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Cross-Subsidization in Conglomerate Firms: Evidence from Government Spending Shocks

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Abstract

Exploiting demand shocks from changes in federal government spending, we examine how the organizational structure of a firm affects its investment behavior. Government spending shocks affect the investment of government-dependent conglomerate segments less than matched stand-alone firms. Investment also increases in lower government-dependent segments when other segments within the same firm experience positive demand shocks, indicating cross-subsidization between segments. We further show that this cross-subsidization leads to worse operating performance and increases the diversification discount. Our findings are robust after addressing the endogeneity of government spending.

I. Introduction

The optimal form of a corporation has been debated for over a century, including watershed events such as the break-up of Standard Oil in 1911 and Berle and Means's (1932) evaluation of the separation of ownership and control. One form of a company, that of a conglomerate, is particularly controversial and has been studied for decades (see Mueller (1969) for an early discussion of conglomerate theory and Weston and Mansinghka (1971) for early empirical testing). The late 1960s saw a wave of conglomerate mergers, and the 21st century has seen a wave of divestitures undoing some conglomerates (e.g., GE, Tyco, ITT, Sara Lee, HP, and UTX). Several technology companies today (e.g., Alphabet) have also expanded into a wide range of businesses, and other large industrial conglomerates remain (e.g., 3M). The empirical evidence is mixed on the benefits of conglomerates, depending upon the research design used. For instance, Lang and Stulz (1994) show that conglomerates on average trade at a discount relative to a portfolio of stand-alone firms, but Campa and Kedia (2002) argue that part of the value reduction could be attributed to firms' endogenous decisions to diversify. Recently, Boguth, Duchin, and Simutin (2022) employ a new empirical method to estimate division Q and conclude that corporate diversification does not destroy value.

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In this article, we utilize industry-specific demand shocks caused by changes in federal government spending to evaluate conglomerate cross-subsidization and efficiency, driven by the observation that some industries are more reliant on government spending than others. We measure each industry's dependence on government spending and further interact it with the level of aggregate government spending to proxy the demand of each industry from the federal government. There are several advantages of this approach. First, our government demand measure represents an identifiable and less noisy set of investment opportunities in each industry from the federal government (compared to industry Q, for example). Since federal spending in the aggregate is largely driven by political factors and our measure is constructed by interacting aggregate spending with the predetermined dependence of each industry on government, we believe this approach reduces endogeneity more than using actual spending by the government in each industry. Second, our government dependency measure of an industry is independent of the organizational structure of the industry. Therefore, ceteris paribus, the impact of our demand shock is unlikely to differ between stand-alone firms and conglomerate segments in the same industry.

We first verify that changes in government demand in an industry represent a credible change to the investment opportunity set of that industry. To do so, we interact the government dependency of an industry (OWN_GD) with government spending in a year and examine how this impacts investment. The results from the segment-level analysis indicate that following increases in government spending, segments in industries that sell a larger portion of their products to the federal government invest more. In conjunction with the industry-level analysis, these results confirm that changes in government spending are more likely to affect firms in industries that are more dependent on government spending.

We then investigate how segments in multi-industry firms respond to demand shocks from the federal government relative to segments in single-industry firms in the same industry. Our results reveal that more government-dependent segments in multi-industry firms are less responsive (in terms of investment) to government spending shocks. This finding is driven by the fact that following increases in government spending, lower government dependency (LGD) segments within multi-industry firms tend to invest more than their single-industry peers, while higher government dependency (HGD) segments within multi-industry firms tend to invest less relative to their single-industry peers. This investment pattern is robust to the careful matching of segments to stand-alone firms based on their previous investment and industry affiliation. These results suggest that positive shocks to some conglomerate segments are likely to be shared with other segments within the same conglomerate. The economic magnitude of the differences in investment rates is also sizable. For a 1-standard-deviation increase in government spending, segments in single-industry firms that sell 10% more of their products to the government invest 0.9% more of their assets relative to otherwise similar segments in multi-industry firms.

We next examine the underlying causes of the underreaction of conglomerate segments to government spending shocks, by conducting tests using conglomerate firms only. Theoretically, a number of factors can contribute to the investment underreaction we have identified. For instance, managers may have different

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incentives in stand-alone firms. Or managers of stand-alone firms may get more precise signals from the stock market. It could also be that there is cross-subsidization across business units in conglomerate firms. We design our tests specifically to detect if there is cross-subsidization in conglomerate firms. To do so, for each segment within a conglomerate, we calculate the sales-weighted average government dependency for the other segments within the same conglomerate (OTHER_GD). For example, if a conglomerate had three equally sized segments, Segment A with OWN_GD of 0%, Segment B with OWN_GD of 20%, and Segment C with OWN_GD of 50%, then A's OTHER_GDwould be 35%, B's would be 25%, and C's would be 10%. We then conduct tests using a segment's OWN_GD relative to its OTHER_GD. We find that for conglomerate segments whose government dependency is lower than the other segments in the same firm (i.e., OWN_GD < OTHER_GD), their investment is affected positively by the level of OTHER_GD interacted with government spending. This shows that when other segments in the same firm are more dependent on government spending, less dependent segments benefit from positive government spending shocks. In other words, less dependent segments gain exposure to government spending shocks through their affiliation with more dependent segments, which provides direct evidence on the existence of cross-subsidization.

To summarize our findings so far, i) HGD segments in conglomerates respond less to funding shocks than matched stand-alone firms, and ii) investment increases for LGD segments within a firm when other HGD segments within the conglomerate receive a positive shock. We now examine the impact of this cross-subsidization on segment performance. Specifically, we contrast the profitability changes in conglomerate segments with those of matched stand-alone firms in response to the same government spending shock. Since cross-division subsidization does not exist in stand-alone firms, the difference between the two represents the net impact of cross-subsidization on operating performance. We find that following the same positive government spending shock, increases in the profitability of conglomerate segments are lower than those of stand-alone firms, indicating that cross-subsidization is detrimental to operating performance. We further show that the smaller increase in profitability only occurs in conglomerate segments that are on the active end of cross-subsidization (OWN_GD≥OTHER_GD). These results indicate that following positive government spending shocks, some conglomerate segments have to sacrifice their own performance when subsidizing others.

To evaluate the overall impact of cross-subsidization, we directly examine its valuation consequences. To begin with, we investigate how the excess value of conglomerate firms changes when cross-subsidization is more likely to occur. Following Berger and Ofek (1995), we construct the excess value measure by comparing the market value of a conglomerate firm to its imputed value if each of its segments operated as stand-alone firms. After confirming the existence of the standard diversification discount in our sample, we show that conglomerates with HGD trade at a larger discount relative to a portfolio of stand-alone firms. Moreover, the bulk of the diversification discount in HGD firms occurs in years with higher levels of government spending. Given that these are exactly the type of firms in which cross-subsidization is more likely to occur, these results speak directly to the value destroying role of cross-subsidization.

Finally, we use an instrumental variable (IV) approach to address the endogeneity issue of government spending. Specifically, we use the political party affiliation of the executive branch and the legislative branch of the federal government as an instrument, which is motivated by Ngo and Stanfield (2022). Because our government spending shocks focus on nondefense discretionary spending, we use a dummy variable indicating if the executive branch and at least one chamber of Congress are under the control of Democrats as our instrument. This instrument is highly correlated with our government spending measure, and it is plausibly exogenous to the investment behavior of firms with different organizational structures interacted with government dependency. Our IV results are consistent with our baseline results, signifying the robustness of our results to the endogeneity of government spending.

This article makes several important contributions to the literature. First, different from the canonical Q-sensitivity analysis, we utilize changes in aggregate government spending prorated to each industry as demand shocks and analyze how conglomerate firms respond to these shocks, which helps to alleviate the issues of using Q as noted in the conglomerate literature (Whited (2001), Chevalier (2004), and Boguth et al.(2022)). Second, while studies examining the Q-sensitivity in conglomerate firms are generally clear on the "if" part, they are largely silent on the "why" part. For instance, Gertner, Powers, and Scharfstein (2002) explicitly mention that this is one of the two questions left unanswered by their paper. Our article, on the other hand, provides direct evidence on one of the reasons behind conglomerates' low sensitivity to government spending shocks: There is cross-subsidization among segments within a conglomerate.

Our article is related to the broad literature that examines internal capital markets. Theoretically, there are two competing views on the potential benefits or costs of internal capital markets.[1] The empirical evidence supporting either view has been extensive in the literature.[2] While our evidence shows that cross-subsidization occurs in conglomerate firms and it is detrimental to firm value, which is consistent with the dark side view of internal capital markets, two caveats are worth noting. First, our results should not be generalized to assess the overall impact of internal capital markets. As pointed out by Matvos and Seru (2014), a firm's decision to choose its organizational structure is likely to be driven by the trade-off between the benefits and costs of internal capital markets. One example of the costs is managerial preferences for corporate socialism, the case that we analyze in this article. The benefit, on the other hand, can be avoiding frictions of accessing external capital markets by allocating funds internally between divisions. For instance, Matvos and Seru (2014) and Kuppuswamy and Villalonga (2016) find that internal resource allocation helped conglomerates offset financial market stress during the recent financial crisis. Our view is similar to theirs, which is that diversification may provide firms with insurance against extreme financial market

[1]See Stein (2003) for an excellent review on this topic.

[2]Please see, for example, Lamont (1997), Shin and Stulz (1998), Khanna and Tice (2001), Gertner et al. (2002), Xuan (2009), Ozbas and Scharfstein (2010), Duchin and Sosyura (2013), Matvos and Seru (2014), Giroud and Mueller (2015), and Kuppuswamy and Villalonga (2016), on the empirical performance of internal capital markets.

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dislocation. While they examine the payoff from diversification insurance during extreme times, we instead focus on the premium paid for diversification insurance during normal times. Second, the government spending shock we exploit in this article is transient rather than permanent. Therefore, the conclusions from our article cannot necessarily be generalized to situations involving permanent shocks. For instance, Khanna and Tice (2001) analyze the investment decisions of discount divisions of diversified firms in response to Wal-Mart's entry into their markets. Their finding, that the investment in these discount divisions is more sensitive to their productivity, is not necessarily at odds with ours given that the shock in their experiment is permanent rather than transient.

II. Data and Summary Statistics

A. Data

For corporate segments that represent at least 10% or more of consolidated sales in a different industry, SFAS No. 14 (superseded by SFAS No. 131 in 1997) requires that firms report some accounting information on a segment-level basis for fiscal years ending after Dec. 15, 1977. We use Compustat Historical Segments data from the fiscal year of 1977 to the fiscal year of 2016. For each segment, we collect the following six variables: net sales, operating profit (loss), depreciation and amortization, capital expenditures, identifiable total assets, and SIC (NAICS) code. An important difficulty in using these data is that firms may reorganize their segments over time. To ensure that each segment is comparable over time, we follow Shin and Stulz (1998) and exclude segment years in which the absolute value of either of the following two ratios exceeds 1: net capital expenditure over the previous year's segment assets and cash flow (defined as operating profits plus depreciation) to the previous year's segment assets. We also exclude segments in the financial sector (SIC code starting with 6) and utility sector (SIC code starting with 49).[3] After further removing observations without industry classifications and segments not organized by industry lines, we are left with a sample of 250,339 firm-segment-year observations. The corresponding firm-level sample is from Compustat fundamental annual files and has 141,997 firm-year observations. To conduct the industry-level analysis, we collect the industry-level employment data from the County Business Patterns. To avoid the inconsistency of industry codes over time, we utilize the industry concordances provided by Eckert, Fort, Schott, and Yang (2020).

B. Government Dependency

Following Nekarda and Ramey (2011), we measure the dependence of industries on the federal government using data from the Benchmark Input–Output Accounts released by the Bureau of Economic Analysis (BEA). The industry input–output table provides detailed information on the flow of goods from one industry to another and the flow of goods from each industry to their final uses.

[3]We keep the nonfinancial and nonutility segments in conglomerates that have operations in financial or utility industries in our sample.

The final uses by the federal government are further broken down into those for national defense and those for nondefense purposes. As shown in Goyal, Lehn, and Racic (2002), most of the variation in defense spending comes from expenditures related to weapons manufacturing. Because the BEA does not further separate spending on weapons from general spending on national defense, we focus on the final uses for nondefense purposes.[4] We use the BEA's use table, which provides the dollar amount of each commodity consumed by each industry and final uses, and the BEA's industry-by-commodity total requirement table, which provides the dollar amount of industry output required per dollar of each commodity delivered to final demand. With these two tables, we are able to calculate a measure of industry dependence on the federal government that captures both the direct and indirect effects.[5] Conceptually, this measure captures the fraction of the output in an industry that is used to produce the final products consumed by the federal government for nondefense purposes. Moreover, it also takes into account that an increase in government purchases of finished goods can also have an indirect effect on industries that supply parts to these finished goods.[6] The input–output tables are available for all years ending with 2 and 7 after 1967. In this article, we use the input–output tables in the years of 1977, 1982, 1987, 1992, 1997, 2002, 2007, and 2012.[7]

To obtain the government dependency of segments (OWN_GD), we follow Belo, Gala, and Li (2013) and match the industry government dependency calculated above to each segment based on the concordance tables provided by the BEA.[8]

[4]Please see Supplementary Material Section A.3 for a more detailed discussion on defense versus nondefense spending.

[5]The procedure is as follows: First, from the use table, we aggregate different items for the final nondefense demand from the federal government at the commodity level. This number represents the dollar amount of a commodity output that is directly consumed by the federal government for nondefense purposes. This is a commodity-by-one vector. Second, from the industry-by-commodity total requirement table, we obtain the industry output required per dollar amount of each commodity delivered to final demand. This is an industry-by-commodity matrix. Third, we multiply the industry-by-commodity matrix by the commodity-by-one vector, which yields the total output required, both directly and indirectly, by each industry to fulfill the final government demand for nondefense purposes. This is an industry-by-one vector. Fourth, from the use table, we obtain the total industry output. This is also an industry-by-one vector. The element-by-element quotient of steps 3 and 4 is the dependence of each industry on the federal government.

[6]This measure summarizes the overall effect along the supply chain as in Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi (2012). Therefore, the supply chain relatedness across segments within a conglomerate in Ozbas and Scharfstein (2010) is implicitly accounted for by this measure.

[7]When matching the input–output table with the segment data, we use the information of the most recent input–output (I–O) table until the next table becomes available. For example, from the year 1982 to 1986, we use the 1982 I–O table; from 1987 to 1991, we use the 1987 I–O table. Supplementary Material Table A1 lists a sample of industries with their levels of government dependency based on the input–output tables of 2007.

[8]The BEA provides concordance tables between I–O industries and SIC codes before 1997, and concordance tables between I–O industries and NAICS codes after (including) 1997. Before 1997, for each 4-digit SIC code, we calculate the weighted average of I–O industry government dependency, with the I–O industry total output as the weights. If not matched at the 4-digit SIC level, we use the 3-digit SIC code and 2-digit SIC code successively. After (including) the year 1997, for each 6-digit NAICS code, we calculate the weighted average of I–O industry government dependency, with the I–O industry total output as the weights. If not matched at the 6-digit NAICS level, we relax the number of NAICS digits gradually until NAICS code and I–O code are matched.

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For each segment in multi-industry firms (defined by 4-digit SIC), we also calculate the companion government dependency introduced by other industries in which the parent firm of the segment operates. Formally, we have

$$\text{(1)} \qquad \text{OTHER\_GD}_{i,j,k,t} = \sum_{l \neq k} \left(\frac{\text{SALES}_{j,l,t}}{\sum_{l \neq k} \text{SALES}_{j,l,t}} \times \text{OWN\_GD}_{l,t} \right),$$

where i denotes the segment, j denotes the parental firm, k denotes the 4-digit SIC industry of segment i, t denotes the year, $\text{SALES}_{j,l,t}$ is firm j's sales in industry l in year t, and $\text{OWN\_GD}_{l,t}$ is the government dependency of industry l in year t. Since $\frac{\text{SALES}_{j,l,t}}{\sum_{l \neq k} \text{SALES}_{j,l,t}}$ is determined by the parental firm's operation, the variation of $\text{OTHER\_GD}_{i,j,k,t}$ over time may reflect its emphasis on different segments. To mitigate this concern, we create a time-invariant measure, $\text{OTHER\_GD}_{i,j}$ (OTHER_GD for short), by averaging $\text{OTHER\_GD}_{i,j,k,t}$ over time. Therefore, OTHER_GD of a segment is essentially the average sales-weighted government dependency of other industries in which the parent firm of the segment operates.

To obtain the firm-level government dependency, we calculate the sales-weighted average of segment government dependency. Similar to $\text{OTHER\_GD}_{i,j,k,t}$, the firm-level government dependency defined in this way may change over time simply due to firms changing their relative sales in each segment. As a result, we construct a time-invariant measure of firm government dependency (FIRM_GD) by averaging the time-varying government dependency of a firm over time. Our results are robust if we use the time-variant version of OTHER_GD and FIRM_GD.

Because input–output tables are at the industry level, our government dependency constructed above has no variation within each industry year. Brogaard, Denes, and Duchin (2021) and Ngo and Stanfield (2022) show that firms within an industry vary in their fraction of sales to the government. Therefore, relying solely on input–output tables may misclassify the government dependency of some segments. Moreover, the literature has shown that the competition for government contracts within an industry or lack thereof may affect how firms invest (Dasgupta (1990), Kang and Miller (2022)). To alleviate these concerns, we utilize the firm-level government dependency from the Compustat customer data in conjunction with our industry-level measure from the input–output tables as our alternative measure of government dependency. Specifically, we only use our government dependence measure when the firm lists the government as an important customer in the Compustat customer data (and 0 for other firms).

We interact government dependency (OWN_GD, OTHER_GD, or FIRM_GD) with government spending in the previous year and use this interaction as our measure of government spending shocks in the empirical analysis. As noted in Ngo and Stanfield (2022), the formal budget process for discretionary spending starts when the President submits a detailed budget request for the coming fiscal year (which begins on Oct. 1) by early February to Congress. Congress then considers the annual appropriations bills, which set the budget authority for the coming fiscal year. Since contemporaneous spending may be determined by the economic conditions in a given year which may also affect firms' investment behavior, we lag federal outlays by 1 year to avoid simultaneity issues.[9] Intuitively, this specification anticipates greater shocks from federal government spending for industries that have larger ex ante sales to the federal government. We measure spending from the federal government in the aggregate, which is driven by, among other things, swings in political ideology, identity of the government, and budget exigencies. Moreover, the government dependency of a segment is predetermined by the industry to which the segment belongs. We, therefore, believe that our measure of government spending shocks is unlikely to be affected by the supply side shocks hitting the focal industry.

C. Other Variables and Summary Statistics

The main dependent variable in our empirical analysis is the investment rate of a segment, which we define as the ratio of capital expenditures over the identifiable total assets of the segment in the previous year. Tobin's Q of each segment is defined as the median Q of all stand-alone firms in the narrowest SIC industry. Firm Q is defined as the market value of assets divided by the book value of assets, where the market value of assets is computed as the book value of assets plus the market value of common stock less the sum of book value of common stock and balance sheet deferred taxes. When measuring the investment performance of a segment, we use its return on assets (ROA), defined as the operating profits (losses) scaled by the identifiable total assets of the segment in the previous year. To provide a comparison, we also calculate the investment rate and ROA at the firm level. Specifically, firm investment is defined as the ratio of capital expenditures over the total assets of the firm in the previous year. Firm ROA is defined as EBIT scaled by total assets in the previous year. When analyzing valuation consequences, we use the excess value measure developed by Berger and Ofek (1995), which represents the discount (or premium) at which diversified firms trade with stand-alone firms in their industries. Following Berger and Ofek (1995) and Campa and Kedia (2002), we compute excess values for firms as the natural logarithm of the ratio between a firm's market value and its imputed value.[10] Our measure of government spending

[9]There are two notions of spending in the federal budget process: outlays, which are how much money actually flows out of the federal Treasury in a given year, and budget authority, which is how much money Congress allows the executive branch to commit to spend. The level of outlays in a given year is dictated by the budget authority set by Congress for that year. Because we are using federal outlays in the previous year as our government spending measure, which is dictated by the budget authority set by Congress 2 years earlier, our measure is less likely to be affected by concurrent economic conditions. Our results are qualitatively similar if we use logged budget authority in the current year as our government spending measure.

[10]We first exclude firm years in which firms report segments in the financial sector (SIC code starting with 6), firm years with sales less than $20 million, and firm years in which the sum of segment sales deviated from total sales by more than 1%. The imputed value of a segment is then obtained by multiplying segment sales with the median sales multiplier of all stand-alone firm-years in that SIC. The sales multipliers are the median value of the ratio of total capital over sales. Total capital is the sum of the market value of equity, long-term and short-term debt, and preferred stock. The industry definitions are based on the narrowest SIC grouping that includes at least 5 firms.

TABLE 1

Summary Statistics

Table 1 reports summary statistics for the samples used in this article. Panel A reports summary statistics for segment-level analyses. INVESTMENT is segment capital expenditure scaled by segment assets in the previous year; ROA is segment operating profits scaled by segment total assets in the previous year; SALES is the amount of segment sales measured in 2012 constant dollars; ASSETS is the amount of segment total assets measured in 2012 constant dollars; SEGMENT_Q is the median Q of all stand-alone firms in a given year in the same industry (defined by the narrowest SIC); OWN_GD is the government dependency of the segment's industry; OTHER_GD is the average sales-weighted government dependency of other industries in which the parent firm of the segment operates; GOVSPEND is the amount of nondefense discretionary government spending scaled by GDP. Panel B reports summary statistics for firm-level analyses. INVESTMENT is firm capital expenditure scaled by the total assets of that firm in the previous year; ROA is EBIT scaled by firm total assets in the previous year; SALES is the amount of firm sales measured in 2012 constant dollars; ASSETS is the amount of firm total assets measured in 2012 constant dollars; FIRM_Q is defined as the market value of assets divided by the book value of assets, where the market value of assets is computed as the book value of assets plus the market value of common stock less the sum of book value of common stock and balance sheet deferred taxes; FIRM_GD is the firm-level average government dependency in the sample; EXCESS_VALUE is the natural logarithm of the ratio of firm value to its imputed value based on Berger and Ofek (1995); GOVSPEND is the amount of nondefense discretionary government spending scaled by GDP. Panel C reports summary statistics for industry-level analyses. EMPLOYMENT_GROWTH is the percentage change in industry employment from the previous year to the current year; OWN_GD is the government dependency of the industry defined by 4-digit SIC; GOVSPEND is the amount of nondefense discretionary government spending scaled by GDP. Variables are winsorized at the 1st and 99th percentile when applicable.

	No. of Obs.	Mean	Median	Std. Dev.
Panel A. Segment-level Variables				
INVESTMENT	250,339	0.09	0.05	0.13
INVESTMENT (OWN_GD < OTHER_GD)	75,226	0.08	0.05	0.12
INVESTMENT (OWN_GD≥OTHER_GD)	65,759	0.10	0.05	0.14
ROA	251,592	0.07	0.09	0.26
ROA (OWN_GD < OTHER_GD)	74,939	0.12	0.11	0.21
ROA (OWN_GD≥OTHER_GD)	65,825	0.11	0.11	0.21
SALES (mm$)	250,339	1,388.27	144.78	7,125.36
ASSETS (mm$)	248,729	1,333.47	126.09	6,379.91
SEGMENT_Q	249,699	1.75	1.45	1.04
OWN_GD	250,265	0.02	0.01	0.02
OTHER_GD	140,985	0.02	0.01	0.02
GOVSPEND (%)	250,339	3.73	3.60	0.52
Panel B. Firm-level Variables				
INVESTMENT	116,929	0.08	0.05	0.09
ROA	116,467	0.09	0.09	0.14
SALES (mm$)	141,997	2,308.13	337.81	10,016.72
ASSETS (mm$)	141,973	2,662.05	323.50	10,669.94
FIRM_Q	118,176	1.71	1.30	1.22
FIRM_GD	141,996	0.02	0.01	0.02
EXCESS_VALUE	121,688	−0.07	−0.04	0.78
GOVSPEND (%)	141,997	3.70	3.60	0.50
Panel C. Industry-level Variables				
EMPLOYMENT_GROWTH	41,652	0.00	0.00	0.08
OWN_GD	41,652	0.01	0.01	0.02
GOVSPEND (%)	41,652	3.69	3.60	0.47

is defined as the ratio of nondefense discretionary outlays scaled by GDP, which is obtained from the Office of Management and Budget (https://www.whitehouse.gov/omb/historical-tables/, Table 8.4).

Table 1 reports the summary statistics for the variables constructed above. Specifically, we report the summary statistics for variables used in our segment-level analyses in Panel A, for variables used in our firm-level analyses in Panel B, and for variables used in our industry-level analyses in Panel C. The median segment in our sample has sales of $145 million, assets of $126 million, and a Q ratio of 1.45. It invests 5% of its assets each year and generates profits equivalent to 9% of its assets. In addition, 1% of its products are consumed by the federal government for nondefense purposes. The median parental firm has sales of

$334 million and assets of $324 million, and invests 5% of its assets. The ROA and government dependency of the median firm are similar to those of the median segment. The median firm has a Q ratio of 1.30, slightly smaller than the median segment. Compared to its imputed value, the median firm trades at a 4% discount. From 1977 to 2016, the federal government on average spends about 3.7% of the GDP on discretionary nondefense projects.

III. Empirical Results

A. Government Spending Shocks and Segment Investment

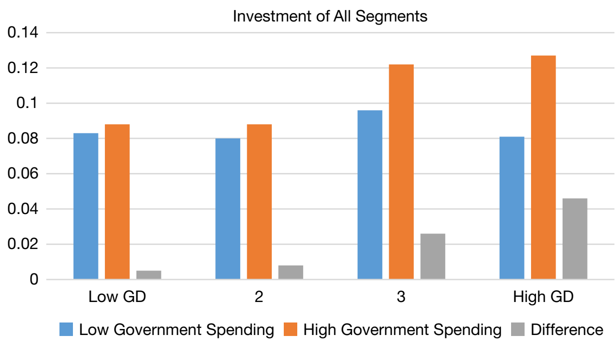
We begin our empirical analysis by examining how firms with different levels of government dependency invest when government spending changes. To do so, we sort segment years along two dimensions: the government dependency of the segment and the level of government spending in the year. Specifically, we break down government spending into two groups: years in which government spending is higher than the 75th percentile and years in which government spending is lower than the 75th percentile. For each group, we calculate the average investment rate of segments in each government dependency quartile. We then plot the average investment rate of segments against the quartile to which the government dependency of these segments belongs in Figure 1. From Figure 1, one can clearly tell that during high government spending years, there is a steady increase in the investment rate as government dependency increases. However, such a trend is not observed in low government spending years. The resulting difference in investment rates between high government spending years and low government spending years also increases monotonically from the lowest government dependency quartile to the highest.

To quantify the visual differences in Figure 1, we regress the investment rates of segments on our measure of government spending shocks, namely, the

FIGURE 1

Investment of Segments Sorted by Government Spending and Government Dependency

The *y*-axis in Figure 1 represents segment investment rates, where investment is defined in Table 1. The *x*-axis represents the level of government dependency (GD) broken down into quartiles, where GD is defined in Table 1. Low Government Spending denotes years in which GOVSPEND in the previous year is lower than the 75th percentile; High Government Spending denotes years in which GOVSPEND in the previous year is higher than the 75th percentile. GOVSPEND is defined in Table 1.



interaction of government spending and government dependency. Formally, we estimate the following model:

$$\text{(2)} \qquad \text{INVESTMENT}_{i,j,t} = \alpha_{i,j} + \delta_t + \beta_1 \text{OWN\_GD}_{i,j,t} \times \text{GOVSPEND}_{t-1} + \beta_2 \text{OWN\_GD}_{i,j,t} + \beta_3 Q_{i,j,t-1} + \varepsilon_{i,j,t},$$

where i indexes segments, j indexes parental firms, and t indexes years. The dependent variable $\text{INVESTMENT}_{i,j,t}$ is the investment rate of segment i of firm j in year t; $\text{OWN\_GD}_{i,j,t}$ is the government dependency of segment i of firm j in year t; $Q_{i,j,t-1}$ is the Q ratio of segment i of firm j in year $t-1$; GOVSPEND_{t-1} is our measure of government spending in year $t-1$; $\alpha_{i,j}$ are segment fixed effects; δ_t is year-fixed effects. Because GOVSPEND_{t-1} only has time-series variation, it is subsumed by the year-fixed effects. Standard errors are clustered at the firm level. The variable that we are interested in is the interaction term. Its coefficient, β_1, captures the differential impacts of government dependency on segment investment in high government spending years versus in low government spending years.

The estimation results of model 2 are presented in the first four columns in Panel A of Table 2. In columns 1 and 2, we report the regression results without including additional controls; in columns 3 and 4, we report the regression results after controlling for segment Q. The estimates in columns 1 and 3 indicate that higher government dependency industries invest more on average. Columns 2 and 4 further indicate that industries with higher levels of government dependency invest more when government spending increases. We note that because GOVSPEND is continuous, the coefficient on OWN_GD in these two columns indicates the impact of government dependency on investment when GOVSPEND equals 0. The coefficient on the interaction term indicates the incremental impact of government dependency on firm investment when government spending increases by 1 percentage point. Taking column 2, for example, for a 1-standard-deviation increase in government spending (0.5% of GDP), it indicates that a segment invests 0.5% more of its assets when it sells 10% more of its products to the government. For example, consider two otherwise similar segments: Segment A sells nothing to the government, and Segment B sells 10% of its goods to the government. Our results indicate that when government spending as a fraction of GDP increases by half a percentage point, Segment A invests 0.5% more of its assets relative to Segment B. Given that the median segment invests 5% of its assets, this represents a 10% increase in investment for segments that sell 10% more of their products to the government. Unlike the first four columns which only use publicly listed firms, in columns 5 and 6 we make use of the County Business Patterns data, which cover the economic activity of both public and private firms in the United States. The results reveal a similar pattern to those in columns 1–4: Industries with higher levels of government dependency respond more positively to increases in government spending as measured by the employment growth in these industries. To account for the possibility that firms in the same industry may vary in their dependence on the government, in Panel B, we present our results using the alternative measure of government dependency, namely, the government supplier status of the firm in conjunction with our OWN_GD. The results are qualitatively similar to those in Panel A, signifying the robustness of our results.

TABLE 2

Government Spending Shocks and Segment Investment

Table 2 reports the regression results of segment investment (or industry employment growth) on government spending shocks. The dependent variable is INVESTMENT in columns 1 to 4 of Panels A and B, and EMPLOYMENT_GROWTH in columns 5 and 6 of Panel A. In Panel A, OWN_GD is constructed using data from the BEA input–output tables; in Panel B, OWN_GD is set to 0 for firms that do not report the government as customers in the Compustat data. All variables are defined in Table 1. Standard errors are adjusted for clustering at the firm level in columns 1–4 (industry level in columns 5 and 6), and the corresponding *t*-statistics are reported in the parentheses below the coefficient estimates. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Government Dependency Measured by Input–Output Tables

	Segment Level				Industry Level	
	INVESTMENT				EMPLOYMENT_GROWTH	
	1	2	3	4	5	6
OWN_GD × GOVSPEND		0.107***		0.109***		0.121**
		(2.67)		(2.69)		(2.23)
OWN_GD	0.051**	−0.351**	0.040*	−0.369**	0.014	−0.452**
	(2.15)	(−2.35)	(1.69)	(−2.45)	(0.32)	(−2.23)
SEGMENT_Q			0.009***	0.009***		
			(20.02)	(19.99)		
Segment FE	Yes	Yes	Yes	Yes	No	No
Industry FE	No	No	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	239,634	239,634	239,002	239,002	41,652	41,652
R^2	0.487	0.487	0.490	0.490	0.252	0.252

Panel B. Alternative Measure of Government Dependency

	INVESTMENT			
	1	2	3	4
OWN_GD × GOVSPEND		0.163***		0.156***
		(3.54)		(3.44)
OWN_GD	0.050*	−0.560***	0.041	−0.545***
	(1.90)	(−3.24)	(1.56)	(−3.20)
SEGMENT_Q			0.009***	0.009***
			(20.03)	(20.01)
Segment FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
No. of obs.	239,634	239,634	239,002	239,002
R^2	0.487	0.487	0.490	0.490

B. Industry Dispersion and Government Spending Shocks

Having established that changes in government spending represent different shocks to the investment opportunities of industries with different government dependencies, we examine how the industry dispersion of a firm (e.g., if it is a conglomerate) alters the investment responses of its segments in this section. Theories provide competing predictions. The bright side models, such as Stein (1997), contend that the headquarters of diversified firms can engage in "winner-picking" practice by pooling resources and allocating them to their best use. In our setting, when facing positive demand shocks from the government, segments with higher levels of government dependency in multi-industry firms will likely have better investment prospects and therefore receive more resources than those in single-industry firms. This in turn makes segments in multi-industry firms more responsive to government spending shocks. The dark side models by Rajan, Servaes, and Zingales (2000) and Scharfstein and Stein (2000), on the other hand, posit that the cross-subsidization within diversified firms often tends to be "socialist" in nature, in the sense that weak segments are more likely to be subsidized by strong ones. Inefficient cross-subsidization implies that government-dependent segments in multi-industry firms are less responsive to government spending shocks. This is because the cross-subsidization in a multi-industry firm can neutralize the impact of government spending shocks experienced by one segment and spread these shocks across all segments.

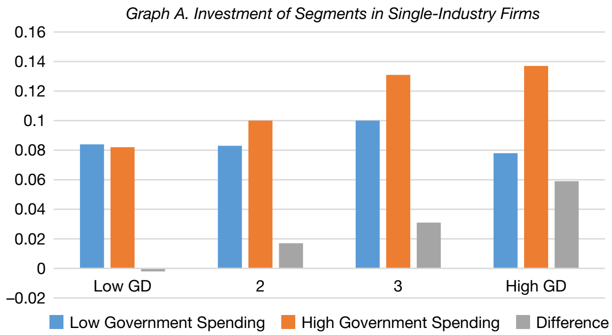
1. Full Sample Tests

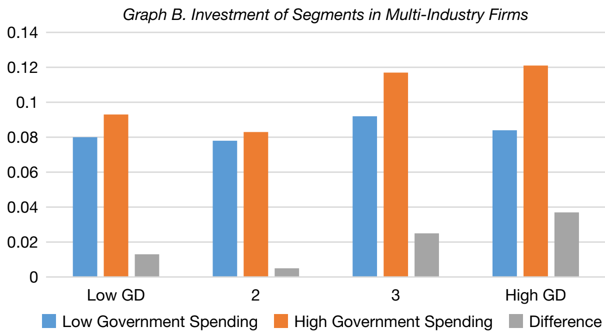
As a starting point, we partition the sample into segment years in single-industry firms and those in multi-industry firms. We then draw a graph similar to Figure 1 for each group and present them in Figure 2. As evident in Graph A of Figure 2, among segments in single-industry firms, the investment rate differences between high government spending years and low government spending years increase monotonically as government dependency increases, which is in contrast to Graph B, where the case for multi-industry firms is presented. The difference between Graphs A and B demonstrates the role of industry dispersion in moderating the investment sensitivity to government spending shocks.

FIGURE 2

Investment of Segments in Single-Industry Versus Multi-Industry Firms

Graph A of Figure 2 plots the investment rates of segments in single-industry firms, and Graph B plots those of multi-industry firms. The *y*-axis represents segment investment rates, where investment is defined in Table 1. The *x*-axis represents the level of government dependency (GD) broken down into quartiles, where GD is defined in Table 1. Low Government Spending denotes years in which GOVSPEND in the previous year is lower than the 75th percentile; High Government Spending denotes years in which GOVSPEND in the previous year is higher than the 75th percentile. GOVSPEND is defined in Table 1.





In addition to the graphic presentation in Figure 2, we provide a more quantitative comparison by regressing segment investment rates on the triple interaction of government dependency, government spending, and industry dispersion. Formally, we estimate the following 3-dimensional panel regression:

$$(3)\quad \text{INVESTMENT}_{i,j,t} = \alpha_{i,j} + \delta_t + \beta_1 \text{OWN\_GD}_{i,j,t} \times \text{GOVSPEND}_{t-1} \times \text{IND\_DISPERSION}_{j,t} + \beta_2 \text{GOVSPEND}_{t-1} \times \text{IND\_DISPERSION}_{j,t} + \beta_3 \text{OWN\_GD}_{i,j,t} \times \text{GOVSPEND}_{t-1} + \beta_4 \text{OWN\_GD}_{i,j,t} \times \text{IND\_DISPERSION}_{j,t} + \beta_5 \text{OWN\_GD}_{i,j,t} + \beta_6 \text{IND\_DISPERSION}_{j,t} + \beta_7 Q_{i,j,t-1} + \varepsilon_{i,j,t},$$

where i indexes segments, j indexes parental firms, and t indexes years. $\text{IND\_DISPERSION}_{j,t}$ is a measure of the industry dispersion of firm j in year t, and other variables are defined in the same way as those in model 2. Standard errors are clustered at the firm level.

We report the regression results of model 3 in Panel A of Table 3. In the first 2 columns, we measure the industry dispersion of a firm using a dummy variable indicating whether the firm operates in multiple industries or not; in the middle two columns, we measure the industry dispersion of a firm using the number of industries in which a firm operates; in the last two columns, we use the Herfindahl–Hirschman Index (HHI) based on a firm's sales at the industry level (4-digit SIC) to measure the industry dispersion of the firm. In odd columns, we report the estimation results without including additional controls, and in even columns, we report the estimation results after controlling for segment Q. Across all six specifications, the results reveal a similar pattern to that shown in Figure 2, which is that the investment of segments in firms with higher industry dispersion is less responsive to government spending shocks.[11] Specifically, the estimates in column 1 indicate that for a 1-standard-deviation increase in government spending, segments in single-industry firms invest 0.92% (0.184 × 0.5 × 10%) more of their assets when they sell 10% more of their products to the government.[12] However, for the same increase in government spending, similar segments in multi-industry firms only increase their investment by 0.02% of their assets (0.184 × 0.5 × 10%-0.179- × 0.5 × 10%). In Panel B, we use only OWN_GD for segments in firms that are government suppliers and 0 for segments in other firms (i.e., our alternative measure). The results mirror those presented in Panel A.

[11]In untabulated tests, we show that if we additionally control for the interaction between segment Q and measures of industry dispersion in even columns, the coefficient on this interaction term is significant (positive for models of columns 2 and 4 and negative for the model of column 6), consistent with the findings in the Q-sensitivity literature. However, the coefficient on the triple interaction term is qualitatively unchanged, suggesting that the government spending shock is not simply captured by Q.

[12]Given that the standard deviation of government dependency in our sample is 2%, a 10% increase represents a large change at the industry level. However, we note that at the firm/segment level, this large of a change is in line with findings in Ngo and Stanfield (2022). We also note that even if one only focuses on 1-standard-deviation increase in industry sales to the government (2%), the economic magnitudes are large if one considers the actual dollar values of sales.

TABLE 3

Industry Dispersion and Segment Investment Sensitivity to Government Spending Shocks

Table 3 reports the regression results of segment investment on the triple interaction of OWN_GD, GOVSPEND, and measures of the firm's industry dispersion. The dependent variable is segment INVESTMENT. IND_DISPERSION is a dummy variable indicating whether the firm operates in multiple industries in columns 1 and 2; IND_DISPERSION is the number of industries in which the firm operates in columns 3 and 4; IND_DISPERSION is the Herfindahl–Hirschman Index (HHI) of the firm's industry dispersion in columns 5 and 6. In Panel A, OWN_GD is constructed using data from the BEA input–output tables; in Panel B, OWN_GD is set to 0 for firms that do not report the government as customers in the Compustat data. All other variables are defined in Table 1. Standard errors are adjusted for clustering at the firm level, and the corresponding *t*-statistics are reported in the parentheses below the coefficient estimates. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: INVESTMENT					
	Multi-Industry Dummy		No. of Industries		Industry HHI	
	1	2	3	4	5	6
Panel A. Government Dependency Measured by Input–Output Tables						
OWN_GD × GOVSPEND × IND_DISPERSION	−0.179**	−0.185**	−0.050**	−0.051**	0.314**	0.342**
	(−2.28)	(−2.33)	(−2.22)	(−2.23)	(2.43)	(2.57)
GOVSPEND × IND_DISPERSION	−0.009***	−0.009***	−0.002***	−0.002***	0.019***	0.018***
	(−3.82)	(−3.67)	(−2.74)	(−2.70)	(4.74)	(4.42)
OWN_GD × GOVSPEND	0.184***	0.186***	0.208***	0.210***	−0.142	−0.163
	(3.32)	(3.37)	(3.15)	(3.16)	(−1.36)	(−1.51)
OWN_GD × IND_DISPERSION	0.665**	0.687**	0.192**	0.192**	−1.207**	−1.297***
	(2.25)	(2.30)	(2.22)	(2.20)	(−2.47)	(−2.59)
OWN_GD	−0.635***	−0.652***	−0.736***	−0.747***	0.611	0.670
	(−3.17)	(−3.27)	(−3.03)	(−3.07)	(1.50)	(1.61)
IND_DISPERSION	0.038***	0.036***	0.008***	0.008***	−0.069***	−0.064***
	(4.24)	(4.06)	(2.73)	(2.67)	(−4.38)	(−4.05)
SEGMENT_Q		0.009***		0.009***		0.009***
		(19.90)		(19.96)		(19.91)
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	239,634	239,002	239,634	239,002	239,634	239,002
R^2	0.487	0.490	0.487	0.490	0.488	0.490
Panel B. Alternative Measure of Government Dependency						
OWN_GD × GOVSPEND × IND_DISPERSION	−0.205**	−0.223**	−0.058**	−0.060**	0.397**	0.432***
	(−2.29)	(−2.54)	(−2.01)	(−2.15)	(2.51)	(2.78)
GOVSPEND × IND_DISPERSION	−0.010***	−0.010***	−0.002***	−0.002***	0.021***	0.020***
	(−4.80)	(−4.65)	(−3.22)	(−3.25)	(5.59)	(5.38)
OWN_GD × GOVSPEND	0.236***	0.238***	0.274***	0.273***	−0.168	−0.202
	(3.99)	(4.03)	(3.65)	(3.67)	(−1.26)	(−1.56)
OWN_GD × IND_DISPERSION	0.742**	0.805**	0.212*	0.221**	−1.488**	−1.603***
	(2.16)	(2.40)	(1.91)	(2.03)	(−2.48)	(−2.72)
OWN_GD	−0.827***	−0.839***	−0.968***	−0.971***	0.682	0.787
	(−3.85)	(−3.92)	(−3.49)	(−3.54)	(1.32)	(1.56)
IND_DISPERSION	0.042***	0.040***	0.010***	0.009***	−0.076***	−0.071***
	(5.23)	(5.05)	(3.20)	(3.17)	(−5.16)	(−4.91)
SEGMENT_Q		0.009***		0.009***		0.009***
		(19.93)		(19.98)		(19.95)
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	239,634	239,002	239,634	239,002	239,634	239,002
R^2	0.487	0.490	0.487	0.490	0.488	0.490

2. Multi-Segment Firms

Although the segment fixed effects in Table 3 implicitly control for all the segment-level time-invariant factors, it is still possible that the results are driven in part by time-varying firm characteristics. We alleviate this concern by focusing on

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the sample consisting of only multi-segment firms, with which we are able to saturate models with firm × year fixed effects. We estimate a regression model similar to model 2 except that segment and year fixed effects are now replaced by firm × year and industry fixed effects. The results are presented in Panel A of Table 4. The coefficients on the interaction term are positive and statistically insignificant in the first 2 columns when only firm × year fixed effects are included, suggesting that segments with higher government dependency do not necessarily invest more than those with lower government dependency when government spending increases. However, these coefficients turn significant in the last two columns once both firm × year and industry fixed effects are included, highlighting the importance of industry affiliations in determining a segment's investment rate. In other words, once segments are compared with others in the same industry, segments with higher government dependency tend to invest more when government spending increases. The effect is also economically significant. Based on the estimates in column 3, when government spending as a fraction of GDP increases by half a percentage point, a 10% increase in a conglomerate

TABLE 4

Segment Investment Sensitivity to Government Spending Shocks Within Multi-Segment Firms

Table 4 reports the regression results of segment investment on the interaction of OWN_GD and GOVSPEND in multi-segment firms. The dependent variable in Panel A is segment INVESTMENT. The dependent variable in Panel B is the difference between the investment rate of a segment and that of the matched stand-alone firm. All other variables are defined in Table 1. Standard errors are adjusted for clustering at the firm level, and the corresponding *t*-statistics are reported in the parentheses below the coefficient estimates. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Segments in Multi-Segment Firms

	Dependent Variable: INVESTMENT			
	1	2	3	4
OWN_GD × GOVSPEND	0.078 (1.44)	0.081 (1.43)	0.137** (2.44)	0.142** (2.48)
OWN_GD	−0.177 (−0.85)	−0.196 (−0.91)	−0.493** (−2.31)	−0.514** (−2.37)
SEGMENT_Q		0.002*** (5.40)		0.002*** (5.97)
Firm × year FE	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
No. of obs.	124,156	123,505	124,116	123,463
R^2	0.520	0.521	0.574	0.574

Panel B. Matched with Single-Segment Firms

	Dependent Variable: ΔINVESTMENT			
	1	2	3	4
OWN_GD × GOVSPEND	−0.137*** (−2.71)	−0.136*** (−2.68)	−0.120** (−2.15)	−0.118** (−2.12)
OWN_GD	0.531*** (2.78)	0.529*** (2.77)	0.479** (2.28)	0.473** (2.25)
SEGMENT_Q		−0.001 (−1.47)		−0.001 (−0.89)
Firm × year FE	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
No. of obs.	64,282	64,233	64,272	64,223
R^2	0.444	0.444	0.450	0.450

segment's sales to the government increases its investment rate by 0.7% more, a 14% increase from the sample median.

The results in Panel A of Table 4 show that a multi-segment firm tends to invest more in segments with higher government dependency when government spending increases. We further examine whether this positive response to government spending shocks within multi-segment firms still holds when these segments are benchmarked against comparable stand-alone firms. To do so, we first match each conglomerate segment with a stand-alone firm along 2 dimensions: the industry affiliation of the segment and the investment of the segment in the previous year. Specifically, we require that the matching firm be in the same industry (4-digit SIC) as the conglomerate segment, and its investment rate be the closest to and in the ± 0.1 range of that of the conglomerate segment (i.e., from conglomerate segment -0.1 to conglomerate segment $+0.1$). After matching, the average previous investments of conglomerate segments and stand-alone firms in our sample are 0.0822 and 0.0815 respectively, which are statistically equal to each other (t value 0.36). We then calculate the investment differences between the conglomerate segment and the matching firm, ΔINVESTMENT. We then regress ΔINVESTMENT on the interaction of OWN_GD and GOVSPEND, and present the results in Panel B of Table 4. β_1, the coefficient on OWN_GD × GOVSPEND, captures how segments in multi-segment firms respond to government spending shocks after subtracting the investment rates of the matching stand-alone firms. The negative and statistically significant β_1 indicates that segments in multi-segment firms are not as responsive to government spending shocks as those in the pseudo multi-segment firms composed of matching stand-alone firms. The contrast of the coefficients in the first 2 columns between Panels A and B further highlights the importance of industry affiliations in determining a segment's investment rate: Only when segments are benchmarked against appropriate stand-alone firms in the same industry do we observe changes in the investment rates in the presence of government spending shocks. The economic magnitude is also sizable. The estimates of column 3 in Panel B indicate that for a 1-standard-deviation increase in government spending, a 10% increase in a conglomerate segment's sales to the government lowers its investment rate by 0.6% more once the corresponding investment rate of the matching stand-alone firm is netted out. Coupled with the increase in investment rates documented in Panel A, it indicates that although segments in multi-segment firms respond positively to government spending shocks, they are not as responsive as their stand-alone counterparts. The results presented in columns 1 and 3 are robust to controlling for segment Q, which we report in columns 2 and 4.

We further explore the role of government dependency diversity (i.e., the variability of government dependency between segments) in affecting the relationship between investment and government spending shocks in Supplementary Material Section A.1. Specifically, in Figure A1 and Tables A2 and A3 of that section, we show that segments in high diversity firms exhibit substantially lower investment sensitivity to government spending shocks relative to those in low diversity firms, suggesting that more government-dependent segments do not benefit as much from positive government spending shocks because the headquarters divert some of the gains to other segments within the firm, which lends further support to the notion of cross-subsidization.

C. Direct Evidence on Cross-Subsidization

While the results in Section III.B provide circumstantial evidence consistent with the notion of cross-subsidization within conglomerate firms, we aim to provide more direct evidence in this section by investigating how one segment of a conglomerate responds to the government spending shocks experienced by the other segments within the same firm. Specifically, we first split all segments in each conglomerate into two groups: segments that are relatively more sensitive to government spending shocks and segments that are relatively less sensitive to government spending shocks. To do so, we compare the magnitude of OWN_GD and OTHER_GD of each segment, and assign segments with OWN_GD smaller than OTHER_GD to the less sensitive group and the rest to the more sensitive group. This is a useful dichotomy when examining the cross-subsidization within firms. On the one hand, in the presence of positive government spending shocks, segments in the more sensitive group will likely experience a larger increase in cash flows, which may result in subsidization to segments in the less sensitive group. On the other hand, when facing negative government spending shocks, segments in the more sensitive group will likely experience a deterioration in cash flows, which may call for subsidization from the less sensitive group. Under either scenario, due to the larger amplitude experienced by segments in the more sensitive group when government spending changes, segments in the less sensitive group are on the passive end of cross-subsidization. Therefore, we hypothesize that the investment of segments in the less sensitive group is likely to be affected by government spending shocks to their companion segments in the same firm, and not so for segments in the more sensitive group.

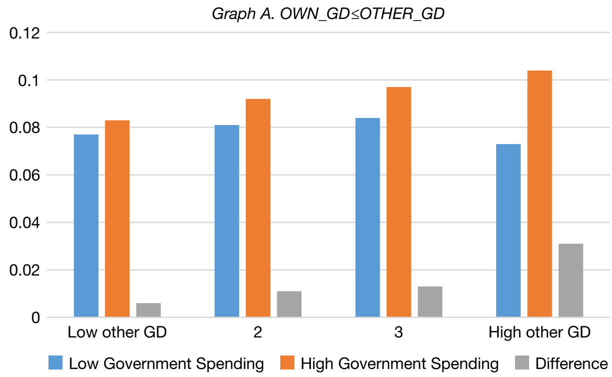
Similar to before, we first depict the investment sensitivity to government spending shocks in a graph for each group. Specifically, we plot the average investment rates of segments against the quartile to which the sales-weighted government dependency of their companion segments (OTHER_GD) belongs for high government spending years and low government spending years, respectively. We present the graph for segments in the less sensitive group in Graph A of Figure 3 and the graph for segments in the more sensitive group in Graph B of Figure 3. As evident in Graph A, segments in the less sensitive group invest more when their companion segments experience positive government spending shocks. In contrast, the investment of segments in the more sensitive group exhibits an irregular pattern when their companion segments experience positive government spending shocks, as shown in Graph B. This evidence pattern on the propagation of government spending shocks within a firm is consistent with the notion of corporate socialism, that is, strong segments cross-subsidizing weak ones.

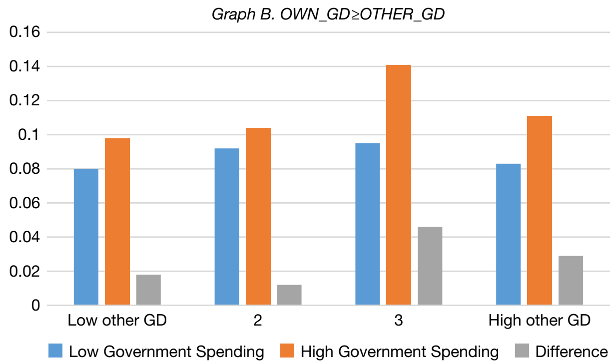
We next use more rigorous approaches to test our hypothesis. Specifically, we run the following regression for segments in the less sensitive group and those in the more sensitive group, respectively:

FIGURE 3

Investment of Segments Sorted by Government Spending and Government Dependency of Companion Segments

Graph A of Figure 3 plots the investment rates of segments in the less sensitive group, and Graph B plots those of the more sensitive group. The *y*-axis represents segment investment rates, where investment is defined in Table 1. The *x*-axis represents the level of companion segments' government dependency (OTHER_GD) broken down into quartiles, where OTHER_GD is defined in Table 1. Low Government Spending denotes years in which GOVSPEND in the previous year is lower than the 75th percentile; High Government Spending denotes years in which GOVSPEND in the previous year is higher than the 75th percentile. GOVSPEND is defined in Table 1.





$$\text{(4)} \quad \text{INVESTMENT}_{i,j,t} = \alpha_{i,j} + \delta_t + \beta_1 \text{OWN\_GD}_{i,j,t} \times \text{GOVSPEND}_{t-1} + \beta_2 \text{OWN\_GD}_{i,j,t} + \beta_3 \text{OTHER\_GD}_{i,j} \times \text{GOVSPEND}_{t-1} + \beta_4 Q_{i,j,t-1} + \varepsilon_{i,j,t},$$

where i indexes segments, j indexes parental firms, and t indexes years. $\text{OTHER\_GD}_{i,j}$ is the sales-weighted government dependency of segment i's companion segments (firm j's segments in industries other than the industry of segment i), and other variables are defined in the same way as those in model 2. Standard errors are clustered at the firm level.

The regression results of model 4 are presented in Panel A of Table 5. Specifically, in the first two columns of Panel A, we report the results for the less sensitive group (OWN_GD < OTHER_GD); in the last two columns of Panel A,

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TABLE 5

Government Spending Shocks and Cross-Subsidization

Table 5 reports the regression results of segment investment on the average sales-weighted government dependency of other industries in which the parent firm of the segment operates. The dependent variable in both panels is segment INVESTMENT. LOW_GD is a dummy variable indicating whether the segment's government dependency is lower than its companion government dependency (OTHER_GD). All other variables are defined in Table 1. Standard errors are adjusted for clustering at the firm level, and the corresponding *t*-statistics are reported in the parentheses below the coefficient estimates. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Two Groups

	Dependent Variable: INVESTMENT			
	OWN_GD < OTHER_GD		OWN_GD ≥ OTHER_GD	
	1	2	3	4
OWN_GD × GOVSPEND	−0.007 (−0.05)	0.067 (0.30)	−0.061 (−0.90)	−0.069 (−1.03)
OWN_GD	−0.136 (−0.27)	−0.439 (−0.56)	0.267 (1.03)	0.289 (1.12)
OTHER_GD × GOVSPEND	0.198*** (2.67)	0.184** (2.21)	−0.239 (−0.95)	−0.246 (−1.02)
SEGMENT_Q		0.005*** (8.13)		0.008*** (10.00)
Segment FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
No. of obs.	71,597	71,256	62,374	62,165
R^2	`	0.474	0.509	0.512

Panel B. Full Segment

	Dependent Variable: INVESTMENT	
	1	2
OWN_GD × GOVSPEND	−0.007 (−0.11)	−0.005 (−0.08)
OWN_GD	0.058 (0.24)	0.044 (0.18)
OTHER_GD × GOVSPEND × LOW_GD	0.445** (2.16)	0.454** (2.24)
GOVSPEND × LOW_GD	−0.012*** (−3.76)	−0.012*** (−3.73)
OTHER_GD × GOVSPEND	−0.354* (−1.66)	−0.364* (−1.74)
OTHER_GD × LOW_GD	−1.765** (−2.07)	−1.798** (−2.15)
LOW_GD	0.044*** (3.52)	0.044*** (3.49)
SEGMENT_Q		0.006*** (12.90)
Segment FE	Yes	Yes
Year FE	Yes	Yes
No. of obs.	135,279	134,719
R^2	0.471	0.473

we report the results for the more sensitive group (OWN_GD ≥ OTHER_GD). The coefficient on $\text{OTHER\_GD}_{i,j} \times \text{GOVSPEND}_{t-1}$, β_3, captures the investment sensitivity of a segment to government spending shocks experienced by its companion segments, which is of particular interest to us. β_3 is positive and statistically significant in the less sensitive group whereas it turns negative and statistically insignificant in the more sensitive group. These results mirror the investment pattern shown in Figure 3 and are consistent with our hypothesis. That is, the investment of segments in the less sensitive group responds positively to shocks in their companion segments whereas no responses are detected in the more sensitive group. These effects are also economically significant. Based on the estimates in column 1, when government spending as a fraction of GDP increases by 1-standard-deviation, for two otherwise similar segments, the segment with companions selling 10% more of their products to the government will invest 1% more of its assets, which reflects a 20% increase over the median investment rate.

To further show that how a segment responds to shocks in its companion segments is predicated upon its relative position in the firm, we estimate a triple difference regression. Specifically, we first create an indicator variable LOW_GD, equal to 1 for segments in the less sensitive group. We then regress segment investment on the triple interaction of OTHER_GD, GOVSPEND, and LOW_GD. The results are presented in Panel B of Table 5. We are interested in the coefficient on OTHER_GD × GOVSPEND × LOW_GD, which captures the differences in investment sensitivity to shocks experienced by other segments. This coefficient is positive and statistically significant, confirming that the relatively "less shocked" segments are more responsive to their companion shocks than the relatively "more shocked" segments. This additional layer of difference also further ascertains the existence of cross-subsidization by ruling out confounding factors common to both groups.[13]

D. Impact of Cross-Subsidization on Firm Performance and Value

1. Operating Performance

Having established the existence of cross-subsidization in conglomerate firms, we turn our attention to its performance consequences in this section. One reason for cross-subsidization that has been postulated in the literature is managerial socialistic concerns, which distort resource allocation inside firms toward weaker divisions. To shed light on the operating performance impact of cross-subsidization, we contrast the profitability changes of conglomerate segments with those of stand-alone firms in response to the same government spending shocks. Because cross-subsidization across conglomerate divisions does not exist in stand-alone firms, the difference in the profitability changes between conglomerate segments and stand-alone firms yields the net impact of cross-subsidization on operating performance. To do so, we match conglomerate segments with stand-alone firms along 2 dimensions: the amount of sales and the industry affiliation. Specifically, we require that the matching stand-alone firm is in the same industry (4-digit SIC) as the conglomerate segment. Moreover, its sales need to be the closest to and at the same time within the range of 50% to 150% of that of the conglomerate segment.[14] After matching, the average natural logarithm of sales in the treatment group is statistically equal to that in the control group (4.99 vs. 4.98 and a *t*-value of 1.10).

We define ΔROA as the difference between the operating income of the conglomerate segment and that of the matched stand-alone firm scaled by the total

[13]In unreported tests, we show that our results are robust when we allow OTHER_GD to vary over time or use the alternative measure of government dependency to construct OTHER_GD.

[14]Our results are not sensitive to the threshold we use. The results are stronger when we use a more stringent threshold (e.g., 75%–125%).

assets of the conglomerate segment in the previous year. We then regress ROA and ΔROA of conglomerate segments on our measure of government spending shocks and report the estimation results in Panel A of Table 6. The coefficient on OWN_GD × GOVSPEND in the first 2 columns captures the impact of government spending shocks on operating performance. The results in column 2 indicate that when treated alone, for a 1-standard-deviation increase in government spending, conglomerate segments that sell 10% more of their products to the government earn 1.5% more of their assets in profits, which is a 17% increase relative to the sample median. In the last two columns, we estimate our model by benchmarking the performance of conglomerate segments against that of comparable stand-alone firms. The coefficient on the interaction term turns negative and significant, indicating that the profitability of conglomerate segments does not increase as much as that of stand-alone firms in the presence of positive government spending shocks, which points to the negative impact of cross-subsidization within conglomerates. Economically, this impact is sizable. For a 1-standard-deviation increase

TABLE 6

Cross-Subsidization and Operating Performance

Table 6 reports the regression results of segment operating performance and that matched with similar stand-alone firms on government spending shocks. The dependent variable of each regression is indicated in each column. ΔROA is the difference between the operating income of a conglomerate segment and that of the matched stand-alone firm scaled by the total assets of the segment in the previous year. All other variables are defined in Table 1. Standard errors are adjusted for clustering at the firm level, and the corresponding *t*-statistics are reported in the parentheses below the coefficient estimates. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Government Spending and ROA

	Full Sample			
	ROA		ΔROA	
	1	2	3	4
OWN_GD × GOVSPEND	0.352**	0.301*	−1.514***	−1.739***
	(2.03)	(1.83)	(−3.25)	(−3.51)
OWN_GD	−1.265*	−1.083*	5.569***	6.582***
	(−1.86)	(−1.66)	(3.01)	(3.30)
SEGMENT_Q		0.009***		0.015***
		(5.00)		(3.07)
Segment FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
No. of obs.	59,285	51,662	59,285	51,662
R^2	0.624	0.632	0.547	0.548

Panel B. Subsample Analysis

	OWN_GD < OTHER_GD		OWN_GD ≥ OTHER_GD	
	ROA	ΔROA	ROA	ΔROA
	1	2	3	4
GOVSPEND	0.061***	0.012	0.057***	−0.043***
	(13.65)	(1.46)	(10.97)	(−3.16)
SEGMENT_Q	0.010***	0.017**	0.009***	0.017**
	(4.09)	(2.33)	(3.46)	(2.31)
Segment FE	Yes	Yes	Yes	Yes
Year FE	No	No	No	No
No. of obs.	26,276	26,276	24,545	24,545
R^2	0.648	0.588	0.643	0.539
GOVSPEND in column 2 − GOVPSEND in column 4	0.0550*** (3.45)			

in government spending, the results in column 4 indicate that the increase in the ROA of conglomerate segments that sell 10% more of their products to the government is 8.7 percentage points smaller than that of comparable stand-alone firms.

We further contrast the operating performance of segments that are likely to be subsidized when government spending increases to that of segments that are likely to subsidize others in Panel B of Table 6. Specifically, we categorize conglomerate segments into two groups based on their relative government dependency: those with OWN_GD < OTHER_GD and those with OWN_GD ≥ OTHER_GD. In columns 1 and 3, we show that the ROA of both categories significantly increases when government spending increases. However, when these segments are benchmarked against stand-alone firms in columns 2 and 4, the impact of government spending increases on the operating performance is asymmetric: Segments that are more likely to be subsidized have similar, if not better, performance compared to stand-alone firms, whereas segments that are more likely to subsidize others have worse performance relative to stand-alone firms. In the bottom row of Panel B, we show that the difference between the coefficient on GOVSPEND in column 2 and that in column 4 is also significant. These results indicate that with positive government spending shocks, conglomerate segments have to sacrifice their own performance when subsidizing others, and the net impact is negative relative to stand-alone firms.

2. Firm Value

We further examine the valuation consequences of cross-subsidization by relating the engagement of cross-subsidization to the market value of conglomerate firms benchmarked against a portfolio of stand-alone firms in the same industries. Previous research has conjectured that cross-subsidization is one of the reasons underlying the diversification discount. If this is indeed the case, we expect the diversification discount to be larger when cross-subsidization is more likely to occur. Specifically, we estimate the following firm-level regression model:

$$(5)\quad \text{EXCESS\_VALUE}_{i,t} = \alpha_i + \delta_t + \beta_1 \text{FIRM\_GD}_i \times \text{GOVSPEND}_{t-1} \times \text{MULTI\_IND}_{i,t} + \beta_2 \text{FIRM\_GD}_i \times \text{MULTI\_IND}_{i,t} + \beta_3 \text{GOVSPEND}_{t-1} \times \text{MULTI\_IND}_{i,t} + \beta_4 \text{FIRM\_GD}_i \times \text{GOVSPEND}_{t-1} + \beta_5 \text{MULTI\_IND}_{i,t} + \varepsilon_{i,t},$$

where i indexes firms and t indexes years. The dependent variable $\text{EXCESS\_VALUE}_{i,t}$ is the natural logarithm of the ratio of firm i's value in year t to its imputed value in that year, where the imputed value of a firm is defined in Section II; FIRM_GD_i is the government dependency of firm i; $\text{MULTI\_IND}_{i,t}$ is a dummy variable indicating whether firm i operates in multiple industries (4-digit SIC) in year t; GOVSPEND_{t-1} is our measure of government spending in year $t-1$; α_i are firm fixed effects; δ_t is year fixed effects. GOVSPEND_{t-1} is subsumed by the year fixed effects; FIRM_GD_i is subsumed by the firm fixed effects. Standard errors are clustered at the firm level.

TABLE 7

Cross-Subsidization and Excess Value

Table 7 reports the regression results of excess value on the triple interaction of FIRM_GD, GOVSPEND, and the multi-industry dummy. The dependent variable is EXCESS_VALUE. MULTI_IND is a dummy variable indicating whether the firm operates in multiple industries. All other variables are defined in Table 1. Standard errors are adjusted for clustering at the firm level, and the corresponding *t*-statistics are reported in the parentheses below the coefficient estimates. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: EXCESS_VALUE				
	1	2	3	4	5
FIRM_GD × GOVSPEND × MULTI_IND					−2.512**
					(−2.48)
FIRM_GD × MULTI_IND		−2.352***			6.610*
		(−2.85)			(1.73)
GOVSPEND × MULTI_IND			−0.070***		−0.035*
			(−4.89)		(−1.71)
FIRM_GD × GOVSPEND				0.443	1.409**
				(0.81)	(2.22)
MULTI_IND	−0.081***	−0.042**	0.179***		0.093
	(−5.87)	(−2.20)	(3.25)		(1.18)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
No. of obs.	103,924	103,924	103,924	103,924	103,924
R^2	0.608	0.609	0.609	0.608	0.609

We present the regression results for model 5 in Table 7. Specifically, in column 1, we regress firms' excess value on an indicator of firms' multi-industry status. The coefficient reflects the magnitude of the discount (or premium) at which a multi-industry firm trades relative to a portfolio of single-industry firms in the same industries. The result indicates that multi-industry firms on average trade at an 8.1% discount, which is consistent with the prevalent evidence of the diversification discount in the literature. In column 2, we interact the multi-industry indicator with firms' government dependency and include the interaction term in the regression. The coefficient on the interaction term captures how the diversification discount varies across firms with different levels of government dependency. As shown in column 2, β_2 is negative and statistically significant, suggesting that the discount of multi-industry firms deteriorates among firms with higher levels of government dependency. Since these firms are on average more likely to engage in cross-subsidization, the result is consistent with the notion that cross-subsidization contributes to the diversification discount. In column 3, we interact MULTI_IND with GOVSPEND to gauge how the diversification discount varies with government spending. Because GOVSPEND is a continuous variable, the coefficient on MULTI_IND in column 3 (0.179) reflects the diversification discount when government spending is 0. For an interquartile change of government spending from 3.4% to 3.8%, our estimation indicates that the diversification discount moves from −0.059 (0.179–3.4 × 0.070) to −0.087 (0.179–3.8 × 0.070), for a difference of −0.028. All of these values are statistically significant. In column 4, we regress excess value on government spending shocks, namely, the interaction of FIRM_GD and GOVSPEND. Our results indicate that government spending shocks on average have no impact on excess value.

We further interact FIRM_GD, GOVSPEND, and MULTI_IND, and report the regression results in column 5. β_1, the coefficient on the triple interaction term, reflects how the results in column 2 vary when government spending changes. As evidenced by the negative and statistically significant β_1 in column 5, the negative impact of government dependency on the diversification discount is aggravated when government spending increases. Moreover, the juxtaposition of β_1 and β_2 indicates that the bulk of the diversification discount among firms with higher levels of government dependency concentrates in years with higher levels of government spending. Specifically, β_2 indicates how the diversification discount varies across firms with different levels of government dependency when government spending equals 0. When government spending is 3.4% (25th percentile), the diversification discount for firms that sell 10% more of their products to the government is −0.193 lower ($-3.4 \times 2.512 \times 10\% + 6.610 \times 10\%$); when government spending increases to 3.8% (75th percentile), the diversification discount for similar firms decreases by −0.293 ($-3.8 \times 2.512 \times 10\% + 6.610 \times 10\%$), for a difference of −0.100. All of these values are statistically significant. Because the unconditional change in the diversification discount for a 10% increase in government dependency is −0.235 in column 2 ($-2.352 \times 10\%$), the −0.100 decrease represents a 42.6% decrease from the unconditional mean. Because cross-subsidization is more likely to occur in multi-industry firms when government spending increases, the results in column 5 provide more convincing evidence on the negative valuation consequences of cross-subsidization.[15]

In Supplementary Material Section A.2, we further differentiate the valuation impact in high-diversity firms from that in low-diversity firms. Specifically, in Supplementary Material Table A4, we show that the deterioration of firm value mainly concentrates in high-diversity firms, echoing our previous finding that cross-subsidization is more likely to occur in firms with high diversity. In addition, our analyses indicate that the value of HGD conglomerate firms on average increases when government spending increases. However, once their valuation is benchmarked against stand-alone firms, the impact on value turns negative.

E. Endogeneity and Selection Issues

Studies that examine the efficiency of internal capital markets usually caution two issues: measurement error of Tobin's Q and the endogeneity of firms' restructuring decisions. We address the former by using demand shocks from the federal government. Regarding the latter, we first note that most of our results are obtained using difference-in-difference-in-difference estimation. Thus, any endogeneity resulting from the decision to diversify, for example, regarding investment activity, is likely to be netted out in this design. Any factors related to a decision to diversify would have to later correlate with changes in government spending interacted with government dependency to create an issue. For example, one concern might be that our measure of excess value, constructed by benchmarking the valuation of conglomerates' segments against stand-alone firms, is subject to the bias that firms endogenously choose to diversify. Indeed, Campa and Kedia (2002) and Graham, Lemmon, and Wolf (2002) show that the diversification discount disappears after

[15]In unreported tests, we show that our results are robust when we allow FIRM_GD to vary over time or use the alternative measure of government dependency to construct FIRM_GD.

controlling for selection bias. However, our conclusion is not based on the simple comparison between conglomerate firms and stand-alone firms, but is instead drawn from the fact that conglomerates that are more government-dependent tend to trade at larger discounts in years with higher levels of government spending. For the selection bias to drive our results, the factors driving a firm's decision to diversify need to be not only correlated with its government dependency but also more so when government spending increases. Given our empirical design, the selection problem is less likely to be an issue.

Further, we provide some results comparing different conglomerates based on the variability of government dependency within the conglomerate. Because firms have less control over the degree of diversification relative to other firms than they do over the decision to diversify, the endogeneity issue is likely to be alleviated (one might still argue that the decision to become a conglomerate with more or less government dependency variability is endogenous, but this then also would need to be correlated with changes in investment within those conglomerates). In addition, we have carefully constructed our key independent variables (such as OWN_GD, OTHER_GD, and FIRM_GD) to ensure that they do not vary simply because of a firm's operation, further mitigating the concern. Collectively, we believe that this endogeneity issue is unlikely to arise in our setting.

Another potential source of endogeneity comes from government spending, as the actual spending of the federal government in an industry may be endogenously affected by the economic conditions of that industry and/or by the lobbying activity in that industry. We address this concern in several ways. First, rather than using the actual spending in each industry, we use aggregate federal spending prorated by the predetermined government dependency of the industry. If the omitted variables are not correlated with government spending interacted with government dependency, this endogeneity issue may be alleviated. Moreover, since we are interested in the responses of firms with different organizational structures in an industry to government spending shocks, the confounding role of industry-specific factors is further mitigated. Second, we use aggregate federal spending in the previous year to construct our government spending shocks. While contemporaneous spending from the government may be endogenous, the lagged spending is less likely to be so. As noted in Ngo and Stanfield (2022), discretionary federal outlays in a year are dictated by the budget authority passed by Congress in the previous year. Therefore, the outlays in the previous year, which we use to construct our measure, are dictated by budget authority passed by Congress 2 years ago, which is even less likely to be correlated with contemporaneous economic conditions. Third, we use the party affiliation of the executive branch and the legislative branch of the federal government as an instrument, which is motivated by Ngo and Stanfield (2022). Because our spending measure focuses on nondefense discretionary outlays, we use a dummy variable, DEMOCRAT, which indicates if the executive branch and at least one chamber of Congress are under the control of Democrats, as the instrument.[16]

[16]Research in political economics shows that political partisanship influences policy outcomes. For example, Besley and Case (2003) find that a higher fraction of Democrat party seats in the state legislature is associated with higher state spending per capita. Reed (2006) shows that from 1960 to 2000, tax burdens are higher when Democrats control the state legislature compared to when

Although firms may be able to affect government spending through lobbying, we argue that it is less likely for individual firms of different levels of government dependency to determine which political party is in power at the national level and therefore less likely for our instrument to violate the exclusion restriction.[17]

We first regress government spending on our instrument and present the results in Panel A of Table 8. Because we cannot include year fixed effects in these regressions, we only control for segment fixed effects in column 1 and additionally control for a linear time trend in column 2. The coefficient on DEMOCRAT is positive and significant across both specifications, indicating that government spending as a fraction of GDP is on average 0.42 percentage points higher when Democrats are in control of the presidency and at least one chamber of Congress. Because many of our regressors involve interactions with the endogenous variable (GOVSPEND), we follow Wooldridge (2002) and use the interactions of the exogenous variables to instrument for the interactions of endogenous variables. Specifically, when using the IV approach to estimate model 3, we use OWN_GD × DEMOCRAT × IND_DISPERSION, DEMOCRAT × IND_DISPERSION, and OWN_GD × DEMOCRAT to instrument for OWN_GD × GOVSPEND × IND_DISPERSION, GOVSPEND × IND_DISPERSION, and OWN_GD × GOVSPEND, respectively. Because the first-stage regression results are similar when we use different variables to measure industry dispersion, we only report the first stage results for the multi-industry dummy (corresponds to column 1 of Table 3 and column 1 in Panel C of Table 8) in Panel B. In Panel C, we present the second-stage regression results. These results are consistent with what is shown in Table 3, indicating that our results are robust after controlling for the endogeneity of government spending.[18]

IV. Conclusion

This article examines how conglomerate firms make their capital expenditure decisions when facing shocks in their investment opportunity set. We depart from the canonical investment-Q sensitivity approach by exploiting a demand shock to the industry with which a segment is affiliated. We construct our demand shock measure by interacting an industry's government dependency with the aggregate federal spending in a year. Armed with this measure, we first contrast the investment responses of segments in multi-industry firms with those of single-industry firms

Republicans are in control. Belo et al. (2013) show that the level of government spending is higher under Democratic presidencies and the stock return difference is mainly concentrated in industries with high dependency on government spending.

[17]One caveat is that there may exist unobserved factors that could affect both election outcomes and firm behavior. For example, Pastor and Veronesi (2020) use risk aversion to model agents' voting behavior, which may affect the merger activity of conglomerates as shown in Amihud and Lev (1981). Since risk aversion is hard to observe, we additionally include as a control a dummy variable indicating if the firm has conducted mergers and acquisitions in the year. In unreported tests, we show that our IV regression results are qualitatively similar.

[18]The results in Table 8 are qualitatively the same when we additionally control for Segment Q. Due to space limitations, we do not tabulate these results.

TABLE 8
Instrumental Variable Analysis

Table 8 reports the instrumental variable regression results of segment investment on the triple interaction of OWN_GD, GOVSPEND, and measures of the firm's industry dispersion. The instrument is a dummy variable indicating if the executive branch and at least one chamber of Congress are controlled by Democrats. The dependent variables are indicated in each column of each panel. In Panel B, MULTI is a dummy variable indicating whether a firm operates in multiple industries. In Panel C, IND_DISPERSION is a dummy variable indicating whether the firm operates in multiple industries in columns 1 and 2; IND_DISPERSION is the number of industries in which the firm operates in columns 3 and 4; IND_DISPERSION is the Herfindahl–Hirschman Index (HHI) of the firm's industry dispersion in columns 5 and 6. All other variables are defined in Table 1. Standard errors are adjusted for clustering at the firm level, and the corresponding *t*-statistics are reported in the parentheses below the coefficient estimates. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Government Spending and Political Party in Power

	GOVSPEND	GOVSPEND
	1	2
DEMOCRAT	0.420***	0.432***
	(90.83)	(139.67)
Segment FE	Yes	Yes
Year trend	No	Yes
No. of obs.	239,634	239,634
R^2	0.565	0.703

Panel B. First Stage Regressions for Multi-Industry Dummy

	OWN_GD × GOVSPEND × MULTI	GOVSPEND × MULTI	OWN_GD × GOVSPEND
OWN_GD × DEMOCRAT × MULTI	0.347***	−1.110***	0.131***
	(11.05)	(−5.70)	(3.99)
DEMOCRAT × MULTI	0.002***	0.489***	0.002***
	(3.62)	(68.13)	(3.58)
OWN_GD × DEMOCRAT	0.001	0.180***	0.215***
	(0.67)	(5.13)	(19.14)
OWN_GD × MULTI	3.739***	1.762***	0.096***
	(164.38)	(8.86)	(3.86)
OWN_GD	0.007**	0.024	3.650***
	(2.43)	(0.36)	(278.99)
MULTI	−0.002***	3.598***	−0.003***
	(−4.51)	(379.80)	(−6.46)
Segment FE	Yes	Yes	Yes
Year trend	Yes	Yes	Yes
No. of obs.	239,634	239,634	239,634

Panel C. Second Stage Regressions

	Multi-Industry Dummy	Number of Industries	Industry HHI
	INVESTMENT	INVESTMENT	INVESTMENT
	1	2	3
OWN_GD × GOVSPEND × IND_DISPERSION	−1.218***	−0.378***	0.373**
	(−6.87)	(−8.14)	(2.10)
GOVSPEND × IND_DISPERSION	0.026***	0.007***	0.011***
	(8.72)	(9.64)	(4.94)
OWN_GD × GOVSPEND	1.248***	1.411***	0.688***
	(9.75)	(9.63)	(5.87)
OWN_GD × IND_DISPERSION	4.457***	1.408***	−1.591**
	(6.71)	(7.99)	(−2.46)
OWN_GD	−4.562***	−5.201***	−2.391***
	(−9.72)	(−9.58)	(−5.32)
IND_DISPERSION	−0.093***	−0.028***	−0.049***
	(−8.08)	(−9.20)	(−4.38)
Segment FE	Yes	Yes	Yes
Year trend	Yes	Yes	Yes
No. of obs.	239,634	239,634	239,634
Kleibergen–Paap rk Wald *F*	116.56	150.00	114.53

and document that conglomerate segments exhibit a significantly lower sensitivity to government spending shocks than that of single-industry firms.

Exploring the underlying reasons, we find that the cross-subsidization between divisions within a conglomerate contributes to the investment underreaction to government spending shocks. The investment of divisions that depend relatively less on government is positively affected by the demand shocks experienced by the other divisions within the same conglomerate. However, the same pattern is not observed for divisions that depend relatively more on government. Moreover, the cross-subsidization between segments negatively affects operating performance. Compared to stand-alone firms and segments being subsidized, segments subsidizing others experience a smaller increase in their profitability following positive government spending shocks. At the firm level, the cross-subsidization between segments has negative value consequences in the stock market.

Supplementary Material

To view supplementary material for this article, please visit http://doi.org/10.1017/S0022109022001004.

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