Skewed Business Cycles

Replication of Empirical Results

Sergio Salgado[*]   Fatih Guvenen[†]   Nicholas Bloom[‡]

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1 Introduction

In this document we provide additional details on the replication of the empirical results of the paper. The replication material consists of two groups of files. First, if you wish to directly use the cross-sectional moments calculated for the main results in the paper and replicate the figures and tables use the following files:

- *AGGREGATE.xls* which contains aggregate time series of annual GDP growth from FRED for the United States, quarterly GDP growth from FRED for the United States, cross-country annual GDP growth from the World Development Indicators, and cross-country quarterly GDP growth from the OECD Stats. See additional details in the data appendix of the paper.

- *Census_LBD.xls* which contains the cross-sectional moments of the distribution of employment growth for establishments and firms from a sample of firms from the Census' Longitudinal Business Dataset (LBD). Section 2.2 describes the available material in detail.

- *USA_AND_CROSSCOUNTRY.xls* which contains the cross-sectional moments of the distribution of annual growth of quarterly sales, annual sales, and employment for publicly traded firms from Compustat, stock returns from CRSP, annual sales growth and employment growth for publicly traded firms from Bureau van Dijk's (BvD) Osiris database, and stock returns from Global Compustat. Section 2.3 describes the available material in detail.

- *SBC_ReplicaEmpirics.do* takes the .xls files and replicates the main figures and empirical results of the paper.

Compustat and Global Compustat data were accessed using the Wharton Research Data Services (WRDS) and were last updated on April 13, 2018.

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[*]University of Minnesota; salga010@umn.edu
[†]University of Minnesota, FRB of Minneapolis, and NBER; guvenen@umn.edu
[‡]Stanford University and NBER; nbloom@stanford.edu

Second, if you wish to replicate the cross-sectional moments from the raw data and do your own calculations, use the following files:

- SBC_Clean_CSTAT.do takes the raw .dta at annual and quarterly frequency for the universe of firms in Compustat downloaded from WRDS and applies selection criteria; upon completion, the code generates a clean dataset at the annual and quarterly frequencies and the time series of cross-sectional moments used in the paper for sales, employment, and stock returns.

- SBC_Clean_BvDOsiris.do takes the raw .csv at annual frequency for the universe of firms Bureau van Dijk's (BvD) Osiris downloaded from WRDS and applies selection criteria; upon completion, the code generates a clean datasets at the country-annual frequency with the cross-sectional moments used in the paper for sales and employment.

- SBC_Clean_GCSTAT.do takes the raw .dta at daily frequency for the universe of firms in Global Compustat downloaded from WRDS and applies selection criterial; upon completion, the code generates a clean dataset at the country-quarterly level and the time series of cross-sectional moments used in the paper for stock returns.

The do-files are heavily commented but in case of any question, do not hesitate contact us. Be aware that the clean dataset created by these do files might be larger than the raw dataset because of the large number of variables generated. The Excel file SBC_DataVariableList.xls contains the list available in the raw data used in the paper following the names of WRDS. Finally, the underlying data is not this packet but can be accessed through WRDS or for replication purposes in the following links:[1]

- Annual Compustat replication data here and Quarterly Compustat replication data here

- BvD Osiris replication data, here

2 Empirical Replication do Files

2.1 SBC Replica Empirics

The do file *SBC_ReplicaEmpirics.do* takes the data from the excel files and replicates the figures 2 to 7. It also replicates the regression results for columns 1 to 9 in Table 2. Additional details can be found in the do-files and in the Appendix A.

2.2 Census LBD

The *SBC_Census_LBD.xls* file contains different moments of the employment growth distribution across firms and establishments. To avoid the disclosure of sensitive information, all the reported percentiles and percentiles-based measures are calculated as the employment weighted average within a 1% centered band around the corresponding percentile (for instance, the 90th percentile is the average across all observations between the 89th and 91th percentiles). See appendix A for additional details on sample selection. The excel file *Census_LBD.xls* contains the following sheets and variables,

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[1]Global Compustat is substantially larger than the rest of the datasets. In case you want to replicate the results using this data, please contact Sergio Salgado.

- Firm Employment Growth Moments: Moments of the employment growth distribution at the firm level across the entire non-farm private sector. The variables in the sheet are the following,

  - Year

  - p90, p50, p10: 90th, 50th, and 10th percentiles of the distribution

  - ksk: Kelley skewness calculated as $KSK_t = \frac{P90 - P50}{P90 - P10} - \frac{P50 - P10}{P90 - P10}$

  - ksk2: alternative measure of Kelley skewness calculated as $KSK2_t = \frac{P95 - P50}{P95 - P5} - \frac{P50 - P5}{P95 - P5}$.

  - ksk3: alternative measure of Kelley skewness calculated as $KSK3_t = \frac{P97.5 - P50}{P97.5 - P2.5} - \frac{P50 - P2.5}{P97.5 - P2.5}$.

  - p9050: 90th-to-50th percentiles spread

  - p5010: 50th-to-10th percentiles spread

  - ksk AC: Kelley skewness of the employment growth distribution considering entry and exit

  - ksk 3 years: Kelley skewness of employment growth distribution of three years log change

- Firm Employment Growth Kelley: Kelley skewness calculated as $KSK_t = \frac{P90 - P50}{P90 - P10} - \frac{P50 - P10}{P90 - P10}$ at the firm level within firm size and age groups. The variables in the sheet are the following,

  - Year

  - group: population group for which the moments are calculated. The categories are

    ◦ fize1: firms with average employment between 1 and 19 where average employment is calculated as $\overline{E}^f_{j,t} = 0.5 \times \left(E^f_{j,t} + E^f_{j,t-1} \right)$.

    ◦ fsize2: firms with average employment between 20 and 49

    ◦ fsize3: firms with average employment between 50 and 99

    ◦ fsize4: firms with average employment between 100 and 499

    ◦ fsize6: firms with average employment between 500 and 999

    ◦ fsize7: firms with average employment of 1000 or more

    ◦ fage1: firms of less than 5 years old

    ◦ fage2: firms between 5 and 10 years old

    ◦ fage3: firms more than 10 years old.[2]

  - ksk: Kelley skewness of the employment growth distribution within the relevant group.

- Estab. Employment Growth Kelley: Kelley skewness calculated as $KSK_t = \frac{P90 - P50}{P90 - P10} - \frac{P50 - P10}{P90 - P10}$ at the establishment level for entire US non farm private sector and within establishment size and age groups. The variables in the sheet are the following,

  - Year

  - group: population group for which the moments are calculated. The categories are

    ◦ All: Entire US non farm private sector

    ◦ eize1: establishment with average employment between 1 and 19 where average employment is calculated as $\overline{E}^e_{j,t} = 0.5 \times \left(E^e_{j,t} + E^e_{j,t-1} \right)$.

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[2]Firms already present in the LBD in 1976 were not considered in any of the age groups.

- esize2: establishment with average employment between 20 and 49
- esize3: establishment with average employment between 50 and 99
- esize4: establishment with average employment between 100 and 499
- esize6: establishment with average employment between 500 and 999
- esize7: establishment with average employment of 1000 or more
- eage1: establishment of less than 5 years old
- eage2: establishment between 5 and 10 years old
- eage3: establishment more than 10 years old.[3]

  - ksk: Kelley skewness of the employment growth distribution within the relevant group.

2.3 United States and Cross Country

The *SBC_USA_AND_CROSSCOUNTRY.xls* file contains cross-sectional moments of the distribution of sales growth, employment growth, and stock returns for the United States and for a cross section of countries. See appendix A for additional details on sample selection. The excel file *SBC_USA_AND_CROSSCOUNTRY.xls* contains the following sheets:

- <u>USA Kernel Density</u>: estimated empirical density for recession and expansion years of the annual sales growth distribution for a sample of publicly traded firms in the United States

- <u>USA Quarter Sales Growth</u>: moments of the four quarters growth rate of quarterly sales for a sample of publicly traded firms in the United States

- <u>USA Quarter Stock Returns</u>: moments of the four quarters growth rate of end-of-quarter stock price for a sample of publicly traded firms in the United States

- <u>USA Annual Sales Growth</u>: moments the one year growth rate of annual sales in the United States

- <u>USA Annual Employment Growth</u>: moments the one year growth rate of annual employment in the United States

- <u>USA Employment Scatter</u>: mean and Kelley skewness within different quantiles of the industry-year distribution of average employment growth in the LBD. These moments were generated using Census data and no additional replication material were disclosed.

- <u>Country Kernel Density</u>: estimated empirical density for recession and expansion years of the annual sales growth distribution for a sample of publicly traded firms from BvD's Osiris across ~40 countries

- <u>Country Annual Sales Growth</u>: moments the one year growth rate of annual sales for a sample of publicly traded firms from BvD's Osiris across ~40 countries

- <u>Country Annual Employment Growth</u>: moments the one year growth rate of annual sales for a sample of publicly traded firms from BvD's Osiris across ~40 countries

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[3]Establishment already present in the LBD in 1976 were not considered in any of the age groups.

- Country Stock Returns: moments the four quarters growth rate of the end-of-quarter stock price for a sample of publicly traded cross ~40 countries from Global Compustat

The sheets contain the following variable

- group: defines the sample over which the moments are calculated. This takes the categories all (all sample) or NAICqq where qq is a two digit industry group. This is only available for USA data

- ISO3: country ISO code. Only available

- Year

- Quarter: Only available for Sales and Stock returns for firms in the United States

- num: number of observations used to calculate the moments

- me: cross-sectional average

- sd: cross-sectional standard deviation

- sk: coefficient of skewness (third standardized central moment)

- ku: coefficient of kurtosis (fourth standardized central moment)

- p025: 2.5th percentile of the distribution

- p10: 10th percentile of the distribution

- p25: 25th percentile of the distribution

- p50: 50th percentile of the distribution

- p75: 75th percentile of the distribution

- p90: 90th percentile of the distribution

- p975: 97.5th percentile of the distribution

- p9010: 90th-to-10th percentiles spread

- p7525: 75th-to-25th percentiles spread

- p9050: 90th-to-50th percentiles spread

- p5010: 50th-to-10th percentiles spread

- ksk: Kelley skewness calculated as calculated as $KSK_t = \frac{P90-P50}{P90-P10} - \frac{P50-P10}{P90-P10}$

- cku: Crow-Sidiqqui kurtosis calculated as $CKU_t = \frac{P97.5-P2.5}{P75-P25}$