

DiSPersion in Dispersion: Measuring Establishment-Level Differences in Productivity¹

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¹Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the Bureau of Labor Statistics or the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed. The Disclosure Review Board release number is CDBRB-FY19-393. We thank John Earle, Bart Hobijn, Mark Roberts, members of FESAC and BLSTAC for useful comments.

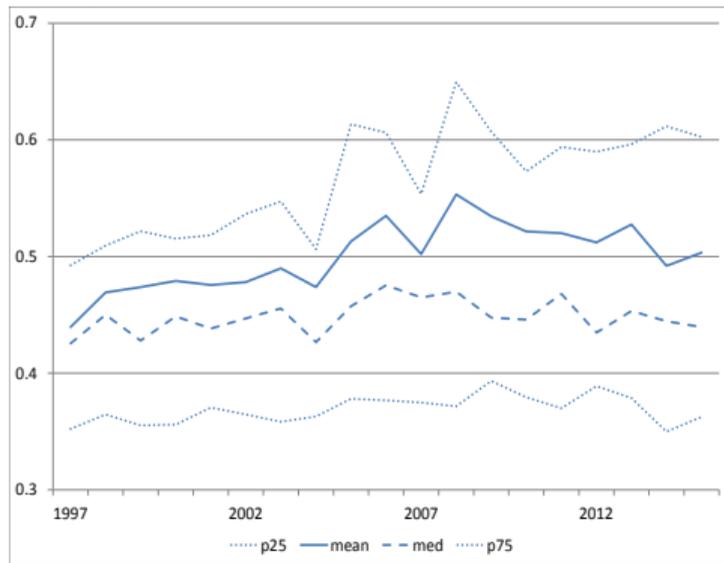
- ▶ BLS produces the official productivity statistics for the U.S. (labor productivity and multifactor productivity). Critical for understanding the economy.
 - ▶ Industry-level information
 - ▶ Contributions of: inputs to output growth, different industries to aggregate productivity growth
- ▶ Understanding what goes on within industries is also important
 - ▶ One important measure is within-industry **DiSP**ersion (large and persistent differences, connection to reallocation, APG, wage dispersion)
 - ▶ Census Bureau and BLS have been collaborating to create an experimental data product:

Dispersion Statistics on Productivity, or **DiSP**

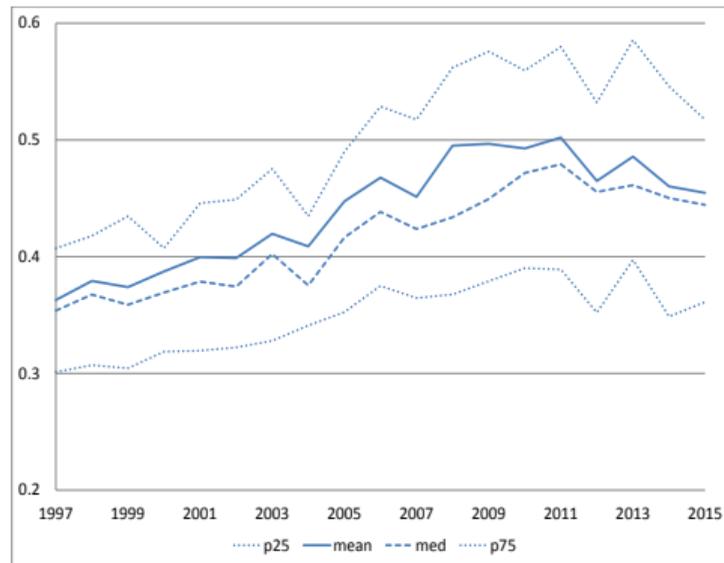
- ▶ Industry-level:
 - ▶ BLS productivity statistics (annual growth rates and indices)
 - ▶ BEA and BLS deflators, depreciation rates
 - ▶ NBER-CES database
- ▶ Establishment-level
 - ▶ Annual Survey of Manufactures (ASM), Census of Manufactures (CM) – input/output measures
 - ▶ Longitudinal Business Database (LBD) universe of establishments (survey and administrative data sources)
- ▶ Selection and Weighting
 - ▶ Probability of being selected into the ASM is positively correlated with plant-size
 - ▶ Inverse propensity score weights (IPW)

- ▶ Productivity indicators: output per hour, value added per worker, multifactor productivity (cost-share-based)
- ▶ **DiSP**ersion statistics: standard deviation, interquartile range, interdecile range of log productivity
- ▶ IPWs & activity weights
- ▶ Balanced panel of industries
 - ▶ NAICS-4
 - ▶ 1997-2015
 - ▶ $86 \times 19 = 1634$ industry-year observations per indicator and dispersion measure

IQR

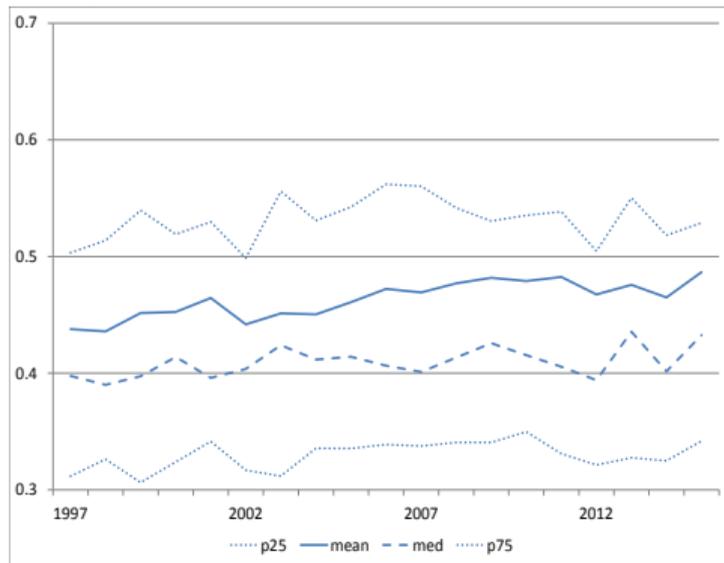


Std. Dev.

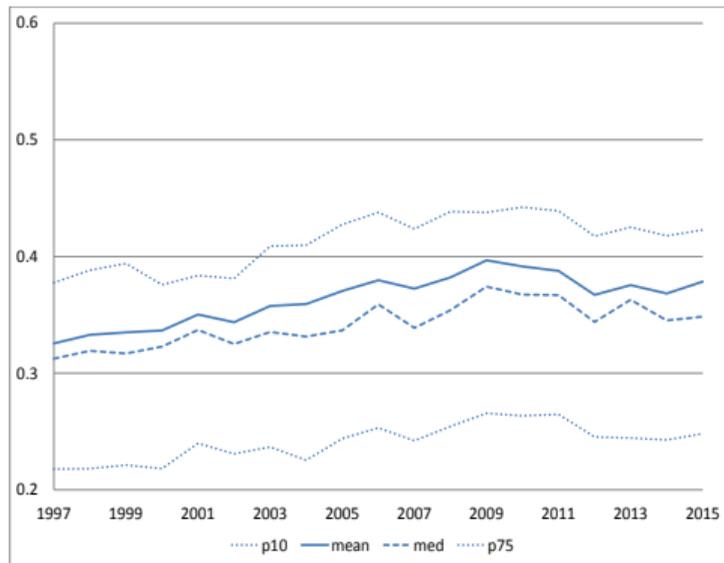


- ▶ Level of dispersion is enormous, and rising
 - ▶ $\overline{\text{IQR}} \approx 0.5$ in 2015: in the average industry, the plant at the 75th percentile generated $\approx 1.7\times$ more revenue *with the same amount of inputs* than the establishment at the 25th percentile.
- ▶ Variation in dispersion is large, as well:
 - ▶ $p75(\text{IQR}) \approx 0.6$ ($\approx 1.8\times$)
 - ▶ $p25(\text{IQR}) \approx 0.36$ ($\approx 1.4\times$)
 - ▶ Cross-industry variation is larger than time series variation...
 - ▶ $R^2(\text{NAICS4}) \approx 58\%$
 - ▶ $R^2(\text{YEAR}) \approx 1\%$ of total variation in iqr
 - ▶ ... But time series variation itself is non-trivial (IQR: 5 log points, Std.Dev.: 10 log points)
- ▶ Rising dispersion in right tail, churning (not shown here)

IQR



Std. Dev.

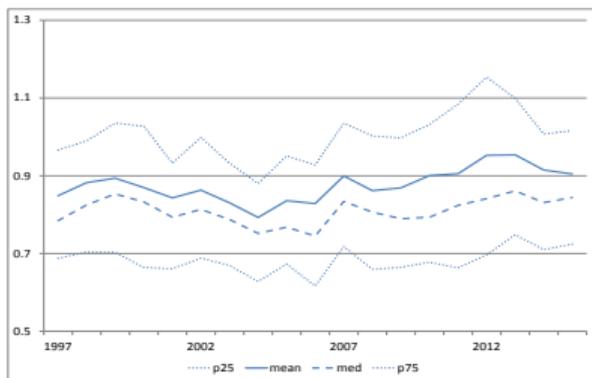


- ▶ Implications of large and rising dispersion
 - ▶ “Good” dispersion: innovation and growth
 - ▶ “Bad” dispersion: frictions (markups, distortions, declining responsiveness to shocks)
- ▶ Large literature investigating these hypotheses

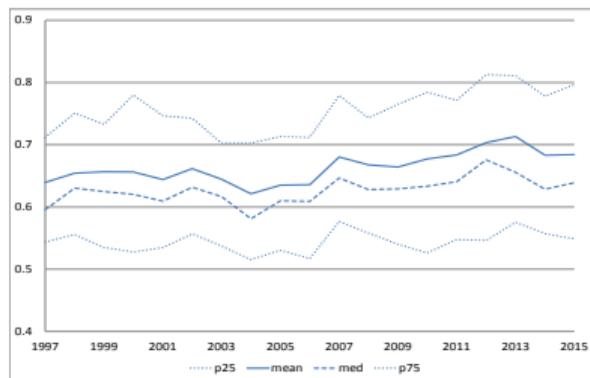
- ▶ Experimental data product by BLS and Census
- ▶ Levels and variation in IQR indicate there is a lot of variation to explain
- ▶ We are soliciting feedback for future releases (CES.DISP@census.gov)
 - ▶ Ideas for improvements
 - ▶ Experience of users with our data

DiSP - $\ln(Q/TH)$

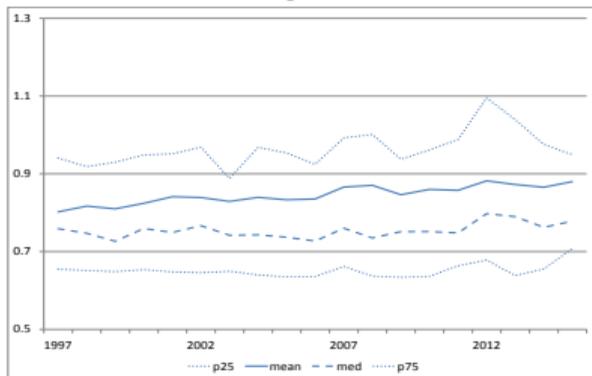
IQR



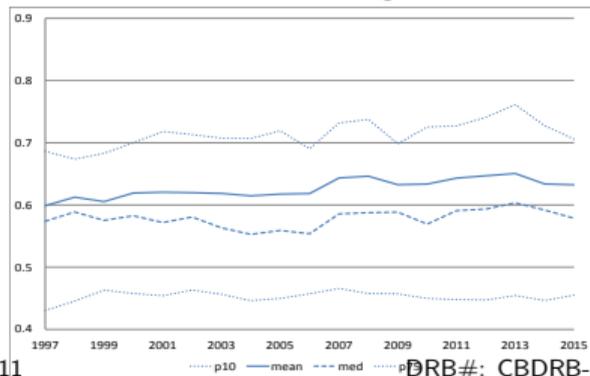
Std. Dev.



IQR, hours-weighted

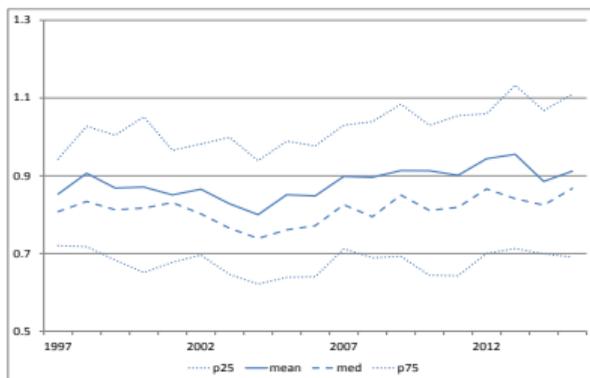


Std. Dev., hours-weighted

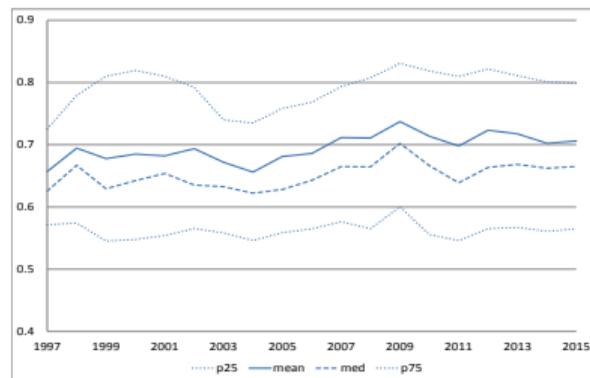


DiSP - $\ln(VA/EMP)$

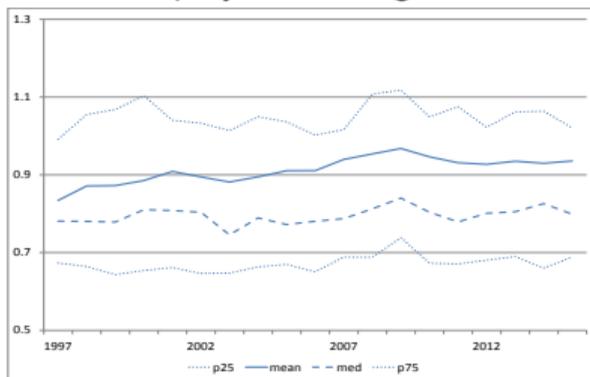
IQR



Std. Dev.



IQR, employment-weighted



Std. Dev., employment-weighted

