# Measuring Labor Demand and Supply Shocks during COVID-19

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NBER Summer Institute
Micro Data and Macro Models
July 15, 2020

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# COVID-19 fall in hours: Labor supply or demand?

Reduction in hours worked in a given **sector** due to:

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     - CARES act
2. Demand ← Firm behavior
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     - Increase in Health risk
     - Complementarities across sectors (input-output — preferences)
     - Aggregate demand
   - Supply chain disruptions
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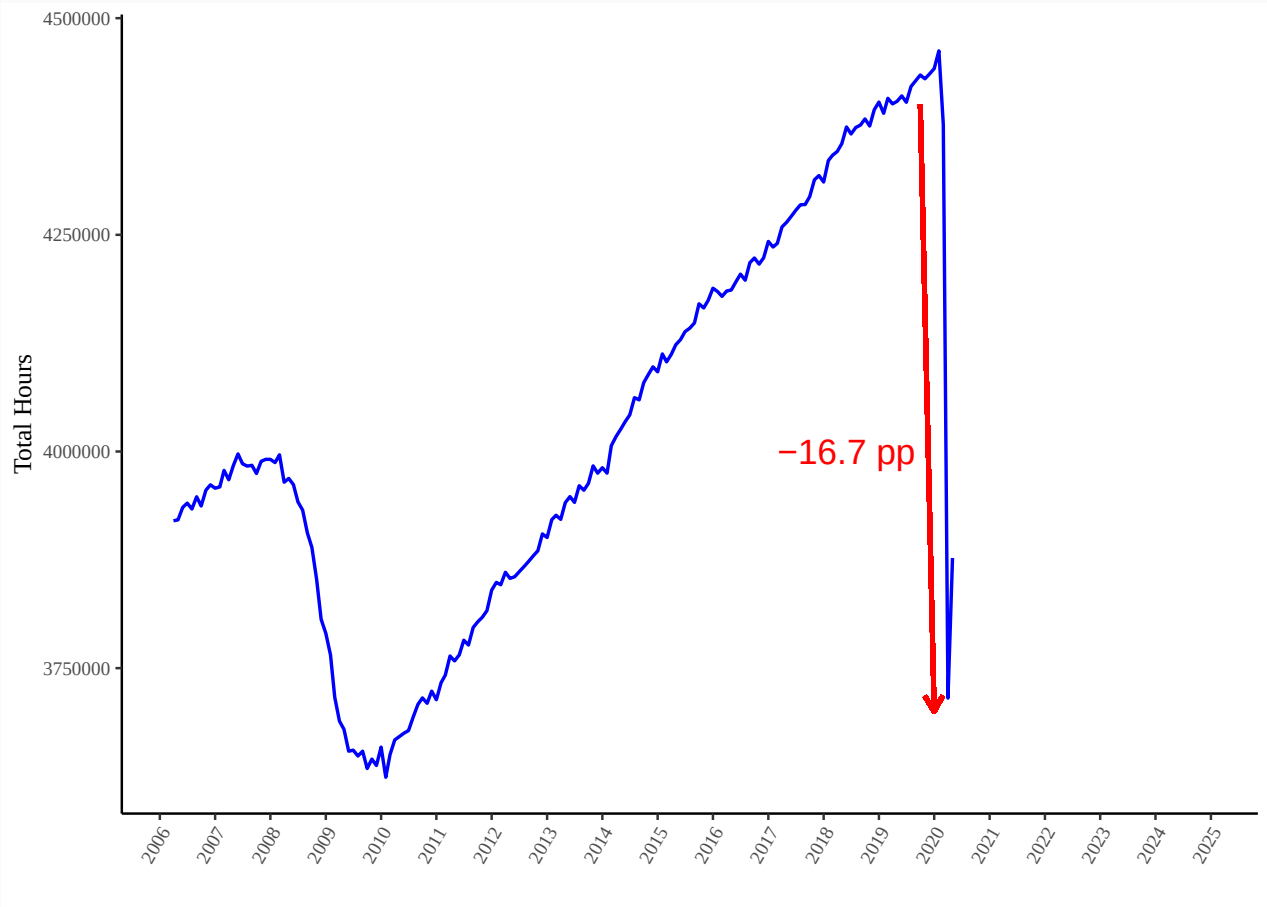
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# This paper

1. How much of the drop in hours worked is explained by shifts in labor supply and demand?
2. How does that vary across sectors?



# This paper

**Approach**:

Measure monthly **labor** demand and supply shocks w/ econometric model

- Using monthly hours and real wage per hour (CES from BLS)
- Estimate Bayesian SVAR ($\Delta h_t$, $\Delta w_t$) with informative prior (Baumeister & Hamilton, 2015, 2017, 2018)
  - Accounts for estimation uncertainty + uncertainty about the underlying structure of the economy
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- Identification of relative size of demand and supply shocks driven by:

  intuition

  - Changes in hours and wages per hour
  - Ratio of labor demand and supply elasticities (prior: ratio$=1$)

- Analysis by
  1. Sector (NAICS-2 and -3 NAICS-3 results)
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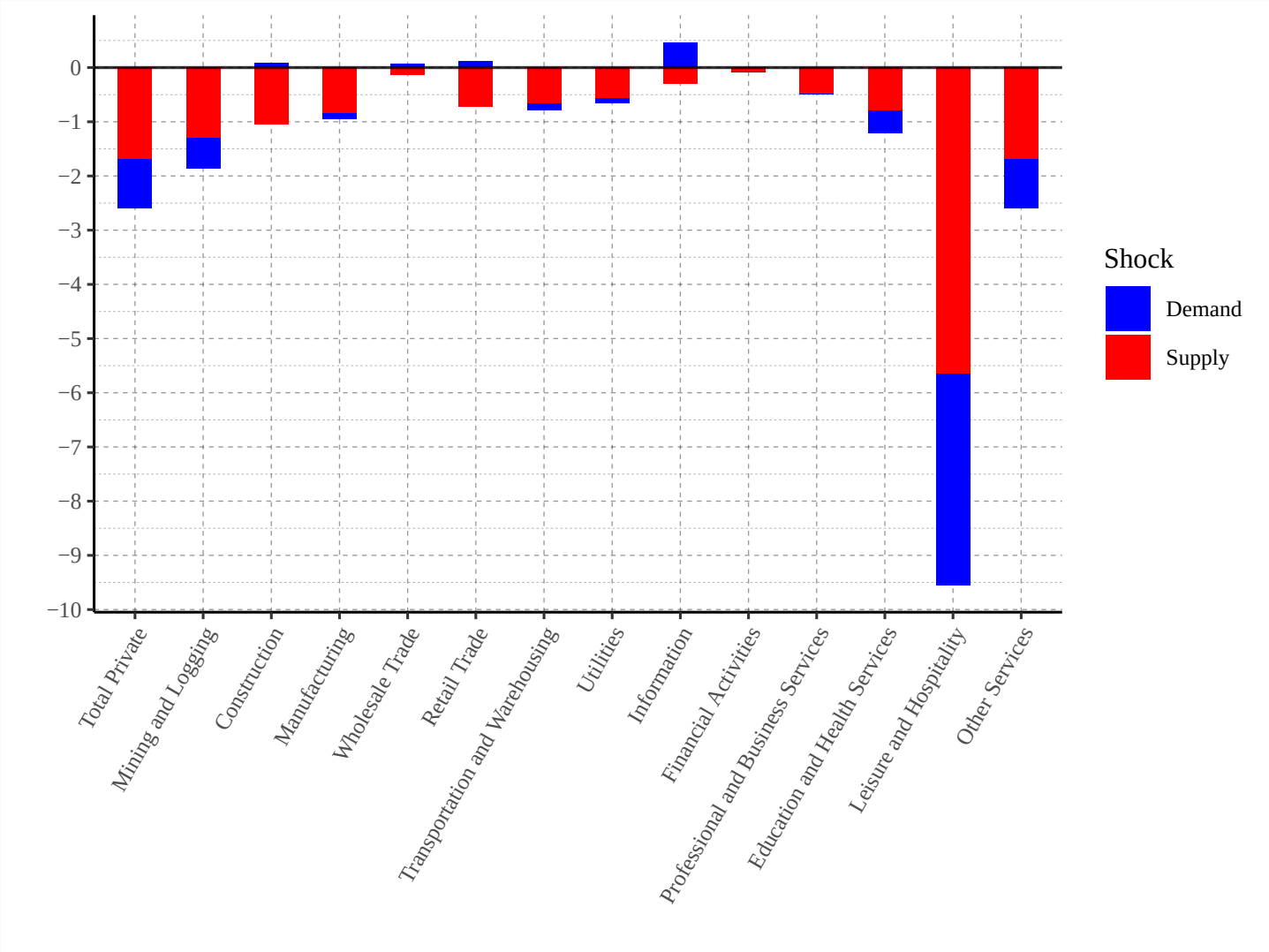
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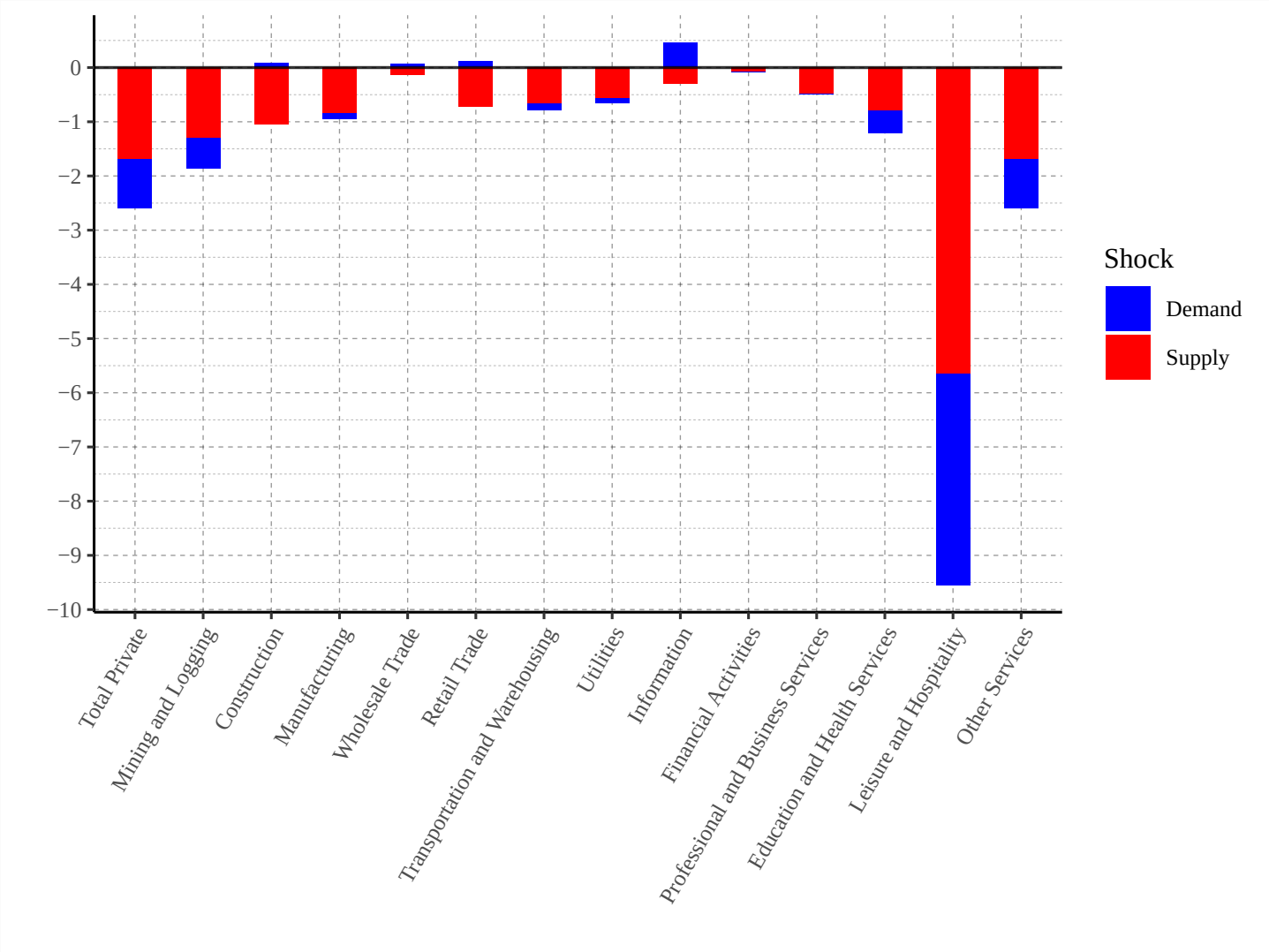
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# Shock decomposition, March 2020



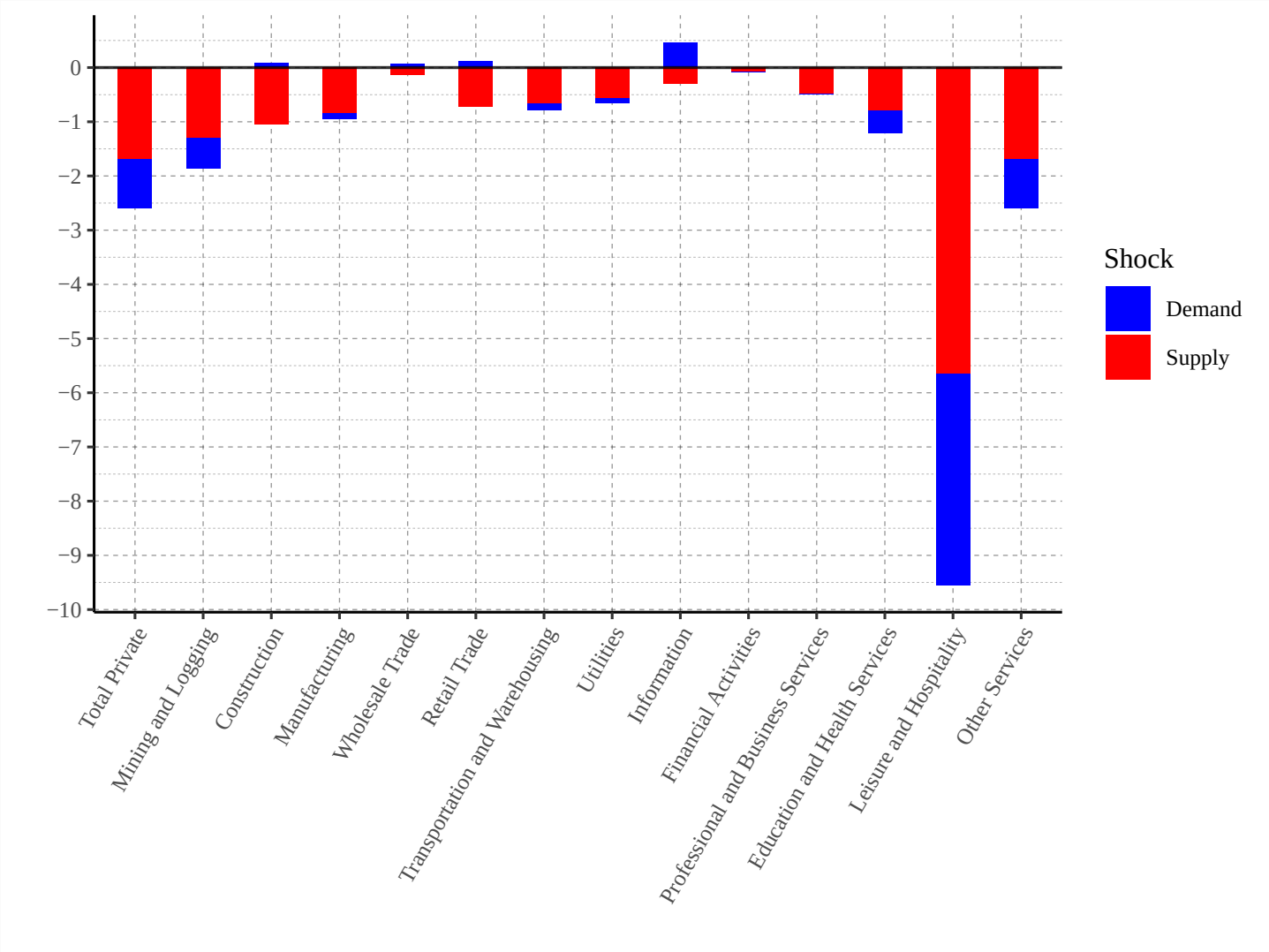

- Total private: $-2.59$ pp, supply accounts for 64.8%

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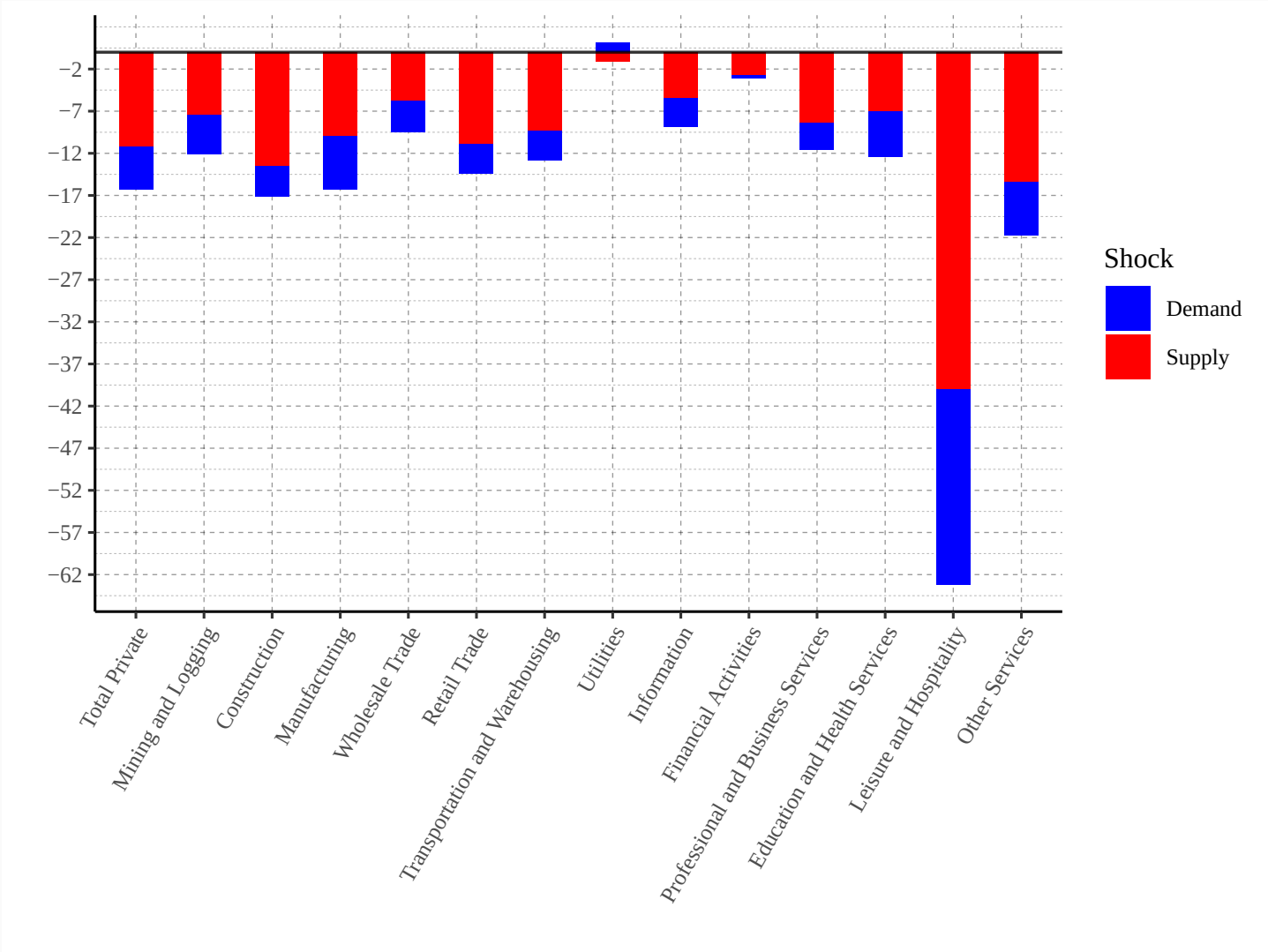

- Leisure and Hosp. most negatively affected sector (59% supply)

# Shock decomposition, March 2020



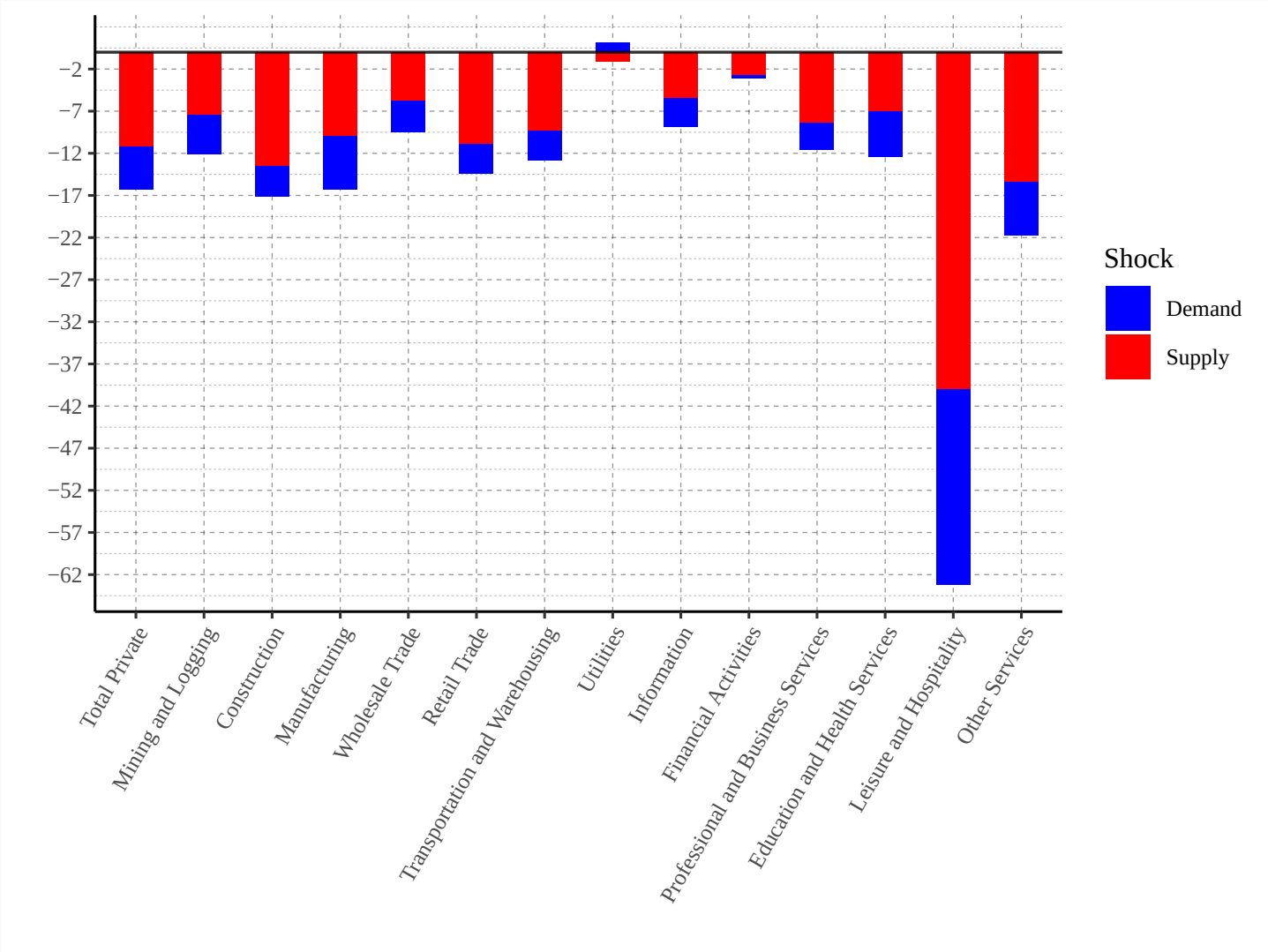

- Positive demand shocks: Information and Retail Trade

# Shock decomposition, April 2020



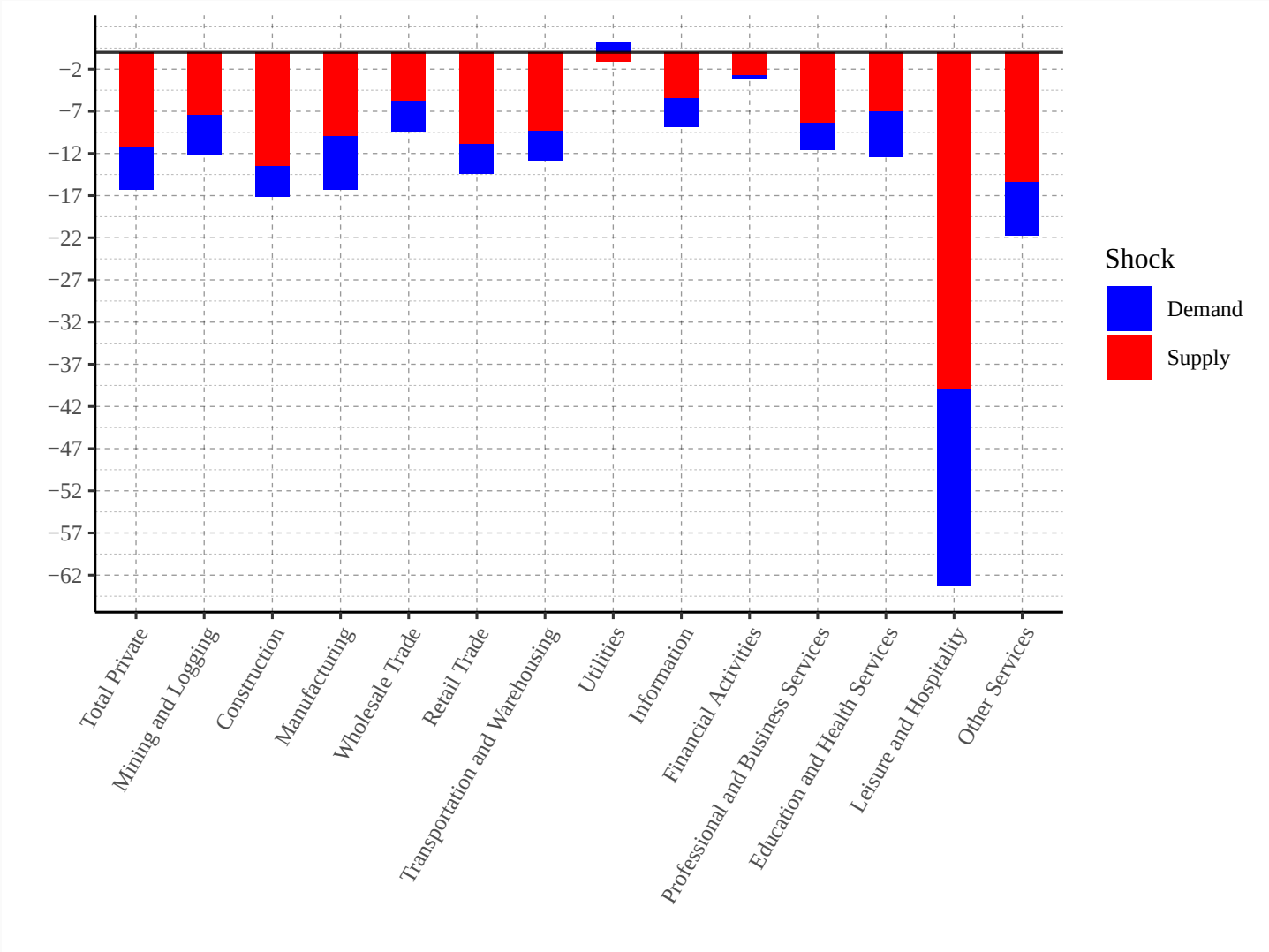

- Combined effect: −16.24 pp, supply accounted for 68.8%

# Shock decomposition, April 2020



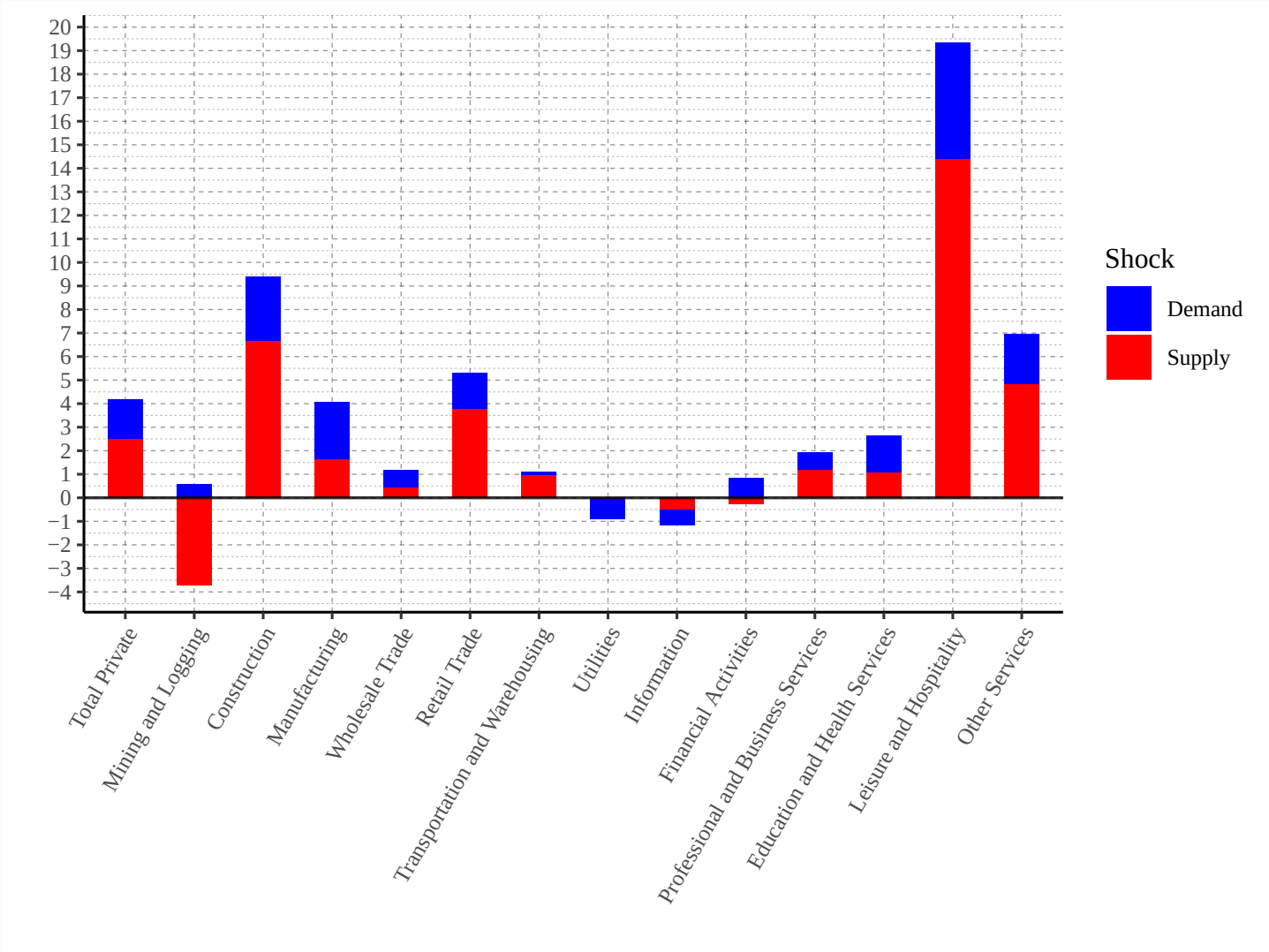

- Least-affected sectors: Utilities (+0.09 pp) and Financial Activities (−3.06 pp)

# Shock decomposition, April 2020




- Sectors where demand was relevant: Manufacturing (40%), Information (40%), Education and Health Services (45%)

# Shock decomposition, May 2020




- Sectors that showed strongest recovery were the ones most hit in April

# Robustness

1. Validation
    - Supply shocks correlate strongly with measures of telework scatter
    - No correlation for "normal" months scatter
    - Low correlation w/ demand shocks scatter
2. Composition effects
    - Results robust to using production only employees decomposition

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# Conclusion

- Supply accounts for 2/3 of 16.24 pp drop in the growth rate of hours worked in April 2020
- Large negative demand & supply shocks in March and April
- Heterogeneity across sectors:
  1. Leisure and Hospitality: -63.18 pp in April, 63% supply
  2. Utilities, Information, Financial Activities least affected
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# Why does this decomposition matter?

1. The need of useful moments and parameters to calibrate models
   - How large were the shifts in labor supply and demand during COVID-19?
   - We provide sectoral labor elasticities (multisector models are key to model COVID-19)
2. Policy guidance
   - Labor supply shocks more closely related w/ state of public health
     - Persistence linked to that of public health crisis
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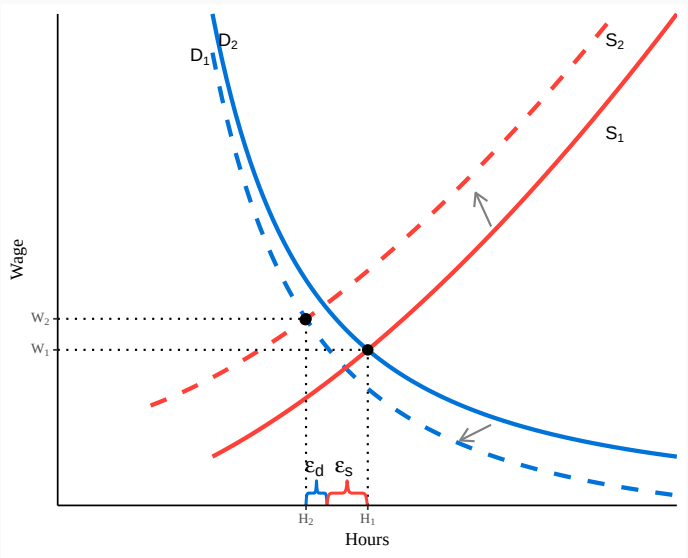
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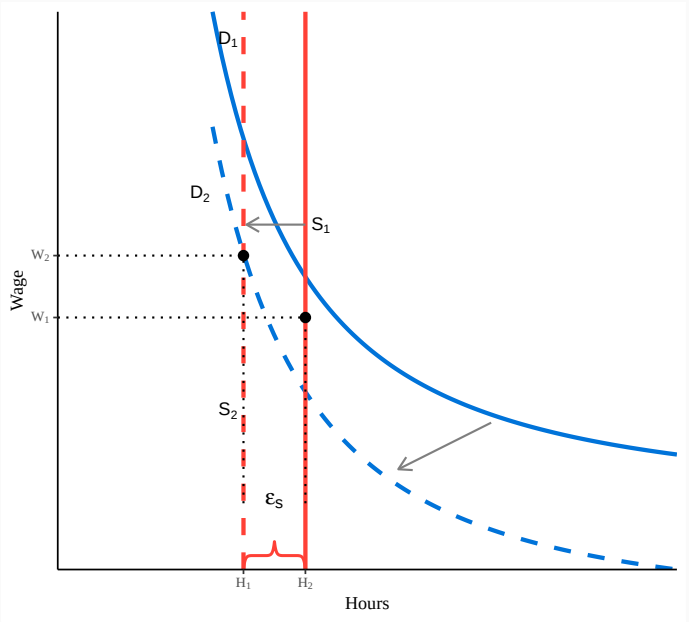
# Appendix

# Identification - Hours Decomposition

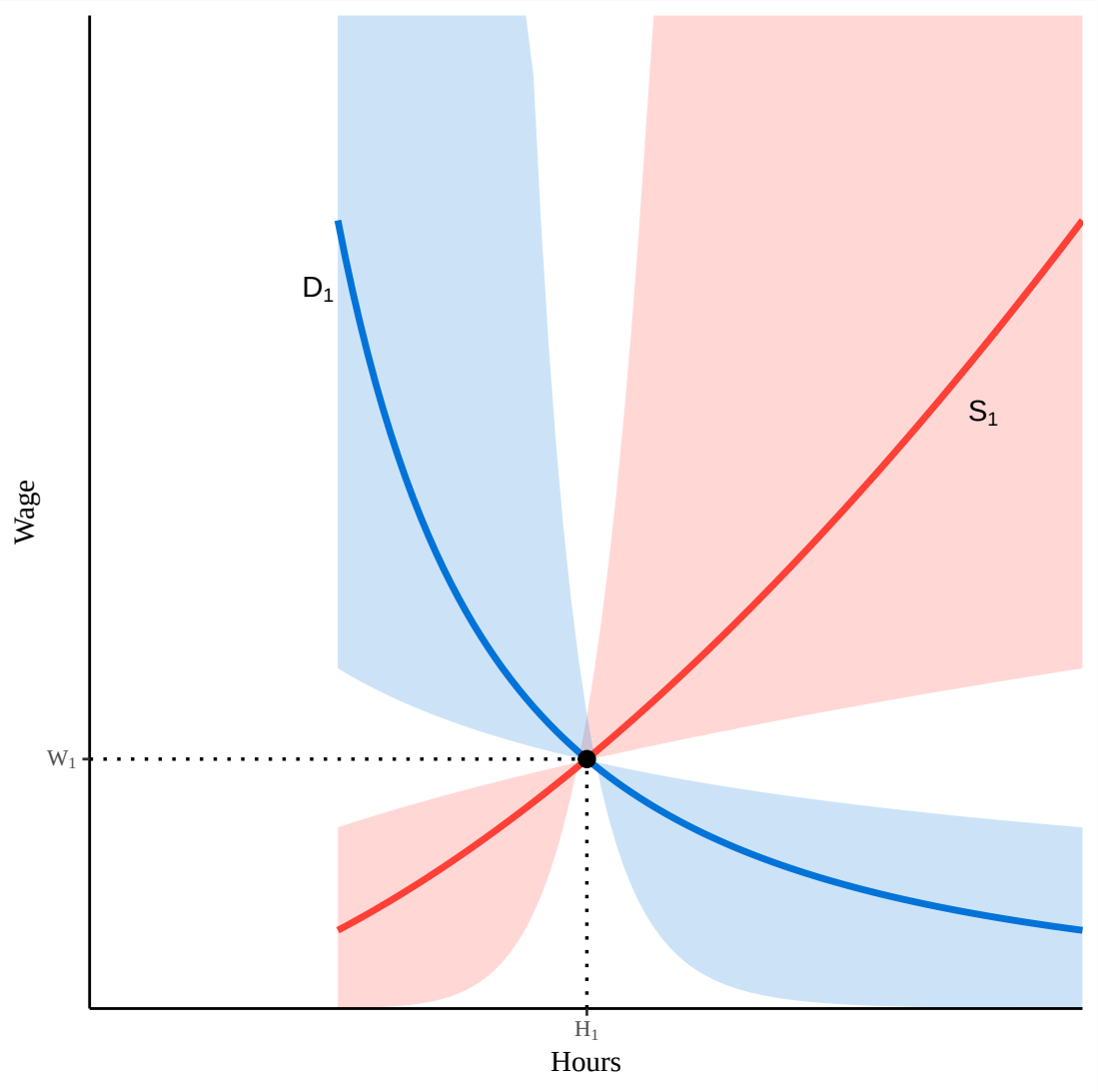
**(a)** Depends on new wage-hours locus




**(b)** Depends on relative labor elasticities

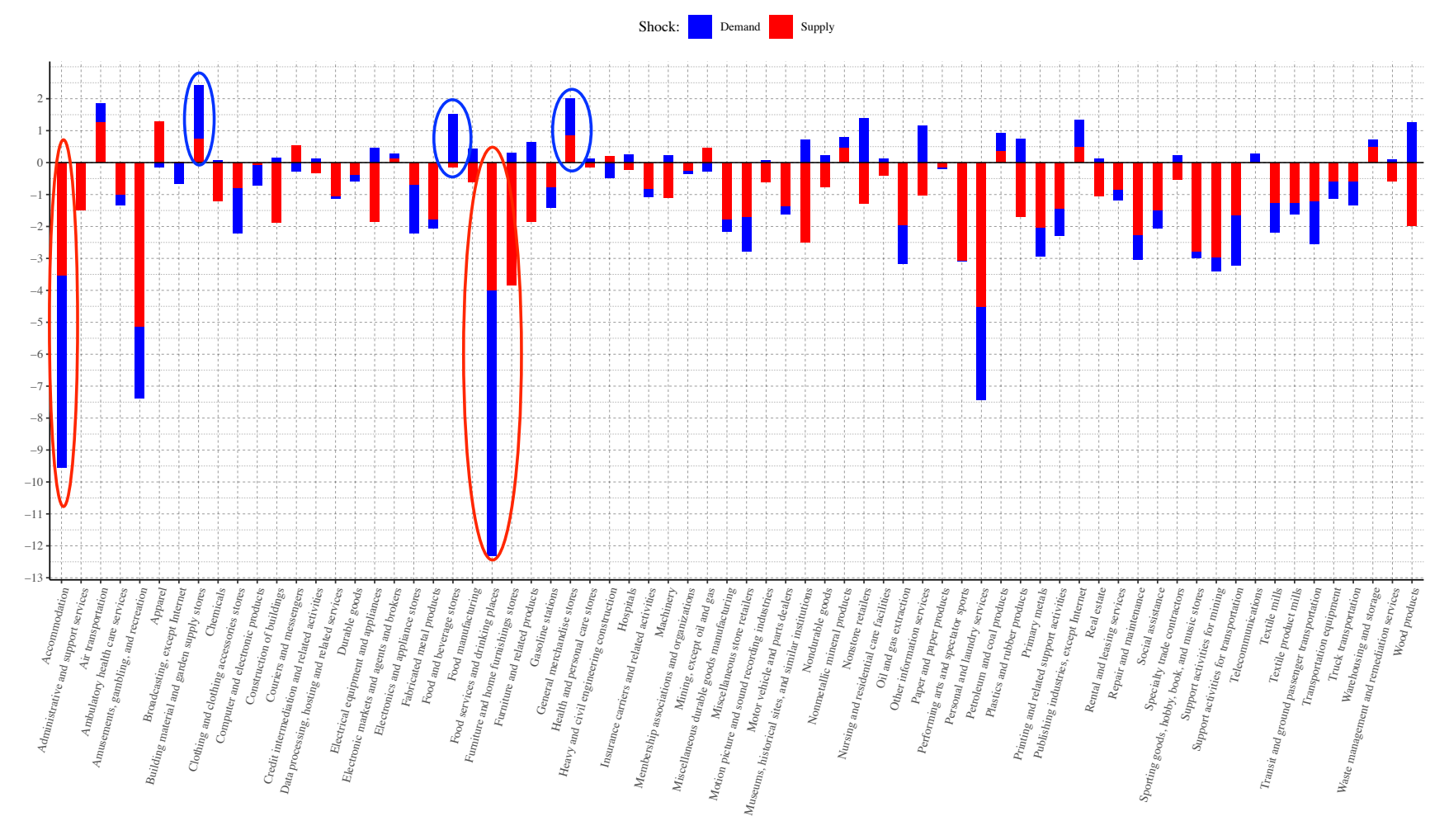


# Identification - Prior

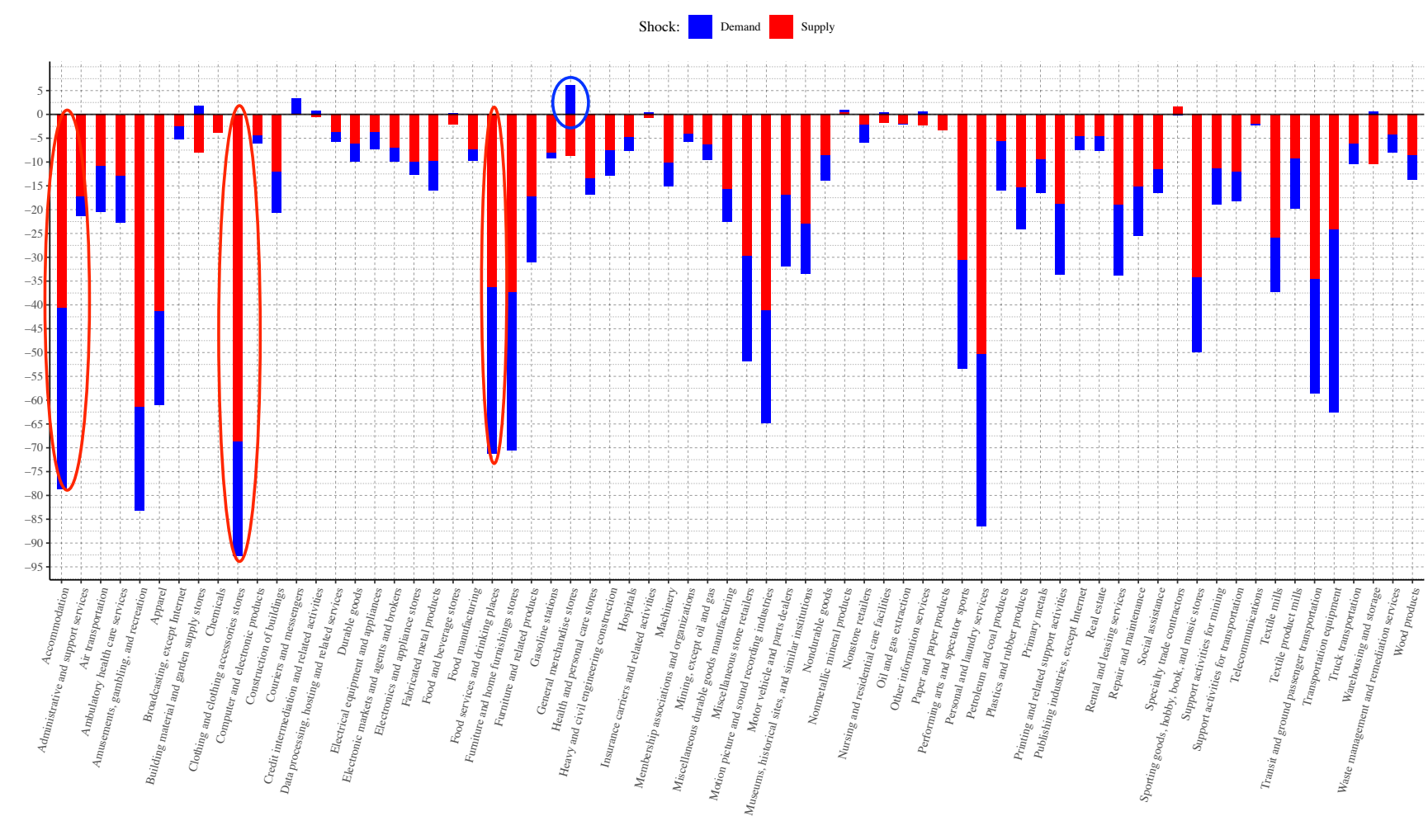



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# Shock Decomposition NAICS-3, March 2020

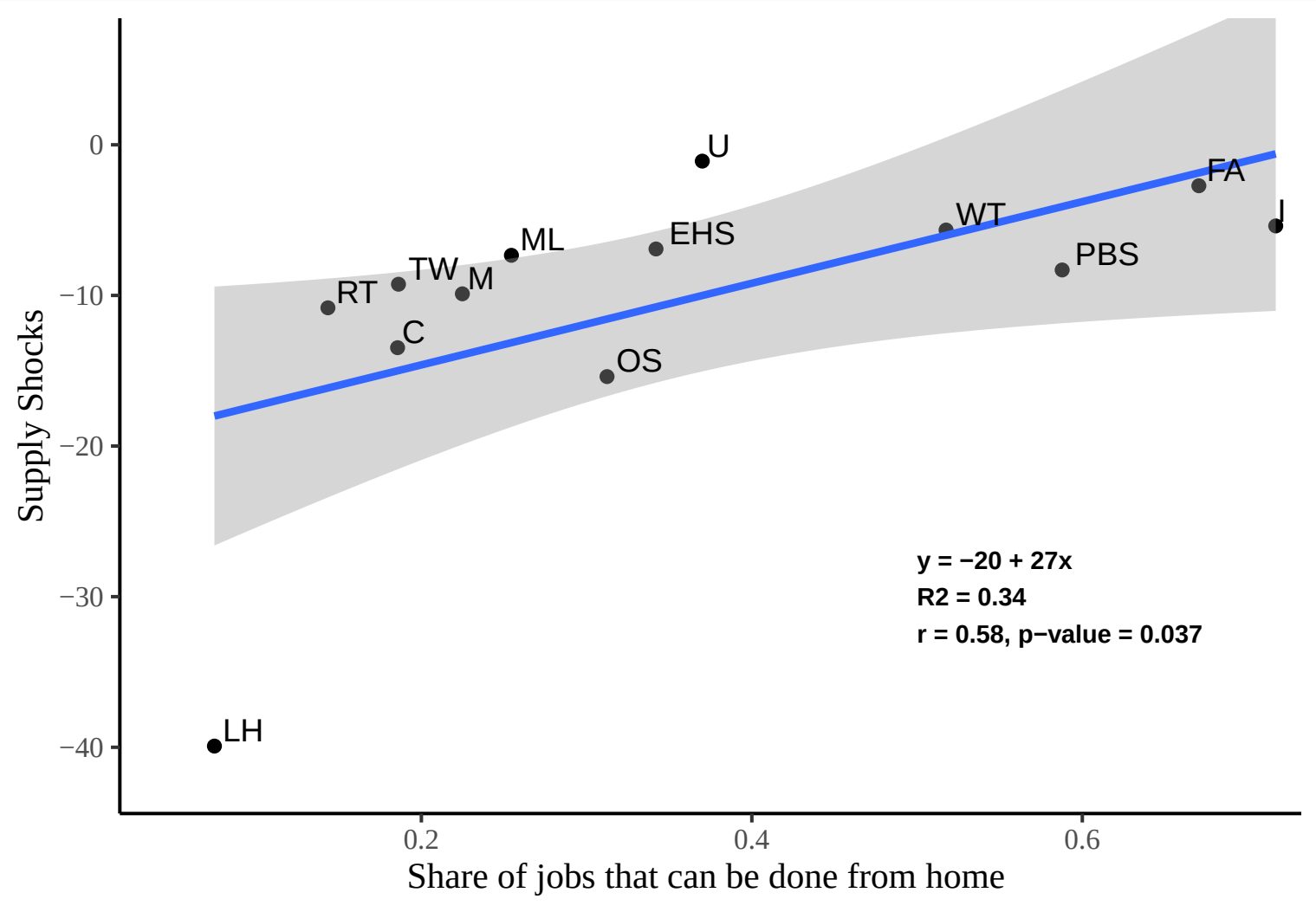


# Shock Decomposition NAICS-3, April 2020



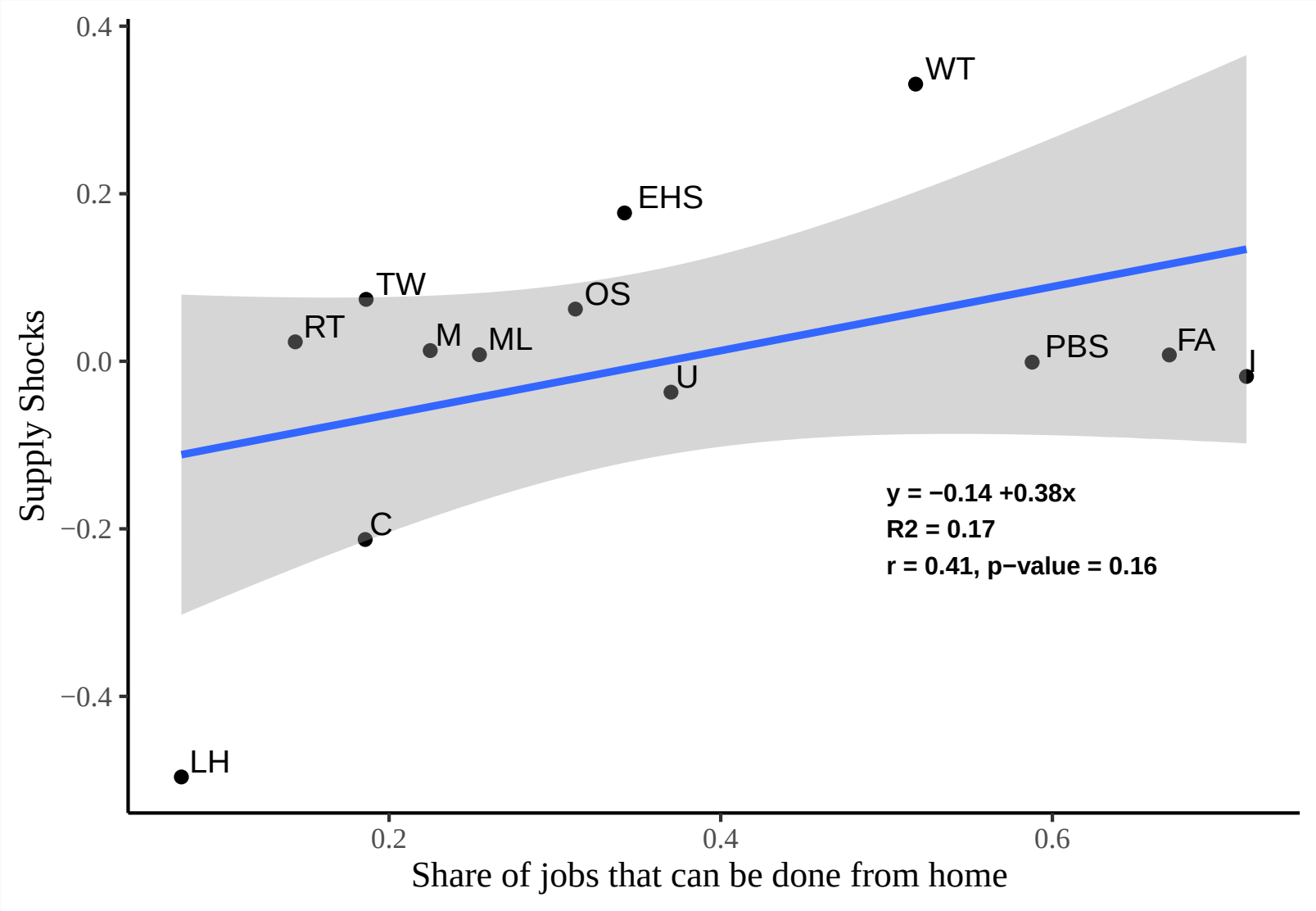
# Estimated Supply Shocks vs. Telework Measure, April 2020

Telework measure from Dingel & Neiman (2020)




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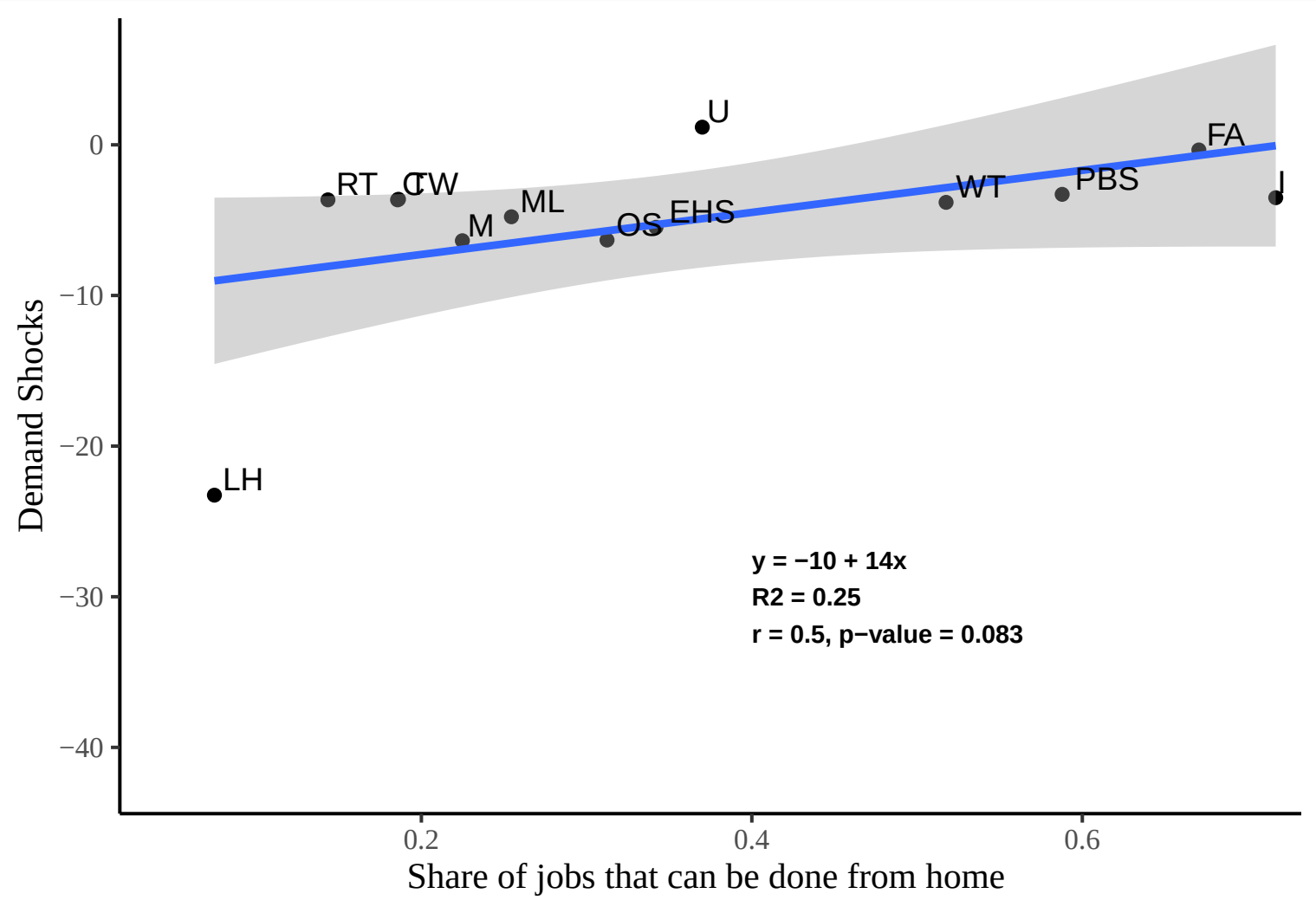
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Back

# Estimated Demand Shocks vs. Telework Measure, April 2020

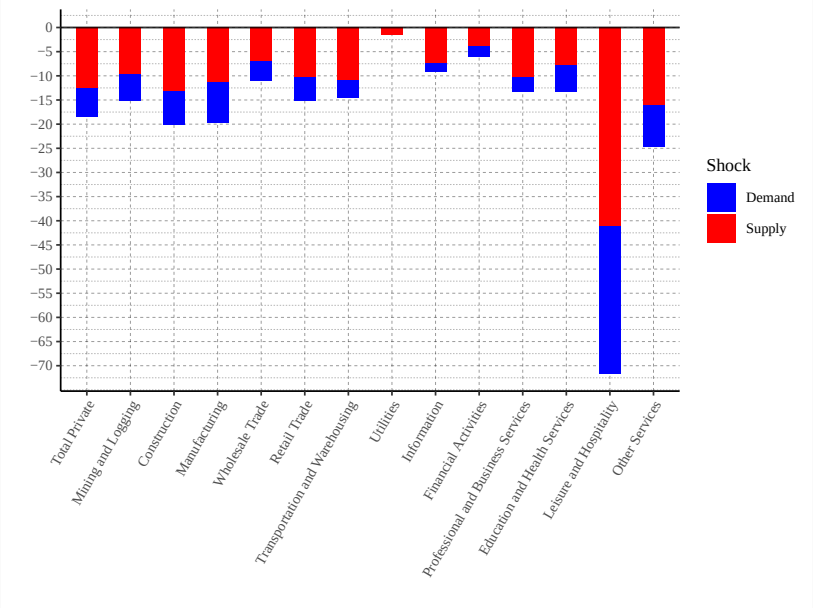
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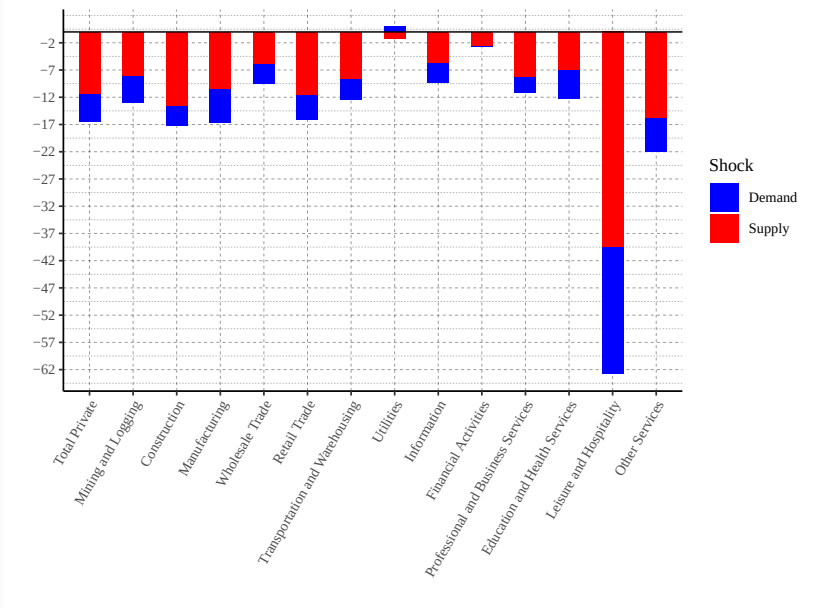

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# Production Only Employees, April 2020

**(a)** Production Only Employees

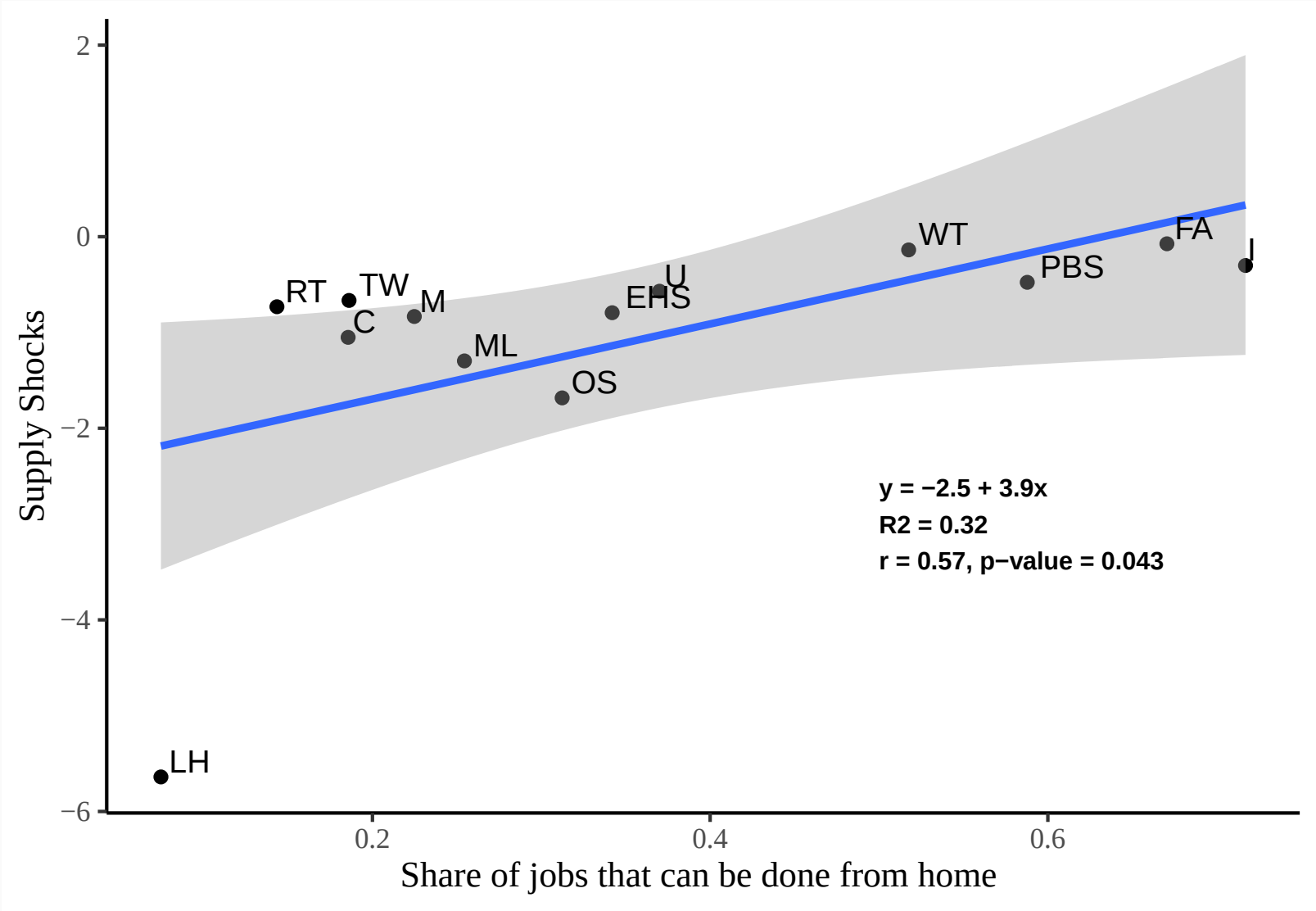



**(b)** All Employees



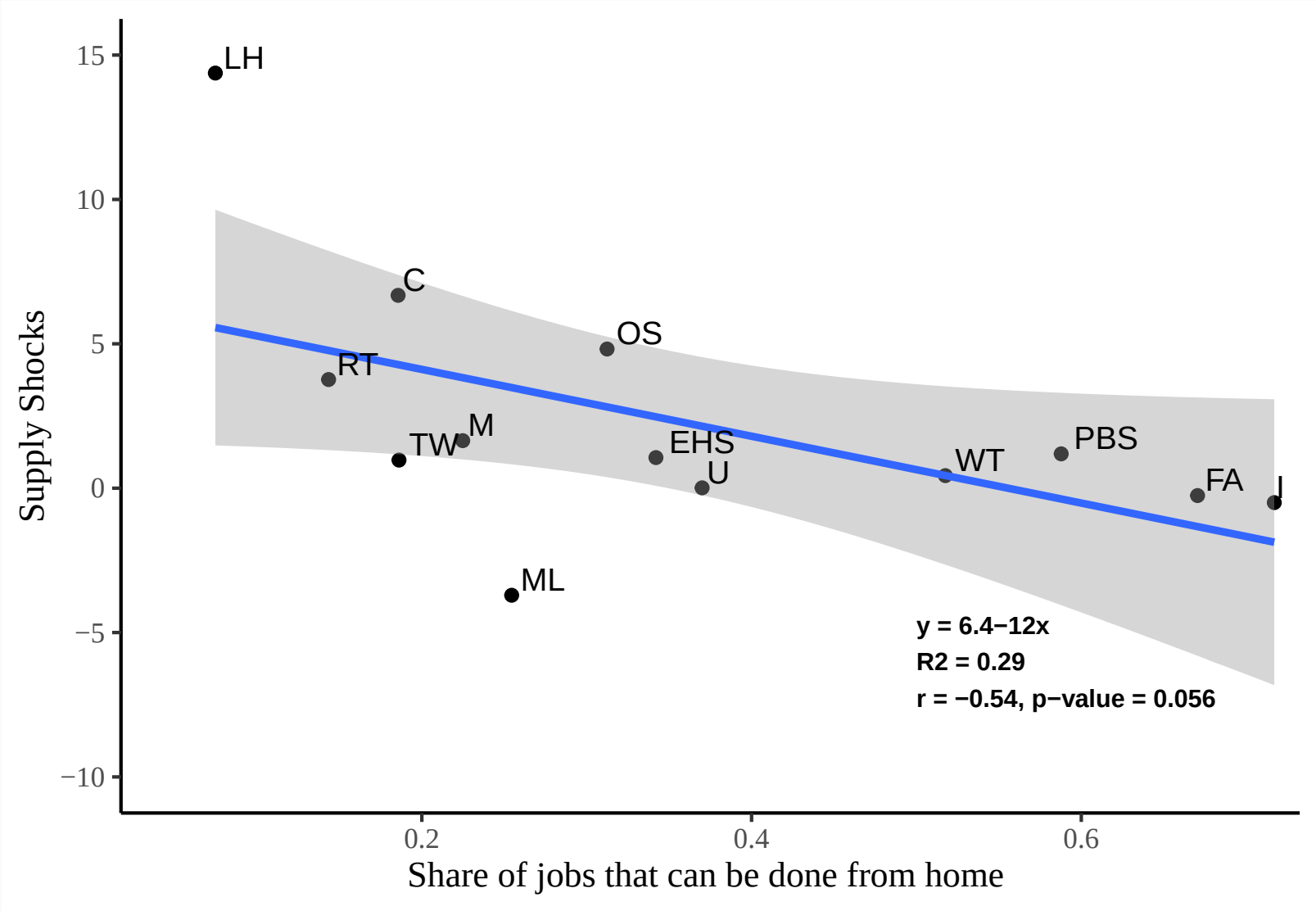

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# Estimated Shocks vs. Telework Measure, March 2020




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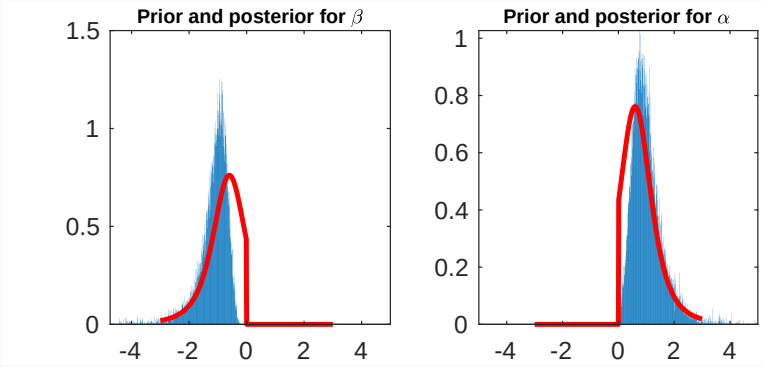
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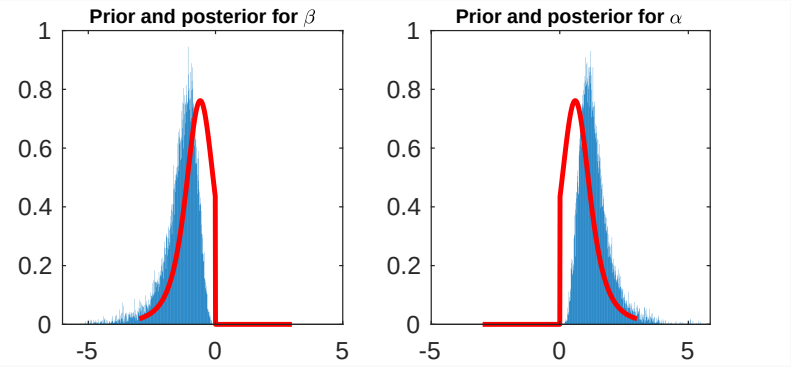

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# Prior and posterior distribution of labor demand and supply elasticities by sector (1/4)

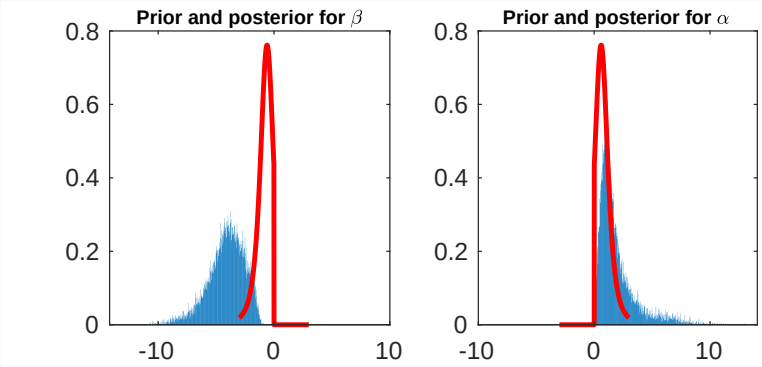
**(a)** Total Private



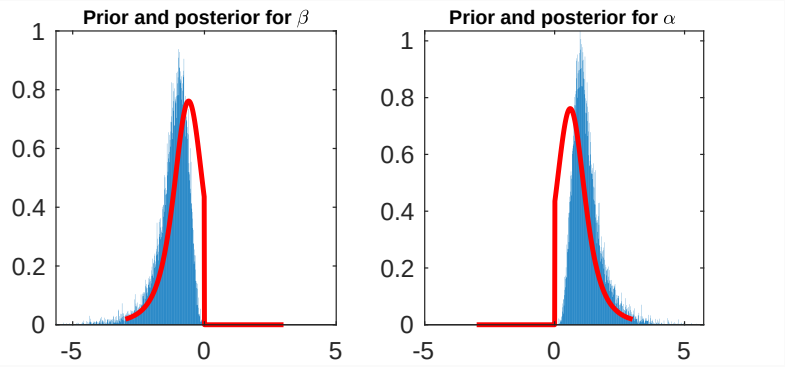

**(b)** Mining and Logging




**(c)** Construction

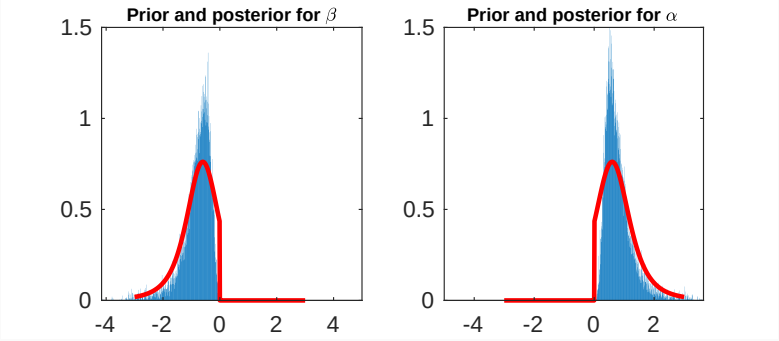



**(d)** Manufacturing

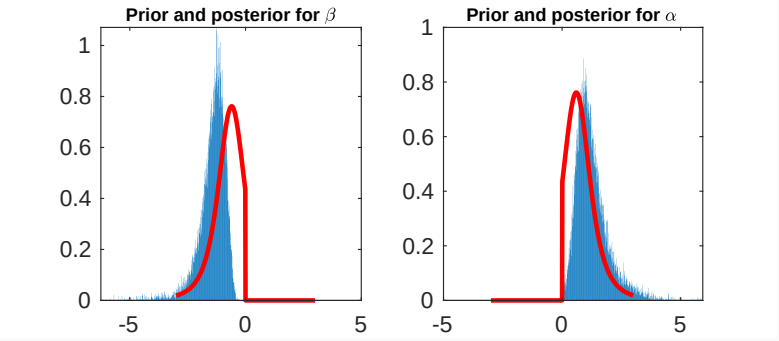


# Prior and posterior distribution of labor demand and supply elasticities by sector (2/4)

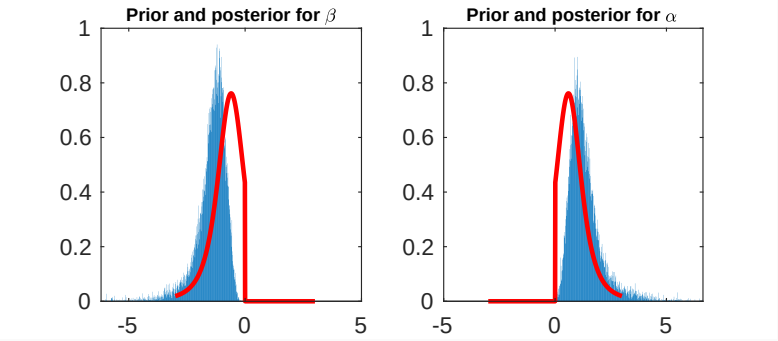
**(a)** Wholesale Trade



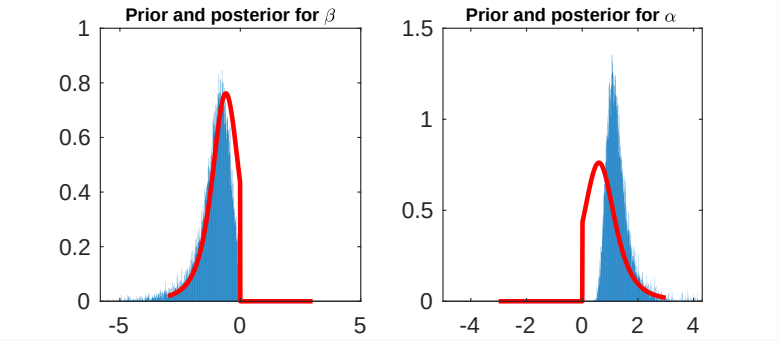

**(b)** Retail Trade




**(c)** Transportation and Warehousing

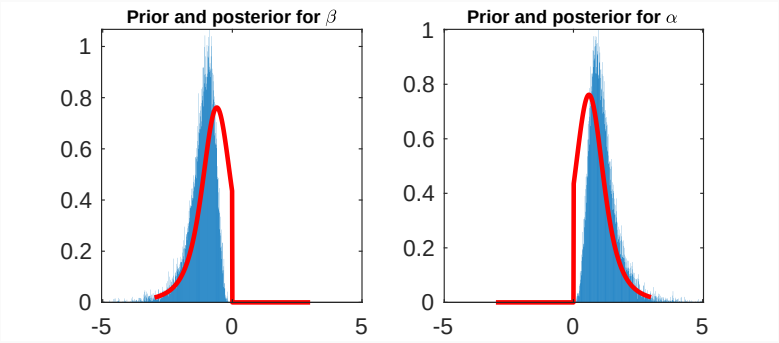



**(d)** Utilities

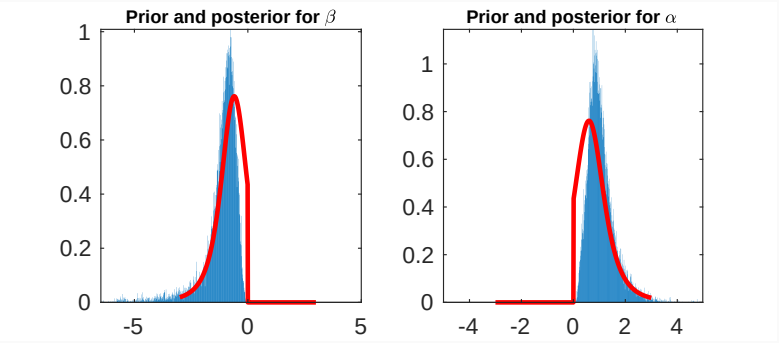


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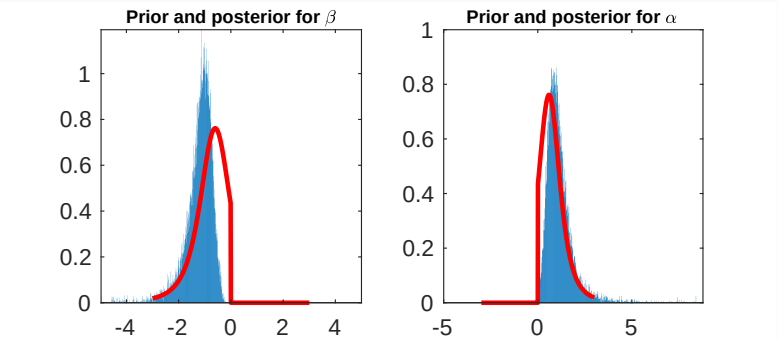
**(a)** Information



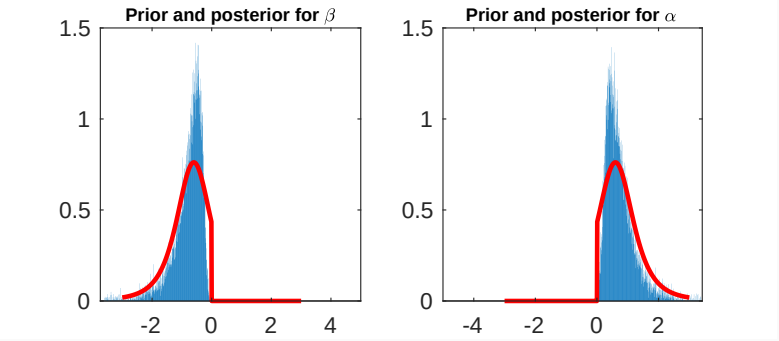

**(b)** Financial Activities




**(c)** Professional and Business Services

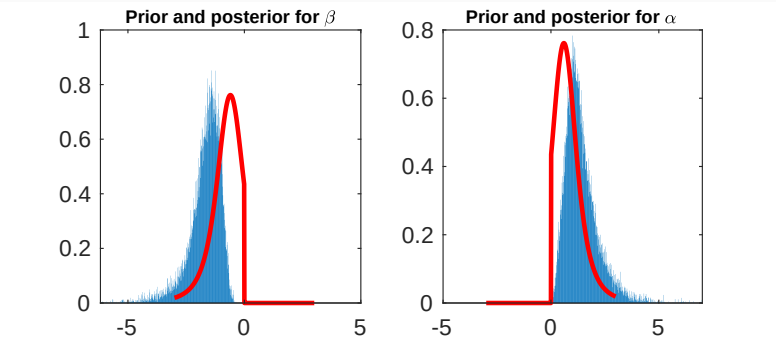



**(d)** Education and Health Services

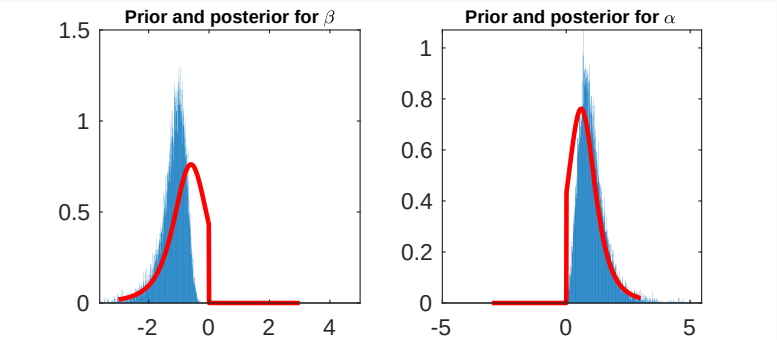


# Prior and posterior distribution of labor demand and supply elasticities by sector (4/4)

**(a)** Leisure and Hospitality




**(b)** Other Services



# Posterior Estimates

| | $\beta^l$ (demand) | | | $\alpha^l$ (supply) | | |
|---|---|---|---|---|---|---|
| Sector | p5 | p50 | p95 | p5 | p50 | p95 |
| Mining and Logging | -3.4985 | -1.4533 | -0.57036 | 0.51094 | 1.3784 | 3.331 |
| Utilities | -2.7957 | -1.0508 | -0.2748 | 0.72259 | 1.3686 | 2.6255 |
| Construction | -14.443 | -4.4111 | -0.70444 | 0.45431 | 2.3951 | 16.097 |
| Manufacturing | -3.813 | -1.4151 | -0.45704 | 0.8067 | 1.8056 | 3.8972 |
| Wholesale Trade | -1.9119 | -0.74404 | -0.21297 | 0.25625 | 0.73813 | 1.7147 |
| Retail Trade | -4.6419 | -2.4711 | -1.2466 | 0.32368 | 1.2577 | 3.7929 |
| Transportation and Warehousing | -2.2208 | -1.2205 | -0.67791 | 0.2437 | 0.95951 | 2.4964 |
| Information | -2.0643 | -0.90012 | -0.34388 | 0.32847 | 0.92223 | 2.1588 |
| Financial Activities | -2.1287 | -1.0533 | -0.49371 | 0.26154 | 0.93418 | 2.3441 |
| Professional and Business Services | -2.9516 | -1.4611 | -0.72686 | 0.34512 | 1.1377 | 2.9259 |
| Education and Health Services | -2.2529 | -1.0778 | -0.47521 | 0.3506 | 1.0614 | 2.5915 |
| Leisure and Hospitality | -4.4276 | -1.9899 | -0.84574 | 0.45443 | 1.4753 | 4.1884 |
| Other Services | -2.9106 | -1.4046 | -0.63227 | 0.42351 | 1.193 | 2.8501 |
| Total Private | -2.6593 | -1.1375 | -0.40432 | 0.53653 | 1.2244 | 2.6541 |

# Shock Decomposition, April 2020

| | Demand | | | Supply | | | Difference 68% Credible Interval |
|---|---|---|---|---|---|---|---|
| Sector | 50p | 2.5p | 97.5p | 50p | 2.5p | 97.5p | |
| Total Private | -5.06 | -11.28 | -0.31 | -11.18 | -15.94 | -4.97 | [-12.204, 0.5492] |
| Mining and Logging | -4.78 | -9.50 | -0.84 | -7.34 | -11.32 | -2.62 | [-8.076, 2.293] |
| Construction | -3.65 | -12.78 | -0.32 | -13.47 | -16.82 | -4.33 | [-14.443, -0.375] |
| Manufacturing | -6.36 | -12.93 | -1.14 | -9.89 | -15.13 | -3.32 | [-10.365, 3.447] |
| Wholesale Trade | -3.82 | -8.23 | -0.37 | -5.66 | -9.10 | -1.25 | [-6.556, 3.101] |
| Retail Trade | -3.65 | -9.25 | -0.04 | -10.82 | -14.43 | -5.23 | [-12.276, -0.285] |
| Transport. & Warehousing | -3.61 | -9.06 | -0.01 | -9.26 | -12.85 | -3.81 | [-9.090, 0.655] |
| Utilities | 1.17 | 0.41 | 1.49 | -1.08 | -1.40 | -0.32 | [-2.467, -1.416] |
| Information | -3.51 | -6.95 | -0.63 | -5.39 | -8.26 | -1.95 | [-5.545, 1.967] |
| Financial Activities | -0.34 | -2.00 | 0.52 | -2.72 | -3.59 | -1.05 | [-3.241, -0.610] |
| Prof. and Business Services | -3.29 | -8.05 | -0.15 | -8.31 | -11.44 | -3.53 | [-9.086, -0.780] |
| Education and Health | -5.47 | -10.77 | -0.63 | -6.92 | -11.76 | -1.62 | [-8.005, 5.076] |
| Leisure and Hospitality | -23.26 | -46.70 | -3.63 | -39.92 | -59.55 | -16.47 | [-38.955, 9.722] |
| Other Services | -6.32 | -14.23 | -0.48 | -15.39 | -21.24 | -7.47 | [-16.701, -0.876] |