Work from Home, Eat near Home?

The Reshaping Geography of Local Service Firms

Adam Gill

with Lena Hensvik and Oskar Nordström Skans
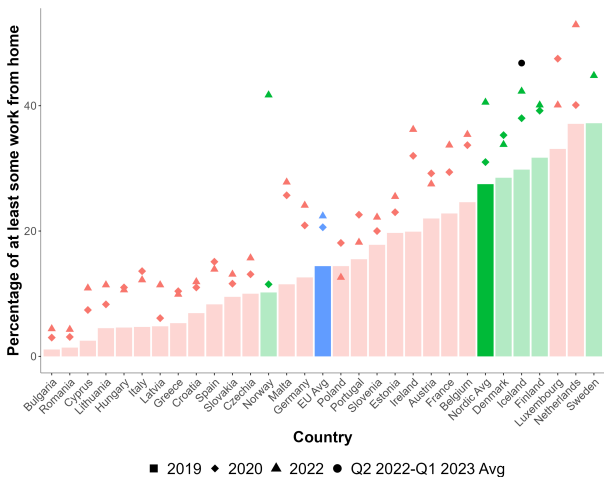
Uppsala University

EEA Congress 2024

August 28, 2024

State of WFH

Figure 1: Percentage of at least some work from home, 2019-22

Note: "At least some" WFH = "usually" WFH + "sometimes" WFH. *Source:* (i) European Labour Force Surveys, 2019,2020, and 2022, accessed through Eurostat. (ii) Icelandic Labour Force Surveys, 2022 and 2023, accessed through Statistics Iceland.

Restaurant Industry Recovery

Figure 2: Aggregate Restaurant Sales 2016-2022
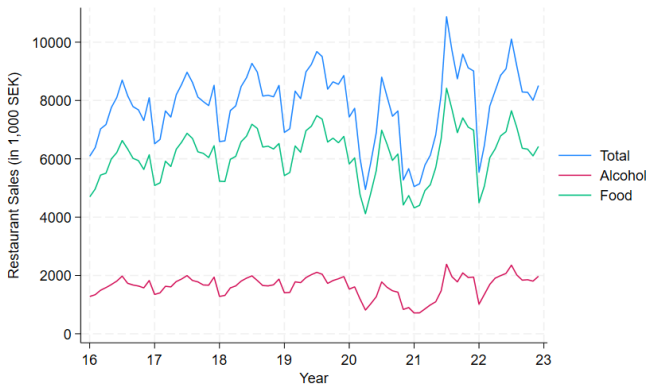
Note: Monthly, aggregated restaurant sales for all of Sweden from January 2016 through December 2022. "Total" sales is the sum of sales for all three tax categorizations. "Food" sales is the sales for the medium tax category. "Alcohol" sales is the sales for the high tax category. These sales numbers are not seasonally adjusted and are measured in thousands of SEK (Swedish krona).

Research Question

How do changes in mobility and working patterns across geographic areas affect the local-service industries?

- Look at geographic shift in production across neighborhoods
- Explore possible channels:
  - WFH a prominent driver
  - "Shift of norms" over persistent COVID-19 exposure effect

How do these changes, and the rise in WFH in general, affect the labor markets of these non-remote industries?

- Employment, earnings, and commuting distance

Focus on post-pandemic effect; Focus on restaurants (for now)

Contribution: (i) Look at entire market of firms using sales directly; (ii) investigate the effect on workers in local service industries

Research Question

How do changes in mobility and working patterns across geographic areas affect the local-service industries?

- Look at geographic shift in production across neighborhoods
- Explore possible channels:
    - WFH a prominent driver
    - "Shift of norms" over persistent COVID-19 exposure effect

How do these changes, and the rise in WFH in general, affect the labor markets of these non-remote industries?

- Employment, earnings, and commuting distance

Focus on post-pandemic effect; Focus on restaurants (for now)

Contribution: (i) Look at entire market of firms using sales directly; (ii) investigate the effect on workers in local service industries

Data

- Matched employer-employee register data for all individuals and firms in Sweden (2015-2022)[1], firm VAT data, and geographic data

- "DeSO" (akin to a neighborhood) - Limit to non-rural DeSOs (4,904)

- "Residential Weights": measure of a DeSO's amount of residents compared to workers (-2 to 2) ▸ Res Wght Eq

- Outcomes:
  - *Firm production* (firm sales from firm VAT) ▸ Sales Eq ▸ Sales Fig
  - *Employment*
  - *Earnings*
  - *Commuting distance* (Distance between DeSO centroids)

- *WFH potential*: Predict WFH levels using individual demographic characteristics based on prediction weights ▸ Pred Wghts

▸ Desc Stats ▸ Swe Covid

---

[1] Parts of the data are only through 2021 (for now)

Data

- Matched employer-employee register data for all individuals and firms in Sweden (2015-2022)[1], firm VAT data, and geographic data

- "DeSO" (akin to a neighborhood) - Limit to non-rural DeSOs (4,904)

- "Residential Weights": measure of a DeSO's amount of residents compared to workers (-2 to 2) ▸ Res Wght Eq

- Outcomes:
  - *Firm production* (firm sales from firm VAT) ▸ Sales Eq ▸ Sales Fig
  - *Employment*
  - *Earnings*
  - *Commuting distance* (Distance between DeSO centroids)

- *WFH potential*: Predict WFH levels using individual demographic characteristics based on prediction weights ▸ Pred Wghts

▸ Desc Stats ▸ Swe Covid

---

[1] Parts of the data are only through 2021 (for now)

Data

- Matched employer-employee register data for all individuals and firms in Sweden (2015-2022)[1], firm VAT data, and geographic data

- "DeSO" (akin to a neighborhood) - Limit to non-rural DeSOs (4,904)

- "Residential Weights": measure of a DeSO's amount of residents compared to workers (-2 to 2) ▸ Res Wght Eq

- Outcomes:
  - *Firm production* (firm sales from firm VAT) ▸ Sales Eq ▸ Sales Fig
  - *Employment*
  - *Earnings*
  - *Commuting distance* (Distance between DeSO centroids)

- *WFH potential*: Predict WFH levels using individual demographic characteristics based on prediction weights ▸ Pred Wghts
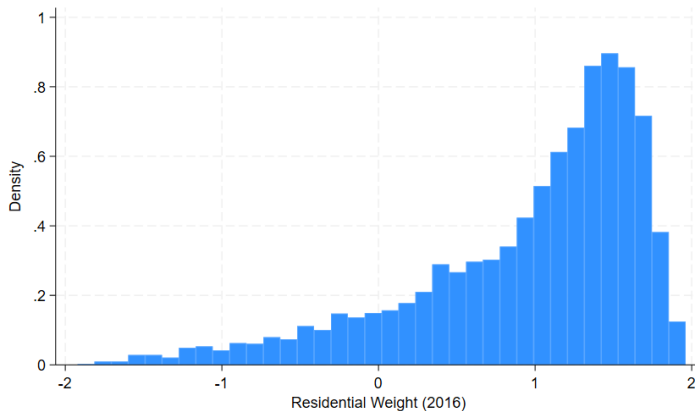
▸ Desc Stats ▸ Swe Covid

---

[1]Parts of the data are only through 2021 (for now)

Distribution of Residential Weights

Figure 3: Distribution of 2016 Residential Weights for non-Rural DeSOs

Data

- Matched employer-employee register data for all individuals and firms in Sweden (2015-2022)[1], firm VAT data, and geographic data

- "DeSO" (akin to a neighborhood) - Limit to non-rural DeSOs (4,904)

- "Residential Weights": measure of a DeSO's amount of residents compared to workers (-2 to 2) ▸ Res Wght Eq

- Outcomes:
  - *Firm production* (firm sales from firm VAT) ▸ Sales Eq   ▸ Sales Fig
  - *Employment*
  - *Earnings*
  - *Commuting distance* (Distance between DeSO centroids)

- *WFH potential*: Predict WFH levels using individual demographic characteristics based on prediction weights ▸ Pred Wghts

▸ Desc Stats   ▸ Swe Covid

---

[1]Parts of the data are only through 2021 (for now)
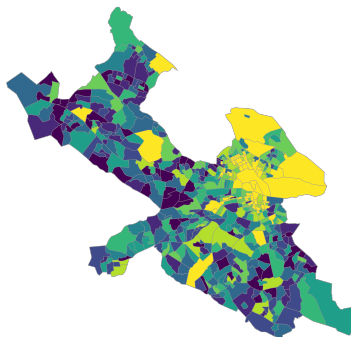
Stockholm Municipality DeSOs - 2019
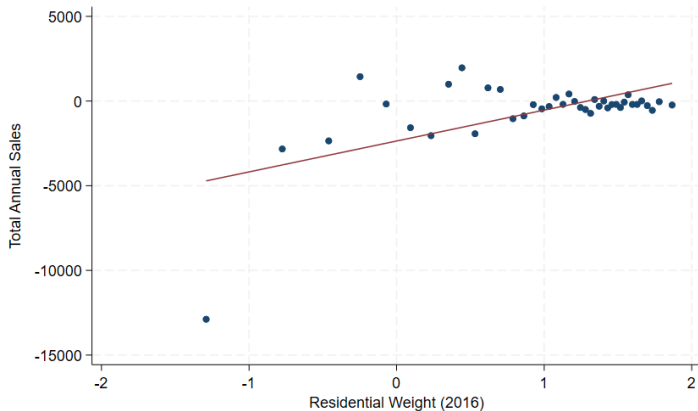
Figure 2(a): Residential Weights
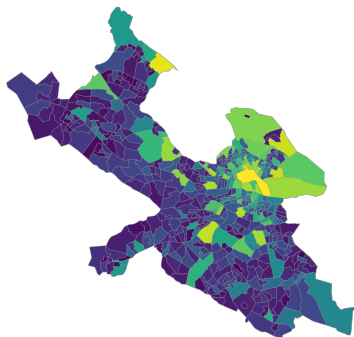
Figure 2(b): Restaurant Sales (by decile)

▸ 2016

Spatial Reorganization

Residential Weight and Sales Correlations

Figure 4: Difference in Sales (2022-2019)

No outliers

Econometric Method - DeSO level

$$\text{Outcome}_{d,m,y} = \beta_0 + \beta_1 RW_d * Post_{m,y} + \beta_2 RW_d * During_{m,y}$$
$$+ \alpha_1 Post_{m,y} + \alpha_2 During_{m,y} + \theta_{m,y} + \theta_d + \epsilon_{d,m,y}$$

where d is the DeSO, m is the month, and y is the year

- RW_d is the 2016 Residential Weight
- $Post_{m,d}$ is the post-COVID period (Oct 2021$-$)
- $During_{m,d}$ is the COVID period (March 2020$-$Sept 2021)
- F.E.s for time ($\theta_{m,y}$) and DeSO (θ_d) ; S.E.s clustered at DeSO level
- Outcomes:
    - Sales (in logs) - total, food, and alcohol separately
    - Employment - both in levels and logs

Restaurant Production - Main Results

Table: Effect on restaurant sales

	Total Sales	Food Sales	Alcohol Sales
RW x Post-period	0.029**	0.034***	0.049***
	(0.012)	(0.011)	(0.019)
RW x COVID-period	0.106***	0.100***	0.111***
	(0.011)	(0.011)	(0.017)
DeSO-level F.E.	Y	Y	Y
Month-year F.E.	Y	Y	Y
R^2	0.08	0.07	0.01
N	321,489	315,880	238,927

▸ Dem Char

- Restaurants in more residential neighborhoods saw a relative improvement in sales in both periods

- Comparing between the highest (1.98) and lowest (-1.93) residential-weight neighborhoods in the full sample:

  - Post-period: 11.3pp

Work-from-Home Results

Table: Effect on restaurant sales

	Full Sample (2016-2022)	Incumbent Firms (2019-2022)
RW x Post-period x WFH prediction	0.005***	0.004***
	(0.002)	(0.001)
RW x COVID-period x WFH prediction	0.007***	0.006***
	(0.001)	(0.001)
DeSO-level F.E.	Y	Y
Month-year F.E.	Y	Y
R^2	0.05	0.06
N	321,489	173,428

Note: "Incumbent firms" is the subset of firms that existed from the beginning of 2019 through the end of 2021. WFH prediction is calculated based on residents in the DeSO.

▸ Reg Eq   ▸ COVID exp

- Restaurants in areas with more WFH-predicted residents/workers but the same residentiality do better on average

- 10% more residents predicted to WFH (holding residential weight constant) in the full sample:
  - Post-period: 5pp

Labor Market Outcomes

Labor Market Outcomes - Employment Results

Table: Effect on restaurant employment
(2019-2021)

	Number of workers	Log employment
RW x Post-period	0.862	0.023*
	(0.728)	(0.012)
RW x COVID-period	7.911***	0.065***
	(1.371)	(0.009)
DeSO-level F.E.	Y	Y
Month-year F.E.	Y	Y
R^2	0.07	0.08
N	176,544	129,785

- No evidence of a post-COVID effect, although restaurants in more residential neighborhoods have relatively higher employment in the COVID period (not well identified though)

Econometric Method - Restaurant Worker Level

$$Outcome_{i,m,y} = \beta_0 + \beta_1 RW_d * Post_{m,y} + \beta_2 RW_d * During_{m,y}$$
$$+ \alpha_1 Post_{m,y} + \alpha_2 During_{m,y} + \theta_{m,y} + \theta_i + \epsilon_{i,m,y}$$

where i is the individual worker

- *Outcome: commuting distance* and *earnings*
- F.E.s for time ($\theta_{m,y}$) and individual (θ_i) ; S.E.s clustered at individual level
- Only workers that are working in the restaurant industry that month-year

Labor Market Outcomes - Earnings Results

Table: Effect on worker earnings (2019-2021)

	Full Sample	Tenured Workers
RW x Post-period	137.42***	275.49***
	(32.74)	(84.38)
RW x COVID-period	337.82***	393.24***
	(19.41)	(40.11)
Individual F.E.	Y	Y
Month-year F.E.	Y	Y
R^2	0.00	0.00
N	3,337,706	462,647

Note: "Tenured workers" is the subset of workers that remained in the same firm for all of 2019-2021.

- Workers at restaurants in more residential neighborhoods saw a relative increase in earnings in both periods
- Comparing between the highest (1.98) and lowest (-1.93) residential-weight neighborhoods in full sample:
  - Post-period: 537 SEK ($\sim$$52) more per month
- We expect that this is driven by increase in hours work more than an increase in wages

Labor Market Outcomes - Commuting Distance Results

Table: Effect on commuting distance
(2019-2021)

	Commuting Distance	% Same DeSO
RW x Post-period	1.105	0.003
	(14.344)	(0.003)
RW x COVID-period	4.029	0.000
	(10.865)	(0.002)
Individual F.E.	Y	N
DeSO-level F.E.	N	Y
Month-year F.E.	Y	Y
R^2	0.00	0.00
N	3,312,371	129,122

- No effect found on commuting distance for restaurant workers

- Point estimates are in meters so economically insignificant

Summary

- The shift in WFH not only has direct effects on remote-work related workers and firms, but it also has effects on city structure and labor market outcomes of non-remote industries

- We find that restaurants in more residential areas are relatively better off in the post-pandemic period compared to the pre-pandemic period in terms of production
    - This seems to be driven by WFH

- Restaurant workers in more residential areas seem to have relatively higher earnings, likely coming from more hours worked

- We find no differential effect on employment (post-pandemic) or on commuting, suggesting that there is no residential sorting (so far)

Thank you for listening!

adam.gill@nek.uu.se

References I

Aksoy, C. G., Barrero, J. M., Bloom, N., Davis, S. J., Dolls, M., & Zarate, P. (2022).Working from home around the world. *Brookings Papers on Economic Activity.*

Residential Weight Formula

$$\text{Residential Weight}_j = \frac{\text{residents}_j - \text{workers}_j}{\left(\dfrac{\text{residents}_j + \text{workers}_j}{2} \right)}$$

▸ Back

Sales Formula

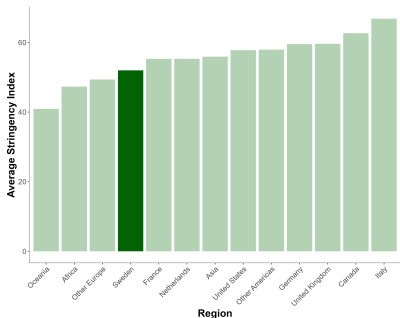$$Total\ Sales = High\ VAT * 4 + Medium\ VAT * 8.3333 + Low\ VAT * 16.6667$$

Descriptive Statistics

Table: Annual descriptive statistics - 2019 (B- and C-type DeSOs)

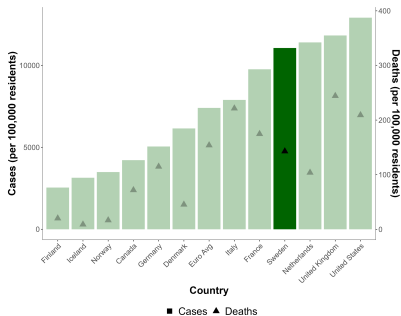|	Quartile 1 (most working)	Quartile 4 (most residential)	All
Average 2016 residential weights	-0.12	1.66	0.96
Share of "C" DeSOs	0.95	0.93	0.88
Average residents per DeSO	1,792	1,794	1,779
Average workers per DeSO	2,739	175	974
Average age	43	45	44
Average share female	0.48	0.51	0.51
Average share with a partner	0.85	0.86	0.85
Average share with children	0.38	0.36	0.37
Average share with at least tertiary education	0.35	0.34	0.34
Average number of passenger cars	665	637	677
Average monthly income (SEK)	3,232	2,078	2,611
Average restaurant plants per DeSO	8.36	1.52	3.74
Average share predicted to WFH (residents)	0.37	0.39	0.38
Average share predicted to WFH (workers)	0.36	0.36	0.35
Average COVID deaths amongst residents (per 100 residents)	0.172	0.120	0.153
Average COVID deaths amongst workers (per 100 workers)	0.020	0.050	0.034
Average employment for restaurant workers	56.16	4.33	20.23
Average earnings for restaurant workers (SEK)	15,670	9,550	12,467
Average commuting distance for restaurant workers (meters)	8,870	8,090	8,423
Average restaurant total sales per person	2.66	0.18	0.93
Average restaurant food sales per person	2.00	0.16	0.72
Average restaurant alcohol sales per person	0.63	0.03	0.20
N	1,226	1,226	4,904

▸ Back

Sweden COVID outcomes

Figure A2(a): COVID-19 Stringency Index

Figure A2(b): Cumulative COVID-19 cases and deaths (per 100,000 residents)

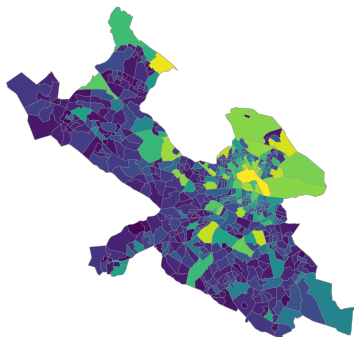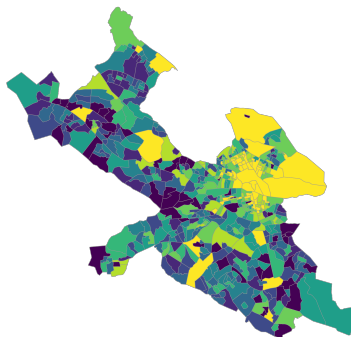# Stockholm Municipality DeSOs - 2016

Figure A4(a): Residential Weights

Figure A4(b): Restaurant VAT (by decile)

▸ Back

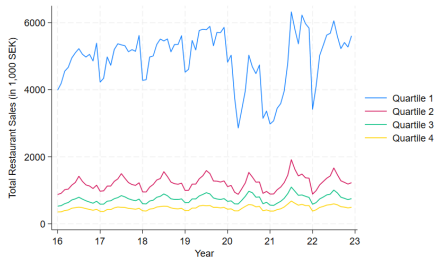# Restaurant Sales by Residential Weight Quartile
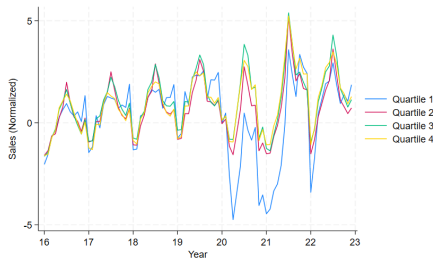
Figure A5(a): Total Sales

Figure A5(b): Sales Normalized by 2016 Average/SD

▸ Back

Prediction Variables and Weights

Table: Logit on "Ever Work from Home" (Binary)

Variable	Prediction Weight
Age (continuous)	-0.02
Gender (Binary 1 = Male)	-0.13
Education (1 = Tertiary, 2 = Tertiary)	1 = 0.81 / 2 = 1.54
Married (Binary)	0.19
Has Kids (Binary)	0.28
Industry (18 Categories)	Banking, Finance, Insurance (2.27) and ICT (2.10)
Constant	-0.93

Note: Out-of-sample WFH prediction is based off of the results from France, Germany, and the Netherlands on the Global Survey of Working Arrangements (Aksoy et al., 2022). Prediction accuracy for Swedish results from that survey is approximately 67%.

▶ Back

Residential Weight and Sales Correlations (no outlier)
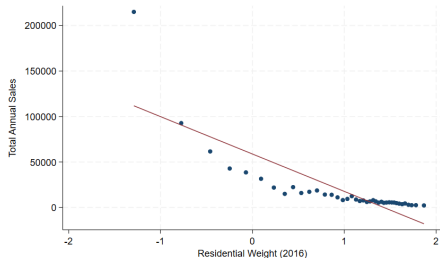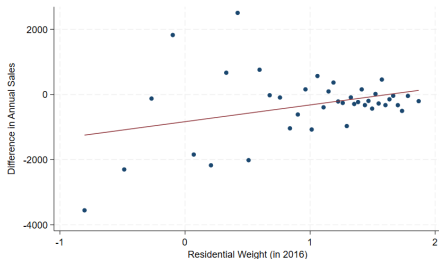
Figure A6(a): Total Sales (2019)

Figure A6(b): Difference in Sales (2022-2019) - outliers removed

▶ Back

Including Demographic Characteristics

Table: Effect of residentiality on total restaurant sales including demographic interactions

	% over age 65	% female	% w/partner	% w/children	% w/tertiary education	# passenger cars	Median income	Average income
RW × Post-period	0.028**	0.031**	0.026**	0.023*	0.028**	0.039***	0.028**	0.030**
	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
RW × COVID-period	0.113***	0.107***	0.100***	0.100***	0.102***	0.108***	0.107***	0.106***
	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)
DeSO-level F.E.	Y	Y	Y	Y	Y	Y	Y	Y
Month-year F.E.	Y	Y	Y	Y	Y	Y	Y	Y
R^2	0.07	0.08	0.01	0.12	0.03	0.02	0.00	0.00
N	321,489	321,489	321,489	321,489	321,489	321,489	321,489	321,489

Note: In this table, we present the results of our main specification with the inclusion of demographic characteristics interacted with the post-COVID and COVID periods. All of the characteristics are from the previous year. The estimated coefficients for the residential weight interactions are presented in the table. This table presents to results for total restaurant sales measured in logs. "RW" is an abbreviation for the residential weights. Residential weights are fixed at the 2016 level. Standard errors are clustered at the DeSO-level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

▸ Back

Econometric Method - Channels

$$\log(sales)_{d,m,y} = \beta_0 + \delta_1 RW_d * Post_{m,y} * WFH\_potential_d + \delta_2 RW_d$$
$$* During_{m,y} * WFH\_potential_d + \cdots + \theta_{m,y} + \theta_d + \epsilon_{d,m,y}$$

- WFH potential: WFH_d is the DeSO-level work-from-home predictions for residents in the DeSO based on demographic characteristics

▸ Back

COVID-Exposure Results

Table: Effect on restaurant sales

	Full Sample (2016-2022)	Incumbent Firms (2019-2022)
RW × Post-period × COVID-deaths	0.023	0.041
	(0.073)	(0.069)
RW × COVID-period × COVID-deaths	0.089	0.151**
	(0.083)	(0.072)
DeSO-level F.E.	Y	Y
Month-year F.E.	Y	Y
R^2	0.08	0.08
N	321,489	173,428

Note: "Incumbent firms" is the subset of firms that existed from the beginning of 2019 through the end of 2021. COVID deaths are calculated based on residents in the DeSO.

▸ Back

- We find no effect from COVID-exposure

- Suggests a "shift of norms" effect over a persistent effect from COVID policies