



What Makes Companies Invest?

Decisions about investment at the firm level are important to the path of economic growth

By Hailey Phelps

In November 2018, Amazon announced the site of its second headquarters, which it calls HQ2, in Northern Virginia. Amazon stated that over the next 20 years HQ2 would create 25,000 jobs and occupy upward of 8 million square feet of office space in the greater Washington, D.C., region. “It will mean more employment opportunities for our families, not only with Amazon but also with the companies that will grow up around Amazon,” Loudoun County Board of Supervisors Chair Phyllis Randall told the Associated Press. “It will boost our economy as Amazon employees and clients spend money in our stores, restaurants and hotels. A rising tide lifts all boats, and we look forward to the whole community benefitting from Amazon’s second home in Northern Virginia and the D.C. Metro region.”

Business investment — like HQ2 — is of prime interest not only to local officials, but also to economists and policymakers concerned with the economic growth of the country as a whole. Over the past few decades, researchers have studied how businesses decide to invest and how those decisions affect the overall economy. In the short term, an increase in investment directly increases gross domestic product (GDP), all else equal. In the long term, investment can influence the economy’s growth because investment in capital increases the economy’s production capacity, which allows more goods and services to be produced with the same amount of labor. The increases in productivity that come with investment, moreover, are a primary source of improvement in our standard of living.

What, then, shapes the decisions that companies make about investment?

One answer is close at hand: The Fed uses its influence over interest rates in part to influence business investment

decisions. Lowering rates decreases the cost for a business to borrow funds to finance investment projects, making a new project easier for the company to justify pursuing; raising rates does the opposite. Interest rates aside, though, there are many factors that influence the investment decisions of firms, including changes in productivity, the business cycle, bank lending, and economic uncertainty. In recent decades, economists have made strides in understanding them.

Investment Isn’t Smooth

Business investment refers to something different from financial investment, such as the purchases of stocks and bonds; business investment primarily refers to new capital good purchases. For example, when an airplane company acquires jet engines, it is investing in equipment; when a paper manufacturer builds a new warehouse, it is investing in structures. Strictly speaking, business investment also includes inventory investment, but investments in fixed capital are what mostly interest economists.

Before the 1990s, it was common in economics research to think of a firm’s investment behavior as mostly smooth and reflective of an investment demand curve in which investment is driven by changes in interest rates. As it turns out, however, investment behavior at the firm level is often characterized by periods of low or zero investment followed by large discrete changes, commonly referred to as investment spikes. Such feast-or-famine investment behavior can be called “spiky” or “lumpy” investment. Many spikes in the investments of small firms can add up, in turn, to significant changes in aggregate investment. Recently, economists have started to pay more attention to the macroeconomic effects of firm investment spikes, and policymakers have discussed the importance of investment spikes in considering policies to stimulate investment when it would otherwise be declining during recessions.

Two of the first economists to study plant-level investment were Mark Doms, the chief economist at the Congressional Budget Office, and Timothy Dunne, a professor at the University of Notre Dame. In a 1998 article in the *Review of Economic Dynamics*, Doms and Dunne observed that relying solely on national-level statistics — as many economists had done up to that point — would not explain the complex dynamics of different industries or operations of a typical plant. To account for these differences, they used data from the U.S. Census Bureau’s Longitudinal Research Database and the Annual Survey of Manufactures. Analysis of these data led them to discover three things. First, many plants do not alter their capital stocks smoothly. Most plants alter their net capital stock by less than 10 percent every year, on average, but at some plants that pattern is punctuated by major investment increases. Second, those major increases are concentrated most often in smaller plants, plants that undergo a change in organizational structure, and plants that switch industries. Third, large investment projects in a small number

Share this article: <https://bit.ly/firm-investments>

of plants and changes in the number of plants undergoing investment episodes greatly affect aggregate investment.

The concept of investment spikes was explored in 2007 by economists Francois Gourio of the Chicago Fed and Anil Kashyap of the University of Chicago. In an article in the *Journal of Monetary Economics*, they showed the effects of plant-level investment spikes on aggregate investment using data from manufacturing plants in the United States and Chile. They defined plant-level investment spikes as periods in which the ratio of investment to capital stock was greater than 20 percent. The investment ratio describes the relationship between the amount of money invested and the value of a plant's existing capital stock.

They argued that one reason many firms choose not to adjust their capital smoothly is because investment has high fixed costs. "If a firm wants to do a big investment project, they may need to shut down the assembly line for a while," Gourio explains. "So sometimes it is better [for firms] to do everything at once rather than spread it out over many years." Gourio and Kashyap showed that for both U.S. and Chilean plants, the majority of the variation in national investment was caused by plants undergoing investment spikes. Upon further analysis, they concluded that changes in the number of firms making large investments had a greater effect on the variation in the aggregate investment ratio than changes in the average size of the investment spike per plant. Additionally, the prevalence of investment spikes in one year predicted future aggregate investment. Years with relatively more investment spikes were followed by years with relatively less investment.

The high fixed costs of investment prevent a firm from immediately reaping the rewards of its investment project. In a *Business Review* article, Aubhik Khan of Ohio State University wrote, "Because it takes time to manufacture, deliver, and install new capital goods, investment expenditures today do not immediately raise the level of a plant's capital." Thus, he explained, firms will tend to increase their investments only "in response to forecasted changes in the market's demand."

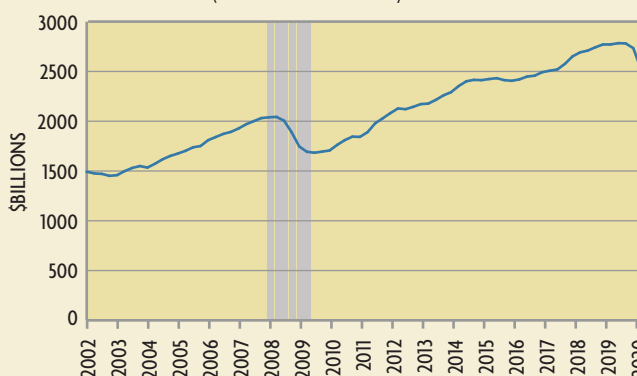
Productivity Shocks

Productivity also makes a difference for a firm's investment decisions. If productivity increases — that is, if the firm becomes able to create a larger quantity of outputs with the same level of inputs — then investment will likely increase. For example, a firm's productivity can increase if it finds ways to lower manufacturing costs. By lowering production costs, the firm can reap a higher profit per unit or sell more of its products at a lower price. Following this, the firm can expand and hire more workers, and investment will rise.

The relationship between productivity and investment flows in both directions, however. A study recently published in the *Journal of Business & Economic Statistics* by Michał Gradzewicz of the National Bank of Poland investigated the relationship between investment spikes and

Business Investment and the Business Cycle Mostly Rise and Fall Together

Business fixed investment (in chained 2012 dollars)



SOURCE: U.S. Bureau of Economic Analysis

productivity at the firm level. He used the financial reports and balance sheets of Polish firms to model the economic effects of investment spikes and how they relate to firm-level total factor productivity (TFP), the ratio of output to inputs. TFP is often used as a measure of productivity or economic efficiency because it explains the portion of growth in output that cannot be explained by growth in inputs of labor and capital. His model predicted that a firm's TFP would increase before an investment spike, fall immediately afterward, and then slowly recover. One reason for the drop in TFP is that firms need time to adjust their operations and train their employees on how to use new capital following investment. During this time, firms become less productive because they are gaining experience with the new equipment — their employees are learning by doing. On average, it took four years for TFP to surpass its initial level following an investment spike. For smaller firms, the fall of TFP was more pronounced and it took even longer to recover.

In another study, Thomas Winberry of the University of Chicago examined how aggregate investment responds to investment at the firm level and how aggregate and firm-level investment responds to productivity shocks and stimulus policy. Using IRS tax data, he constructed a model that matched both the volatility of firm-level investment and the real interest rate dynamics of national data. His model accounted for the procyclical volatility of investment, so it better matched the national response to changes in productivity. He concluded that when many firms are close to their adjustment threshold for investment, an additional productivity shock induces a large spike in aggregate investment; on the other hand, when only a few firms are considering investing, an additional shock makes less of a difference to aggregate investment.

Business Cycles

It is well known that aggregate investment fluctuates in response to the business cycle: Companies tend to shut off the investment spigot during a downturn and reopen

it during a recovery. (See chart.) Winberry found that in recent decades, some 38 percent of the decline in GDP during recessions can be attributed to the decline in aggregate investment. But how does firm investment volatility respond during contractionary periods? Unfortunately, there does not seem to be a clear answer. Some economists believe that “lumpy” investment is irrelevant for business cycle analysis; others believe that accounting for such lumpiness is critical. There is some evidence that firm investment has become less responsive to the business cycle. The United States has been shifting to a service-based economy — and services are less capital intensive, meaning that overall fixed-capital investment levels in the United States are decreasing and therefore potentially becoming less prone to cyclical swings. “Investment is moving abroad; we’re not doing as much manufacturing as we used to. We’re leaving the manufacturing to other countries,” says Gourio.

On the other hand, researchers have argued that investment is sensitive to fluctuations in the business cycle. A recession sometimes arises from a collapse in asset prices, as in the global financial crisis of 2007-2008. In a recent article published in the *American Economic Journal: Macroeconomics*, Richmond Fed economist Toan Phan and his co-authors studied the effects of booms and busts on housing prices and how they affected the economies of the United States and Japan. “The collapse of a large bubble can cause involuntary unemployment, which can lead to a long recession like the one we saw in Japan in the 1990s,” says Phan. “The collapse of a large bubble will also put downward pressure on the real interest rate, which will affect nominal interest rates and can push them down to the zero lower bound. Then, the central bank’s hand will be tied since they cannot lower interest rates anymore.” Their theoretical model showed that expansionary bubbles boost economic activity when they are occurring, but their collapse pushed the economy into persistent secular stagnation and recessions. During such times, investment decreases substantially along with output and consumption and there is increased involuntary unemployment.

The United Kingdom, like the United States, experienced a sharp drop in real GDP during the 2007-2008 global financial crisis. The financial crisis severely curtailed normal bank lending, resulting in a decline in investment and consumer spending. Research by Richard Disney and Helen Miller of the Institute of Fiscal Studies and Thomas Pope of the Institute for Government, published in *Economica*, examined firm-level investment spikes and aggregate investment over the Great Recession in the United Kingdom. Using a model similar to one used by Gourio and Kashyap, they showed that the probability of a firm undergoing an investment spike fell substantially after 2008 and that prolonged levels of low investment prevented a “v-shaped” economic recovery in the United Kingdom.

When the economy is in a recession, policymakers want to pass countercyclical policies to stimulate investment. During previous recessions, policymakers have enacted stimulus policies that were not dependent on the size of a firm, which may have reduced cost efficiency. Winberry’s study observed how policy affects investment during recessions. He found that firms are less likely to respond to policies geared toward investment when the economy is in a recession because the probability of financing a large investment project during a recession is low. Winberry proposed a simple micro-targeted policy based on employment and the size of a firm; he estimated that such a policy would generate five times more investment than existing stimulus policies at the same cost.

Bank Lending

The way in which firms finance investment projects also plays a role in determining how they make investment decisions. Firms most commonly fund their investments in one of several ways: internally, from retained earnings or the owners’ personal funds; by borrowing; or by selling equity. From a company’s perspective, especially a large company’s, these choices are enormously complex — the subject of many a business school finance course. Ease of borrowing from banks, however, is commonly a major factor in whether companies go ahead with investment projects.

Large corporations have ready access to the corporate bond market and short-term lending markets and can raise capital in the stock market, but small and medium-sized firms may not have that luxury. Small and medium-sized firms primarily rely on access to credit through longstanding relationships with banks to finance their investments. Since most variation in total investment is caused by investment spikes, and investment spikes are caused by changes in the number of firms undergoing investment projects, it is important to understand the role of bank lending as the mechanism for financing investment. Research by two Richmond Fed economists, Russell Wong and Marios Karabarbounis, has examined the effects of bank lending on investment at different sized enterprises.

In a recent working paper, Wong — with co-authors Zachary Bethune, Guillaume Rocheteau, and Cathy Zhang — argued that the formation of lending relationships is critical for small businesses to finance their investment opportunities. Using data from the Fed’s Survey of Small Business Finances, the researchers constructed a model to simulate how the economy would respond to a negative credit shock under different policy responses and levels of commitment by the central bank. Their results showed that if the central bank cut interest rates at the onset of the credit shock and committed to raising them following the shock — a policy known as forward guidance — then investment at the national level initially would decline but would recover quickly relative to other traditional monetary policies. The initial decline

in investment would be caused by the increased number of firms that lost their relationship with banks. But if the central bank was unable to commit to future interest rates, then aggregate investment would sharply decline and recover more slowly.

In other research, Karabarbounis examined how variation in the supply of bank loans affects large firms' investment decisions. He constructed an index of bank lending, which he used to compare the number of loan deals issued by a bank from October 2008 to June 2009 with the number issued by the same bank from October 2005 to June 2007. He also constructed a firm-specific measure of bank lending supply that showed the relative exposure of each firm to banks that faced severe lending disruptions caused by toxic loans. If a firm had a large loan or multiple loans from a bank that experienced difficulties, then the firm would most likely experience more problems trying to borrow compared with a firm that was borrowing from a healthier bank. He found that exposure to risky banks did not affect investment decisions of large firms. "One reason for this may be that these larger firms have means of financing that the smaller firms don't have. So even when banks cannot help financing them, [large firms] can sell their assets or rely on their own cash," suggests Karabarbounis.

Uncertainty

Another factor that contributes to firms' investment decisions is uncertainty about policy. As Richmond Fed President Tom Barkin has observed, policy uncertainty may lower business confidence, which in turn has a dampening effect on investment. Policy uncertainty may also create a "waiting game" as business owners tend to put off investing until they know how changes in tax policy, government spending, or regulation will affect their investment plans. Most recently, there has been policy uncertainty regarding government aid for the unemployed and lending programs for businesses.

In a 2016 study in the *Quarterly Journal of Economics*, Scott Baker of Northwestern University, Nicholas Bloom of Stanford University, and Steven Davis of the University of Chicago developed a new index of economic policy uncertainty (EPU) by measuring the frequency of references to the economy, uncertainty, and policy in articles published in 10 major newspapers. Their results showed that their EPU spiked around tight presidential elections, the two U.S. wars in the Persian Gulf, the Sept. 11 attacks, the failure of Lehman Brothers

in 2008, the 2011 debt ceiling dispute, and other major battles over fiscal policy. Their results also showed that policy uncertainty is associated with reduced investment and employment in policy-sensitive sectors. They concluded that at the national level, policy uncertainty predicted declines in investment, output, and employment in the United States and other major economies.

Following this, Bloom and a different set of co-authors published "Really Uncertain Business Cycles," an article in *Econometrica* about the role of uncertainty in the business cycle at the firm level. Using establishment-level data from the Census Bureau, they developed new empirical measures of uncertainty and found that increased uncertainty makes it optimal for firms to delay investment decisions and postpone entering new markets. They found that when there was heightened uncertainty, there was a significant fall in hiring, investment, and output, which led to a drop in GDP of approximately 3 percent. Additionally, they found that investment is more volatile than output and consumption at the firm and plant level than at the national level. In the long run, after the uncertainty shock went away, firm investment bounced back to normal levels. Their results echoed Winberry's: As uncertainty rises, firms become more cautious and move further and further away from their investment threshold. Therefore, they are less responsive to investment stimulus policies and less likely to undertake investment projects.

Conclusion

The past 30 years have seen an increased use of microeconomic data for macroeconomic research, specifically how firm-level investment affects aggregate investment. Studying investment at the firm level reveals much more about the behavior of firms than simple national statistics do. Investment spikes play an important role in determining aggregate investment, as firms are sensitive to the business cycle, bank lending, and economic uncertainty. Research on business investment highlights the importance of maintaining efficient credit markets, especially for small and medium-sized businesses, which rely on these institutions to finance investment projects. This research also highlights the importance of certainty about the path of future policy as an influence on companies' investment decisions. Further research into the factors that shape investment may help to inform policymaking that fosters economic growth in the future. **EF**

READINGS

Bachmann, Rüdiger, Ricardo J. Caballero, and Eduardo M.R.A. Engel. "Aggregate Implications of Lumpy Investment: New Evidence and a DSGE Model." *American Economic Journal: Macroeconomics*, October 2013, vol. 5, no. 4, pp. 29-67.

Bachmann, Rüdiger, and Christian Bayer. "Wait-and-See' Business Cycles." *Journal of Monetary Economics*, September 2013, vol. 60, no. 6, pp. 704-719.

Letterie, Wilko, Gerald A. Pfann, and Sher Verick. "On Lumpiness in the Replacement and Expansion of Capital." *Oxford Bulletin of Economics and Statistics*, June 2010, vol. 72, no. 3, pp. 263-281.

Winberry, Thomas. "Lumpy Investment, Business Cycles, and Stimulus Policy." *American Economic Review*, January 2021, vol. 111, no. 1, pp. 364-396.