Introduction to Macro Data

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Contents

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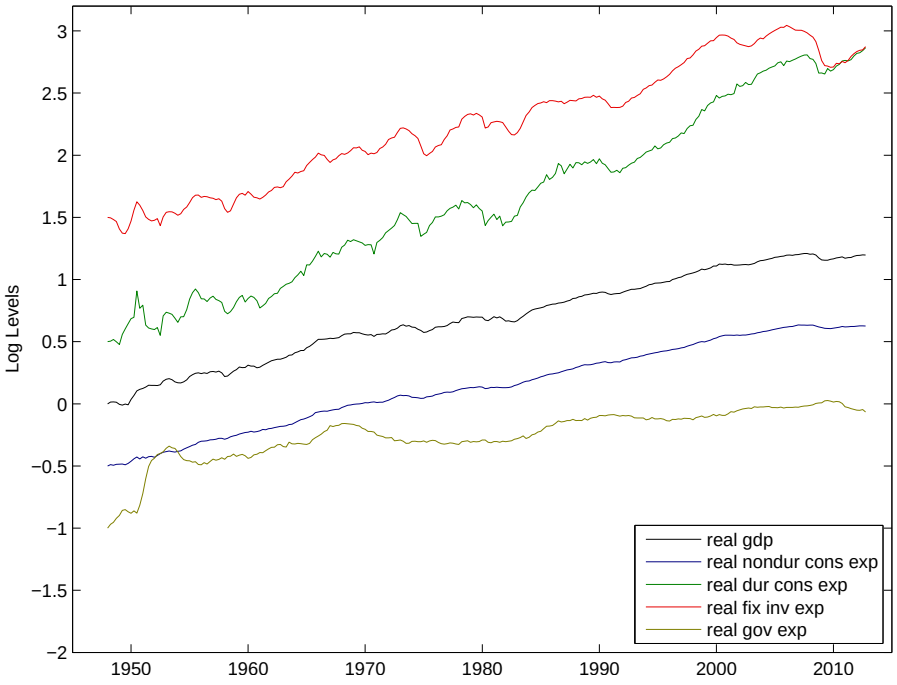
Figure 1: Real Per Capita Expenditures



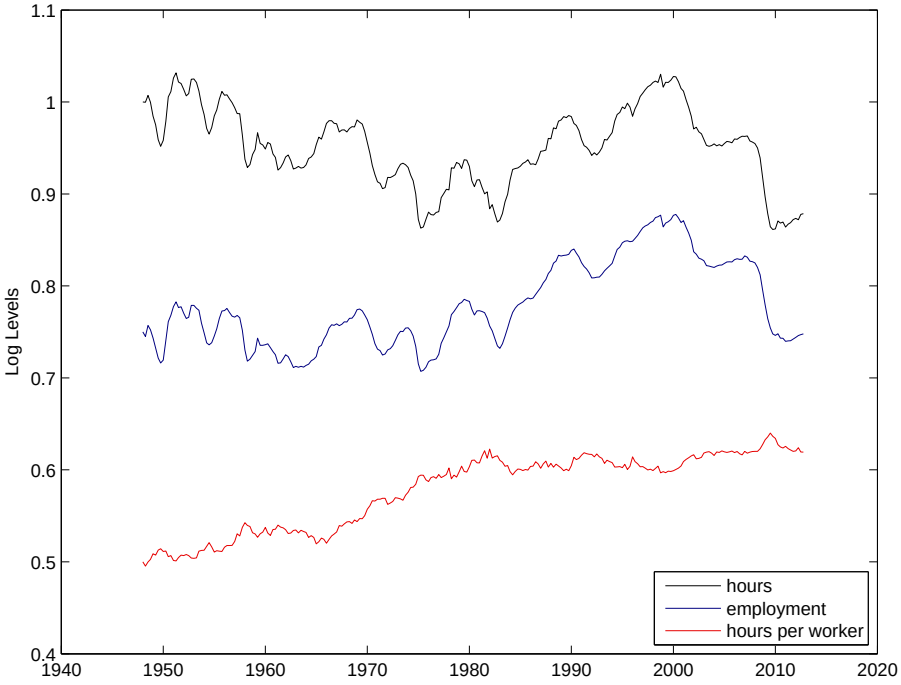
1 US Data

Figure 1 plots time series for per capita (adult) real output, per capita real consumption, per capita investment and per capita hours worked for the US over the sample 1948Q1:2012Q4.[1] Note that there is trend growth in output, consumption and investment. At shorter frequencies the output series display recurrent and large fluctuations about its trend known as *business cycles*. Moreover, the other time series seem to comove with the output series. The objective of many macro models is to generate endogenous dynamic behavior conditional on exogenous factors that resemble the behavior of the empirical time series, either at long run frequencies, short run frequencies or both.

Because many macroeconomic time series display trend growth, it is not immediately obvious what the cyclical properties of the data are. Many business cycle models generate cyclical variability in response to *transitory* exogenous events. To make a comparison of the model dynamics with the cyclical properties of the empirical data, we need a procedure, a detrending method, to extract the cyclical component of the actual time series. However,

[1] You can download an excel file with the data on the course website.

Figure 2: Employment and Hours



there are many economic models that generate variability by incorporating both *transitory* and *permanent* exogenous events. In such cases, some of the trend-cycle decompositions may be inappropriate.

The data in Figures 1 and 2 are based on the following sources

> Bureau of Economic Analysis, National Income and Product Accounts (NIPA Tables) http://www.bea.gov/iTable/index_nipa.cfm. For more background on the national accounts, see http://www.bea.gov/methodologies/.
>
> Bureau of Labor Statistics, http://www.bls.gov/.
>
> Data from Francis and Ramey (2009), updated files at http://www.econ.ucsd.edu/~vramey/research.html.

Measuring Real Quantities and Prices in NIPA Gross domestic product (GDP), as measured by the sum of the final expenditures components, and the major expenditure components in current dollars are in NIPA Table 1.1.5. Note that all the series are already seasonally adjusted.

Table 1: **Current Dollars (NIPA Table 1.1.5)**

Line			More detail
1	**Gross domestic product**	2 + 7 + 15 +22	
2	**Personal consumption expenditures**	3+4	NIPA Table 2.3.5
3	Goods	4+5	
4	Durable goods		
5	Nondurable goods		
6	Services		
7	**Gross private domestic investment**	8+14	
8	Fixed investment	9 +13	NIPA Table 5.3.5
9	Nonresidential	10+11+12	
10	Structures		
11	Equipment		
12	Intellectual property products		
13	Residential		
14	Change in private inventories		
15	**Net exports of goods and services**	16-19	NIPA Table 4.2.5
16	Exports	17+18	
17	Goods		
18	Services		
19	Imports	20+21	
20	Goods		
21	Services		
22	**Government consumption exp. and gross inv.**	23+26	NIPA Table 3.9.5
23	Federal	24+25	
24	National defense		
25	Nondefense		
26	State and local		

Aggregate real quantity indices q_t^{index} are computed using prices $P_t(i)$ and current dollar amounts $P_t(i)q_t(i)$ as chained indices based on the Fisher index formula,

$$q_t^{\text{index}} = q_{t-1}^{\text{index}} \sqrt{\left(\frac{\sum_{i=1}^n P_t(i)q_t(i)}{\sum_{i=1}^n P_t(i)q_{t-1}(i)}\right)\left(\frac{\sum_{i=1}^n P_{t-1}(i)q_t(i)}{\sum_{i=1}^n P_{t-1}(i)q_{t-1}(i)}\right)} \qquad \text{(Table 1.1.3)}$$

with the value for some base period fixed to 100. Currently the base year is 2009. Chained price indices P_t^{index} are computed as

$$P_t^{\text{index}} = P_{t-1}^{\text{index}} \sqrt{\left(\frac{\sum_{i=1}^n P_t(i)q_t(i)}{\sum_{i=1}^n P_{t-1}(i)q_t(i)}\right)\left(\frac{\sum_{i=1}^n P_t(i)q_{t-1}(i)}{\sum_{i=1}^n P_{t-1}(i)q_{t-1}(i)}\right)} \qquad \text{(Table 1.1.4)}$$

with the value for some base period fixed to 100. The quantity indices for GDP and the main expenditure components are in NIPA Table 1.1.3 and the price indices are in NIPA Table 1.1.4.

Current-dollar (nominal) aggregates for GDP and the main expenditure components are,

$$Q_t^{\text{current\$}} = \sum_{i=1}^{n} P_t(i) q_t(i) \qquad \text{(NIPA Table 1.1.5)}$$

The chained-dollar value $q_t^{\text{chain\$}}$ is calculated by multiplying the quantity index by the base-period current-dollar value and dividing by 100, i.e.

$$q_t^{\text{chain\$}} = q_t^{\text{index}} \times Q_{2009}^{\text{current\$}}/100 \qquad \text{(NIPA Table 1.1.6)}$$

Finally, the implicit price deflators are alternative measures of aggregate nominal price levels. These deflators are defined as as the ratio of the current-dollar value to the corresponding chained-dollar value times 100:

$$P_t^{IPD} = Q_t^{\text{current\$}}/q_t^{\text{chain\$}} \times 100 \qquad \text{(NIPA Table 1.1.9)}$$

The implicit price deflators P_t^{IPD} and the price indices P_t^{index} are typically very similar.

Obtaining measures of real quantities that are comparable to model generated data often requires summing or subtracting different expenditure components. For instance, the measure of nondurable consumption in Figure 1 is based on the sum of expenditures on nondurable goods and services. Unlike the current dollar values, adding up chained real measures can be misleading when there are important relative price changes, see Whelan (2002). In principle, a new measure must be computed by re-aggregating over all subcomponents according to the formulas above. Unfortunately, most researchers do not have access the detailed data underlying the aggregates. However, a good approximation can usually be found by chain-adding the aggregate data. For instance, suppose we want a real measure of the sum of components X and Y, i.e. q_t^{X+Y}, based on current value data from Table 1.1.5 and price indices P_t^X and P_t^Y from Table 1.1.4. Rather than approximating by

$q_t^X + q_t^Y$, a better procedure is chain-adding:

$$q_t^{X+Y} = q_t^X \overset{\text{chain}}{+} q_t^Y = q_{t-1}^{X+Y} \sqrt{\left(\frac{P_t^X q_t^X + P_t^Y q_t^Y}{P_t^X q_{t-1}^X + P_t^Y q_{t-1}^Y}\right)\left(\frac{P_{t-1}^X q_t^X + P_{t-1}^Y q_t^Y}{P_{t-1}^X q_{t-1}^X + P_{t-1}^Y q_{t-1}^Y}\right)} \quad \text{(Chain-Adding)}$$

with the value for some base period fixed to 100.

Population and Labor Supply Data on population, hours worked and employment is available from the Bureau of Labor Statistics. More comprehensive measures that also include the government sector require additional data that is not readily available from the BLS website, but can be found in appendix to Francis and Ramey (2009). **Total Population** is the sum of the total civilian noninstitutional population age 16 and over (BLS series ID LNS10000000, quarterly average of monthly data) and total employed in the armed forces from Francis and Ramey (2009). **Total hours** and **total employment** are also from Francis and Ramey (2009).

The series in Figure 1 are the log of ratios of quantity indices divided by total population. Hours and employment in Figure 2 are also in logs after dividing by total population. Hours per worker is the log of the hours-employment ratio.

2 Detrending and filtering

Time series such as real output y_t (real GDP per capita) can be thought of as consisting of a cyclical component y_t^c and a trend component y_t^x, i.e.

$$y_t = y_t^x + y_t^c$$

There are numerous ways to separate y_t^c from y_t^x.[2] The terms *detrending* and *filtering* are often used interchangeably to describe this separation, but are distinct procedures. Detrending is the process of making economic series *(covariance) stationary*, which is necessary for instance to compute second moments. Filtering is a much broader concept. A *filter* is an operator that removes movements at particular frequencies. Business cycles have frequencies corresponding to cycles of 6 to 32 quarters, which is in the range of the business cycle periodicity reported by the NBER and CEPR. A filter that extracts movements at these frequencies therefore extracts the cyclical movements of interest.

2.1 The Growth Rate

It is possible to assume that the growth rate of y_t captures the cyclical component:

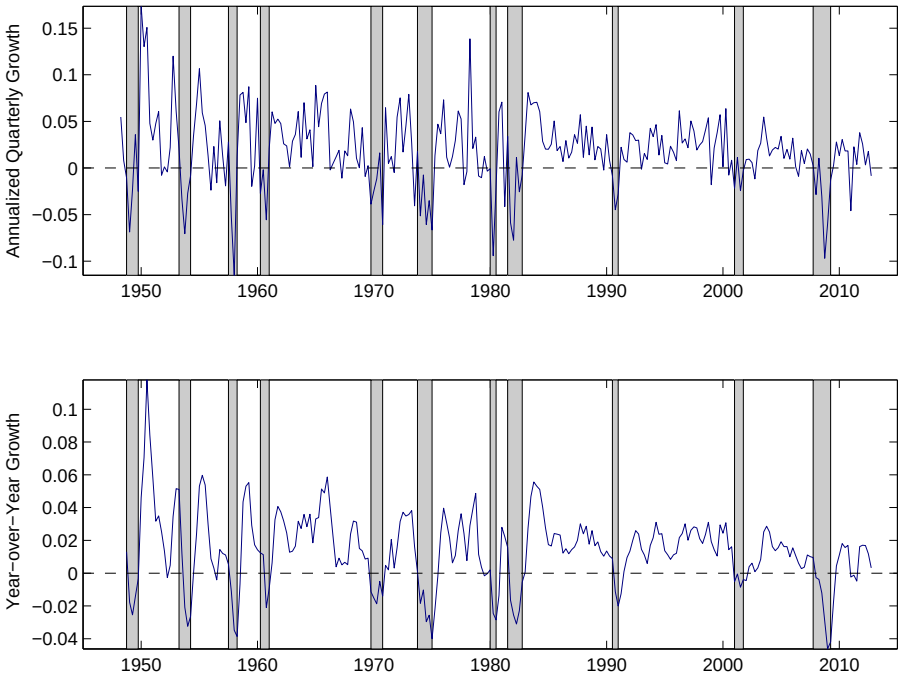
$$y_t^c = \Delta y_t \qquad y_t^x = y_{t-1}$$

Figures 1 and 2 show annualized quarterly growth as well as year-over-year growth in real GDP per capita. The shaded areas denote NBER-dated recessions.[3]

[2] See Canova (2007, Ch. 3) for an overview.

[3] NBER Business Cycle Dates are available at http://www.nber.org/cycles.html

Figure 3: Growth US Real GDP per capita



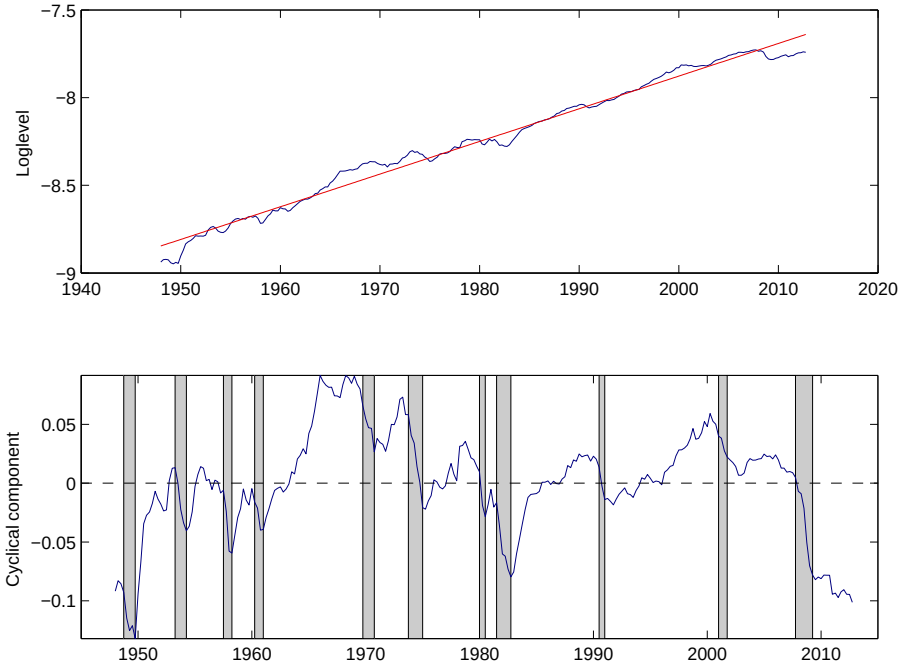
2.2 Deterministic Detrending

A trend of a time series can be taken to be deterministic and the cyclical component is then measured as the residual of a regression of y_t on polynomials in time.

$$y_t = a_0 + \sum_{j=1}^{J} a_j t^j + y_t^c \ , \qquad Corr(y_t^x, y_t^c) = 0$$

The a's and the residual y_t^c can be easily estimated by OLS. Figure 4 shows the case of a simple linear trend $J = 1$.

Figure 4: US Real GDP per capita: linear deterministic trend



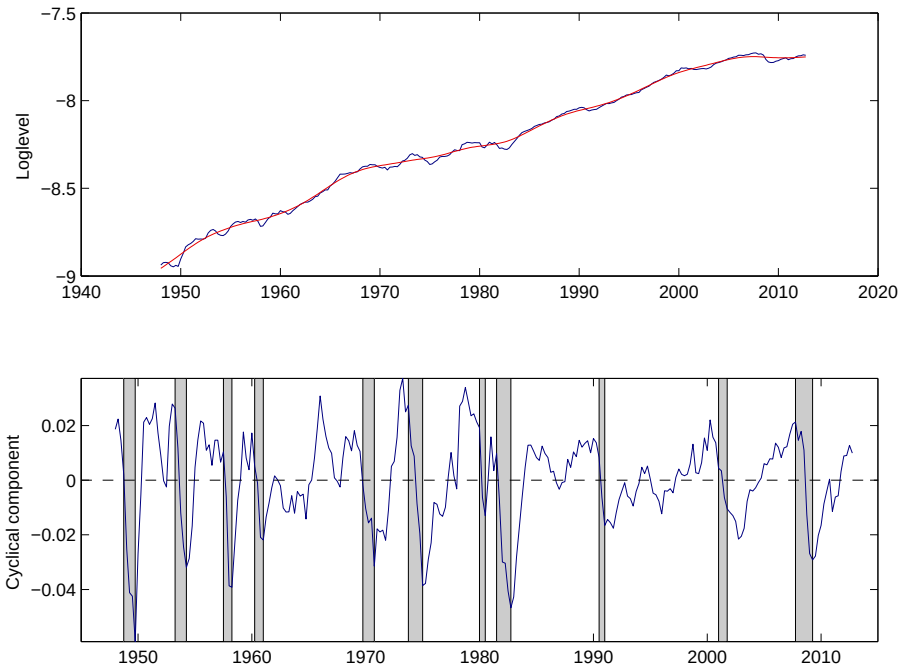
2.3 Hodrick-Prescott filter

The Hodrick-Prescott (HP) filter is one of the most popular methods to extract cyclical components. First, trend and cycle are assumed to be uncorrelated. Second, the trend is a smooth process, which is made operational by penalizing variations in the second difference of the trend:

$$\min_{y_t^x} \left\{ \sum_{t=0}^{T} (y_t - y_t^x)^2 + \lambda \sum_{t=2}^{T-1} \left((y_{t+1}^x - y_t^x) - (y_t^x - y_{t-1}^x) \right)^2 \right\}$$

As λ increases the trend becomes smoother and for $\lambda \to \infty$ it becomes linear. The literature typically selects the value of λ a priori to carve out particular frequencies. For quarterly US data, $\lambda = 1600$ is typically chosen, which implies that cycles longer than six to seven years are attributed to the trend. Note that for other data frequencies and sometimes also for other countries, the value of λ has to be adjusted, see Ravn and Uhlig (2002).

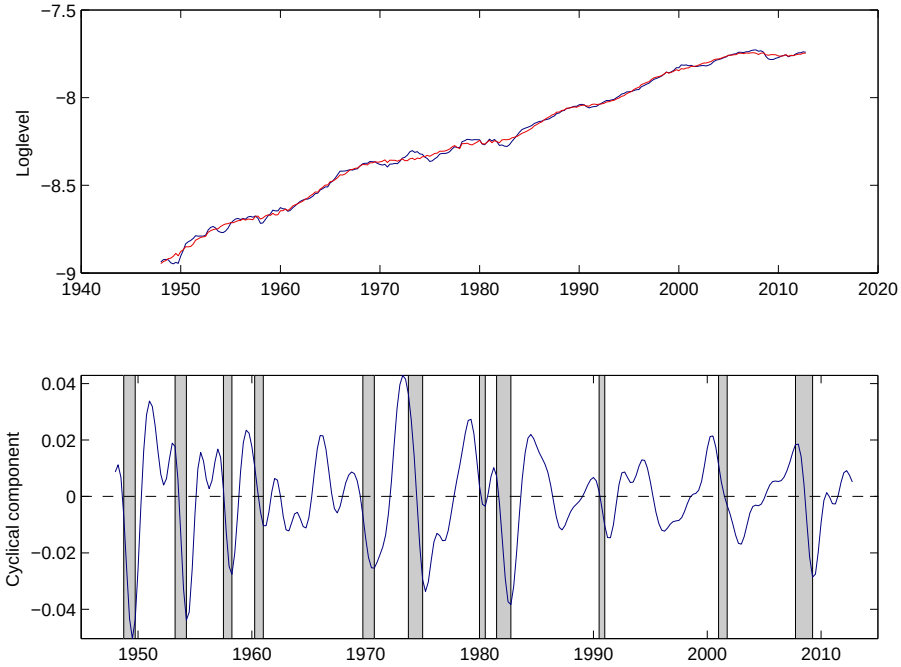
Figure 5: US Real GDP per capita: HP filter



2.4 Other Methods

The *Beveridge and Nelson (1981) decomposition* assumes a stochastic trend and that the long-run forecast is a measure of the trend. If y_t is stationary in first differences, the BN decomposition yields a trend that follows a unit root and a stationary cyclical component. The *regime shifting decomposition* of Hamilton (1989) assumes that the trend is regime specific, that the trend is deterministic within a regime, but that regime itself is stochastically varying over time. The *exponential smoothing filter* is very similar to the HP filter, but penalizes the changes in the trend instead of the acceleration of the trend. *Moving average filters* are based on average of a specified number of leads and/or lags. Most of these filters remove the low frequencies, but leave the high frequencies (they are *high pass* filters). *Band pass filters* eliminate both the high and low frequency movements from the data, see Christiano and Fitzgerald (2003).

Figure 6: US Real GDP per capita: Band-pass filter



3 Stylized Facts

Let's list some basic stylized facts that characterize the behavior of the main economic aggregates in the US, although most also extend to other industrialized countries.[4] Good overviews of the basic facts are Stock and Watson (1999) and King and Rebelo (1999). The facts listed here concern a restricted set of real variables. The cyclical behavior of monetary aggregates, inflation, wages, interest rates and other variables will be discussed later in the course.

King and Rebelo (1999) include the following facts:

Some Stylized facts of Economic Growth

- The shares of the income components (labor and capital) are relatively constant, although there has been a slight gradual decline of the labor share since the early 1980s.
- The investment-output and the consumption-output ratios are roughly constant, al-

[4] See Backus and Kehoe (1982) for international evidence on the properties of business cycles.

though there has been a slight rise in the US consumption-output ratio over time.

- The constancy of these "great ratios" implies that many series have similar growth rates.
- Measures of labor input per person are also relatively constant.

Some Stylized facts of Business Cycles

Volatility:

- Consumption of non-durables is less volatile than output.
- Consumer durables purchases are much more volatile than output.
- Investment is much more volatile than output.
- Government expenditures are less volatile than output.
- Total hours worked has about the same volatility as output.
- Employment is as volatile as output, while hours per worker are much less volatile than output, so that most of the cyclical variation in total hours worked stems from changes in employment.

Comovement:

- Most of these macroeconomic aggregates are procyclical, i.e. they exhibit a positive contemporaneous correlation with output. One exception is government expenditures.
- The correlation between output and total hours is high and positive.

Persistence:

- The macroeconomic aggregates display substantial persistence, i.e the first-order serial correlation for the cyclical components is usually high with linear-detrending or hp-filtering, and also positive for growth rates.

Always keep in mind that stylized facts are sometimes sensitive to the method of detrending or filtering and on the precise time series and sample used.

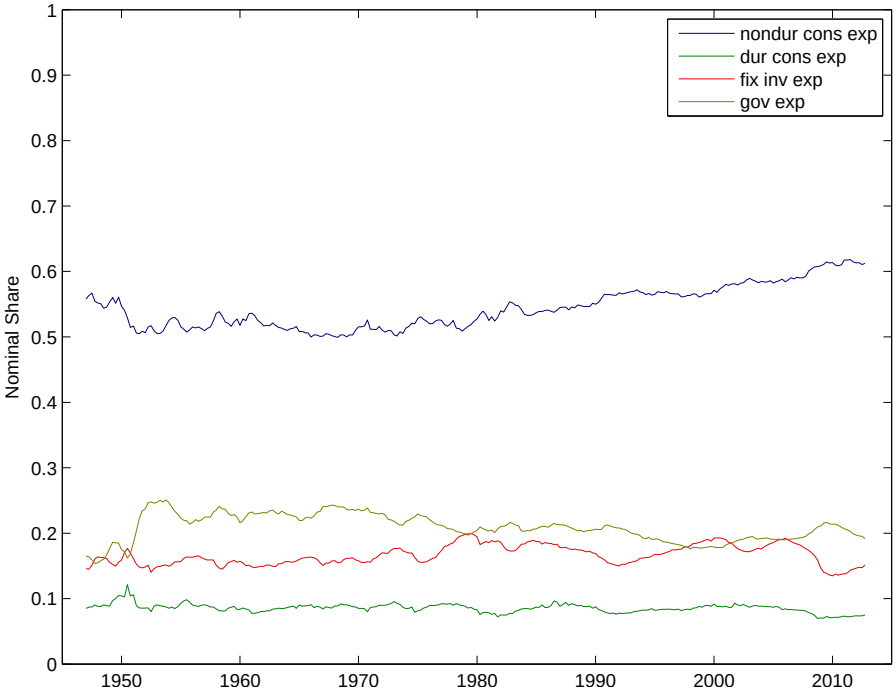


Figure 7: Expenditures as nominal shares of GDP

Descriptive statistics for cyclical components of series, 1953–1996

Series	Std dev.	Cross correlations with output (corr(x_t, y_{t+k}))												
		−6	−5	−4	−3	−2	−1	0	1	2	3	4	5	6
Gross Domestic Product	1.66	−0.29	−0.18	0.03	0.33	0.66	0.91	1.00	0.91	0.66	0.33	0.03	−0.18	−0.29
Sectoral employment														
1. Contract and construction employment	3.75	0.02	0.20	0.39	0.58	0.73	0.80	0.77	0.65	0.44	0.19	−0.04	−0.23	−0.35
2. Manufacturing employment	2.61	−0.06	0.14	0.40	0.67	0.87	0.94	0.84	0.59	0.26	−0.06	−0.30	−0.43	−0.45
3. Finance, insurance and real estate employment	1.01	0.25	0.35	0.43	0.49	0.50	0.46	0.38	0.28	0.15	0.02	−0.10	−0.20	−0.28
4. Mining employment	3.79	0.13	0.19	0.25	0.28	0.25	0.16	−0.00	−0.20	−0.40	−0.53	−0.58	−0.55	−0.45
5. Government employment	0.82	0.51	0.53	0.49	0.43	0.35	0.29	0.23	0.15	0.04	−0.08	−0.21	−0.31	−0.37
6. Service employment	0.83	0.20	0.33	0.49	0.63	0.71	0.69	0.55	0.34	0.08	−0.15	−0.33	−0.44	−0.50
7. Wholesale and retail trade employment	1.20	−0.01	0.21	0.45	0.68	0.83	0.87	0.79	0.60	0.35	0.10	−0.10	−0.24	−0.32
8. Transportation and public utility employment	1.54	0.23	0.42	0.61	0.77	0.83	0.76	0.56	0.26	−0.06	−0.33	−0.49	−0.53	−0.50
NIPA components														
9. Consumption (total)	1.26	−0.39	−0.28	−0.07	0.21	0.51	0.76	0.90	0.89	0.75	0.53	0.29	0.09	−0.06
10. Consumption (nondurables)	1.11	−0.36	−0.24	−0.02	0.25	0.52	0.74	0.83	0.80	0.65	0.43	0.21	0.02	−0.12
11. Consumption (services)	0.64	−0.13	−0.00	0.14	0.31	0.49	0.66	0.78	0.80	0.70	0.51	0.27	0.05	−0.12
12. Consumption (nondurables + services)	0.78	−0.28	−0.15	0.05	0.29	0.55	0.75	0.87	0.85	0.71	0.49	0.25	0.03	−0.13
13. Consumption (durables)	4.66	−0.46	−0.38	−0.19	0.09	0.42	0.70	0.85	0.86	0.73	0.53	0.32	0.15	0.03
14. Investment (total fixed)	4.97	−0.34	−0.19	0.04	0.32	0.61	0.82	0.89	0.83	0.65	0.41	0.18	−0.00	−0.13
15. Investment (equipment)	5.25	−0.06	0.16	0.41	0.65	0.84	0.92	0.88	0.73	0.49	0.23	−0.01	−0.20	−0.31
16. Investment (nonresidential structures)	4.67	0.20	0.40	0.58	0.70	0.74	0.67	0.52	0.30	0.07	−0.14	−0.30	−0.40	−0.44
17. Investment (residential structures)	10.04	−0.49	−0.48	−0.37	−0.18	0.09	0.38	0.62	0.77	0.78	0.69	0.53	0.36	0.20
18. Change in bus. inventories (rel. to trend GDP)	0.38	−0.58	−0.50	−0.32	−0.04	0.28	0.57	0.73	0.72	0.56	0.32	0.08	−0.08	−0.15

Series	Std dev.	Cross correlations with output (corr(x_t, y_{t+k}))												
		−6	−5	−4	−3	−2	−1	0	1	2	3	4	5	6
19. Exports	4.76	0.33	0.42	0.47	0.50	0.48	0.40	0.27	0.09	−0.11	−0.29	−0.43	−0.50	−0.51
20. Imports	4.42	−0.45	−0.28	−0.03	0.27	0.54	0.72	0.78	0.70	0.53	0.34	0.17	0.05	−0.02
21. Trade balance (relative to trend GDP)	0.38	0.54	0.45	0.30	0.10	−0.11	−0.29	−0.42	−0.48	−0.49	−0.48	−0.45	−0.41	−0.35
22. Government purchases	2.49	0.30	0.25	0.22	0.21	0.21	0.19	0.15	0.03	−0.10	−0.20	−0.23	−0.19	−0.09
23. Government purchases (defense)	4.66	0.21	0.18	0.15	0.14	0.12	0.09	0.05	−0.06	−0.18	−0.26	−0.27	−0.20	−0.08
24. Government purchases (non-defense)	1.35	0.21	0.12	0.07	0.08	0.13	0.19	0.22	0.23	0.21	0.18	0.13	0.08	0.01
Aggregate employment, productivity and utilization														
25. Employment (total employees)	1.39	0.07	0.26	0.49	0.72	0.89	0.92	0.81	0.57	0.24	−0.07	−0.31	−0.44	−0.49
26. Employment (total hours)	1.61	−0.06	0.13	0.37	0.63	0.85	0.94	0.88	0.67	0.36	0.03	−0.23	−0.39	−0.45
27. Employment (average weekly hours)	0.37	−0.51	−0.44	−0.24	0.05	0.38	0.66	0.82	0.80	0.64	0.40	0.16	−0.03	−0.15
28. Unemployment rate	0.76	0.13	−0.03	−0.27	−0.55	−0.80	−0.93	−0.89	−0.69	−0.39	−0.07	0.19	0.33	0.37
29. Vacancies (Help Wanted index)	14.52	−0.25	−0.09	0.15	0.43	0.71	0.89	0.93	0.80	0.54	0.23	−0.06	−0.26	−0.38
30. New Unemployment claims	13.19	0.47	0.43	0.27	−0.00	−0.35	−0.67	−0.86	−0.87	−0.71	−0.43	−0.14	0.08	0.21
31. Capacity utilization	3.07	−0.37	−0.23	0.01	0.31	0.63	0.86	0.93	0.83	0.59	0.29	0.02	−0.16	−0.25
32. Total factor productivity	2.29	−0.54	−0.46	−0.29	−0.03	0.27	0.56	0.77	0.86	0.82	0.68	0.50	0.31	0.16
33. Average labor productivity	1.05	−0.49	−0.60	−0.58	−0.41	−0.11	0.24	0.53	0.70	0.72	0.62	0.47	0.32	0.21
Prices and wages														
34. Consumer price index (level)	1.35	0.34	0.24	0.12	−0.04	−0.21	−0.38	−0.51	−0.62	−0.68	−0.67	−0.59	−0.48	−0.34
35. Producer price index (level)	2.26	0.36	0.33	0.27	0.18	0.05	−0.09	−0.24	−0.37	−0.47	−0.54	−0.56	−0.55	−0.50
36. Oil prices	11.12	0.22	0.16	0.09	0.01	−0.08	−0.17	−0.26	−0.35	−0.41	−0.44	−0.42	−0.36	−0.28
37. GDP price deflator (level)	0.91	0.23	0.12	−0.02	−0.18	−0.33	−0.46	−0.54	−0.60	−0.61	−0.59	−0.52	−0.42	−0.30

source: Stock and Watson (1999)

Series	Std dev.	Cross correlations with output (corr(x_t, y_{t+k}))												
		−6	−5	−4	−3	−2	−1	0	1	2	3	4	5	
38. Commodity price index (level)	7.43	0.18	0.28	0.36	0.41	0.41	0.38	0.30	0.18	0.04	−0.11	−0.26	−0.36	–
39. Consumer price index (inflation rate)	1.44	0.34	0.47	0.58	0.64	0.62	0.52	0.35	0.14	−0.08	−0.27	−0.40	−0.48	–
40. Producer price index (inflation rate)	2.64	0.10	0.21	0.33	0.43	0.49	0.49	0.43	0.34	0.21	0.07	−0.05	−0.17	–
41. GDP price deflator (inflation rate)	0.96	0.45	0.55	0.61	0.58	0.48	0.32	0.15	−0.01	−0.14	−0.25	−0.34	−0.41	–
42. Commodity price index (inflation rate)	10.55	−0.28	−0.23	−0.15	−0.03	0.09	0.22	0.33	0.41	0.44	0.39	0.28	0.14	–
43. Nominal wage rate (level)	0.94	0.22	0.13	0.02	−0.09	−0.21	−0.34	−0.45	−0.56	−0.62	−0.62	−0.54	−0.42	–
44. Real wage rate (level)	0.64	−0.16	−0.13	−0.07	0.00	0.08	0.14	0.16	0.14	0.10	0.07	0.05	0.05	
45. Nominal wage rate (rate of change)	1.14	0.31	0.35	0.38	0.41	0.42	0.38	0.29	0.14	−0.05	−0.24	−0.39	−0.47	–
46. Real wage rate (rate of change)	1.10	−0.05	−0.13	−0.18	−0.18	−0.13	−0.05	0.04	0.08	0.08	0.04	−0.00	−0.04	–
Interest rates and stock prices														
47. Federal funds rate	1.47	0.26	0.38	0.50	0.60	0.63	0.56	0.38	0.13	−0.16	−0.41	−0.60	−0.69	–
48. Treasury Bill rate (3 month)	1.09	0.20	0.29	0.40	0.50	0.57	0.54	0.41	0.18	−0.10	−0.38	−0.58	−0.69	–
49. Treasury Bond rate (10 year)	0.71	0.03	0.03	0.07	0.13	0.17	0.16	0.08	−0.07	−0.24	−0.39	−0.49	−0.52	–
50. Real Treasury Bill rate (3 month)	0.71	−0.02	−0.04	−0.05	−0.07	−0.12	−0.19	−0.28	−0.35	−0.38	−0.36	−0.29	−0.20	–
51. Yield curve spread (long–short)	0.76	−0.29	−0.40	−0.52	−0.61	−0.66	−0.64	−0.52	−0.32	−0.07	0.17	0.38	0.52	
52. Commercial paper/Treasury Bill spread	0.32	0.44	0.58	0.66	0.65	0.54	0.33	0.06	−0.20	−0.41	−0.53	−0.54	−0.49	–
53. Stock prices	8.28	−0.23	−0.32	−0.35	−0.28	−0.12	0.10	0.34	0.51	0.57	0.49	0.32	0.11	–
Money														
54. Money stock (M2, nominal level)	1.48	−0.39	−0.35	−0.27	−0.15	0.03	0.22	0.39	0.53	0.59	0.58	0.51	0.40	
55. Monetary base (nominal level)	1.12	−0.06	−0.05	−0.03	0.01	0.07	0.13	0.18	0.19	0.18	0.16	0.13	0.10	
56. Money stock (M2, real level)	2.00	−0.39	−0.30	−0.17	0.00	0.20	0.40	0.57	0.69	0.73	0.71	0.62	0.49	

Series	Std dev.	Cross correlations with output (corr(x_t, y_{t+k}))												
		−6	−5	−4	−3	−2	−1	0	1	2	3	4	5	6
57. Monetary base (real level)	1.53	−0.18	−0.11	−0.01	0.12	0.25	0.36	0.45	0.49	0.50	0.46	0.40	0.32	0.23
58. Money stock (M2, nominal rate of change)	2.07	−0.08	−0.22	−0.36	−0.48	−0.54	−0.50	−0.38	−0.19	0.01	0.19	0.31	0.37	0.38
59. Monetary base (nominal rate of change)	1.38	−0.01	−0.07	−0.14	−0.18	−0.19	−0.16	−0.08	−0.01	0.05	0.10	0.14	0.17	0.18
60. Consumer credit	3.29	0.30	0.50	0.67	0.75	0.74	0.63	0.46	0.25	0.06	−0.08	−0.15	−0.18	−0.18
Miscellaneous leading indicators														
61. Consumer expectations	9.15	−0.61	−0.64	−0.59	−0.46	−0.25	0.00	0.25	0.44	0.54	0.53	0.44	0.32	0.20
62. Building permits	16.19	−0.51	−0.54	−0.51	−0.41	−0.21	0.07	0.36	0.60	0.74	0.75	0.67	0.52	0.36
63. Vendor performance	10.87	−0.40	−0.40	−0.32	−0.14	0.09	0.34	0.53	0.61	0.58	0.43	0.23	0.04	−0.11
64. Mfrs' unfilled orders, durable goods industry	6.73	0.48	0.60	0.69	0.72	0.70	0.61	0.47	0.28	0.06	−0.15	−0.32	−0.45	−0.50
65. Mfrs' new orders, non-defense capital goods	8.11	−0.09	0.09	0.30	0.53	0.72	0.83	0.83	0.71	0.51	0.26	0.02	−0.16	−0.27
International output														
66. Industrial production – Canada	3.43	−0.19	−0.03	0.19	0.45	0.68	0.84	0.87	0.77	0.56	0.29	0.04	−0.17	−0.30
67. Industrial production – France	2.58	0.03	0.20	0.35	0.44	0.46	0.39	0.26	0.12	−0.01	−0.11	−0.18	−0.21	−0.22
68. Industrial production – Japan	4.46	0.09	0.23	0.37	0.49	0.53	0.49	0.35	0.15	−0.06	−0.23	−0.33	−0.36	−0.33
69. Industrial production – UK	2.60	−0.04	0.11	0.27	0.42	0.51	0.53	0.47	0.39	0.28	0.18	0.10	0.03	−0.02
70. Industrial production – Germany	3.19	0.01	0.08	0.18	0.29	0.38	0.40	0.35	0.24	0.09	−0.07	−0.19	−0.27	−0.31

[a] All statistics are computed using bandpass filtered data. The second column shows the standard deviation of the resulting estimate of the cyclical component. Other columns show the cross correlations of the cyclical component of each series with the cyclical component of GDP, led k periods.

source: Stock and Watson (1999)