MACROECONOMIC ADVISERS
By IHS Markit

Macro Focus

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Trade Policy Uncertainty and Capital Spending

- *Uncertainty about trade policy has been elevated recently.*
- *We find evidence, consistent with other research, that increases in trade policy uncertainty reduce investment spending.*
- *The effects of trade policy uncertainty appear to be concentrated in the manufacturing sector and directly related to exposure to trade. The more inputs an industry imports and the more output an industry exports, the more sensitive it is to trade policy uncertainty.*
- *We estimate that the increase of trade policy uncertainty from 2014 through 2018 lowered real investment spending and GDP by about $100 billion, or 0.5% of real GDP.*
- *So far this year, trade policy uncertainty has been about as elevated as it was last year, implying roughly the same hit to the level of investment spending and GDP as last year.*
- *Going forward, a diminution of trade policy uncertainty to pre-2015 levels has the potential to boost GDP by 0.5%.*

Beginning with the election of President Trump, and then with the imposition in early 2018 of tariffs on imported solar panels, washing machines, steel, and aluminum, uncertainty about trade policy has risen sharply. Aggravating this uncertainty more recently has been an escalating trade dispute with China as well as threatened tariffs on imported motor vehicles and all imports from Mexico. The latter tariffs were quickly called off, and a decision about tariffs on imported motor vehicles has been delayed until mid-November, but the angst remains and the trade dispute with China rages on.[1]

There is mounting evidence that elevated uncertainty about trade policy is weighing on business investment spending. In a special set of questions in the Atlanta Fed's July 2018 Survey of Business Uncertainty, a significant portion of respondents indicated that previously planned capital expenditures had been placed under review in light of worries about tariffs and, for many firms, cut or deferred.[2] Reinforcing this anecdotal evidence, a recent study by researchers at the Federal Reserve Board provides econometric evidence that capital expenditures have indeed been curtailed recently by trade policy uncertainty (TPU).[3]

In this Macro Focus, we provide further statistical evidence that TPU has been weighing on investment spending. Using the news-based measure of TPU de-

[1] A comprehensive survey of all of the recent trade disputes by the Peterson Institute for International Economics can be found at https://www.piie.com/blogs/trade-investment-policy-watch/trump-trade-war-china-date-guide.

[2] The Atlanta Fed/Chicago Booth/Stanford Survey of Business Uncertainty (SBU) is conducted by the Atlanta Fed in coordination with Nick Bloom and Steven Davis. The survey can be found at https://www.frbatlanta.org/research/surveys/business-uncertainty. Discussion of the special questions in the July 2018 survey can be found at https://macroblog.typepad.com/macroblog/2018/08/are-tariff-worries-cutting-into-business-investment.html.

[3] Caldara, Dario, Matteo Iacoviello, Patrick Molligo, Andrea Prestipino, and Andrea Raffo, "The Economic Effects of Trade Policy Uncertainty," manuscript presented at the 91st meeting of the Carnegie-Rochester-NYU Conference on Public Policy, April 2019.

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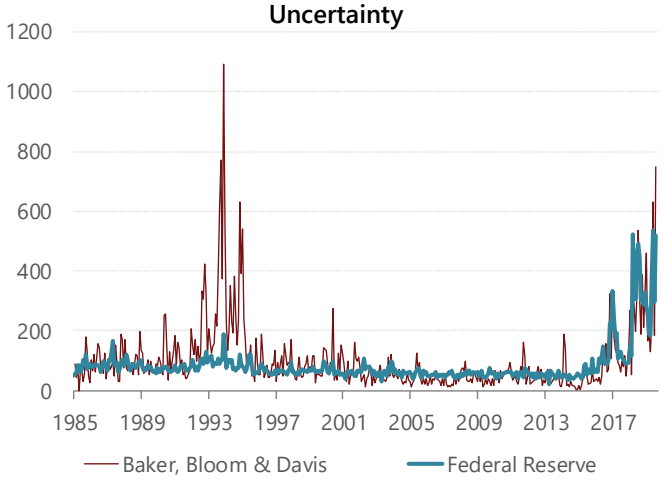
veloped by researchers at the Federal Reserve and data on fixed assets from the Bureau of Economic Analysis, we find a statistically significant and negative relationship between TPU and growth of the business capital stock that is concentrated in the manufacturing sector. Furthermore, we present evidence that the effects of TPU are directly related to an industry's exposure to trade, both across domestic industries and within the manufacturing sector. We estimate that the increase of TPU from 2017 to 2018 reduced the change in real investment spending and real GDP by roughly $40 billion, or 1.5% of private nonresidential fixed investment and 0.2% of GDP.[4] This followed increases in TPU from 2014 to 2017 that reduced the change in real investment and real GDP a cumulative $60 billion, for a total cumulative hit to real GDP of about $100 billion from 2014 through 2018, or 0.5% of GDP. TPU has been roughly unchanged, on an annual average basis, from 2018 to 2019, implying no contribution, positive or negative, to growth of investment spending and GDP this year. Going forward, if TPU returns to pre-2015 levels, we estimate that, before multiplier effects, and assuming no monetary policy offset, real GDP will be boosted by roughly 0.5%, with the effects allocated over the years that TPU returns to pre-2015 levels.

Two news-based measures of trade policy uncertainty

There are two widely followed news-based measures of TPU: one produced by Baker, Bloom, and Davis and a new one produced by researchers at the Federal Reserve.[5] Both are built up from automated text searches of US news sources for concurrent mentions of terms related to trade policy and terms related to uncertainty. The more frequent the concurrent mention of the search terms, the higher the measure of TPU. Both series are shown in Figure 1. Both series show a marked increase in recent years, no doubt due to press mentions of new trade policies (tariffs) implemented by the Trump administration, counter-tariffs imposed by other

Figure 1: Two News-Based Measures of Trade Policy Uncertainty



counties, and concerns surrounding these developments. Of note is the surge in the measure from Baker, Bloom and Davis in the mid-1990's that is not present in the measure from the Federal Reserve. This reflects the fact that the two measures are built up from a different set of search terms; e.g., the measure from the Federal Reserve specifically excludes mentions of NAFTA, which was crafted and implemented in the 1990's and which apparently looms large in the measure from Baker, Bloom, and Davis.[6]

Also of note is the first (recent) spike evident in both series right around the time of Trump's election. This was roughly a full year before the US International Trade Commission recommended protection for the solar panel and washing machine industries and the Trump administration followed suit with tariffs. This highlights the fact that these measures of TPU reflect concern about trade policy rather than trade policy itself.

[4] All real figures reported in this Macro Focus are in chained 2012 dollars.

[5] The measure from Baker, Bloom, and Davis is from "Measuring Economic Policy Uncertainty" by Scott Baker, Nicholas Bloom and Steven J. Davis at www.PolicyUncertainty.com. The one from researchers at the Fed is cited above.

[6] The Federal Reserve Measure also excludes mentions of GATT and the WTO.

Investment and trade policy uncertainty

The underlying relationship between capital spending and trade policy uncertainty that we examine is as follows:

$$(1)\quad \dot{K}_{i,t} = a_i + b_i log(TPU_t) + c_{1,i}\dot{Q}_{t-1} + c_{2,i}\dot{Q}_{t-2} + c_{3,i}\dot{Q}_{t-3} + e_{i,t}$$

That is, growth of the i^{th} type of capital ($\dot{K}_{i,t}$) is thought to depend on the natural log of the index of trade policy uncertainty (TPU_t) as well as lags of growth of output in the nonfarm business sector ($\dot{Q}_{t-k}$). The relationship also includes a constant term (a_i) and an error term ($e_{i,t}$).

The parameter of interest is b_i, which shows how growth of capital of type i responds to the (log) level of TPU, holding constant recent growth of output in the nonfarm business sector, which is the primary driver of growth of the business capital stock.

The parameter of interest (b_i) can also be estimated in the change form of equation (1):

$$(2)\quad \Delta\dot{K}_{i,t} = b_i \Delta log(TPU_t) + c_{1,i}\Delta\dot{Q}_{t-1} + c_{2,i}\Delta\dot{Q}_{t-2} + c_{3,i}\Delta\dot{Q}_{t-3} + v_{i,t}$$

where

$$(3)\quad v_{i,t} = e_{i,t} - e_{i,t-1}$$

In much of the analysis below, we estimate and report on both equations.[7]

In addition to the effect of TPU on growth of the business capital stock, we are interested in the effect of TPU on investment spending. The two are closely related due to the tight relationship between the growth of the capital stock and investment spending. To get at the effect of TPU on investment, we begin with the perpetual inventory equation that relates the change in the capital stock to the level of investment spending:

$$(4)\quad \Delta K_{i,t} = I_{i,t} - \delta_{i,t}\left(K_{i,t-1} + 0.5 \cdot I_{i.t}\right)$$

Here, $I_{i,t}$ is gross investment in the i^{th} type of capital in time t, and $\delta_{i,t}$ is the annual depreciation rate of the i^{th} type of capital in time t. This expression simply states that the change in the stock of a fixed asset over a year is given by gross investment in that asset during the year less depreciation of the asset during that year. Because gross investment takes place throughout the year (some takes place early in the year, some late in the year), one-half of gross investment is assumed to depreciate at the full annualized depreciation rate, and one-half is assumed not to depreciate at all. Dividing through by the lagged stock and solving for $I_{i,t}$ gives

$$(5)\quad I_{i,t} = K_{i,t-1}\left(\frac{1}{1 - 0.5 \cdot \delta_{i,t}}\right)\left(\dot{K}_{i,t} + \delta_{i,t}\right)$$

Substituting equation (1) in for $\dot{K}_{i,t}$ and differentiating with respect to $log(TPU_t)$ gives

$$(6)\quad \frac{dI_{i,t}}{dlog(TPU_t)} = K_{i,t-1}\left(\frac{1}{1 - 0.5 \cdot \delta_{i,t}}\right) b_i$$

which serves as the basis for our estimate of the contribution of changes in TPU to changes in gross investment in capital of type i. In particular, replacing differentials with first differences, we have the following approximation:

$$(7)\quad \Delta I_{i,t}^{TPU} \approx 0.5\left[K_{i,t-1}\left(\frac{1}{1 - 0.5 \cdot \delta_{i,t}}\right) + K_{i,t-2}\left(\frac{1}{1 - 0.5 \cdot \delta_{i,t-1}}\right)\right] b_i \Delta log(TPU_t)$$

[7] As discussed below, we ultimately settle on the change form of the equation on empirical grounds. Serial correlation in the error terms of the level regressions suggest the need to difference the data.

where $\Delta I_{i,t}^{TPU}$ is the approximate contribution of (changes in the log of) TPU to changes in gross investment in fixed asset of type i at time t.

A note on the data

In this analysis, we employ annual, quarterly, and monthly data, all transformed to an annual frequency. The data on capital are from BEA's Fixed Assets accounts, are annual, and are end-of-year measures. Growth of capital, then, is defined as the percent change in the net stock of capital over a calendar year. The data on output are from BEA's National Income and Product Accounts and are quarterly. Growth of output in the nonfarm business sector for a calendar year is defined as the four-quarter percent change over that calendar year. The index of trade policy uncertainty is monthly; we convert these data to the annual frequency by taking calendar-year averages.

Which types of capital are affected by trade policy uncertainty?

Our first goal is to identify the types of capital, if any, that are affected by TPU. To this end, we estimate equations (1) and (2) above using BEA's data on fixed assets by type of asset as the dependent variable.[8] The results appear in Table 1. The column titled "level equation" reports the estimates of b_i from equation (1), while the column titled "change equation" reports the estimate of b_i from equation (2).[9] Statistical significance is indicated with asterisks.[10] For every type of capital shown, and in both the level and change equations, the point estimate of the response of growth of capital to TPU is negative.[11] Also, the magnitude of the response is generally estimated to be larger in the level equation than in the change equations.

Table 1: Effects of TPU by Type of Capital

	Coefficient on TPU	
	level equation	change equation
Private nonresidential fixed assets	-0.7 **	-0.4 *
Equipment	-1.3 *	-0.7
Information processing	-1.5 **	-0.9
Industrial	-1.2	-0.8 **
Transportation	-1.1	-0.4
Other	-2.3 **	-0.8
Structures	-0.6 *	-0.2
Commercial and health care	-0.7	-0.1
Manufacturing	-1.2	-1.1 **
Power and communication	-0.8 *	0.0
Mining exploration, shafts and wells	-0.8 *	0.0
Other	-0.1	0.0
Intellectual property products	-0.1	-0.7

Notes: Sample is annual; 1964-2018 for level regressions, 1965-2018 for change regressions. In the level regressions, the dependent variable is the percent change of the end-of-year real net stock (quantity index). Trade policy uncertainty is entered as the log of a 12-month average for each year. Included as independent variables in all regressions, but not shown, are the 4-quarter percent changes of real nonfarm business sector output lagged 4 quarters, 8 quarters, and 12 quarters. Standard errors are adjusted per Newey-West in the level regressions. In the change regressions, the dependent and independent variables are first differenced and the intercept is dropped. *** indicates 1% significance, ** indicates 5% significance, * indicates 10% significance.

We are inclined to place more credence on the estimates b_i from the change equations than from the level equations. In the level equations, the error terms generally appear to exhibit enough serial correlation to make us suspicious of the regression results.[12] Serial correlation can arise for a number of reasons, but a likely candidate is the presence of low-frequency omitted variables whose effects are picked up in the error terms. Such low-frequency terms are "differenced out" in the change equations, removing serial correlation from the error terms and giving us more confidence in the regression results.

Focusing on the change equations in Table 1, we see a statistically significant (at 10%) response of top-line growth of private nonresidential fixed assets to TPU. Drilling down into more detailed types of capital, we find statistically significant (at 5%) responses of industrial equipment and manufacturing structures to TPU. Both of these types of capital are held mainly in the manufacturing sector, suggesting that the effect of TPU may be centered there. We investigate this next.

[8] We limit our analysis to private nonresidential fixed assets; i.e., we exclude residential and government fixed assets.

[9] The dependent variables in these regressions are the percent changes in the capital stocks, not the rates of change. The coefficients reported in the table, then, must be divided by 100 to arrive at estimates of b in equations (1) and (2).

[10] Significance at 10% is indicated with *, 5% with **, and 1% with ***. In nearly all cases, the point estimates of the coefficients on lags of output are positive, and with only a few exceptions at least one is significantly different from zero.

[11] This is true even of the point estimates within structures that round to zero.

[12] In the level regressions, we apply the Newey-West adjustment to the standard errors.

Which industries are affected by trade policy uncertainty?

Our next goal is to identify which industries are affected by TPU. To identify these industries, we estimate equations (1) and (2) above using BEA's data on fixed assets *by industry* as the dependent variable. The results appear in Table 2. TPU appears with statistical significance in several of the level equations, but in only one of the change equations: the equation for the manufacturing sector. For the same reasons as noted above, we are inclined to view the results from the change equations as more credible, leaving manufacturing as the only industry affected, with statistical significance, by TPU.[13]

Table 2: Effects of TPU by Industry

	Coefficient on TPU	
	level equation	change equation
Agriculture, Forestry, Fishing, and Hunting	-2.4 *	-0.7
Mining	-2.4 ***	-0.8
Utilities	-0.9	-0.2
Construction	-0.5	-0.1
Manufacturing	-1.8 **	-1.3 ***
Wholesale Trade	-2.2 *	-1.1
Retail Trade	-0.4	-0.3
Transportation and Warehousing	0.3	-0.2
Information	0.1	-0.1
Finance and Insurance	-0.3	0.0
Real Estate and Rental and Leasing	-0.2	0.2
Professional, Scientific, and Technical Services	0.7	0.8
Management of Companies and Enterprises	-0.3	0.1
Administrative and Waste Management Services	1.3	0.4
Educational Services	-1.0 **	-0.2
Health Care and Social Assistance	-2.2 **	-0.1
Arts, Entertainment, and Recreation	1.1 **	0.4
Accommodation and Food Services	-0.9	-0.5
Other Services except Government	-1.4 ***	-0.5

Notes: Sample is annual; 1964-2018 for level regressions, 1965-2018 for change regressions. In the level regressions, the dependent variable is the percent change of the end-of-year real net stock (quantity index). Trade policy uncertainty is entered as the log of a 12-month average for each year. Included as independent variables in all regressions, but not shown, are the 4-quarter percent changes of real nonfarm business sector output lagged 4 quarters, 8 quarters, and 12 quarters. Standard errors are adjusted per Newey-West in the level regressions. In the change regressions, the dependent and independent variables are first differenced and the intercept is dropped.
*** indicates 1% significance, ** indicates 5% significance, * indicates 10% significance.

[13] As a robustness check, we shortened the sample of the change regression for manufacturing to end in 2015, prior to the beginning of the sharp rise in TPU. The point estimate on TPU rose in magnitude from -1.3 to -2.0, and the value of the t-statistic increased in magnitude from -3.5 to -4.5.

Consider the coefficient on TPU in the change equation for the manufacturing sector. This suggests that an increase in log(TPU) of 1 would reduce the rate of growth of the manufacturing capital stock by 1.3 percentage points, all else equal. From 2017 to 2018, log(TPU) rose by 0.8, implying a subtraction of 1.0 percentage point from the growth of the manufacturing capital stock (=-1.3*0.8). From 2017 to 2018, growth of the manufacturing capital stock rose by 0.2 percentage point, from 1.1% in 2017 to 1.3% in 2018. The regression suggests that the 0.2 percentage point increase in growth of the manufacturing capital stock was held down by 1.0 percentage point due to the increase in TPU; i.e., had TPU been constant from 2017 to 2018, the manufacturing capital stock would have accelerated by 1.2 percentage points to growth of 2.3%.

Trade exposure and trade policy uncertainty

Taken together, the results reported in Tables 1 and 2 suggest that what matters for the sensitivity of capital spending to TPU is not the type of capital, but rather the investing industry. In Table 1, we see that the only types of capital that exhibit a statistically significant response to TPU (in the change equations) are those types of capital that are typically held in the manufacturing sector (industrial equipment and manufacturing structures). In Table 2, the only major industry that exhibits a statistically significant response of capital expansion to TPU (in the change equations) is manufacturing.

So what is it about manufacturing that makes it uniquely sensitive to TPU? A plausible explanation rests in its exposure to tariffs through trade in goods. Manufacturing is unique in that its supply chains are global, so costs in the manufacturing sector are uniquely exposed to tariffs. Furthermore, along with the farming and mining sectors, manufacturing is exposed to counter-tariffs (tariffs imposed by other counties in response to US tariffs) because a significant share of its output is exported.

This is seen in Figure 2, which shows the exposure of the major industries shown in Table 2 to trade. Using information from BEA's input-output accounts, for each industry, we calculate the share of the industry's intermediate inputs accounted for by imported goods. Also,

for each commodity associated with each major industry, we calculate the share of total commodity output accounted for by exports of goods. We define an industry's "trade-exposure value" as the sum of these two shares. A hypothetical industry whose intermediate inputs are composed solely of imported goods and whose output is fully exported would have a trade-exposure value of 2.

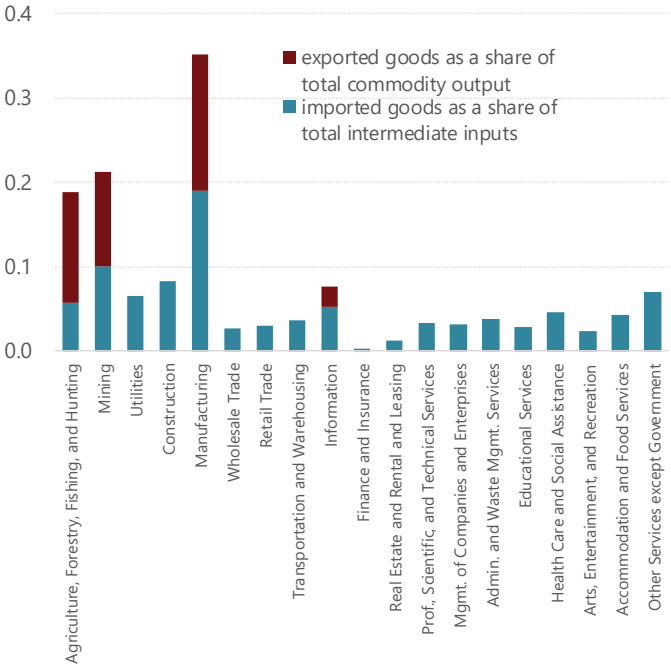
The manufacturing sector far and away is most exposed to trade. In 2017, imported goods accounted for 19% of total intermediate inputs in the manufacturing sector, and exports accounted for 16% of manufactured commodity output, implying a trade-exposure value of 0.35. The next highest trade-exposure values were in agriculture, forestry, fishing and hunting (0.19) and in mining (0.21). Most other industries had values well below 0.10.

Figure 3 demonstrates how an industry's exposure to trade relates to the response of its capital spending to TPU. Plotted for each industry are combinations of 2017 trade-exposure values and point estimates of the response of capital spending to TPU (from the change equations in Table 2). There is a clear relationship between trade exposure and sensitivity to TPU; the more an industry is exposed to trade on either the input or output side, the more sensitive its capital spending is to TPU.[14]

A closer look at manufacturing

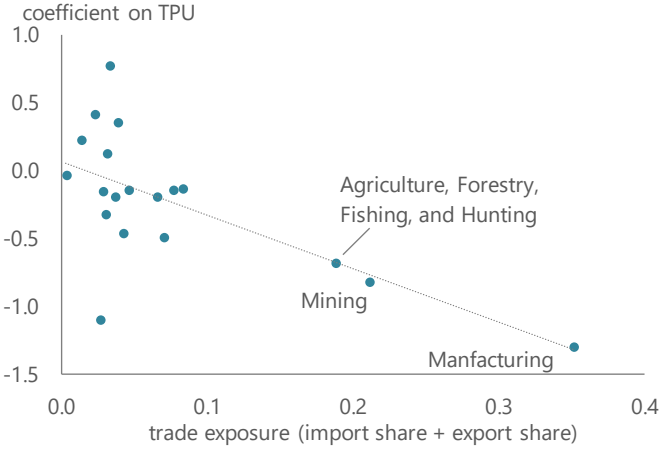
Given that TPU appears to have its main effect in the manufacturing sector, we decided to investigate the effect of TPU on capital spending across the major manufacturing industries and explore the relationship between these effects and trade exposure. Table 3 reports the results of estimating equation (2) using BEA's data on the real net stock of fixed assets by major

Figure 2: Trade Exposure by Major Industry (2017)



Source: Macroeconomic Advisers by IHS Markit, BEA

Figure 3: Trade Exposure and Response to TPU



Source: Macroeconomic Advisers by IHS Markit, BEA

[14] The response of capital spending to TPU is estimated on data going back to 1965, while trade exposure as reported here is only for 2017. The conclusion that manufacturing is most sensitive to TPU (followed by the agriculture group and mining) due to its exposure to trade would require that similar trade patterns by industry hold in deeper historical data. We looked at trade exposure in this same group of industries in 1997 and 2007 as well, and similar patterns held, with manufacturing most exposed to trade followed by the agriculture group and mining. We did not look at trade patterns by industry prior to 1997.

Table 3: Effects of TPU in Manufacturing

	coefficient on TPU
Wood Products	-1.0
Nonmetallic Mineral Products	-1.1
Primary Metals	-1.2 **
Fabricated Metal Products	-0.8
Machinery	-1.2
Computer and Electronic Products	-2.0 *
Electrical Equipment, Appliances, and Components	-2.1 ***
Motor Vehicles, Bodies and Trailers, and Parts	-2.4 **
Other Transportation Equipment	-1.3
Furniture and Related Products	-1.0
Miscellaneous Manufacturing	-1.6 ***
Food and Beverage and Tobacco Products	-0.4
Textile Mills and Textile Product Mills	-1.3 **
Apparel and Leather and Allied Products	-0.8
Paper Products	-1.7 **
Printing and Related Support Activities	-0.1
Petroleum and Coal Products	-0.9
Chemical Products	-1.1 *
Plastics and Rubber Products	-1.7 **

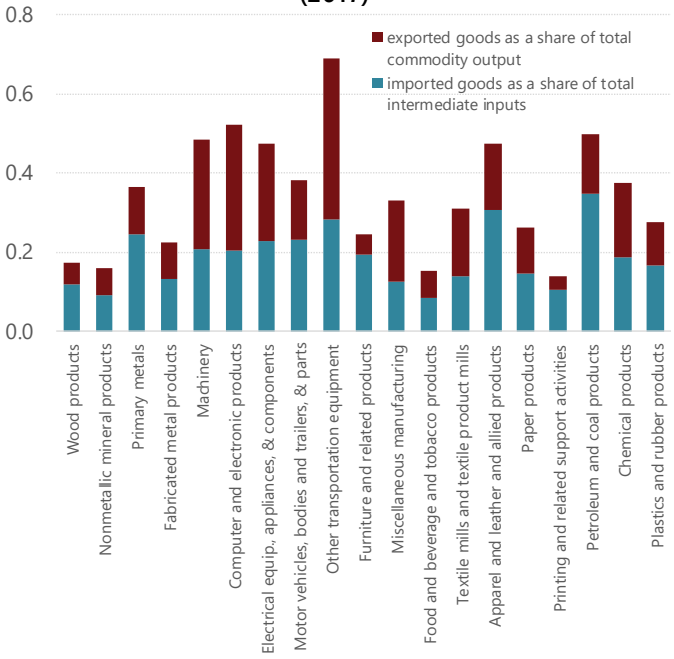
Notes: Sample is annual; 1965-2018. The dependent variable is the first difference of the percent change of the end-of-year real net stock (quantity index). Trade policy uncertainty is entered as the first difference of the log of a 12-month average for each year. Included as independent variables in all regressions, but not shown, are the first differences of the 4-quarter percent changes of real nonfarm business sector output lagged 4 quarters, 8 quarters, and 12 quarters. *** indicates 1% significance, ** indicates 5% significance, * indicates 10% significance.

manufacturing industry.[15] In each major industry, the point estimate of the response of growth of fixed assets to TPU is negative, and in nine of the nineteen industries, the coefficient is significantly different from zero at the 10% level of significance or better. The effect of TPU within manufacturing appears to be fairly widespread.

Figure 4 shows the trade-exposure value (as described above) for each major manufacturing industry. The values range from as little exposure as 14% for printing and related support activities to as high as 69% for other transportation equipment (which includes aircraft). Figure 5 shows the relationship between trade exposure and sensitivity to TPU as indicated by the point estimates on the TPU term in the regressions reported in Table 3. A relationship between trade exposure and sensitivity to TPU is evident; the correlation between trade exposure and sensitivity to TPU is -0.41. And while not charted here, trade exposure on the ex-

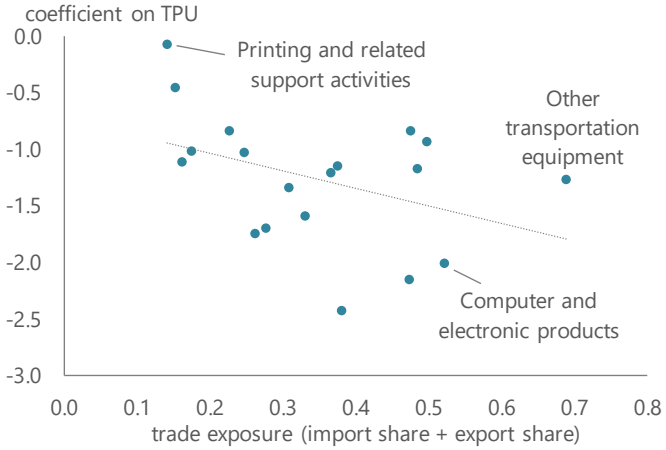
[15] Given our preference for the change equations, we omitted the regression results for the level equations.

Figure 4: Trade Exposure by Manufacturing Industry (2017)



Source: Macroeconomic Advisers by IHS Markit, BEA

Figure 5: Mfg Trade Exposure and Response to TPU



Source: Macroeconomic Advisers by IHS Markit, BEA

port side (share of exports in total commodity output) appears to be more important than trade exposure on the import side (share of goods imports in total intermediate inputs), as the correlation between export exposure and TPU sensitivity (-0.45) is roughly twice the magnitude of the correlation between import exposure and TPU sensitivity (-0.22).

Effect of trade policy uncertainty in manufacturing by type of capital

From the regressions reported in Table 1 above, we were able to identify a statistically significant response of private nonresidential fixed assets to TPU, but the significance was marginal (10%), and we were not able to separately identify statistically significant responses of business equipment, structures, and intellectual property products (IPP) to TPU.[16] This result likely follows from the fact that the capital stocks included in those regressions are stocks held across all industries, and the regression results shown in Table 2 indicate it's only the stocks held in the manufacturing sector that appear to be sensitive to TPU. This hypothesis is further supported by the finding in Table 1 that capital stocks that are mainly held in the manufacturing sector — industrial equipment and manufacturing structures — do exhibit a statistically significant response to TPU.

To determine whether there are statistically significant responses of equipment, structures, and IPP to TPU, then, we turn our focus to these types of capital held only in the manufacturing sector. Table 4 shows the result of estimating equation (2) using as dependent variables growth of total fixed assets held in the manufacturing sector (first row, also shown in Table 2), equipment held in the manufacturing sector (second row), structures held in manufacturing (third row), and IPP held there (fourth row). We also show the sum of the coefficients on the lagged output terms ($c_{1,i}+c_{2,i}+c_{3,i}$) and the fit of the regression as indicated by the r-squared statistic.

[16] In each of the three relevant regressions, the coefficient was negative, but was not statistically different from zero.

Table 4: Effects of TPU in Manufacturing by Type of Capital

	TPU	Sum of coeff. on output	r-squared
Total private fixed assets	-1.3 ***	0.31 ***	0.52
Equipment	-1.5 ***	0.41 ***	0.49
Structures	-1.0 ***	0.21 ***	0.38
Intellectual property products	-1.2 **	0.26 ***	0.34

Notes: Sample is annual; 1965-2018. The dependent variable is the first difference of the percent change of the end-of-year real net stock (quantity index). Trade policy uncertainty is entered as the first difference of the log of a 12-month average for each year. Included as independent variables in all regressions, but not shown separately, are the first differences of the 4-quarter percent changes of real nonfarm business sector output lagged 4 quarters, 8 quarters, and 12 quarters. Shown is the sum of these coefficients. *** indicates 1% significance, ** indicates 5% significance, * indicates 10% significance.

When we focus on capital held only in the manufacturing sector, we identify statistically significant responses of equipment, structures, and IPP to TPU. The largest response, in terms of the effect on growth of capital, is in equipment spending, but the responses of growth of IPP and structures are not far behind. This argues strongly that investment in all types of productive capital is affected by TPU.[17]

Implications of TPU for the forecast

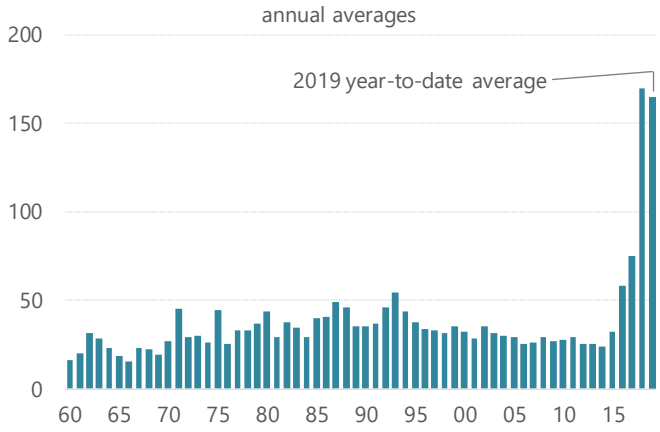
The annual average of TPU had been trending lower from the mid-1990's through 2014 (see Figure 6). Beginning in 2015 or 2016, TPU started climbing higher, as coverage of and concern over then-candidate Trump's views on trade widened. Then, in 2018, when tariffs first started going into effect, TPU spiked.

Using equation (7) above and the estimate of b from the first equation reported in Table 4, we estimated the effect of changes in TPU on changes in gross investment in total private fixed assets held in the manufacturing sector. Because the effects of TPU on investment spending appear to be limited to the manufacturing sector, these estimates also serve as the estimated effects of TPU on changes in total nonresidential fixed investment, which are shown in Figure 7.

The largest increase in TPU in recent years was from 2017 to 2018, an increase that we estimate subtracted

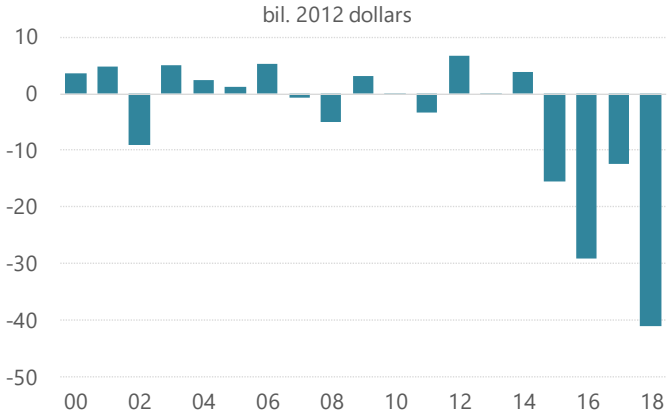
[17] Statistical significance is robust to changes in sample selection. For each equation reported in Table 4, we experimented with the following three samples: 1965-2015, 1965-1990, and 1980-2015. The point estimates on TPU did change from sample to sample, but in every sample for every equation, the coefficient on TPU remained significant at 5% or better.

Figure 6: Trade Policy Uncertainty



Source: Caldara, Dario, Matteo Iacoviello, Patrick Molligo, Andrea Prestipino, and Andrea Raffo

Figure 7: Effect of TPU on change in nonresidential fixed investment



Source: Macroeconomic Advisers by IHS Markit

roughly $40 billion from growth of real private nonresidential fixed investment, or roughly 1.5% of the 2018 level.[18] This is also about 0.2% of real GDP, so we estimate that the increase of TPU from 2017 to 2018 subtracted 0.2 percentage point from year-over-year real GDP growth in 2018. Increases in TPU over the three prior years (2015 – 2017) were, on average, half as large, implying a cumulative subtraction from real private nonresidential fixed investment (and real GDP) from 2015 through 2018 of roughly $100 billion, or 0.5% of GDP.

From Figure 6 we see that TPU so far this year has averaged roughly the same as the 2018 average. If this average holds over all of 2019, we would expect roughly no contribution this year to the change in private nonresidential fixed investment (and GDP) from TPU. Going forward, if TPU subsides and returns to levels prior to 2015, we can look for a boost to real investment spending and real GDP that would reverse the cumulative effects seen over recent years, implying a boost to real GDP of about 0.5%, spread out over the years that TPU declines to pre-2015 levels.[19]

Conclusion

Trade policy uncertainty has risen sharply in recent years, as estimated by two news-based measures. We have found evidence in support of both anecdotal reports and other research that increases in TPU do, in fact, weigh on capital expansion. These effects, moreover, appear to be limited to the manufacturing sector, a sector whose production processes and selling markets are uniquely exposed to trade and, hence, to the potential detrimental effects of tariffs and counter-tariffs. The increase in TPU from 2017 to 2018 — a period that saw the imposition of new tariffs on solar panels, washing machines, aluminum, steel, and imported goods from China — is estimated to have reduced year-over-year real GDP growth by 0.2 percentage point. For this year, TPU is, so far, little changed from last year, implying roughly no contribution, positive or negative, to 2019 GDP growth. And, finally, given that increases in TPU have been weighing on capital expansion for a few years now, a return of TPU to pre-2015 levels has the potential to boost real GDP growth by (possibly) one- to two-tenths per year for a few years, depending on whether and how quickly TPU returns to pre-2015 levels.

[18] This is in line with estimates from Caldara, Dario, Matteo Iacoviello, Patrick Molligo, Andrea Prestipino, and Andrea Raffo cited above. They estimate the subtraction from 2018 private nonresidential fixed investment two ways: aggregating up from effects estimated in firm-level data (a 1% subtraction) and directly from VAR analysis (a 1% to 2% subtraction).

[19] This boost would be before any multiplier effects and assumes no monetary offset.

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