Occupation Demand Shocks and Mismatch in Local Labor Markets

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Focus of project: What are effects of local labor demand shocks to different occupation types? Variation by group, and by local characteristics?

- **My initial motivation:** What should industry targets be for state/local economic development policies? Should we consider what jobs are "well-matched" to local residents we want to help most? (For ex., will attracting Amazon HQII high-skill jobs help local residents?)

- **Autor hypothesis:** Local data may shed light on Autor (2019) hypothesis that "occupational polarization" explains declining relative wages of non-college grads, particularly in largest cities.

- **Main finding:** Consistent with Autor hypotheses, mid jobs by far the most important in explaining local labor market outcomes, particularly for non-college-grads.

- **Policy Implications:** Local econ dev policies should target "mid jobs" – to extent this is feasible. But limitations of growth potential of mid-jobs suggests need to also increase occ mobility to "high jobs", & boost wages of "low jobs".

Model and Data: Effects on long-run (2000 to 2015-19) change in labor market outcomes for different groups of demand shocks to high-, middle-, or low-occupations, interacted w/ local characteristics

$$\ln(Y_{jz9}) - \ln(Y_{jz0}) = B0 + B_e \times \ln(E_{z0}) + B_c \times [\ln(C_{z0}) - \ln(C_{n0})] +$$

$$Bl \times (D_{lz}) + Ble \times [(\ln(E_{z0})] (D_{lz}) + B_{lc} \times [\ln(C_{z0}) - \ln(C_{n0})] (D_{lz}) +$$

$$B_m \times (D_{mz}) + Bme \times [(\ln(E_{z0})] (D_{mz}) + B_{mc} \times [\ln(C_{z0}) - \ln(C_{n0})] (D_{mz}) +$$

$$Bh \times (D_{hz}) + Bhe \times [(\ln(E_{z0})] (D_{hz}) + B_{hc} \times [\ln(C_{z0}) - \ln(C_{n0})] (D_{hz})$$

Y_{jz9} and Y_{jz0} are demographically-adjusted real labor market outcomes for group j in CZ z at years 2015–2019 (from ACS) or year 2000 (Census). (E_{z0}) is CZ z's overall adjusted employment rate relative to the U.S. in the year 2000. (C_{z0}) and (C_{n0}) are the college grad percent of adults ages 25–64 in the year 2000 in either the CZ or the nation (subscript n). (D_{lz}), (D_{mz}), and (D_{hz}) are the demand shocks to low-, mid- and high-occupations in CZ z from the former to the latter period.

Model is estimated on 371 "commuting zones" (CZs), all > 100K in pop, which comprise 96% of U.S. pop.

For presentation, focus on change in real earnings for different education groups (less than BA, BA+). Real earnings controls for local prices.

CZ population	Most populous county in CZ	Change from 2000 to 2015-19 in relative real earnings index for <BA	Change for BA plus
16,372,860	**Los Angeles CA**	**-11.9%**	**-7.6%**
10,762,079	Kings NY	-7.2%	1.1%
8,610,555	Cook IL	-8.5%	-1.2%
6,661,455	Bergen NJ	-3.8%	-5.0%
5,100,708	**Alameda CA**	**2.4%**	**11.8%**
5,077,106	**Wayne MI**	**-14.7%**	**-8.3%**
4,770,018	Harris TX	-1.2%	0.1%
4,751,998	Middlesex MA	-0.1%	4.2%
4,435,552	Philadelphia PA	-6.7%	2.7%
4,414,255	Fairfax VA	0.6%	1.2%
3,955,878	**Miami-Dade FL**	**-11.8%**	**-10.9%**
3,942,141	**King WA**	**8.1%**	**12.0%**
3,797,219	Fulton GA	1.1%	3.3%
3,469,660	Maricopa AZ	-0.1%	7.8%
3,405,239	Fairfield CT	-1.3%	3.1%
3,029,141	Dallas TX	2.5%	-2.3%
2,955,948	San Diego CA	-7.0%	-0.6%
2,945,557	**Hennepin MN**	**8.8%**	**7.7%**
2,945,432	Cuyahoga OH	5.7%	3.6%
2,880,863	Denver CO	4.9%	3.9%
2,665,798	Baltimore MD	0.7%	0.4%
2,603,382	**Allegheny PA**	**21.2%**	**1.4%**

Occ types based on Autor: high (managers/execs; professionals + sales in finance/ads; technicians+fire/police**); middle** (retail sales except fin/ads; clerical/admin support; production/operative); **low** (transport; construction;laborers; mechanics;services; farming/mining)

Table 5: Growth in employment, 2000 to 2015-2019, by high, mid, and low occupations

		Total	**High**	**Mid**	**Low**
2000	**Employment(in millions)**	130.9	50.3	40.7	39.8
	Percent of total employment	100.0%	38.4%	31.1%	30.4%
2015-2019	**Employment(in millions)**	155.9	66.7	38.9	50.3
	Percent of total employment	100.0%	42.8%	25.0%	32.3%
2000 to 2015-19 % growth, as percent of total base in 2000		19.1%	12.5%	-1.4%	8.0%

Occ growth at national level can be divided into 3 components: (1) National growth; (2) Differential growth of industries w/ diverse occ shares; (3) w/i industry shifts across occ groups. Negative share effect for mid-occ is driven a lot by manufacturing's below-average growth. Positive share effect for low-occ driven in part by above average growth of restaurants. Shift effect from mid to high occurs across MANY industries.

	Total	High	Mid	Low
2000 to 2015-19 % growth, as percent of total base in 2000	19.10%	12.54%	-1.41%	7.97%
National growth effect		8.08%	5.22%	5.80%
Industry Share effect		0.56%	-2.80%	2.24%
Occ Shift effect		3.90%	-3.83%	-0.07%

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Definition of a CZ's occupation demand shocks

- $\sum_i (1/E_{z0}) \times [E_{izo} \times (E_{in9}/E_{in0}) \times P_{oi9} - E_{izo} \times P_{oi0}]$
- The summation is over all industries i for each CZ z. E_{iz0} is employment in industry i in CZ z at the base time period (1999), E_{z0} is total employment in the CZ in 1999, E_{in9} is national employment in industry i in 2016, E_{in0} is national employment in industry i in 1999, P_{oi9} and P_{oi0} are the national proportion of industry i's employment in occupation group *o* at the final time period (subscript 9), and the base time period (subscript 0). Intuition: change in occ jobs in CZ as % of total base jobs if all industries grew at national rate & followed national ind/occ shares.
- Sum of this expression over three occ groups = geographic share effect from geographic shift-share analysis = total percent job growth predicted if all industries in CZ grew at national average = Bartik instrument = proxy for demand-driven increase in jobs if all export-base industries kept their national market share.

Descriptive stats for 371 CZs for growth and various components, 1999 to 2016, based on Upjohn Institute's WholeData (County Business Patterns with suppressions estimated) for over 1,000 industries, and industry/occ shares from Census/ACS

			Mean	Median	Standard Deviation
Overall growth			8.97%	6.14%	17.75%
Share effect (Bartik shock)			9.23%	10.39%	6.90%
	High group Demand shock		8.03%	8.13%	**2.30%**
		Differential industry growth component	4.22%	4.50%	**2.45%**
		Within-industry shift component	3.81%	3.85%	**0.46%**
	Mid group Demand shock		-4.15%	-3.64%	**3.21%**
		Differential industry growth component	-0.40%	0.15%	**2.94%**
		Within-industry shift component	-3.75%	-3.72%	**0.60%**
	Low group Demand Shock		5.35%	5.41%	**2.03%**
		Differential industry growth component	5.41%	5.52%	**1.98%**
		Within-industry shift component	-0.06%	-0.07%	**0.31%**
Competitive Shift Effect			-0.26%	-2.25%	15.03%

Demand shock to occ types, 1999 to 2016		Effect on 2000 to 2015-19 change in ln(earnings) for those w/ < BA	Effect on 2000 to 2015-19 change in ln(earnings) for those w/ BA+
High-occ	At means	-0.8396	-0.1523
		(0.5112)	(0.3215)
	Interacted w/ ln(EmpRate index, 2000)	-17.65	-4.10
		(10.94)	(5.28)
	Interacted w/ diff of ln(CollGradRate) from U.S. mean	0.572	-0.060
		(1.319)	(0.798)
Mid-occ	At means	**1.951**	**0.728**
		(0.633)	(0.354)
	Interacted w/ ln(EmpRate index, 2000)	4.06	**6.80**
		(6.45)	(2.78)
	Interacted w/ diff of ln(CollGradRate) from U.S. mean	1.327	-0.648
		(1.656)	(0.709)
Low-occ	At means	0.112	-0.079
		(1.005)	(0.534)
	Interacted w/ ln(EmpRate index, 2000)	**26.33**	**-8.57**
		(9.20)	(3.67)
	Interacted w/ diff of ln(CollGradRate) from U.S. mean	**-4.966**	1.619
		(2.567)	(1.195)

	Table 19: How Effects of Labor Demand Shocks on Earnings of Non-College & College Grads Vary at Different Levels of CZ Characteristics (Erate holding grad rate at median; Grad rate holding Erate constant at median)					
	Non-college graduates			College graduates		
	Panel A: With CZ employment rate					
	10th pctile	50th pctile	90th percentile	10th pctile	50th pctile	90th percentile
High	0.317	-0.923	**-1.856**	0.168	-0.119	-0.336
	(1.109)	(0.623)	(0.731)	(0.566)	(0.386)	(0.450)
Mid	1.289	**1.575**	**1.789**	0.399	**0.876**	**1.236**
	(0.676)	(0.427)	(0.497)	(0.339)	(0.247)	(0.266)
Low	-0.498	1.351	**2.744**	0.119	-0.483	-0.936
	(0.850)	(0.778)	(1.033)	(0.415)	(0.385)	(0.467)
"Average" shock	**0.5266**	**0.7765**	**0.9646**	**0.2564**	**0.2206**	**0.1936**
30%H,44%M,27%L	(0.2643)	(0.1528)	(0.2122)	(0.1070)	(0.0669)	(0.0950)
	Panel B: With college grad rate					
	10th pctile	50th pctile	90th percentile	10th pctile	50th pctile	90th percentile
High	-1.161	-0.923	-0.685	-0.094	-0.119	-0.144
	(1.027)	(0.623)	(0.572)	(0.630)	(0.386)	(0.350)
Mid	1.021	**1.575**	**2.125**	1.147	0.876	0.607
	(0.788)	(0.427)	(0.833)	(0.320)	(0.247)	(0.439)
Low	**3.424**	1.351	-0.710	**-1.158**	-0.483	0.189
	(1.359)	(0.778)	(1.283)	(0.585)	(0.385)	(0.670)
"Average" shock	**1.0140**	**0.7765**	**0.5403**	**0.1670**	**0.2206**	**0.2739**
30%H,44%M,27%L	(0.1856)	(0.1528)	(0.2573)	(0.0820)	(0.0669)	(0.1136)

CZ population	Most populous county in CZ	Emp rate relative to nation, 2015-2019	College % of pop 25-64, 2015-2019	High effect for <CG	Mid effect for <CG	Low effect for <CG
16,372,860	**Los Angeles CA**	0.993	31.7%	-0.74	1.86	0.16
10,762,079	**Kings NY**	1.005	41.4%	-0.80	2.26	-0.83
8,610,555	**Cook IL**	1.018	40.9%	-1.03	2.30	-0.44
6,661,455	**Bergen NJ**	1.027	44.7%	-1.14	2.45	-0.65
5,100,708	**Alameda CA**	1.023	48.3%	-1.04	2.54	-1.12
5,077,106	**Wayne MI**	0.981	34.0%	-0.49	1.90	-0.50
4,770,018	**Harris TX**	1.001	32.8%	-0.86	1.93	0.20
4,751,998	**Middlesex MA**	1.031	50.0%	-1.14	2.61	-1.10
4,435,552	**Philadelphia PA**	1.000	41.0%	-0.73	2.23	-0.90
4,414,255	**Fairfax VA**	1.058	52.1%	-1.59	2.78	-0.61
3,955,878	**Miami-Dade FL**	1.021	32.3%	-1.22	1.99	0.82
3,942,141	**King WA**	1.007	41.1%	-0.84	2.26	-0.75
3,797,219	**Fulton GA**	1.028	40.5%	-1.22	2.32	-0.12
3,469,660	**Maricopa AZ**	0.978	30.6%	-0.50	1.75	-0.05
3,405,239	**Fairfield CT**	1.024	41.1%	-1.15	2.33	-0.30
3,029,141	**Dallas TX**	1.034	35.8%	-1.39	2.18	0.65
2,955,948	**San Diego CA**	0.988	37.8%	-0.55	2.07	-0.84
2,945,557	**Hennepin MN**	1.073	43.9%	-1.93	2.61	0.61
2,945,432	**Cuyahoga OH**	1.013	32.7%	-1.09	1.98	0.57
2,880,863	**Denver CO**	1.032	45.4%	-1.21	2.49	-0.60
2,665,798	**Baltimore MD**	1.038	41.6%	-1.36	2.40	-0.02
2,603,382	**Allegheny PA**	0.999	37.7%	-0.74	2.11	-0.54

Industry	Description	Employment	LQ SD	Low%	Mid%	High%
3116	Animal slaughtering, processing, and seafood	421,202	4.37	28.0%	**58.4%**	13.6%
337	Furniture and related products manufacturing	359,933	4.04	18.0%	**62.8%**	19.2%
313-315	Fabric and textile mills & apparel	302,633	3.50	12.7%	**66.3%**	21.0%
321	Miscellaneous wood product manufacturing	351,448	3.34	29.9%	53.5%	16.6%
322	Paper and pulp mills and products	334,672	3.24	23.9%	54.6%	21.5%
335	Electrical machinery and equipment manufacturing	333,844	2.92	12.3%	52.6%	35.0%
3361-3363	Motor vehicles and motor vehicle equipment manufacturing	861,870	2.86	16.9%	**56.1%**	27.0%
3391	Medical equipment and supplies	275,880	2.82	7.7%	48.1%	44.2%
5111	Newspapers and book publishing	350,552	2.65	5.5%	24.7%	69.8%
all other 325	Industrial and miscellaneous chemicals	225,219	2.38	16.1%	41.3%	42.6%
3254	Pharmaceuticals and medicines	246,051	2.36	7.8%	32.1%	**60.2%**
3364	Aircraft and aerospace manufacturing	395,524	2.23	11.6%	34.2%	54.2%
all other 311	Dairy, animal foods specialty foods	668,250	1.69	30.0%	47.9%	22.2%
all other 339	Miscellaneous manufacturing	252,227	1.66	18.8%	**55.4%**	25.8%
3261	Plastics products	598,596	1.51	18.6%	**59.6%**	21.8%
333	Machinery manufacturing	979,932	1.46	13.8%	51.4%	34.8%
all other 334	Other electronic components and products.	736,040	1.44	6.5%	34.1%	**59.4%**
all other 327	Cement, concrete, & other non-metallic mineral products	245,001	1.36	37.1%	40.3%	22.6%
3118	Bakeries	289,434	1.29	22.1%	**64.4%**	13.5%
493	Warehousing and storage	812,620	1.19	**54.2%**	36.6%	9.3%
332	Fabricated metal products manufacturing	1,367,201	1.17	15.5%	**61.3%**	23.2%
488	Services incidental to transportation	677,864	1.16	**53.3%**	25.7%	21.1%
323	Printing and related support activities	437,522	1.09	9.0%	**64.8%**	26.2%
721	Traveler accommodations	1,971,617	1.07	**59.5%**	20.5%	20.0%
5614	Business support services	751,639	1.04	5.5%	**67.6%**	26.9%
562	Waste management and remediation services	375,310	0.87	**63.7%**	19.3%	17.0%
22	Utilities	604,385	0.85	29.1%	35.7%	35.3%
5112	Software publishers	516,621	0.85	1.0%	18.4%	**80.6%**

Conclusions

- Mid job shocks tend to have greater effects overall in most CZs, particularly for less-educated groups.
- What happens to less-educated groups will depend in part on post-pandemic trends in mid jobs: will occupational polarization continue at same pace, or slow down? Whither U.S. manufacturing?
- State/local economic development policies should consider mix of mid jobs in chosen industrial targets – if such industries are growing.
- But due to issues w/ mid jobs potentially lagging, policymakers should also consider how to increase mobility to high jobs, and how to improve wages for low jobs.