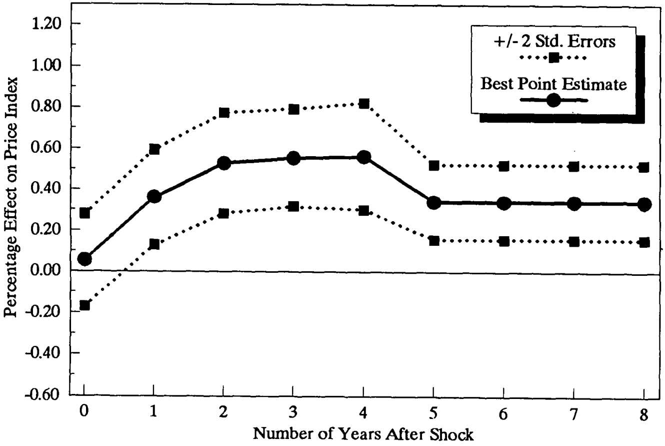
Bartik (1991)

Figure 4.2
Estimated Cumulative Effects of a 1 Percent Shock to Local Employment on Local Employment Rate, Using Micro Data



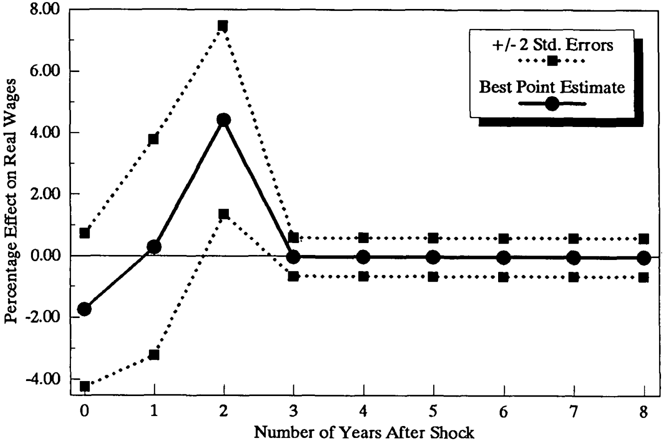
Bartik (1991)

Figure 5.1
Estimates of the Cumulative Percentage Effects of a 1 Percent Once-and-for-All Local Employment Shock on the MSA Shelter Price Index



Bartik (1991)

Figure 6.1
Percentage Effects of Demand-Induced 1 Percent Once-and-for-All Local Employment Shock on Real Wages, Micro Sample



Bartik (1991)

Bartik (1991), main findings:

- Demand shocks have strong short-run impact on employment, wages, prices
- Observes quick recovery of local labor markets
- However, finds persistent (small) effects in employment and unemployment rates, prices
- For example, 1-percent employment change reduces area's long-run unemployment rate by 0.07 percent. ("hysteresis effects" $\rightarrow$ p. 76 in book)

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

- Monte, Redding and Rossi-Hansberg (2018)
- Defining "local"
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Blanchard and Katz (1992)

Blanchard and Katz (1992), "Regional Evolutions." Brookings Papers on Economic Activity

Question:

- How do U.S. states adjust to adverse economic shocks – more specifically, local *demand* shocks?
- Considers joint movement of employment, unemployment, wages and prices

Empirical approach:

- Vector auto-regressions (VAR) on state-year level
- Assume that most of transitory variation in employment are caused by shifts in labor demand (not shifts in labor supply)
- Alternatively, construct observable demand shocks (defense spending or *Bartik instrument*)

Blanchard and Katz (1992)

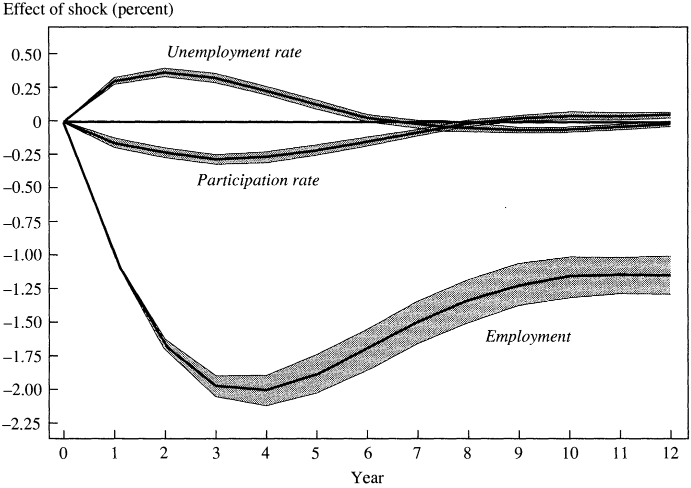
Estimate vector auto-regressions (VAR) on state-year level

$$\begin{aligned}
\Delta e_{it} &= \alpha_{i10} + \alpha_{i11}(L)\Delta e_{i,t-1} + \alpha_{i12}(L) le_{i,t-1} + \alpha_{i13}(L) lp_{i,t-1} + \varepsilon_{iet} \\
le_{it} &= \alpha_{i20} + \alpha_{i21}(L)\Delta e_{it} + \alpha_{i22}(L) le_{i,t-1} + \alpha_{i23}(L) lp_{i,t-1} + \varepsilon_{iut} \\
lp_{it} &= \alpha_{i30} + \alpha_{i31}(L)\Delta e_{it} + \alpha_{32}(L) le_{i,t-1} + \alpha_{i33}(L) lp_{i,t-1} + \varepsilon_{ipt}
\end{aligned}$$

where Δe_i is first difference of log employment in state i (as deviation from U.S. aggregate employment), le_i is log ratio of employment to labor force, lp_i is log ratio of labor force to population

Blanchard and Katz (1992)

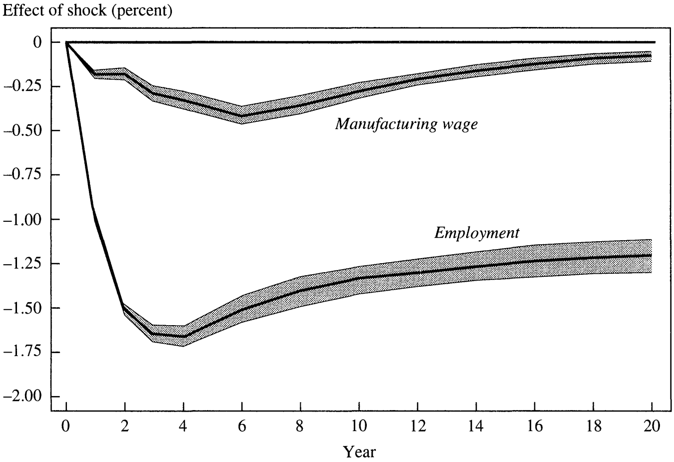
Figure 7. Response of Employment, Unemployment, and Labor Force Participation to an Employment Shock



Source: Authors' calculations based on the system of equations described in the text, using data described in the appendix. All 51 states are used in the estimation. The shock is a −1 percent shock to employment. Bands of one standard error are shown around each line.

Blanchard and Katz (1992)

Figure 11. Response of Employment and Manufacturing Wages to an Employment Shock



Source: Authors' calculations using data described in the appendix. The shock is a −1 percent shock to employment. Bands of one standard error are shown around each line.

Blanchard and Katz (1992)

Blanchard and Katz (1992) find similar short-run effects as Bartik (1991), but much slower adjustment in local wages:

- Permanent effect on local employment (growth recovers, but not levels)
- Temporary effect on unemployment rate (recovery within half a decade)
- Semi-permanent effect on local wages (recovery within a decade)
- Do not find evidence for "hysteresis effects"

Blanchard and Katz (1992)

Blanchard and Katz (1992) argue that labor mobility is the main mechanism underlying local adjustments:

> *"The conclusion favoring perfectly elastic long-run labor supply is inevitable, given the behavior of the three variables. If employment in a state can change a great deal and tends to remain at the new level, but unemployment and labor force participation return to normal, then no other possible conclusion exists but that the population has changed to accommodate the higher employment."*

Hysteresis effects

- Bartik (1991) finds evidence for "hysteresis effects" (persistent local effects of short-run demand shocks) while Blanchard and Katz (1992) do not (except in employment levels).
- The existence of hysteresis effects continues to be debated. See for example "Recessions and Local Labor Market Hysteresis" by Hershbein and Stuart (2020):

  "We find that recession-induced declines in employment are permanent, suggesting that local areas experience ***permanent declines in labor demand*** *relative to less-affected areas. Population also falls, primarily due to* ***reduced in-migration****, but by less than employment. As a result, recessions generate long-lasting hysteresis:* ***persistent decreases in the employment-to-population ratio and earnings per capita.****"*

VAR versus event studies

Another point of debate is whether the VAR method used by Blanchard and Katz (1992) is reliable.

Two methodological issues:

1. Serial correlation in the demand shocks themselves (Greenaway-McGrevy and Hood, 2016)
2. Finite sample bias in vector autoregressions. Hershbein and Stuart (2020):

   "We further show that finite sample bias in vector autoregressions leads to artificial convergence, which can explain why some previous work finds no evidence of hysteresis in employment rates."

Greenaway-McGrevy and Hood (2016)

Greenaway-McGrevy and Hood (2016) compare the role of job creation (forms moving in) vs. labor mobility (workers moving out) in local recovery process

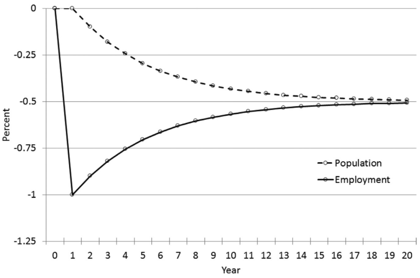
- Note that local demand shocks are serially correlated:

  "If the structural shocks identified in the empirical model are ***persistent****—in the sense that the economic shock occurs over several time periods—it is difficult to* ***disentangle the increase in employment*** *due to the endogenous labor demand response from* ***the ongoing exogenous decrease in employment*** *due to the original downturn."*

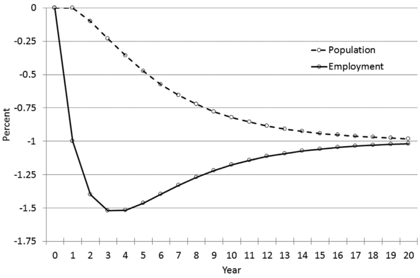
- Evidence for serial correlation: employment falls for several periods in IRFs of Blanchard and Katz (1992)
- Estimates by Blanchard and Katz (1992) then partly reflect ongoing job destruction from original downturn (Jäger, Ruist and Stuhler 2018, make similar argument in migration context)

Greenaway-McGrevy and Hood (2016)

Without serial correlation:



With serial correlation:



Greenaway-McGrevy and Hood (2016)

Greenaway-McGrevy and Hood (2016) consider similar data as Blanchard and Katz (1992), but

- Use Bartik instrument to isolate labor demand shocks
- Parametrize serial dependence in demand shock

Main findings:

- Find only limited population response. Instead, local job creation (i.e., a labor demand response on the firm side) is main driver of local recoveries in the U.S.
- Find slower local recovery than Blanchard and Katz, extending over more than 20 years.
- Because the migration response is limited and the labor demand response is protracted, local policies and shocks can have large and long-lasting effects on local residents

Greenaway-McGrevy and Hood (2016)

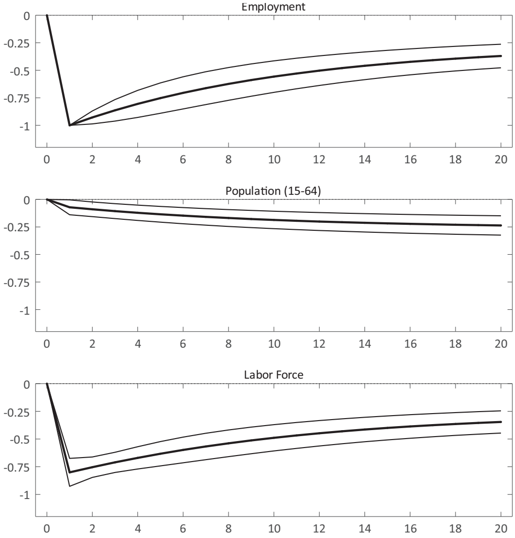


Fig. 5. Responses to a serially uncorrelated −1% labor demand shock using Bartik shift shares. Error bands represent 90% confidence intervals.

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

- Monte, Redding and Rossi-Hansberg (2018)
- Defining “local”
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Do local shocks have persistent impacts?

Do transitory shocks have persistent local impacts?

- Blanchard and Katz (1992) find quick local recovery of employment rate and wages, Greenaway and Hood (2016) find slower adjustment. Bartik finds permanent local effects.

Many other literatures find persistent effect of area- or firm-level shocks on **individual** outcomes. Examples:

- Impact of mass layoffs on worker-level outcomes
- Impact of trade on worker-level outcomes (e.g. Autor, Dorn, Hanson and Song 2014)

We consider two specific shocks here:

1. Carrington (1996) on constructing Trans-Alaska pipeline
2. Yagan (2019) on the Great Recession

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

- Monte, Redding and Rossi-Hansberg (2018)
- Defining "local"
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Carrington (1996)

Carrington (1996) "The Alaskan Labor Market during the Pipeline Era," Journal of Political Economy

Background:

- After oil discovery, construction of Trans-Alaska Pipeline System (TAPS) between 1975 and 1977
- Interpret TAPS as a major positive shock in local labor demand

Method:

- Simple differences over time (no control group)

Carrington (1996)

Main findings:

- Large temporary positive effect on earnings, employment,
- Employment and population returned quickly to pre-97 trend

Interpretation:

- Local labor supply is quite elastic (both intensive and extensive margin)
- No evidence of wage stickyness

Carrington (1996)

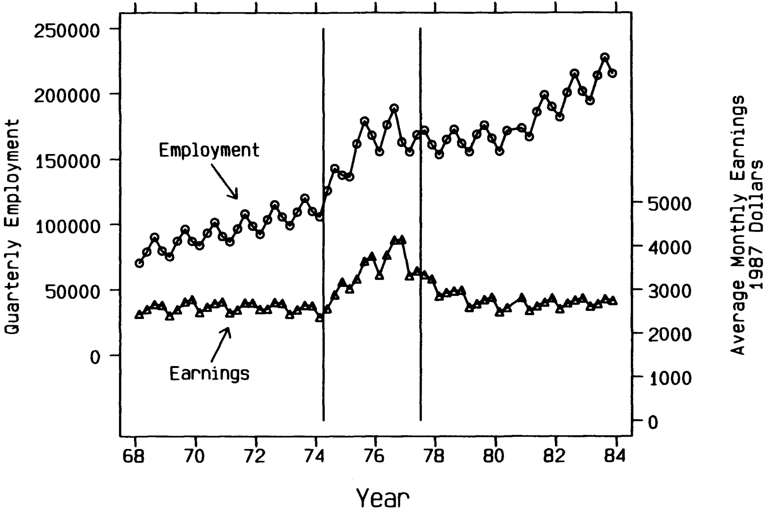


FIG. 3.—Employment and earnings: all industries

Carrington (1996)

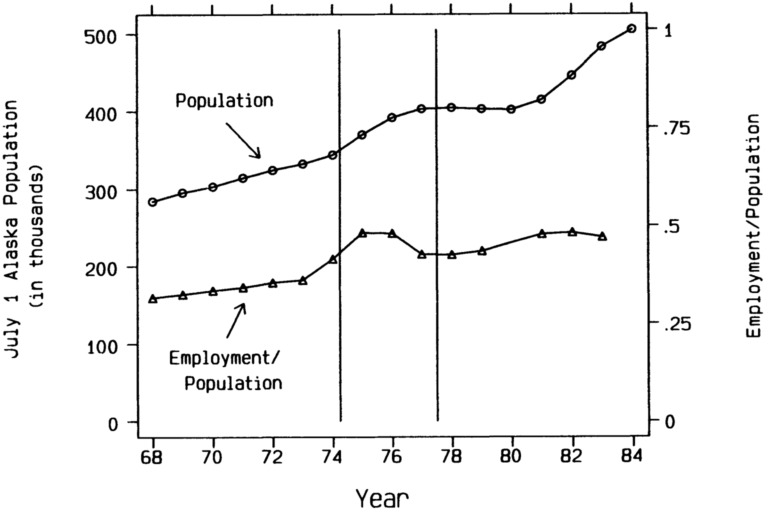


FIG. 5.—Population and employment/population

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

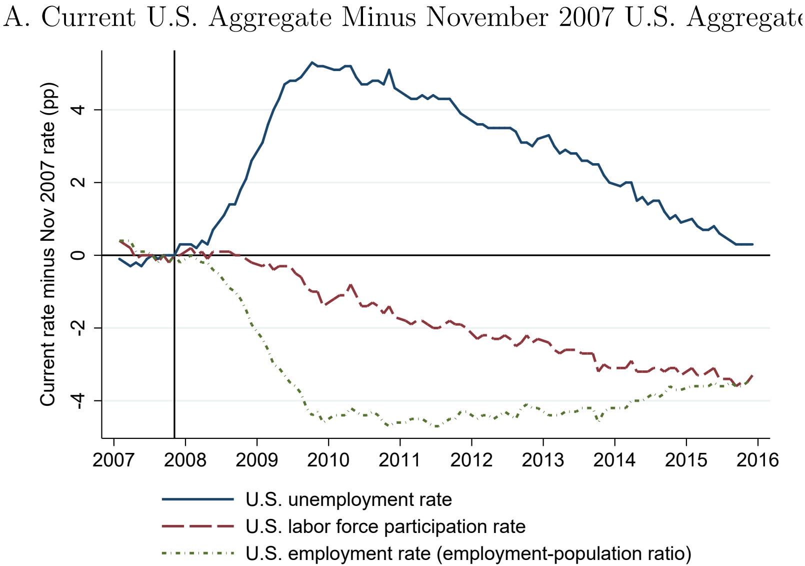
- Monte, Redding and Rossi-Hansberg (2018)
- Defining “local”
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Yagan (2019)

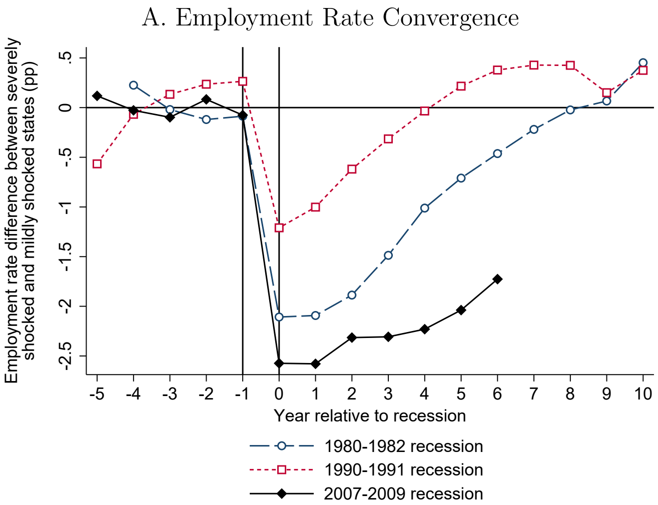
Yagan (2019), "Employment Hysteresis from the Great Recession", Journal of Political Economy

- Asks whether Great Recession caused long-term decline in employment rate
- Studies labor market outcomes of workers over time, distinguishing between those located in areas hit badly and those in areas hit less badly by Great Recession
- Use longitudinal worker data to control for post-2007 sorting on labor supply and pre-2007 sorting on human capital

Yagan (2019)


A. Current U.S. Aggregate Minus November 2007 U.S. Aggregate
Current rate minus Nov 2007 rate (pp)
4
2
0
-2
-4
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
U.S. unemployment rate
U.S. labor force participation rate
U.S. employment rate (employment-population ratio)

Yagan (2019)



A. Employment Rate Convergence
Employment rate difference between severely shocked and mildly shocked states (pp)
.5
0
-.5
-1
-1.5
-2
-2.5
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
Year relative to recession
1980-1982 recession
1990-1991 recession
2007-2009 recession

Yagan (2019)

Estimate worker-level event study

$$y_{i2015} = \beta SHOCK_{c(i2007)} + \theta_{g(i2006)} + \varepsilon_{i2015}$$

where y_{i2015} is some outcome in year 2015, $SHOCK_{C(i2007)}$ is the "recession shock" to individual i living in area c in 2007, $\theta g(i2006)$ are fixed effects for groups g based on 2006 characteristics

- Argues $SHOCK_{c(i2007)}$ is one-time shock in labor demand (not serially correlated local shocks as in Greenaway et al 2017)
- β is the causal effect of Great Recession local shocks and their underlying causes on *individual* outcomes in 2015

Yagan (2019)

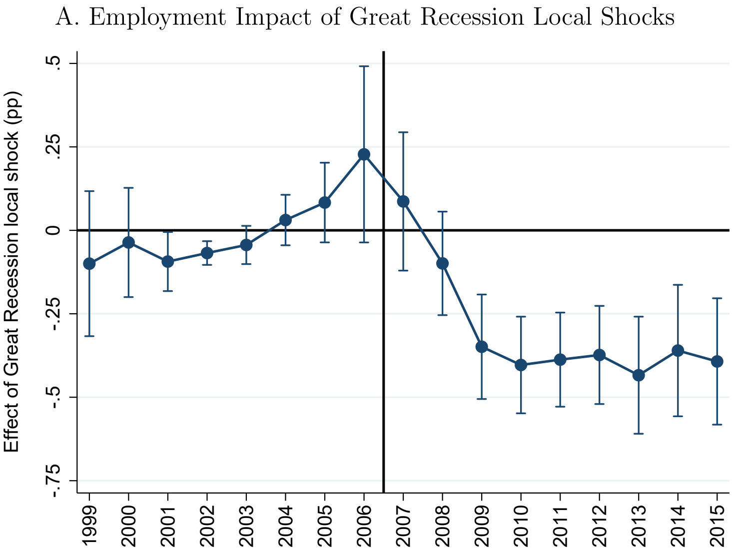
Why consider individual- instead of area-level outcomes?

- Area-level evidence may reflect post-2007 sorting of workers
- Can control for 2006 age-earnings-industry fixed effects

Extensions:

- Event-study design with different coefficients for each period
- Main, retail chain and mass layoff samples

Yagan (2019)


A. Employment Impact of Great Recession Local Shocks
Effect of Great Recession local shock (pp)
.5
.25
0
-.25
-.5
-.75
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Yagan (2019)

Main findings

- Local and individual employment rates do not recover from local impact of Great recession (“hysteresis”)
- Area-level conditions have large and persistent effects on individual employment outcomes

Implications

1. “Naive extrapolation” of local-shock-based estimate to the national level would suggest that the Great Recession caused more than half of the 2007-2015 decline in U.S. employment
2. Unemployment rate (as considered in matching models) is not a reliable indicator for economic recovery. Consider labor force participation.

Agenda

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

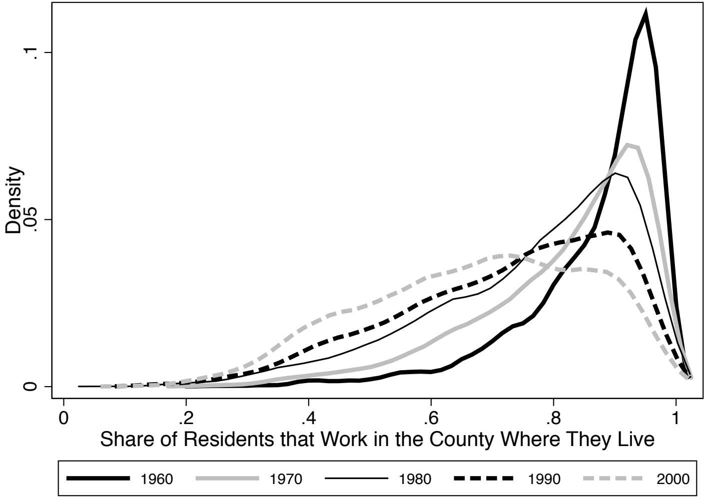
- Monte, Redding and Rossi-Hansberg (2018)
- Defining "local"
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Monte, Redding and Rossi-Hansberg (2018)

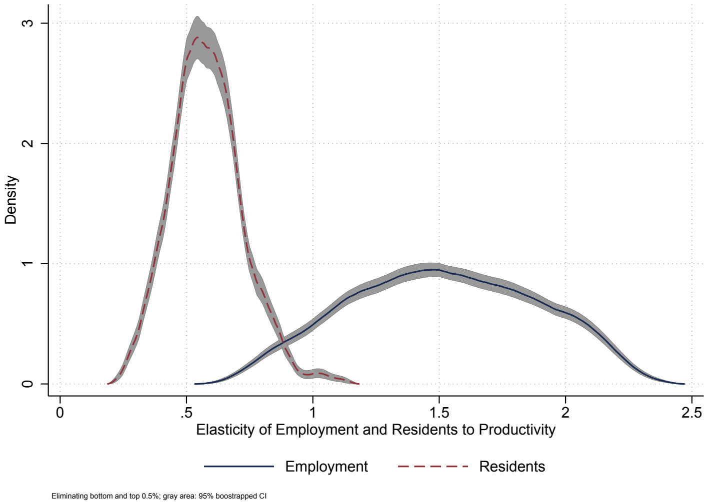
Impact of local demand shock will depend on the elasticity of local labor supply (see model by Moretti, 2011)

- Monte, Redding and Rossi-Hansberg (2018) argue that this elasticity – and therefore the impact of local demand shocks – depends on the "openness" of a local labor market.
- Consider a quantitative general equilibrium model with spatial linkages in goods markets (trade) and factor markets (commuting and migration)
- Match model to observed "gravity" relationships for trade and commuting $\rightarrow$ commuting more sensitive to distance
- Find that elasticity of local employment with respect to productivity shock ranges from 0.5 to 2.5, which is mostly explained by variation in commuting links

Commuter share is increasing over time



Employment & population response to 5% prod. shock



- Larger heterogeneity in employment than resident elasticity driven by commuting links

Monte, Redding and Rossi-Hansberg : Findings

Main findings from Monte, Redding and Rossi-Hansberg (2018):

- Employment and population response to local shocks varies substantially across counties, because they have different trade, migration and commuting links
- These links are not well approximated by area and size, but can be proxied by the commuting share
- Model-based implications confirmed in quasi-experimental evidence: Large plant openings have larger employment effect in counties with higher commuting share

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

- Monte, Redding and Rossi-Hansberg (2018)
- Defining "local"
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

Local labor markets

Local labor markets are typically defined based on geographic proximity

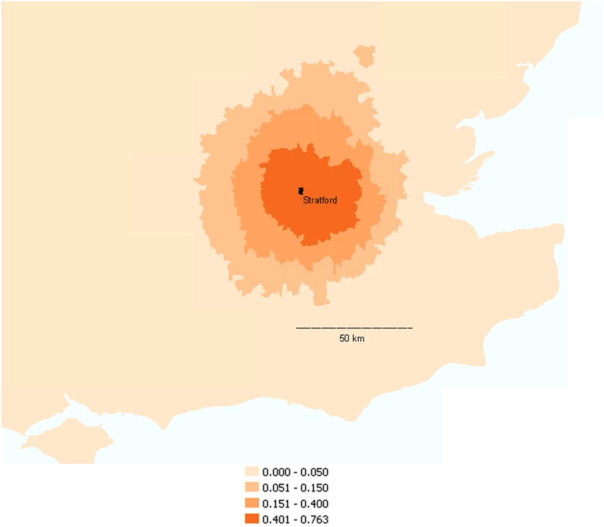
- e.g. "Commuting zones": local administrative units connected by high commuter flow
- Assumed to be identical for each worker

Two interesting recent contributions::

- Manning and Petrongolo (2017) ask "How local are labor markets?": estimate cost of distance in job search in UK
- Nimczik (2023) considers more flexible, "data-driven" labor markets

Manning and Petrongolo (2017)

Effect of a doubling in the number of vacancies in Stratford on the unemployment outflow, percentage change



Manning and Petrongolo (2017)

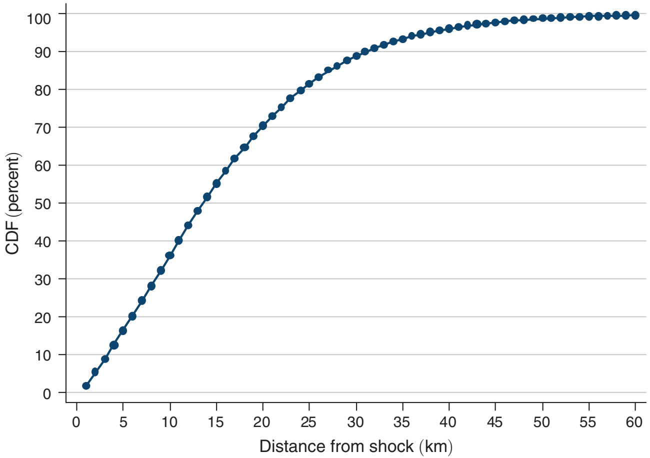


FIGURE 4. THE SPATIAL DISTRIBUTION OF LOCAL POLICY IMPACT ON THE UNEMPLOYMENT OUTFLOW

Notes: The CDF of treatment represents the percentage of the total increase in the unemployment outflow produced within a given distance from the source of a local labor demand shock. The underlying shock is a doubling in the number of local vacancies.

Agenda

Introduction

Classic Evidence

- Bartik (1991)
- Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

- Evidence from constructing Trans-Alaska pipeline
- Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

- Monte, Redding and Rossi-Hansberg (2018)
- Defining “local”
- Nimczik (2023)
- Borusyak, Dix-Carneiro and Kovak (2023)

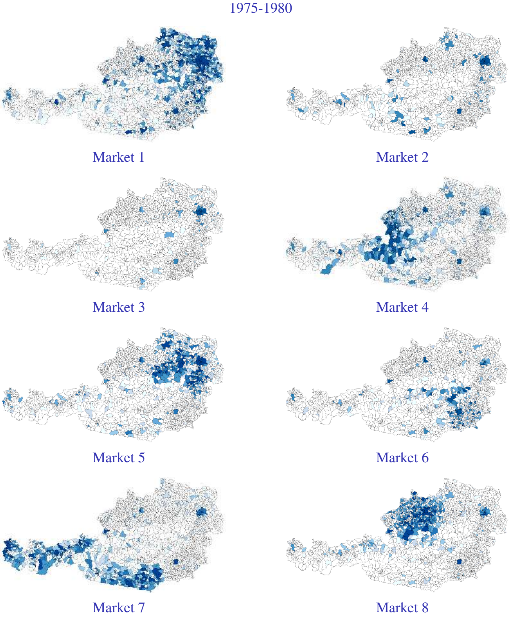
Nimczik (2023)

Nimczik (2023), "Job Mobility Networks and Data-Driven Labor Markets"

- Considers non-geographic, "data-driven" labor markets based on observed worker flows between firms
- Create firm network using the universe of job-to-job transitions
- Partition job mobility network into separate markets based on Stochastic Block Model (SBM)
- Two firms are in same labor market if they have similar probabilities to link to the rest of the network

→ Labor markets determined by unobserved transition costs including moving costs, skill transferability, preferences for jobs etc.

Nimczik (2023): Map of labor markets



Nimczik (2023): Findings

1. Higher shares of job transitions within data-driven labor markets than within geographical entities of same size
2. Finds two distinct types of data-driven labor markets
   - Spatially clustered firms resembling traditional local labor markets
   - Firms scattered across the country in industry-specific city-type markets (becoming more important over time)
3. Scope of data-driven labor markets differs across subgroups, in particular across skill-groups: the spatial distance between firms within data-driven labor markets for high-skilled is about 1.3 times larger than for low-skilled

Nimczik (2023): Application

Study a local labor demand shock:

- Unexpected mass layoffs in the Austrian steel industry in mid-1980s
  $\rightarrow$ Adverse effects on employment in non-steel firms from the same data-driven labor market (also in distant regions) **Why?**
- Data-driven labor markets can predict scope of the impact: Most important margin of adjustment is mobility *within* "data-driven" labor markets but *across* regional labor markets and industry boundaries

Agenda

Introduction

Classic Evidence

Bartik (1991)

Blanchard and Katz (1992)

Local Labor Demand Shocks: Applications

Evidence from constructing Trans-Alaska pipeline

Employment hysteresis from the Great Recession

Mechanisms and Margins of Adjustment

Monte, Redding and Rossi-Hansberg (2018)

Defining "local"

Nimczik (2023)

Borusyak, Dix-Carneiro and Kovak (2023)

Borusyak, Dix-Carneiro and Kovak (2023)

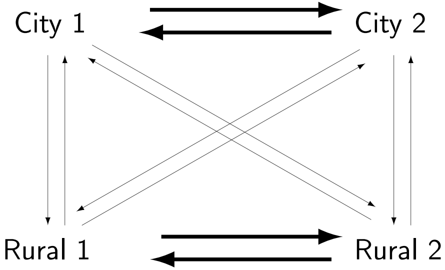
Borusyak, Dix-Carneiro and Kovak (2023), "Understanding Migration Responses to Local Shocks"

- Most of the literature on local demand shocks finds small or no migration responses of workers
- Reason is that conventional regression is misspecified:

$$\hat{L}_\ell = \alpha + \beta \hat{z}_\ell + \varepsilon_\ell$$

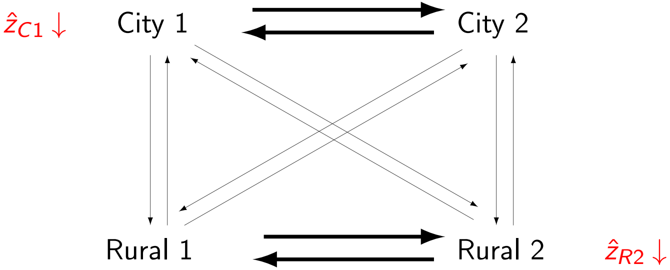
- Intuition: workers' response to a local shock also depends on the shocks in potential alternative locations (i.e. potentially distant but connected labor markets as in Nimzcik, 2023)

Borusyak, Dix-Carneiro and Kovak (2023): Intuition



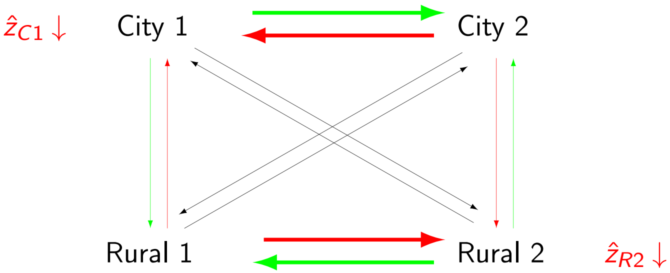
Borusyak, Dix-Carneiro and Kovak (2023): Intuition

Case 1: Neg. shock in city 1 and rural 2



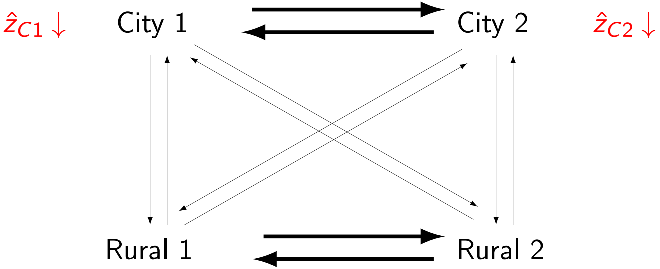
Borusyak, Dix-Carneiro and Kovak (2023): Intuition

Case 1: Neg. shock in city 1 and rural 2 $\Rightarrow$ Large migration outflows



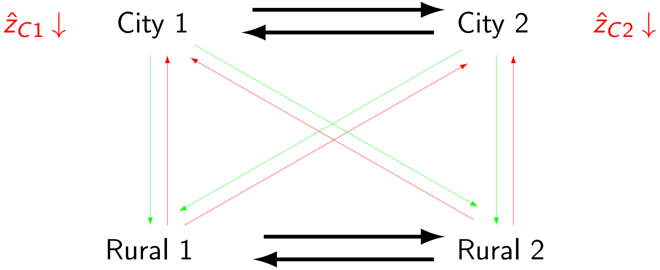
Borusyak, Dix-Carneiro and Kovak (2023): Intuition

Case 2: Neg. shock in city 1 and city 2



Borusyak, Dix-Carneiro and Kovak (2023): Intuition

Case 2: Neg. shock in city 1 and city 2 $\Rightarrow$ Small migration outflows



Borusyak, Dix-Carneiro and Kovak (2023): Model

1. Develop a model with many labor markets ℓ and costly migration to characterize mobility responses to labor demand shocks

2. Interpret β through the lens of the model
   - True response to unit shock in location ℓ: $\frac{2\theta}{\sigma} \cdot \frac{M_\ell}{L_\ell}$
   - Estimate from conventional regression: $\frac{2\theta}{\sigma} \cdot \frac{M}{L} \cdot \frac{1-\rho}{1-\widetilde{\rho}}$

   ⇒ True responses to counterfactual shocks could be large even if $\hat{\beta} \approx 0$

3. Propose simple alternative estimation procedures better suited to understand migration responses
   - Control for migration-weighted average shock to other locations

A characterization of β

Theorem: under low-mobility approx. and $\hat{z}_\ell$ that are as good as randomly assigned:

$$\beta = \frac{2\theta}{\sigma} \cdot \frac{M}{L} \cdot \frac{1-\rho}{1-\widetilde{\rho}}$$

The effect combines:

1. migration elasticity θ relative to labor demand elasticity σ
2. national no-shock share of migrants M/L
3. attenuation factor $\frac{1-\rho}{1-\widetilde{\rho}}$: below 1 if shocks are particularly positively correlated between regions with strong migrant connections
    - $\widetilde{\rho} = \sum_{o \neq d} \frac{\widetilde{F}_{od}}{\widetilde{M}} \text{Corr}[\hat{z}_o, \hat{z}_d]$ in placebo w/ no migration costs, $\widetilde{F}_{od} = \frac{L_o L_d}{L}$
    - $\rho = \sum_{o \neq d} \frac{F_{od}}{M} \text{Corr}[\hat{z}_o, \hat{z}_d]$ avg. migrant flow-weighted shock correlation

A characterization of β

Theorem: under low-mobility approx. and $\hat{z}_\ell$ that are as good as randomly assigned:

$$\beta = \frac{2\theta}{\sigma} \cdot \frac{M}{L} \cdot \frac{1-\rho}{1-\widetilde{\rho}}$$

The effect combines:

1. migration elasticity θ relative to labor demand elasticity σ
2. national no-shock share of migrants M/L
3. attenuation factor $\frac{1-\rho}{1-\widetilde{\rho}}$: below 1 if shocks are particularly positively correlated between regions with strong migrant connections
    - $\widetilde{\rho} = \sum_{o \neq d} \frac{\widetilde{F}_{od}}{\widetilde{M}} \text{Corr}[\hat{z}_o, \hat{z}_d]$ in placebo w/ no migration costs, $\widetilde{F}_{od} = \frac{L_o L_d}{L}$
    - $\rho = \sum_{o \neq d} \frac{F_{od}}{M} \text{Corr}[\hat{z}_o, \hat{z}_d]$ avg. migrant flow-weighted shock correlation

A characterization of β

Theorem: under low-mobility approx. and $\hat{z}_\ell$ that are as good as randomly assigned:

$$\beta = \frac{2\theta}{\sigma} \cdot \frac{M}{L} \cdot \frac{1-\rho}{1-\widetilde{\rho}}$$

The effect combines:

1. migration elasticity θ relative to labor demand elasticity σ
2. national no-shock share of migrants M/L
3. attenuation factor $\frac{1-\rho}{1-\widetilde{\rho}}$: below 1 if shocks are particularly positively correlated between regions with strong migrant connections
   - $\widetilde{\rho} = \sum_{o \neq d} \frac{\widetilde{F}_{od}}{\widetilde{M}} \text{Corr}[\hat{z}_o, \hat{z}_d]$ in placebo w/ no migration costs, $\widetilde{F}_{od} = \frac{L_o L_d}{L}$
   - $\rho = \sum_{o \neq d} \frac{F_{od}}{M} \text{Corr}[\hat{z}_o, \hat{z}_d]$ avg. migrant flow-weighted shock correlation

A characterization of β

Theorem: under low-mobility approx. and $\hat{z}_\ell$ that are as good as randomly assigned:

$$\beta = \frac{2\theta}{\sigma} \cdot \frac{M}{L} \cdot \frac{1-\rho}{1-\widetilde{\rho}}$$

The effect combines:

1. migration elasticity θ relative to labor demand elasticity σ
2. national no-shock share of migrants M/L
3. attenuation factor $\frac{1-\rho}{1-\widetilde{\rho}}$: below 1 if shocks are particularly positively correlated between regions with strong migrant connections
   - $\widetilde{\rho} = \sum_{o \neq d} \frac{\widetilde{F}_{od}}{\widetilde{M}} \text{Corr}[\hat{z}_o, \hat{z}_d]$ in placebo w/ no migration costs, $\widetilde{F}_{od} = \frac{L_o L_d}{L}$
   - $\rho = \sum_{o \neq d} \frac{F_{od}}{M} \text{Corr}[\hat{z}_o, \hat{z}_d]$ avg. migrant flow-weighted shock correlation

Model-Consistent estimation

Model-consistent estimation using OLS:

$$\hat{L}_\ell = \frac{2\theta}{\sigma} \cdot \frac{M_\ell^0}{L_\ell^0} \cdot (\hat{z}_\ell - \hat{z}_\ell) + \varepsilon_\ell$$

where $\hat{z}_{-\ell}$ is the average shock to migrant-connected locations:

$$\hat{z}_{-\ell} \equiv \sum_{k \neq \ell} \frac{F_{k\ell}}{M_\ell} \hat{z}_k$$