International Comparisons

We know that national income accounting is grounded on this key equation:

$$GDP = C + I + G + NX.$$

Simple logic says that fluctuations in GDP must depend on its components and the data for the United States show that Investment is more volatile than Consumption and Government spending.

But what about other countries? Is investment responsible for the boom and bust nature of GDP in other economies?

Data from the Organisation for Economic Cooperation and Development (OECD) answers this question. This international agency was created after World War II and serves, in part, as a hub for data gathered from member countries. They are online at oecd.org, but we will access the data through the FRED Excel add-in.

There is a data issue to address before we explore the volatility of investment in other countries. Instead of Investment spending, the OECD reports Gross Fixed Capital Formation (GFCF) as a measure of investment activity.

There are several differences between I and GFCF, but the key one is that GFCF includes second-hand assets (think of used heavy machinery that is purchased by a manufacturing company). Investment, on the other hand, counts only new tools, plant, and equipment.

STEP Insert a sheet in your *GDPInvestment.xlsx* workbook. In the top row, enter *GPDIC1* (this is Real I) and *NAEXKP04USQ652S* (this is Real GFCF). Enter *01/01/1972* in cell A4 (so both series start from the same date) and get the data. Widen column D, if needed.

Investment spending is in billions of dollars so, to make it easier to compare the two, we need to convert GFCF to billions of dollars.

STEP Enter the formula *=D8/1000000000* (carefully enter 9 zeroes) in cell E8. Fill it down.

It is easy to see that column E, GFCF (in billions) is greater than column B (I in billions). This is mainly because GFCF counts the resale of previously produced tools, plant, and equipment and I does not. It also means that you would not get C + GFCF + G + NX to equal GDP.

It is not that GFCF is wrong, but we want to be aware that it is a different measure of investment activity than I. The OECD uses GFCF in its country reports and highlights it as their preferred measure of investment activity. We will compare the volatility of GFCF to C and G to answer our question.

OECD Countries and Series IDs

The OECD has data on real C, GFCF, and G for 39 countries. We will focus on the major economies in the OECD, called the G7: Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

To get the data, we parse the *Series ID* we used to get GFCF for the United States: NAEXKP04USQ652S. To *parse* means to separate something into its component parts.

The Series ID for OECD macro aggregates has five parts. We can show this using vertical line separators:

NAEXKP|04|US|Q|652S

In the second part, the 04 indicates GFCF, 01 is GDP, 02 is C, and 03 is G.

The third part is a two-character country code. The table in Figure 8.4 shows the two-letter abbreviation for each country.

The last part is troublesome because it is different for different countries. This means that we cannot simply plug in the two-letter FRED code for each country because the last part of the Series ID (the part after the Q) is not always the same. As a workaround, we use FRED's search tool.

Country	FRED code	Country	FRED code	Country	FRED code	Country	FRED code
Australia	AU	**France**	**FR**	**Japan**	**JP**	Slovak Republic	SK
Austria	AT	**Germany**	**DE**	Korea	KR	Slovenia	SI
Belgium	BE	Greece	GR	Luxembourg	LU	South Africa	ZA
Brazil	BR	Hungary	HU	Mexico	MX	Spain	ES
Canada	**CA**	Iceland	IS	Netherlands	NL	Sweden	SE
Chile	CL	India	IN	New Zealand	NZ	Switzerland	CH
Czech Republic	CZ	Indonesia	ID	Norway	NO	Turkey	TR
Denmark	DK	Ireland	IE	Poland	PL	**United Kingdom**	**GB**
Estonia	EE	Israel	IL	Portugal	PT	**United States**	**US**
Finland	FI	**Italy**	**IT**	Russia	RU		

Figure 8.4: OECD Country Codes.

STEP Insert a sheet in your *GDPInvestment.xlsx* workbook and click the Data Search button. In the search box, enter the text *NAEXKP02USQ* and click the *Series ID* option (below the search box). Click the Search button. Select the series with units of *US $* and click the Add Series IDs button at the bottom of the dialog box. Change the 2 to a 3 in the search box and repeat the procedure: search, select the series with units of US $, and add it to the spreadsheet. Change the 3 to a 4 and repeat again. Click close and then get the data.

You have real C, G, and GFCF for the United States. But we want the annualized growth rate for each quarter and we want to start from the same date.

STEP Change *lin* to *pca* in each cell in row 2 and set the start date in row 4 to 04/01/2002 (since that is the latest date for the series). Get the data.

We are ready to answer the question of which component is the most volatile for the United States, but this time using GFCF instead of I.

STEP Use FRED's *Build Graph* tool to put the three series on the same chart.

GFCF seems a little more variable than C and G, but the difference is not as dramatic as when we used Investment spending. Also, there is a sharp increase in G in 2007 that is not in the NIPA data. That is an error in the OECD data.

The SD

Before we explore the other G7 countries, we offer a more objective measure with which to gauge volatility than the eyeball test we have been using.

The standard deviation or SD is a measure of dispersion in a list of numbers. if the numbers are bunched tightly together, the SD is low (if they are all the same, then the SD is zero). The more spread out the numbers, the larger the SD.

The SD has the same units as the numbers. If we measure the heights of 20 college students in inches, then the SD is in inches.

Think of the SD as a +/- number. The SD tells us the size of the typical deviation from the average. If the average height is 5 feet 8 inches with an SD of 3 inches, that says most of the students are around 5 feet 8 inches tall, give or take 3 inches. In other words, most of them are between 5 foot 5 inches and 5 foot 11 inches.

It would not make sense that the SD of the height of 20 college students was 4 feet because then the range is from under 2 feet to almost 10 feet tall.

STEP Return to the sheet with GDP, C, I, and G (from the US NIPAs) and scroll down to the bottom row. In a row below the last row, in column B, use Excel's *STDEV.P* function to compute the SD of Real GDP. Copy your formula and paste it in columns D, F, and H.

	A	B	C	D	E	F	G	H
313	07/01/2023	4.9	07/01/2023	4.0	07/01/2023	8.4	07/01/2023	4.6
314		=STDEV.P(B6:B313)		=STDEV.P(D6:D313)		=STDEV.P(F6:F313)		=STDEV.P(H6:H313)
315	SD -->	4.6		4.4		20.9		7.4

Figure 8.5: SD of GDP, C, I, and G.

Figure 8.5 shows the result as of fall 2023 (so 07/01/2023 is the last value). Investment spending is in column F and it has a much higher SD, or dispersion, than C or G. Does the same hold true for GFCF?

STEP Return to the sheet with the OECD measures of C, G, and GFCF. Scroll to the bottom and compute the SDs for the three series. Yes, GFCF has a higher SD than C or G, but not by a lot.

Discovery

What about the other G7 countries? Use the procedure applied above to explore the volatility of C, G, and GFCF.

STEP Download OECD data on the annualized percentage change in real C, G, and GFCF. Make a chart. Compute the SDs of the three series. What do you find with respect to the crucial question about volatility in GDP—is investment driving volatility in GDP for these economies?

Notice that the *Series IDs* can be tricky to work with in this case. Confirm that the *Series IDs* are correct and that they make sense. It is easy to make a mistake. A simple check is to click on the URL in row 5 of each variable and make sure it is the correct country and series.