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Sectoral Dynamics and Business Cycles

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Abstract

I construct an index of sectoral dynamics to characterize changes in the sectoral composition of economic activity. There is evidence of asymmetry in different phases of business cycles with recessions being associated with larger changes in sectoral composition than expansions. I find that the correlation between dynamics in sectoral employment and aggregate output has weakened since the 1990s. Also, sectoral changes appear to be smaller and spread across more sectors, while their contribution to aggregate volatility has been increasing. I also perform a simulation exercise and replicate these documented facts. The results suggest that shifts in the sectoral composition of the economy likely contribute to the formation of business cycles. Also the duration of recessions implied by the impulse response functions from a VAR model of sectoral dynamics and aggregate output growth matches the duration of recessions observed in the data.

Keywords: Structural changes, business cycles, labor share, employment

JEL Classification: E32, E24

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1 Introduction

Is the structure of the economy more dynamic in recessions or expansions? What is the contribution of these sectoral dynamics to aggregate volatility? In answering these questions, I investigate changes in the allocation of economic activity across sectors over time and explore how these sectoral dynamics relate to business cycles and GDP growth volatility.

I construct a simple index of sectoral dynanamics based on changes in sectoral shares of total output over time; I also construct a similar index using employment data. The larger the index, the more pronounced are the changes in the sectoral composition of the economy. The index is constructed for different levels of sectoral disaggregation, coverage, and time frequency. I document the following facts about sectoral dynamics, GDP growth, and volatility.

First, recessions are associated with large changes in sectoral composition. For example, over the period 1948–2010, sectoral shifts were about 1.7 times larger in recessions than in expansions. Furthermore, the larger the changes in sectoral composition, the more severe the recessions were. Second, starting from the 1990s, there is a weakening of the correlation between the index of sectoral dynamics using employment data and output growth. This finding is consistent with the decline in the labor share of output both in aggregate and within industries as documented by Elsby et. al (2013) and Karabarbounis and Neiman (2013). As the labor share of output decreases, the contribution of labor dynamics to growth dynamics would be expected to decrease as well. Third, while until the 1990s, business cycles were characterized by large cyclical changes in the share of the Durables sector, afterwards the sectoral dynamics were smaller and spread across more sectors. Fourth, the contribution of sectoral dynamics to GDP growth volatility has been continuously increasing. While GDP growth volatility has declined since the 1990s, sectoral dynamics seems to have played a more prominent role.[1] Up until the 1990s, the average contribution of sectoral dynamics to growth volatility fluctuated between 25 and 45 percent, while during the Great Moderation, it increased continuously and accounted for 50 to 60 percent of the GDP growth volatility.

I also perform a simple simulation exercise to replicate the stylized facts on the relationship between sectoral dynamics and business cycles. The simulated sectoral growth rates are drawn to match the joint distribution of the sectoral growth rate in the historical data, accounting for the comovement across sectors. I find that the simulated data replicate the negative correlation between sectoral dynamics and the GDP growth during recessions. Furthermore, the duration of recession in the impulse response functions from a VAR of sectoral dynamics and GDP growth rate matches the recession duration observed in the data.

The results are consistent with Phelan and Trejos (2000), in that an one-time change in the sectoral composition of the economy can lead to an aggregate downturn. The index presented in this paper is similar to that in Lilien (1982). Lilien (1982) constructs a measure of structural shifts within the labor market and argues that sectoral shifts are represented by a positive correlation between the dispersion of the employment growth rate across sectors and the level of the unemployment rate.[2] The advantage of constructing an index of sectoral dynamics based on output, as in this paper, is that it fully captures sectoral dynamics in the economy. A decrease in employment in a

[1] The decline in GDP growth volatility in the U.S since the mid–1980s, a period known as the Great Moderation, is well documented in the literature (Kim and Nelson (1999), McConnell and Perez-Quiros (2000) and Blanchard and Simon (2001)).

[2] Abraham and Katz (1986) show that the measure proposed by Lilien does not distinguish between a pure sectoral shift and a pure aggregate demand explanation of the unemployment rate. They show that aggregate demand movements alone can produce a positive correlation between the dispersion of the employment growth rates across sectors and the unemployment rate. They isolate the structural component from the aggregate component by using the detrended series of the unemployment rate after accounting for the aggregate shock measured by unanticipated growth in the money supply. Rissman (1997) develops a measure that is similar to Lilien's but which addresses the criticism of Abraham and Katz by applying a Kalman filter to a simple model of industry employment growth to construct a measure of dispersion that is free from cyclical effects.

given sector might be due to changes in labor intensity in that sector rather than representing a change in that sector's share in total output. Furthermore, an implicit assumption in constructing the index using employment data is that there is no variation in the labor share over time. As shown in Table 2, there is a variation in the labor share across sectors. For example, over the period 1960–2005, the average labor share in sectoral value added varied from 0.25 for "Oil and gas extraction" to 0.87 for "Construction". In addition, as shown in Figure 2, the average labor share across sectors has been declining, from an average of 0.67 in the 1960s and 1970s to about 0.56 in the later period.

This paper is organized as follows: Section 2 presents the data. Section 3 presents various specifications of the index of sectoral dynamics and its relationship to aggregate growth. Section 4 shows the contribution of sectoral dynamics to growth volatility. Section 5 concludes.

2 Data and Stylized Facts

I use industry-level data on value added, employment and output from different sources as described in this section with sectoral coverage, disaggregation, time frame and frequency varying across datasets.

Bureau of Economic Analysis (BEA) Industry Accounts

The data from BEA are available at an annual frequency for the period 1947–2010 for 22 broad sectors of the economy.[3] The list of sectors is given in Table 1. These sectors correspond to the two-digit level of the 2002 North American Industry Classification System (NAICS), and they fully represent the economy. More disaggregated data are available only from 1987. The sectoral share is measured as the sector's value added as a percentage of GDP. I also construct a less disaggregated

[3] See http://www.bea.gov/industry/gdpbyind_data.htm.

data set (15 sectors) based on the sector-level classification from the Input-Output Table.

Dale Jorgenson's 35-Sectors KLEMS

This database contains data on output and input usage for 35 sectors at an annual frequency for the period 1960–2005.[4]. I calculate the sector's value added as the difference between the value of output and the value of intermediate inputs. As shown in Table 2, the KLEMS data set provides more disaggregated data for manufacturing than the 22-sector BEA data. The advantage of these two data sets compared to Current Employment Statistics and the Federal Reserve Board's Index of Industrial Production is that they contain information on the entire economy.

Current Employment Statistics (CES)

CES include employment, hours, and earnings series.[5] The data are at a monthly frequency, and most employment series start from 1990. I use the seasonally adjusted employment series (number of workers) by major industry sector (generally two-digit NAICS) which is available from 1939 to 2013, and I compute the sector's employment as a percentage of nonfarm employment. The list of sectors is shown in Table 3.

The Federal Reserve Board's Industrial Production (IP)

This database provides a monthly index of IP, related capacity indexes, and capacity utilization rates for manufacturing, mining, and electric and gas utilities.[6] The production index measures real output, and it is expressed as a percentage of real output in a base year, currently 2007. I use the seasonally adjusted quarterly series for the period 1972q1–2013q4, corresponding to the industry structure classification of IP as shown in Table 4.

I measure sectoral dynamics as the average change in the sectoral shares of total output over

[4]See http://scholar.harvard.edu/jorgenson/data.
[5]See http://www.bls.gov/ces/.
[6]See http://www.federalreserve.gov/Releases/g17/download.htm.

two consecutive periods across all sectors, as shown in (1):

$$SecDynamics_t = \frac{1}{n} \sum_i |\omega_{i,t} - \omega_{i,t-1}|, \tag{1}$$

where $\omega_{i,t}$ denotes sector's $i's$ share of total output at time t.

Figure 1 plots the index for various levels of sectoral disaggregation using value added or employment data. Summary statistics for the index over stages of the business cycles and over time are shown in Table 5. Both Figure 1 and Table 5 show that recessions are associated with larger values of this index than expansions, suggesting that most of the reallocation of economic activity across sectors occurs during recessions. Furthermore, the larger the value of the index, the larger is the drop in GDP growth. Focusing on recession periods only, the negative correlation suggests that the larger the sectoral dynamics, the more pronounced the recessions are. These results are robust across a variety of levels of disaggregation (15, 22, and 35 sectors) as well as the basis for the construction of sectoral shares (value added or employment).

Looking at the period after 1990, the correlation between the index of sectoral dynamics based on the labor data and GDP growth is significantly lower, suggesting a disentangling between the labor market and the aggregate economy. This pattern is consistent with the decline in the share of labor in output. Figure 2 plots the labor share of value added for the U.S. economy and the average labor share across sectors. Both series show a decline in the labor share, which is even more pronounced for the average labor share, implying a shift away from the labor-intensive sectors. This observation is consistent with Elsby et.al (2013) who argue that the offshoring of the labor-intensive component of the U.S. supply chain is a leading potential explanation of the decline in the U.S. labor share. Karabarbounis and Neiman (2013) document that a global decline in the labor share is occurring within the large majority of countries and industries. They show that the decrease in the relative price of investment goods, inducing firms to shift away from labor and toward capital, explains roughly half of the observed decline in the labor share.

While recessions are associated with large sectoral shifts, the magnitude and distribution of these shifts have been changing over time. Figure 3 shows that the range of the change in the sectoral shares was wider before the mid–1980s. However, the standard deviation of the change in sectoral shares in largely unchanged.

In the periods before the mid–1980s, the largest changes in the sectoral shares were concentrated in the "Durables goods" sector, with the share of Durables shrinking in recessions and increasing in expansions. During the period 1948–1983, there were 16 recession years and 10 expansion years. Durables had the largest drop in sectoral share in 10 out of the 16 recession years and the largest increase in 10 out of the 10 expansion years. The period 1984–2010 shows a different picture. More sectors exhibited large changes in both recessions and expansions. Out of the 6 recession years in the period 1984–2010, Durables had the largest drop in 3 years, followed by Construction and Mining. During the expansions years, Finance and Insurance, Professional Services and Transportation were the sectors with the largest increases. Hence, even though the range of changes in the sectoral share is narrower in the period after the mid–1980s, more sectors exhibit changes in their share of GDP. While before the mid–1980s the cycles were mostly mirroring the change in the manufacturing activity, in the later period, distinct sets of sectors drove recessions and expansions suggesting a larger role for structural changes.

These structural shifts can provide an explanation for the stagnant employment during the recoveries since the 1990s, also known as jobless recoveries.[7] The argument is that if a recession corresponded to the permanent shrinking of some industries and the expansion of other industries,

[7]Starting from the 1990s, the nature of the recoveries following the recessions has changed. Expansions after the recessions of 1990–91, 2001, and 2007–09 (the Great Recession) were labeled "jobless recoveries". Unlike the previous recoveries, they did not see an increase in employment, corresponding to the growth in output.

then job losses in the recession would mostly be permanent. The job postings from the expanding industries would be new hires rather than rehires. The resulting structural unemployment would be more persistent than the cyclical one, as the newly unemployed people would need to acquire new skills to be employed in another industry. Furthermore, a new vacancy would take longer to fill than a rehire opening. Motivated by the "jobless recoveries", Groshen and Potter (2003) distinguish between the cyclical component and the structural component by looking at the correlation of job flows by industry in recession and recovery. The industries that exhibit a positive correlation (jobs losses during both recession and recovery or job gains during both recession and recovery) are identified as predominated by structural changes. They find that the recoveries following the recessions of 1990–91 and 2001 saw larger structural changes than those following previous recessions. Panovska (2016) also finds that the composition of the structural shocks during recessions and the periods immediately following recessions has changed; the recessions before 1984 were followed by recoveries driven by positive permanent shocks to output, whereas the post–1984 recessions were followed by weak recoveries in demand.

3 Sectoral Dynamics and Business Cycles

In this section, I perform a simple simulation exercise to replicate the stylized facts on the relationship between sectoral dynamics and business cycles. The simulated sectoral growth rates are drawn to match the joint distribution of the sectoral growth rate in the historical data, accounting for the comovement across sectors. I then follow with a VAR analysis of sectoral dynamics and GDP growth and compare the response time in the impulse response functions with recession duration in the historical data.

3.1 Simulation Approach

First, I present a rule to define the recession periods in the simulated GDP growth series. I consider three candidate measures as a recession indicator: (1) negative GDP growth rate, (2) negative cyclical component of the GDP growth rate, and (3) negative cyclical component of the GDP growth rate by at least half the standard deviation of the cyclical component.[8] Table 6 shows how these three indicators perform in defining business cycles in the data. "Correctly defined" corresponds to the percentage of times in the period 1948–2010 when the indicator defined the year to be a recession year when the true state was recession, and when the indicator defined the year to be an expansion year when the true state was expansion. Among these indicators, the third one - negative cyclical component of the GDP growth rate by at least half the standard deviation of the cyclical component- produces cycles that are closest to the cycles defined by the NBER. In the simulation procedure, I will use this indicator to define a recession year in the simulated series of the GDP growth rate.

The simulation procedure is as follows:

1. Set the initial sectoral shares to their values in 1948. Historical data are based on the 22-sector classification from the BEA for the period 1947–2010 as it provides the most comprehensive coverage.

2. For each time t and sector i, generate sectoral shocks $\epsilon_{i,t}$, where μ_{ϵ_i} and $\sigma_{\epsilon_i,\epsilon_j}$ match the average growth rate of sector i and the covariance between sector i and j in the data for the period 1948–2010. The sectoral growth rate is defined as $g_{i,t} = \Delta \log(vaqi_{i,t})$, where $vaqi$ denotes the chain-type quantity index for value added in the BEA industry data.

[8] The cyclical component corresponds to the deviations from the trend of the HP-filtered GDP growth rate. In the case of the normal distribution, $P(z < -0.5) = 0.31$, which matches the proportion of recessions in the period 1948–2010.

3. Compute the sectoral shares as $\omega_{i,t} = \omega_{i,t-1} * (1 + g_{i,t})$.

4. Repeat steps (2) and (3) for each time t. I set the number of periods to 100.

5. Compute the GDP growth rate as $g_{GDP,t} = \sum \omega_{i,t} * (1 + g_{i,t})$.

6. Compute the index of sectoral dynamics as $SecDynamics_t = \frac{1}{n} \sum_i |\omega_{i,t} - \omega_{i,t-1}|$.

7. Define the recession periods.

8. Compute the correlation between the GDP growth rate and sectoral dynamics during recessions.

Table 7 shows simulation results and how they compare with the historical data. Figure 4 plots a histogram of the ratio of the index of sectoral dynamics in recessions to the index of sectoral dynamics in expansions, and Figure 5 plots the correlation between the index of sectoral dynamics and GDP growth in the simulation data. The simulation data replicate the negative correlation between sectoral dynamics and business cycles.

3.2 VAR Approach

The variables in the VAR are based on the seasonally adjusted quarterly data for IP for the period 1972q1–2013q4. The index of sectoral dynamics is calculated as the average deviation (in absolute value) of the sectoral growth rate from the IP growth rate. Figure 6 plots the index of sectoral dynamics and IP growth. The standard lag-length selections criteria recommend a recursive VAR with three lags. The stability conditions are satisfied, and the errors are not correlated. The results for the Granger test are shown in Table 8 and they are significant for all of the specifications.

The impulse response functions are shown in Figure 7. Also plotted is the 95 percent confidence interval for each of the impulse responses. An increase in the index of sectoral dynamics by 1 percentage points leads to an immediate decline in IP growth by 0.5 percentage point which lasts for two quarters and then it fades away after the third quarter. As a reference, the mean and the standard deviation are 1.78 and 0.73 for the index of sectoral dynamics and 0.55 and 1.55 for IP growth, where the units are *percent*. This result is similar to the duration of recession in the data. During the period 1972q1–2013q4, the length of a recession varied from 1.5 quarters (the 1980 recession) to 4.5 quarters (the Great Recession), with an average of 3 quarters. Since World War II, the average recession duration has been 2.71 quarters.

4 Sectoral Dynamics and Growth Volatility

I compute the contribution of the sectoral dynamics to aggregate volatility using an approach similar to that Long and Plosser (1987). They use a one-factor model to extract a common shock, and they regress the aggregate volatility on the first component to compute the contribution of the common shock to aggregate volatility. The R^2 of this regression shows the contribution of the common factor to aggregate volatility. Using monthly data for the 13-sector decomposition of the index of IP for the period 1948–1981, they find that the common factor accounted for 47 percent of the aggregate variance.

In the spirit of Long and Plosser (1987), the contribution of the sectoral shocks to aggregate volatility is given by the R^2 of the following regression:

$$\sigma_{GDP,t} = \beta_0 + \beta_1 SecDyn_t + u_t, \tag{2}$$

Following the literature on the Great Moderation, $\sigma_{GDP,t}$ denotes the instantaneous GDP growth volatility. The instantaneous volatility is defined as $\sigma_t = \sqrt{\frac{\pi}{2}}\,|\epsilon_t|$, where ϵ_t is the estimated error term from the following AR(1) model of real GDP growth rates: $\Delta y_t = \alpha + \beta \Delta y_{t-1} + \epsilon_t$, where y_t is the log of real GDP.

I use a rolling-window estimation of regression 2 to capture the time dynamics of the contribution of sectoral dynamics to GDP volatility. Figure 8 plots a time series of the R^2 from regression 2. The contribution of structural changes to GDP growth volatility has been increasing in the past two decades, from an average of about 30 percent until the 1990s to about 60 percent in 2010. During the Great Moderation, sectoral dynamics accounted, on average, for half of the annual variation in GDP growth. This finding is in line with Foerster et.al (2011) who use a multisector growth model to adjust for the effects of input-output linkages in the factor analysis of quarterly IP data. They find that the Great Moderation was characterized by a fall in the importance of aggregate shocks while the volatility of sectoral shocks was essentially unchanged, leading to a considerable increase in the role of the idiosyncratic shocks. Carvalho and Gabaix (2013) and Tase(2013) find that the Great Moderation was the outcome of changes in the sectoral composition.[9]

5 Concluding Remarks

This paper presents an index of structural dynamics that captures changes in the sectoral composition of economic activity. These sectoral shifts are associated with an aggregate downturn like what we would observe in the case of an aggregate productivity shock. In this regard, the sectoral shifts story can be considered an additional mechanism that generates business cycles. Furthermore the contribution of these sectoral dynamics to the aggregate volatility has been increasing.

[9] Other explanations of the Great Moderation include: better monetary policy (Clarida, Gali and Gertler 2000, Cecchetti, Flores-Lagues and Krause 2006), and better inventory management (Kahn, McConnell, and Perez-Quiros 2002, McCarthy and Zakrajšek 2007, Irvine and Schuh 2005).

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Sector	2002 NAICS Code
Agriculture, Forestry, Fishing and Hunting	11
Mining	21
Utilities	22
Construction	23
Durable goods	33, 321, 327
Nondurable goods	31, 32 (except 321 & 327)
Wholesale trade	42
Retail trade	44, 45
Transportation and Warehousing	48, 49 (except 491)
Information	51
Finance and Insurance	52
Real estate, Rental, Leasing	53
Professional, Scientific and Technical Services	54
Management of Companies and Enterprises	55
Administrative and Waste Management Services	56
Education services	61
Health care and Social assistance	62
Arts, Entertainment and Recreation	71
Accomodation and Food services	72
Other Services, except Government	81
Federal Government	na
State and Local Government	na

Table 1: List of Sectors - Bureau of Economic Analysis. Value added, 22 sectors.

Sector	Description	Labor Share
1	Agriculture	0.50
2	Metal mining	0.51
3	Coal mining	0.59
4	Oil and gas extraction	0.25
5	Non-metallic mining	0.51
6	Construction	0.87
7	Food and kindred products	0.63
8	Tobacco	0.39
9	Textile mill products	0.75
10	Apparel	0.82
11	Lumber and wood	0.70
12	Furniture and fixtures	0.79
13	Paper and allied	0.66
14	Printing, publishing and allied	0.74
15	Chemicals	0.51
16	Petroleum and coal products	0.41
17	Rubber and misc plastics	0.76
18	Leather	0.74
19	Stone, clay, glass	0.73
20	Primary metal	0.67
21	Fabricated metal	0.74
22	Machinery, non-electical	0.74
23	Electrical machinery	0.68
24	Motor vehicles	0.63
25	Transportation equipment and ordnance	0.87
26	Instruments	0.83
27	Misc. manufacturing	0.70
28	Transportation	0.67
29	Communications	0.44
30	Electric utilities	0.32
31	Gas utilities	0.34
32	Trade	0.77
33	Finance Insurance and Real Estate	0.34
34	Services	0.81
35	Government enterprises	0.59

Table 2: List of Sectors - Dale Jorgenson's KLEMS. Value added, 35 sectors.

Industry Title	CES Industry Code
Mining and logging	10-000000
Construction	20-000000
Durable goods	31-000000
Nondurable goods	32-000000
Wholesale trade	41-420000
Retail trade	42-000000
Transportation and warehousing	43-000000
Utilities	44-220000
Information	50-000000
Financial activities	55-000000
Professional and business services	60-000000
Education and health services	65-000000
Leisure and hospitality	70-000000
Other services	80-000000

Table 3: List of Sectors - Current Employment Statistics (CES). Employment, 14 sectors.

Industry Title	NAICS Industry Code
Mining	21
Electric power generation, transmission, and distribution	2211
Electric and gas utilities	2211,2
Natural gas distribution	2212
Food, beverage, and tobacco	311,2
Textiles and products	313,4
Apparel and leather goods	315,6
Wood product	321
Paper	322
Printing and related support activities	323
Petroleum and coal products	324
Chemical	325
Plastics and rubber products	326
Nonmetallic mineral product	327
Primary metal	331
Fabricated metal product	332
Machinery	333
Computer and electronic product	334
Electrical equipment, appliance, and component	335
Motor vehicles and parts	3361-3
Aerospace and miscellaneous transportation	3364-9
Furniture and related product	337
Miscellaneous	339

Table 4: List of Sectors - Industrial Production. Output, 23 sectors.

	SecDyn(35)	SecDyn(22)	SecDyn(15)	SecDyn(CES, 16)
mean(Index | recession)	0.134	0.158	0.225	0.199
mean(Index | expansion)	0.079	0.099	0.129	0.109
$\frac{mean(Index\|recession)}{mean(Index\|expansion)}$	1.7	1.6	1.7	1.8
corr(Index, growth)	-0.508	-0.600	-0.684	-0.681
corr(Index, growth)|recession	-0.345	-0.588	-0.615	-0.661
corr(Index, growth)|before 1990	-0.567	-0.640	-0.719	-0.770
corr(Index, growth)|after 1990	-0.663	-0.508	-0.544	-0.177
mean(Index pre 90s)	0.099	0.116	0.153	0.137
mean(Index post 90s)	0.072	0.106	0.144	0.113

Table 5: Summary Statistics. SecDyn(35), SecDyn(22), and SecDyn(15) correspond to the index of sectoral dynamics where the sectoral share is given by the sector's share of value added in total output. In SecDyn(CES, 16), the sectoral share is given by the sector's employment as a share of total employment. The numbers in parentheses correspond to the number of sectors. The time coverage for SecDyn(35) is 1960–2005; for SecDyn(22) and SecDyn(15) 1947–2010; and, for SecDyn(CES, 16) 1939–2013.

	$GDPgrowth \leq 0$	$CyclicalGDP \leq 0$	$CyclicalGDP \leq -sd/2$
correctly defined	81%	79%	87%
define recession | recession	45%	82%	73%
define expansion | expansion	100%	78%	95%

Table 6: Defining Phases in Business Cycles. The columns represent three alternative measures used in defining phases in business cycles. The figures correspond to the percent correctly defined. The (*correctly defined*) is given as a percentage of the total number of periods, 63 years (1948–2010). The (*define recession* | *recession*) and the (*define expansion* | *expansion*) are given as a percentage of the number of recession years (22) and expansion years (41), respectively.

	Historical Data	Simulation Data
mean(Index) | recession	0.158	0.144
mean(Index) | expansion	0.099	0.125
$\frac{mean(Index \mid recession)}{mean(Index \mid expansion}$	1.6	1.2
corr(Index, growth)	-0.600	-0.122
corr(Index, growth)|recession	-0.588	-0.543

Table 7: Comparing Simulation Results with Data. Historical data are from the BEA's Industry Accounts and are 22 sectors, value added, and the period 1947–2010. Simulation data are drawn to match the joint distribution of sectoral growth rates in the historical data.

Dependent Variable in Regression	Regressor	Prob >chi2
Sectoral dynamics	IP growth	0.000
IP growth	Sectoral dynamics	0.000

Table 8: Granger Causality Test. The entries show the p-values for F-tests that lags of the variable in the column *Regressor* do not enter the reduced-form equation for the variable in the column labeled *Dependent Variable*. The results were computed from a recursive VAR with 3 lags and over the 1972q1–2013q4 sample period.

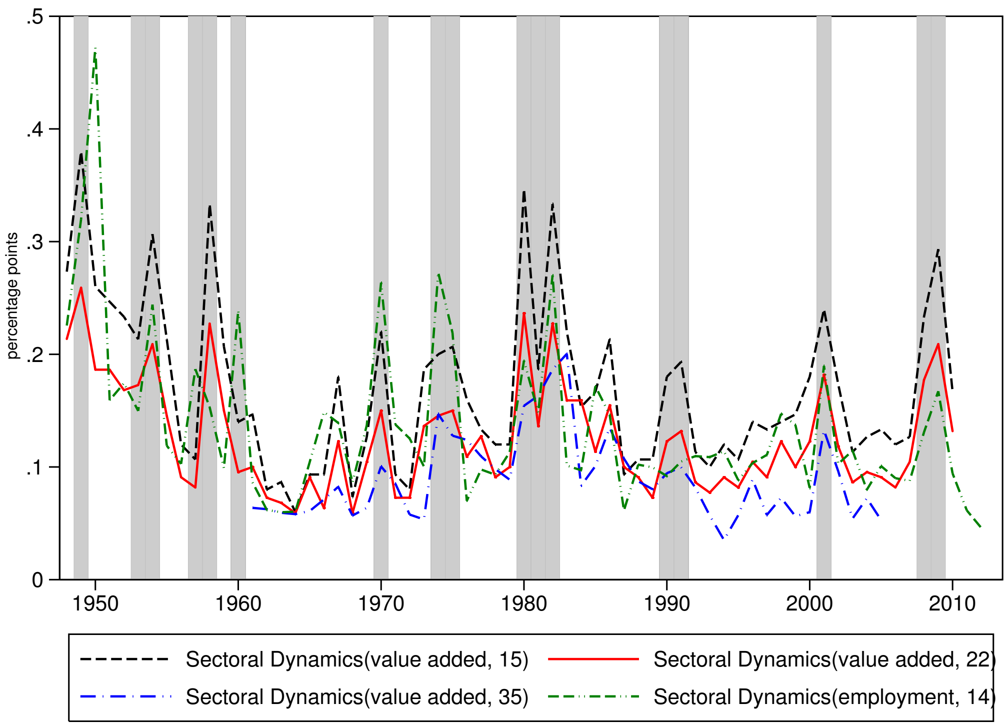

Figure 1: Index of Sectoral Dynamics. The numbers in parentheses correspond to the number of sectors.

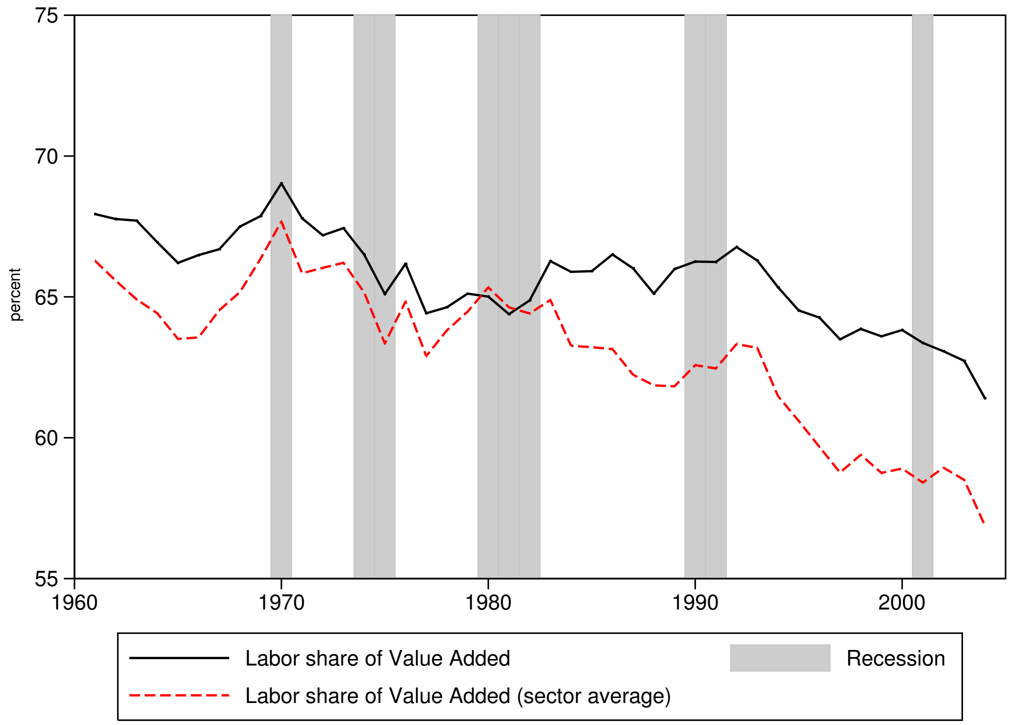

Figure 2: Labor Share.

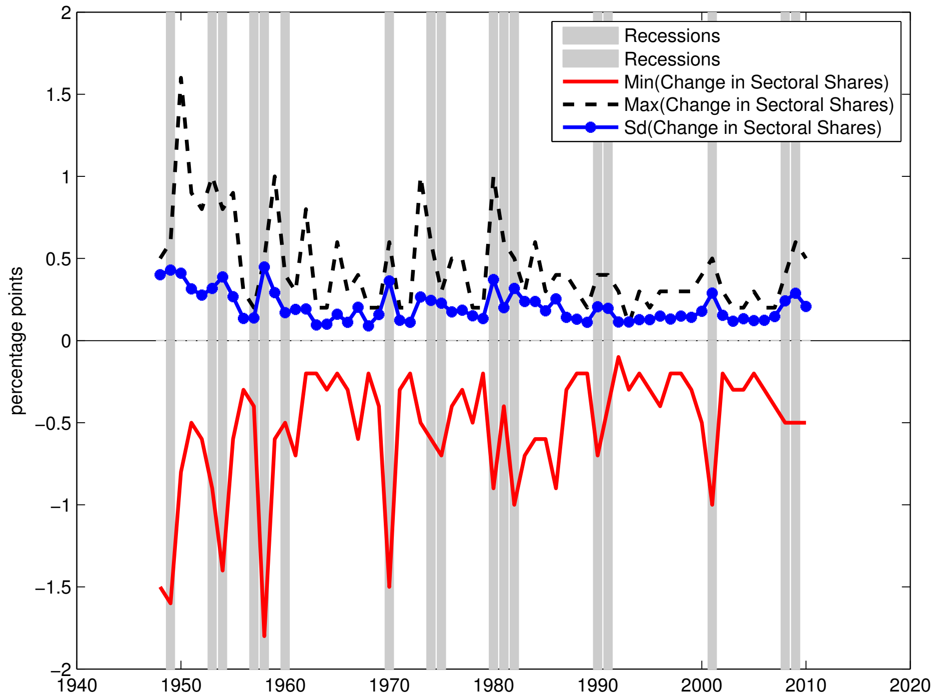

Figure 3: Range and Standard Deviation of the Change in Sectoral Share of GDP. BEA's Industry Accounts, 22-sector disaggregation.

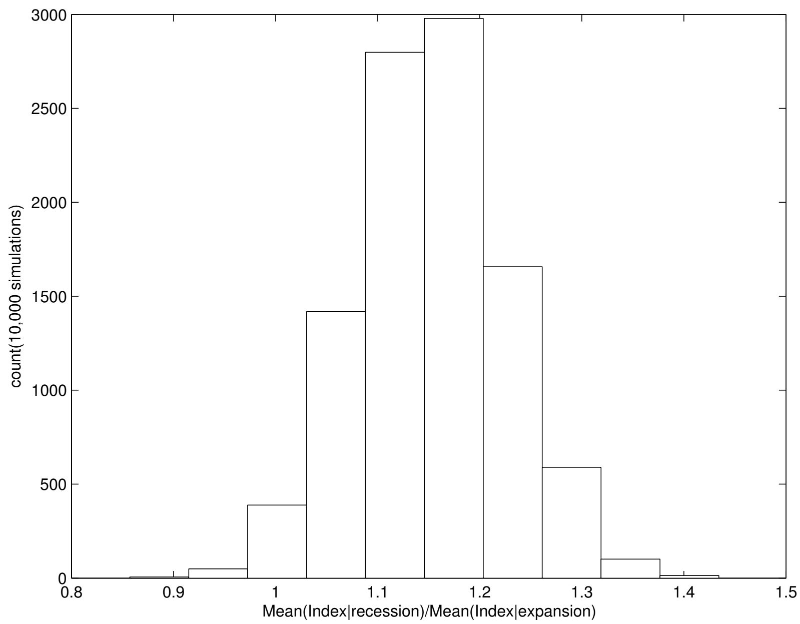

Figure 4: Simulation Results. Distribution of Mean(Index|recession)/Mean(Index|expansion) in the simulated data.

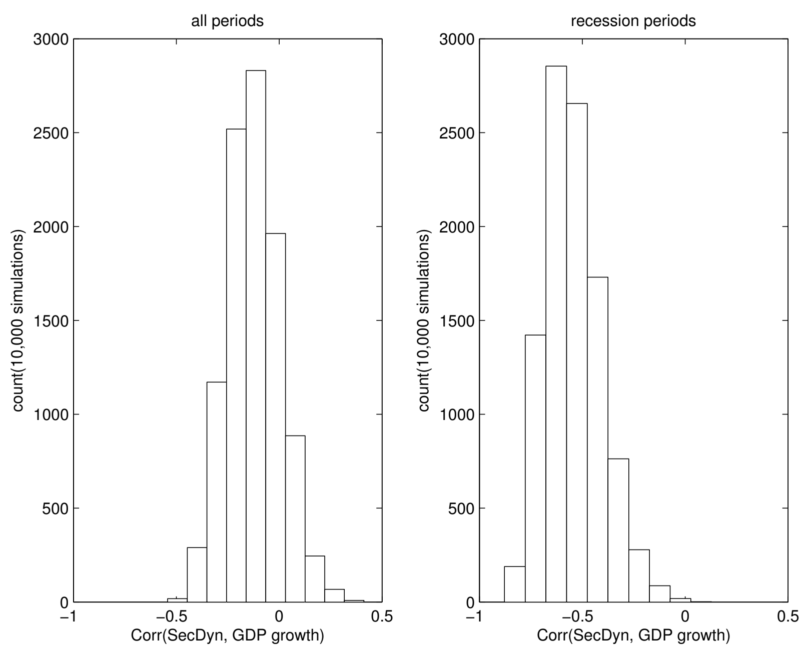

Figure 5: Simulation Results. Distribution of the correlation between sectoral dynamics and growth volatility in the simulated data.

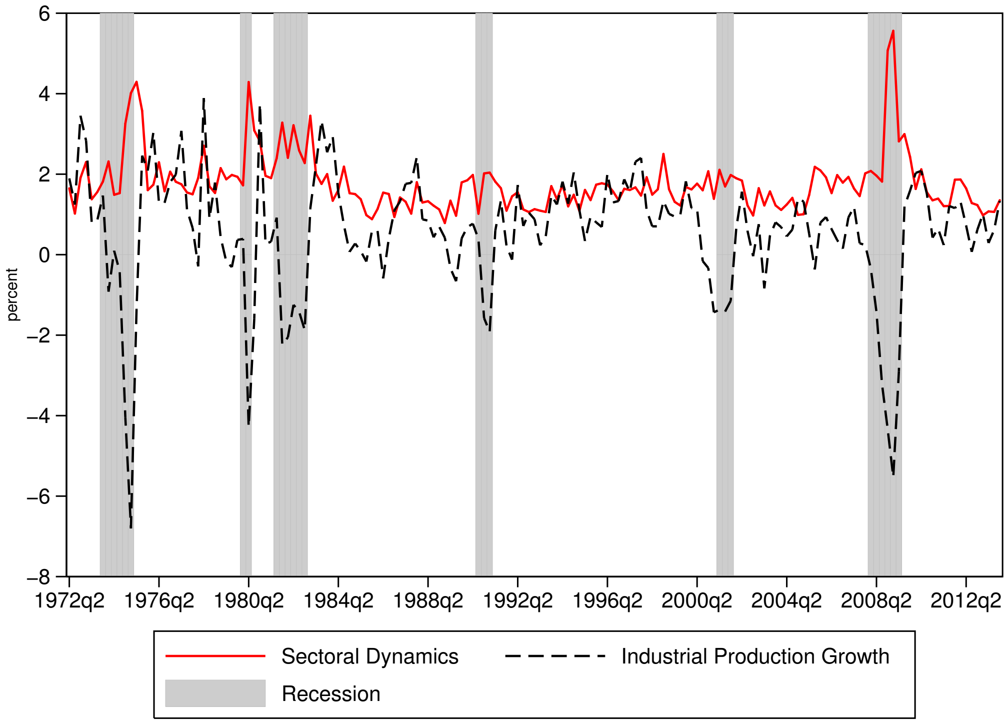

Figure 6: Sectoral Dynamics (Industrial Production).

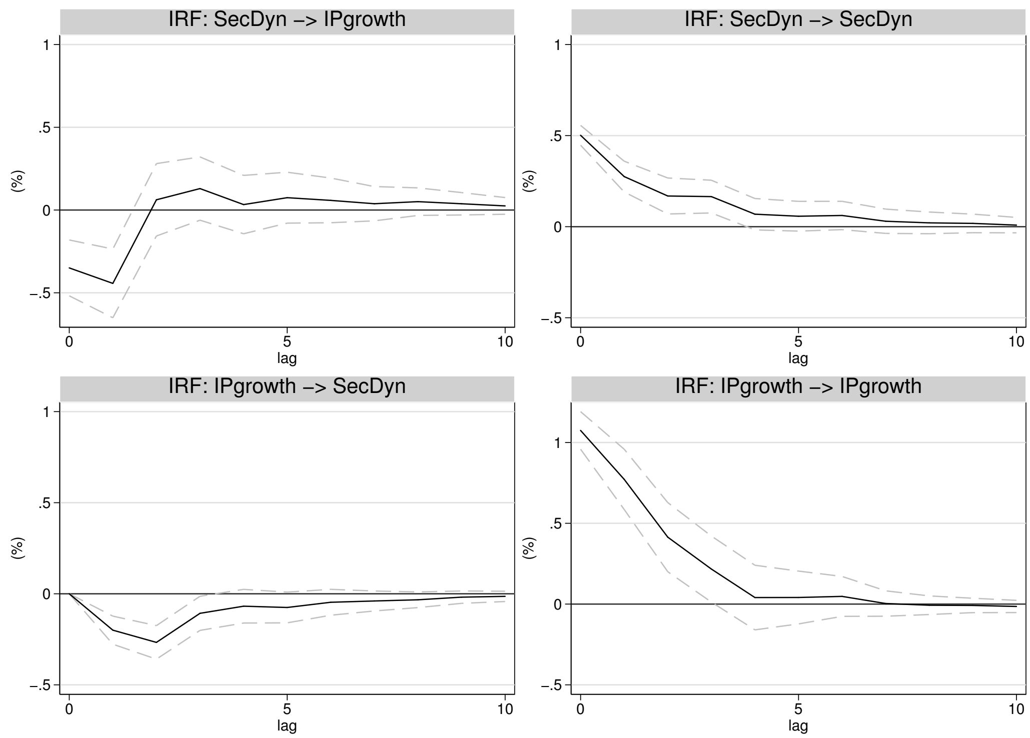

Figure 7: Impulse Responses. The results were computed from a recursive VAR with 3 lags and over the 1972q1–2013q4 sample period.

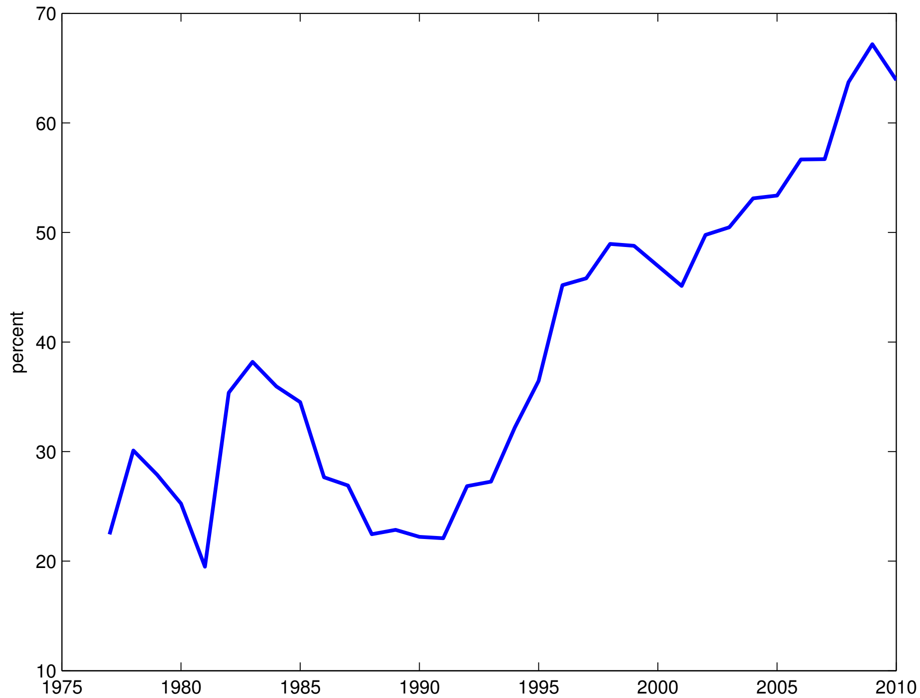

Figure 8: Contribution of Sectoral Changes to GDP Growth Volatility. This figure plots the R^2 from the regression $sigma_{GDP,t} = \beta_0 + \beta 1 SecDyn_t + u_t$, where $sigma_{GDP,t}$ denotes the instantaneous GDP growth volatility.