DiSPersion in Dispersion: Measuring Establishment-Level Differences in Productivity[1]

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Background

www2.census.gov/ces/disp

- 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 **S**tatistics on **P**roductivity, or **DiSP**

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Data

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- 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)

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Data product: **DiSP**

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- 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

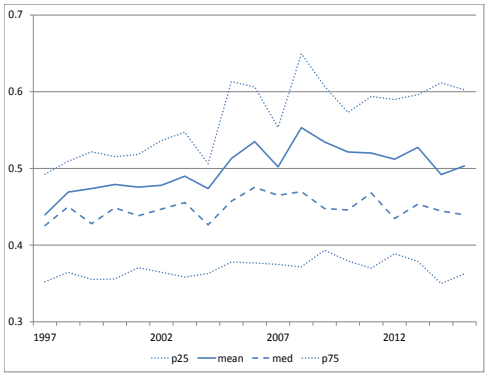
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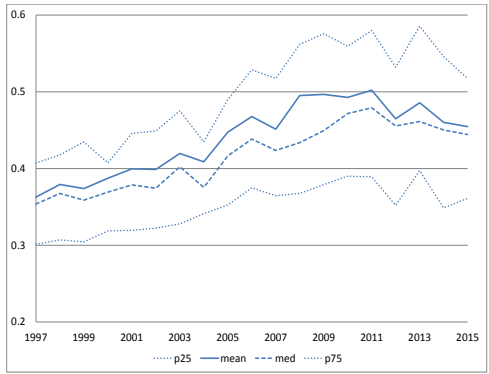
DiSP - ln(MFP)

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IQR



Std. Dev.



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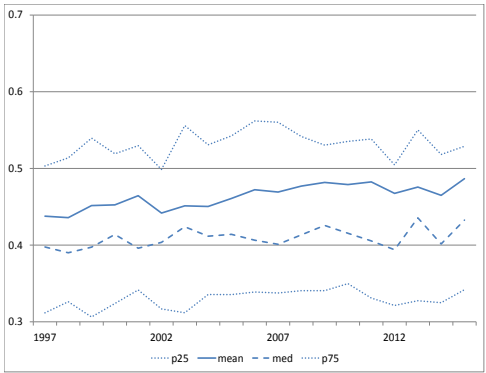
Nature of **DiSP**ersion

- Level of dispersion is enormous, and rising
  - $\overline{\text{IQR}} \approx 0.5$ in 2015: in the average industry, the plant at the 75^{th} percentile generated $\approx 1.7\times$ more revenue *with the same amount of inputs* than the establishment at the 25^{th} percentile.
- Variation in dispersion is large, as well:
  - p75(IQR)$\approx$0.6 ($\approx 1.8\times$)
  - p25(IQR)$\approx$0.36 ($\approx 1.4\times$)
  - Cross-industry variation is larger than time series variation...
    - $R^2(NAICS4) \approx 58\%$
    - $R^2(YEAR) \approx 1\%$ 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)

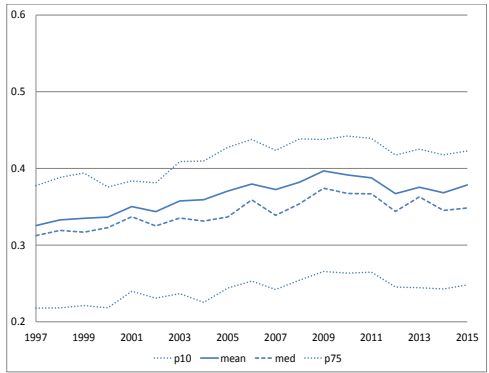
DiSP - ln(MFP), Input-index-weighted

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IQR



Std. Dev.



Nature of **DiSP**ersion

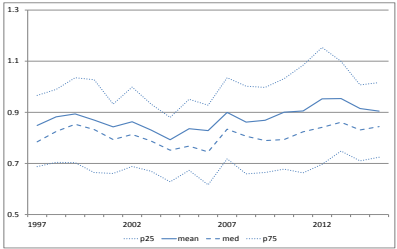
- Implications of large and rising dispersion
  - "Good" dispersion: innovation and growth
  - "Bad" dispersion: frictions (markups, distortions, declining responsiveness to shocks)
- Large literature investigating these hypotheses

- 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

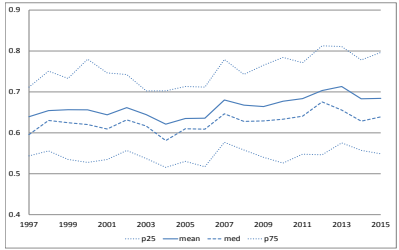
DiSP - ln(Q/TH)

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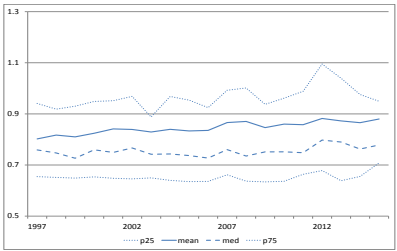
IQR



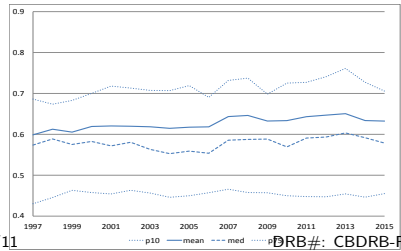
Std. Dev.



IQR, hours-weighted



Std. Dev., hours-weighted



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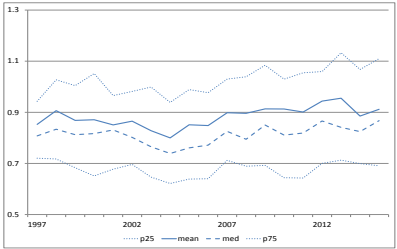
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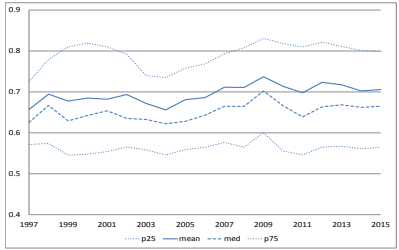
DiSP - ln(VA/EMP)

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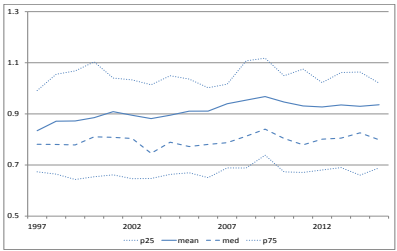
IQR



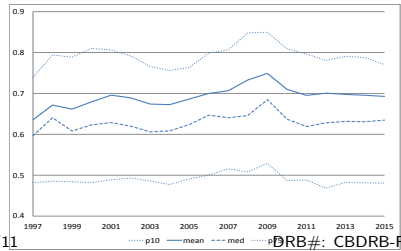
Std. Dev.



IQR, employment-weighted



Std. Dev., employment-weighted



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