European Journal of Political Economy 79 (2023) 102431

Contents lists available at ScienceDirect

European Journal of Political Economy

journal homepage: www.elsevier.com/locate/ejpe

Defending election victory by attacking company revenues: The impact of elections on the international defense industry

Jeroen Klomp [a, b, *]

[a] Netherlands Defence Academy, the Netherlands
[b] Wageningen University & Research, the Netherlands

ARTICLE INFO

Keywords:
Elections
Political budget cycles
Contracting cycles
Defense companies

ABSTRACT

This study examines the influence of upcoming general elections on the sales revenues of major defense companies. Based on the empirical findings, several broad conclusions can be drawn. First, as a result of election-induced procurement decisions, the total revenues of defense companies in major arms-producing countries increase when domestic elections are approaching to boost the performance of the economy. Second, elections in democratic foreign countries cause a fall in the revenues received by domestic defense firms as foreign governments are likely to shift their public expenditures away from defense imports and towards domestic contractors or to other public spending categories. In contrast, elections in autocratic foreign countries slightly improve the defense sales of arms producers as authoritarian rulers try to deter any political actions of challengers by signalling their military capabilities. Finally, governments of countries that are subject to serious security risks are more likely to increase their purchase of military-strategic items abroad when elections are upcoming for protection purposes.

1. Introduction

National defense is one of the most important objectives of any government because national security is a necessary condition for a government to pursue other policy aims and create a peaceful environment for everyday economic activity (Schick, 2008). For these reasons, every nation allots a substantial part of its fiscal budget to defense programs. To be specific, approximately four percent of a NATO member country's government budget is allocated to military expenditures. Of this figure, about fifteen percent is reserved for the procurement of strategic-military equipment such as tanks, navy ships, fighter jets, guns, missiles, or radar and communication systems.[1]

Economists and political scientists have already been trying to explain for decades the observed variation in defense spending across countries (Wezeman, 2014; Smith, 1995). Special attention has also been paid to the role of general elections on defense spending. However, the existing literature is rather inconclusive about which direction elections would push or pull the military expenditures. On the one hand, arms purchases from the domestic defense industry might improve the economic performance of a country. Besides, in many arms-producing countries, there are close ties between politicians and defense-minded corporations (Eisenhower, 1961; Luechinger and Moser, 2014). A driving force behind this tight relationship is that both sides benefit from this connection—one side from obtaining weaponry and the other from being paid to supply them. Buying from the national defense

* Netherlands Defence Academy, Faculty of Military Sciences, the Netherlands.
E-mail address: klomp_j@yahoo.com.

[1] https://www.nato.int/cps/en/natohq/news_156770.htm.

https://doi.org/10.1016/j.ejpoleco.2023.102431
Received 11 December 2022; Received in revised form 22 May 2023; Accepted 26 June 2023
Available online 28 June 2023

industry is recognized as a legitimate and efficient form of protectionism, which is then justified by the substantial economic and industrial benefits accruing from such procurement decisions. This creates an environment where votes are traded in return for economic benefits or political favours (Mayer, 1992, 1995). On the other hand, it might be more favourable for the incumbent leader to cut military expenditure in an election year to finance expansions in other public spending categories that are preferred more by voters, such as health care, education, social security, or public infrastructure (see, for instance, Bove et al., 2017).

So far, the existing literature is mainly concerned with the existence of election cycles at the demand side of the defense market by focusing either on electoral manipulations in the defense budget (e.g., Bove et al., 2017; Mintz, 1988; Enkelmann and Leibrecht, 2013) or the timing of defense contract award announcements (e.g., Mayer, 1992, 1995; DeRouen and Heo, 2000, 2001). In contrast, the aim of this study is to shift the attention towards the supply side of the defense market and focus on the revenues received by major international defense companies.[2] This is of rather importance since the complete election effect on the economic performance of the national defense industry is expected to go beyond a direct spending or procurement effect. Politicians might, in addition, also provide other, more non-budgetary, political favours to the domestic defense-related industry around election periods. For instance, governments might provide political assistance in order to obtain foreign contracts or offsets. For example, during the 1992 re-election campaign, U.S. president Bush Sr. Lifted several arms trade embargoes against Taiwan to primarily support the U.S. defense industry (Mayer, 1992).

For the purpose of this research, I estimate a dynamic panel model, thereby including data of more than 200 major defense companies from 25 countries. Based on the empirical findings, I can draw several broad conclusions. First, domestic elections in major arms-producing countries raise the revenues in the domestic defense industry. Second, foreign elections in democratic countries cause a fall in these revenues, while autocratic foreign elections increase the sales revenues in this industry. Finally, elections in countries that are subject to serious security risks are likely to increase their purchase of military-strategic goods, thereby benefiting international defense companies.

The remainder of the paper is structured as follows. Section 2 provides the theoretical considerations underlying the relationship between the sales revenues in the defense industry and elections held domestically and abroad. Section 3 describes the data and methodology used, while Section 4 shows and discusses my empirical results. The final section offers the conclusions.

2. Theoretical considerations

The priority put on the military capabilities of a state typically differs between politicians and voters. Generally, voters assign just a low priority to military spending as they consider it to be less important in periods of peace. In contrast, politicians prefer to spend more on the military as national defense is perceived as a general measure of status and prestige. The differences in preferences might lead to rent seeking behaviour by the ruling parties in order to be re-elected. The different hypotheses tested in this study are primarily based on two political economy theories that either explain the electoral manipulations of the defense budget or the timing of defense contract award announcements.

The first line of research that this study builds on is related to the theory of political budget cycles (PBCs). The political budget cycle theory emphasizes that the incumbent will try to secure his re-election by maximizing the expected vote share at the next election (Nordhaus, 1975). In essence, this theory is based on two key assumptions. First, voters are myopic and evaluate the performance of the government only on the recent past. Second, as voters usually vote with their wallets in their hands, they prefer candidates from whom they expect to deliver a better economic well-being (see, e.g., Franzese, 2002; Rogoff and Sibert, 1988; Persson and Tabellini, 2003; and Shi and Svensson, 2006; Potrafke, 2020). These assumptions imply that governments have a great incentive to adopt expansionary fiscal policies in the late year(s) of their term in office in order to stimulate the economy. Increasing the defense budget before an election would inject money into the defense sector, create jobs and raise corporate profits, thereby signalling the competence of the incumbent leader in handling the economy (Mayer, 1992, 1995). This election-motivated incentive is further reinforced since in many arms-producing countries there are close ties between politicians, the military, and the defense-related industry, the so-called military-industrial complex (Eisenhower, 1961; Mayer, 1992, 1995; Rundquist, 1978; Luechinger and Moser, 2014). In many cases, politicians even advocate that having a solid defense industry is vital for a country, as self-sufficiency in the supply of weapons is a high priority for many countries. As a result, governments face the urge to support or protect this industry out of national interest (Heidenkamp et al., 2015). Election induced industrial policies are recognized as a politically efficient way to cater the interests of certain sectors that are detrimental and attract votes from specific constituencies at the cost of other industries domestically and abroad (Chang, 2008; Rickard, 2012a, 2012b; Laffont, 1996). Meanwhile, the defense industry tries to maintain or even strengthen its strategic position by using different kinds of corporate political activities such as the revolving door (Luechinger and Moser, 2014; Moore, 2010; Rundquist, 1978), lobbying, or election campaign contributions (e.g., Kim, 2019; Tripathi, 2000; Fleisher, 1993). In return, the incumbent leader might provide some political favours to this industry, for example, by increasing the annual defense budget.

As a result of these considerations, it is expected that the defense budget will increase when elections are upcoming to support the domestic defense industry. Consequently, the revenues received by domestic arms-producing companies will rise. Thus, the first hypothesis that will be tested in the empirical section is given by.

[2] Subsequent studies that investigate electoral manipulations in the outcome of the defense budget are Buts et al. (2017) and Marinov et al. (2015) who find statistically significant evidence that a country deploys fewer troops close to elections. Moreover, Carrell and Hauge (2009) indicate that U. S. military housing policies are being used a re-election strategy by the incumbent.

H1. *Elections increase the sales revenues of domestic defense companies in the year before the elections.*

However, there are two problematic concerns with this first hypothesis. First, one crucial assumption underlying the predictions of Hypothesis 1 is that countries actually have an economically meaningful defense industry that has a nationwide economic impact. However, when this is not the case, it is not likely that the incumbent will increase the defense budget for electoral reasons. In these countries, the commercial benefits accruing directly from the additional defense expenditures will flow for a great part abroad and not stimulate the domestic economy or employment. This expectation is also largely confirmed in the existing literature on the fiscal multiplier effect of defense expenditure. Most studies claim that this multiplier is typically much lower than the multiplier of other public spending categories (see, for instance, Barro and De Rugy, 2013). In particular, there are only a few countries that actually have a domestic defense industry that has a macroeconomic impact. About eighty percent of the revenues in the arms market are concentrated in just seven countries—the United States, the United Kingdom, Russia, China, France, Germany, and Italy.

A second argument against hypothesis 1 is that voters do not only reward fiscal expansions when elections are upcoming, but also punish politicians who finance these expansions by tax increases or additional borrowing (Peltzman, 1992). This argument implies that election cycles in public spending do not necessarily affect aggregate expenditures, but are more likely to create a switching pattern between different spending categories to avoid large budget deficits or tax increases. In particular, election cycles show up as some pivotal groups of voters are targeted by the incumbent at the expense of others (see Drazen and Eslava, 2006, 2010; Gonzalez, 2002; Kneebone and McKenzie, 2001; Potrafke, 2010; Thies and Porche, 2007; Klomp and De Haan, 2013). In this case, voters assign only a low priority to military spending, as they consider it to be less important in periods of peace. In return, voters tend to favour welfare spending and reward incumbents with similar spending choices. Applying this latter logic would suggest that governments are likely to cut military expenditures in an election year to finance expansions in other categories, such as social security, education, health care, or public infrastructure, as these categories are valued more by voters (Russett, 1982; Nincic and Cusack, 1979; Cusack and Don Ward, 1981; Griffin et al., 1982a, 1982b; Mintz and Hicks, 1984; Zuk and Woodbury, 1986; Kamlet and Mowery, 1987; Mintz and Ward. 1988; Mintz, 1988; Su et al., 1993; Efthyvoulou, 2012).

Following this line of reasoning argues that incumbent leaders will try to cut their defense expenditures in an election year to finance expansions in other public spending categories. In return, this election-motivated cut is translated into a drop in the revenues received by arms-producing companies. Therefore, the second hypothesis that will be tested in this study is.

H2. *Elections decrease the sales revenues of domestic defense companies in the year before the elections.*

Based on the discussion above, the defense budget is a tempting candidate to explore for electoral manipulation. According to Blum (2019), there is a close relationship between the demand for national defense spending and the arms sales by a country's largest arms-producing companies. In contrast, according to Mayer (1992, 1995), conclusions about the election-motivated use of the defense budget should be tempered, and results need to be interpreted cautiously. Pamp and Thurner (2017) show that rising imports of major conventional weapons do not necessarily translate into a higher defense budget. Rather, this relationship depends on political, economic, and contract conditions that influence different choices for financing arms imports. More specifically, Mayer (1992, 1995) points to various several serious drawbacks in exploring the role of elections in setting the defense budget. First, not all forms of defense spending are to an equivalent extent susceptible to electoral manipulation. Some items are amenable to for short run manipulations, while other parts are uncontrollable or are subject to varying degrees of timing discretion. Budget authority, obligations, and outlays are usually not interchangeable, nor are military pay and procurement accounts. Second, the bureaucratic process of changing the defense budget is relatively long, making that the defense budget cannot be manipulated quickly enough to produce the timely response required of electoral instruments. For instance, for the U.S., it takes over two years to elapse between the Joint Chiefs' initial spending requests and final congressional action. Third, the economic effects of one year's defense budget are not felt immediately due to the outside lag. Few jobs are created until funds are actually obligated, a phase that may lag actual budget adoption by as long as five years (Greenberg, 1967; Lee, 1970; Mayer, 1992). For instance, in the U.S., less than three-fourths of procurement funds are actually obligated in the year in which they are budgeted, and a sizable portion of that is not obligated until the last month of the fiscal year. Finally, arms imports are not always paid through the defense budget, but can also be financed through military aid, loans, counter trade, offsets, or barter trade. Consequently, a transfer that is financed through these alternative sources will not show up in the defense budget. As a result of these limitations, the annual defense budget might be a poor place to look for short-term electoral manipulations.

To overcome many of these limitations, several subsequent studies have come up with an alternative theory on the election-motivated use of the defense spending. This competing contracting cycle theory is based on the premise that incumbents do not directly manipulate the size of the defense budget before the election, but instead use the timing of the announcement of defense contract awards (DeRouen and Heo, 2000, 2001; Mayer, 1992, 1995). The key assumption underlying this alternative theory is that timing strategies do not require any increase in total defense spending or budget. As incumbents can easily control the timing and level of contract awards, in contrast to the defense budget, they simply maximize the political and economic advantages of existing and future contracts by timing awards to coincide with elections. A decision to speed up or delay a contract award by a few months does not require any subsequent balancing to counteract the consequences of the original decision. The electoral contracting cycle predicts that the timing of domestic contract awards accelerates just before the elections (see also Havlik et al., 2021). In particular, to provide electoral benefits, contract awards would have to be timed to fall into a narrow window prior to the election day—far enough in advance to maximize the pre-election effects, but close enough to election day that incumbent credit-claiming is fresh in voters' minds. Meanwhile, contract awards create jobs almost immediately as defense contractors hire or retain engineering, manufacturing, and management personnel, issue sub-contracts, and gear up production facilities as soon as a contract is awarded (Greenberg, 1967; DeRouen and Heo, 2000).

To test the electoral contracting cycle theory for the U.S., Mayer (1995) used data for fifty states over the period October 1985 to December 1992 taken from the Federal Procurement Data Centre and explored whether there are contract accelerations visible during general elections and around presidential primaries. His main result indicates that electoral cycles in contract awards are actually existing in several strategic states and are especially prevalent in civilian-contract awarding. However, these election cycles had only limited macroeconomic effects, since they involve changing the award dates of existing contracts by a few months rather than an increase in total activity. One key implication of this conclusion is that, even if electorally timed contract awards have only negligible measurable economic impact, incumbents will time announcements to signal their competence.

When comparing the empirical predictions of the PBC theory and the contracting cycle theory more closely, there is one main difference regarding the timing and visibility of the election cycle on the sales revenue figures of defense companies. The PBC theory argues that governments adjust their fiscal policy during the year running up to the elections, while the contracting cycle theory suggests that the acceleration of contract award announcements takes place just a few months before the elections. This latter implies that a substantially larger part of the election effect is passed through to the post-election year in the case of the contracting cycle theory, as payments are typically lagging behind the award announcement.

Based on the discussion above, I formulate my third hypothesis.

H3. *Elections will increase the sales revenues of domestic defense companies in the period after the elections.*

However, the complete election effect on the sales revenues goes beyond a direct budgetary or domestic procurement effect. First, politicians may also be more inclined to provide other strategic favours to the defense-related industry when elections are upcoming, including providing political assistance to obtain foreign contracts, negotiating offsets, or approving more easily arms export licences (Aydin, 2007). These foreign contracts are essential as the domestic demand often is not large enough to absorb the production capacities of firms, which is necessary to cover the extraordinarily high R&D cost in this industry.

The following anecdotes illustrate this latter issue. Two months before the U.S. elections in 1992, President Bush announced the approval of a $9 billion sale of F-15s to Saudi Arabia. This sale led to a counterbalancing sale of Apache and Blackhawk helicopters to Israel. Around the same period, President Bush announced the lifting of a decade-old ban on advanced arms sales to Taiwan, which directly led to a $5.8 billion order for F-16 fighters. Likewise, in October 1992, Vice President Quayle announced in Philadelphia that Bush had decided to support the V-22 Osprey aircraft, a tilt-rotor plane that Bush had been trying to cancel since 1989. The affected companies were mainly located in states that were considered competitive "must-wins" for Bush, and all had been hurt by defense cutbacks in the previous years (Diehl and Von Drehle, 1992; Mayer, 1995).

Another political favour could be that incumbents try to replace foreign suppliers with domestic contractors when elections are upcoming to stimulate the domestic defense sector. However, this decision might involve high contract termination costs or disrupt international relations with foreign supplier countries. Also, the government can improve the exports of military equipment directly by increasing the number of government-to-government sales programs such as the U.S. Foreign Military Sales program.

Second, the revenues in the domestic defense industry are likely not only to be affected by domestic elections, but also by foreign elections, especially in countries that are recognized as large arms-importing states. Generally, it is always beneficial for an incumbent foreign leader to reduce arms imports in an election year. The reasoning behind this claim is twofold and relies on whether or not a foreign country has a defense-related industry of its own. First, when a country produces its own defense-related items, it needs to rely only partly on foreign supply to satisfy its arms demand. Governments in these countries might, as a re-election strategy, award contracts more easily to domestic producers or even try to replace foreign contractors in current orders by domestic companies. As a result, the domestic economy and employment will benefit. Also, when the resistance to defense expenditure is very strong among voters in these countries, it will be even more beneficial for the incumbent to cut on arms imports when elections are upcoming. The fall in arms imports should be reflected in lower sales revenues in the defense industry of exporting countries.

In turn, when a country lacks a domestic arms industry, the commercial benefits accruing from the defense expenditures will always directly flow abroad and not stimulate the domestic economy, as already discussed above. Also in this situation it is more advantageous for the foreign incumbent in terms of votes to cut down on defense spending. So, the final hypothesis that will be tested in this study is given by.

H4. *Elections in foreign arms-importing countries will reduce the sales revenues of domestic defense companies in the period around elections.*

Thus, based on the four hypotheses presented above, it is contested whether elections affect the economic performance of the defense industry, and if so, in which direction. One can therefore argue that this question is ultimately an empirical one.

3. Data and methodology

3.1. Defense sales revenues and election data

As my dependent variable, I use the annual total sales revenues of a particular defense company. The total revenues are based on information mainly taken from SIPRI Arms Industry Database. In particular, the database contains financial data, including sales and

profit margins, and employment data for more than 200 public and private arms-producing companies in more than 25 countries and has been available from 2002 onwards. The database collects information from company annual reports and articles in journals and newspapers (see also Blum, 2019).[3] The data is supplemented using information taken from World Top 100 Defense Firms published by the Defense News Media Group collecting similar information. To make the raw data suitable for my analysis, I have conducted three modifications. First, the SIRPI Arms Industry Database also considers large foreign subsidiaries of international defense corporations, which as an independent company, would rank among the top 100. Subsidiaries are specified by the country in which they are located. Since sales figures of subsidiaries are already included in the sales figures of the parent company, including both subsidiaries and parent companies in one panel would result in double-counting. Following Blum (2019), I have removed the foreign subsidiaries from my main sample and only use the consolidated figures of the parent company. Second, the sales figures of transnational companies have been allocated to individual countries according to employee shares. Finally, in order to make the sales revenue figures comparable over time, I have converted the current values into constant U.S. dollars using the GDP deflator.[4] These adjustments left me with an unbalanced panel of 269 (consolidated) firms from 25 countries over the period from 2002 to 2016.[5] Table 1 provides some descriptive figures about the defense industrial base of the countries considered in the sample, including sales revenues, employment, and export value. From this table, it is already clear that there is a large U.S. dominance in the companies considered in the sample. These particular companies are responsible for about two-thirds of the total sales revenues or export value.

Since many defense companies consist of various international subsidiaries, the consolidated revenues of a defense company are not only affected by domestic elections taking place in countries where the headquarters of a company is hosted, but also by domestic elections where only a subsidiary is located. One difficulty is that the election-induced incentives faced by the incumbents to use the defense industry in their re-election strategy is likely to differ between these two types of countries. As a response, I must split the sample of domestic elections considered in this study into two country groups. One group of countries where the headquarters of a specific company is settled, and another group of countries where only a subsidiary of an international company is located. To be specific, domestic election cycles in countries that host the headquarters of a defense company are captured by an election variable suggested by Franzese (2000), taking the timing of an election in the course of a year into account. This allows elections held at the beginning of the year to have a different impact on the sales revenues of a defense firm than those that are near the end of the year. This issue is of rather importance, as I expect that the magnitude of the pre- and post-election effect differs among the two theories discussed above .[6] The election indicator is calculated as follows

$$\text{election}_{jt}^{dom\_HQ} = \begin{cases} \dfrac{12 - M_{jt}}{12} & \text{pre} - \text{election year} \\ \dfrac{M_{jt}}{12} & \text{election year} \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

Where M_j is the month of the election in country j. The election data are mainly taken from the Database of Political Institutions reported by the Inter-American Development Bank. Specifically, for countries classified as a parliamentary system, I consider the parliamentary elections, while for the remaining countries, I concentrate on presidential elections.[7] An election is included if the election is held on the fixed date (year) specified by the constitution or if the election occurs in the last year of a constitutionally fixed term for the legislature. Also, when an election is announced more than one year in advance, it is taken up in the analysis.

The domestic election indicator in countries where a subsidiary is located is constructed in a similar way. However, some defense firms have multiple subsidiaries. As detailed data is lacking for most companies about the exact subsidiary size or their actual contribution to the consolidated revenues, I simply use the average of the number of elections in N countries in year t that host a subsidiary b of a particular defense firm[8]

[3] One major limitation of the dataset is that it is subject to sample selection as it only reports the data on the 100 largest companies in a particular year and excludes some important countries such as China. For a critical review about this SIPRI dataset, see the special issue on this database published by the Economics of Peace and Security Journal in 2018.

[4] It is not possible to subtract subsidiary figures from parent company figures, because only large subsidiaries are included in the dataset. Direct subtraction would lead to an incomparable dataset.

[5] Included countries are Australia, Brazil, Canada, Finland, France, Germany, India, Israel, Italy, Japan, Kuwait, Netherlands, Norway, Poland, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom and the United States.

[6] In particular, using an election year dummy that takes the value one in an election year would distort the results in this study as, in that case, it is actually a mix of a pre-election and post-election year effect. This mix differs across elections.

[7] To be precise, a country is classified as a parliamentary regime when the executive has no legislative powers in the realm of fiscal policy, and the government is accountable to parliament through a confidence requirement. I only include elections if the government has sufficient time to change its fiscal policies. When there are, for instance, elections shortly after the fall of a cabinet, the government may have little opportunity to use expansionary fiscal policy.

[8] Data about international subsidiaries is primarily taken from SIPRI Arms Industry database, the annual reports of the considered defense companies and the websites of the firms.

Table 1
Defense industrial base.

	Companies	Major subsidiaries	Arms sales	Labour force	Arms exports
	(1)	(2)	(3)	(4)	(5)
Australia	7	–	27,532	6028	68
Brazil	1	–	6095	7294	49
Canada	3	2	10,922	5611	239
Finland	1	–	4469	1176	65
France	21	10	353,243	188,520	1718
Germany	11	6	99,155	316,821	1875
India	4	–	79,353	120,673	20
Israel	7	–	97,524	25,967	592
Italy	19	15	229,162	154,385	615
Japan	9	–	112,312	323,365	3
Kuwait	1	–	7573	5733	–
Netherlands	1	1	2378	–	552
Norway	1	–	9790	4797	118
Poland	2	–	10,008	7387	69
Russia	33	9	226,655	299,581	6220
Singapore	1	–	24,284	18,601	21
South Africa	1	–	1346	2117	103
South Korea	12	2	43,314	16,765	197
Spain	5	2	23,780	13,439	595
Sweden	6	3	36,866	27,080	406
Switzerland	2	–	13,743	6607	289
Trans-European	5	–	284,360	145,722	-
Turkey	2	–	9205	3433	104
Ukraine	2	–	6564	27,425	519
United Kingdom	23	10	598,182	312,815	1143
United States	101	18	3820107	2,123,587	7749

Note: Column (1) reports the number of defense companies by country used in the sample; column (2) are the major subsidiaries reported in the SIPRI Arms Industry Database; column (3) is the annual arms sales in constant million U.S. dollars; column (4) is the average number of employees hired by the firms considered in the sample; and column (6) provides the value of arms exports in constant millions U.S. dollars.

$$\text{election}_{bt} = \begin{cases} \dfrac{12 - M_{bt}}{12} & \text{pre} - \text{election year} \\ \dfrac{M_{bt}}{12} & \text{election year} \\ 0 & \text{otherwise} \end{cases}$$

$$\text{election}_{jt}^{dom\_sub} = \frac{1}{N}\sum_{n=1}^{N} \text{election}_{bt} \tag{2}$$

Finally, to test hypothesis 4 provided above, I need to come up with a foreign election indicator. In this case, this election indicator is created by calculating a weighting average of the elections held in all foreign countries in a particular year. Specifically, a foreign country is defined as a country where no headquarters or a subsidiary of a particular defense company is located. Clearly, it makes a large difference for the sales performance of a defense company whether elections are taking place in a country with a large arms import demand, such as Australia or South Korea, or has only a small foreign demand for strategic-military items, like Iceland or Slovenia. Therefore, I weight the elections included in the foreign election indicator by the relative arms imports as a share of the world's total. In my approach, the foreign election indicator is based on the following formula.

$$\text{election}_{ft} = \begin{cases} \dfrac{12 - M_{ft}}{12} & \text{pre} - \text{election year} \\ \dfrac{M_{ft}}{12} & \text{election year} \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

where election_{ft} indicates whether there is an election held in a particular foreign country f in year t. In the next step, I multiply this

election indicator by the relative arms imports (w_f). The data on the arms imports are taken from SIPRI. More specifically, I use the average arms import value from the five consecutive years before the start of the latest term of the incumbent to assure exogeneity. In total, a maximum of 202 countries are included in the foreign election indicator, thereby covering more than ninety percent of the global economy, worldwide government spending, or population. This high coverage reduces any sample selection concerns in the foreign elections included.[9]

3.2. Empirical model

This section describes the empirical approach applied to explore the impact of elections on the total sales revenues received by defense companies. The estimated model is given as follows

$$\ln rev_{ijt} = \alpha_{ij} + \mu \ln rev_{ijt-n} + \beta_v \mathbf{x}_{ijt-m} + \gamma_1 election_{jt}^{dom\_HQ} + \gamma_2 election_{jt-1}^{dom\_HQ} + \gamma_3 election_{jt}^{dom\_sub} + \gamma_4 election_{jt-1}^{dom\_sub} + \theta_1 election_{jt}^{for} + \theta_2 election_{jt-1}^{for} + \delta_{Rt} + \varepsilon_{ijt} \quad (4)$$

where rev_{ijt} is the total annual sales revenues of defense company i with their headquarters in country j in year t taken in logarithms[10]. The revenues are not only determined by the current market conditions, but are also constrained by procurement decisions taken in the past. Typically, defense contracts are spread over multiple years and often tied to additional long-term obligations such as service and maintenance. These arguments suggest that there is possibly some autoregressive tendency present in the sales revenues that accrue from these contracts. To capture this, the sales revenues in the previous year are included in the econometric specification.[11]

The variables $election^{dom}$ and $election^{for}$ capture the impact of respectively domestic and foreign elections as explained above, while the suffixes HQ and sub in the superscripts refer respectively to a headquarters or subsidiary country. Although the expected direction and magnitude are likely to differ among the election variables, the hypotheses given above all suggest that parameters γ_i and θ_i in equation (4) are statistically different from zero. According to the political budget cycle theory, the government will try to manipulate the defense budget in the year before the elections. In contrast, the contracting cycle theory assumes that the acceleration of contract award announcements takes place just a few months before the elections. Consequently, the moment when the election effect is visible in the revenue time series possibly differs between these two theories. More specifically, between the conclusion of the deal and the final delivery of the weapon, a couple of years can pass due to production capacities. Payments usually take place in different tranches over the course of the deal. Based on detailed contract information collected by SIPRI, a vast majority of deals have a throughput speed of about two years. This implies that most contracts are concluded in a pre-election year and that the payments in these contracts also run over to the post-election year. Thus, the contracting cycle theory argues that a substantially larger part of the payment is transferred to the year after the elections than is expected by the political budget cycles theory. To control for this latter issue, I include the election variables also with a one-year lag to capture both the pre- and post-election effect.[12]

The parameter α_{ij} is a firm-specific intercept to control for any time-invariant observed and unobserved characteristics, such as the legal status or ownership of a company. By using firm-specific intercepts, I place the emphasis of my analysis on the identification of the within-firm variation over time. In addition, this approach also reduces the influence of any potential selection bias that might arise, for example, since U.S. firms are over-represented in my data. The final term ε_{ijt} is the error term.[13]

The vector $\mathbf{x}$ includes a set of control variables that is necessary to avoid an omitted variable bias and are related to structural supply and demand factors for defense goods and the role of national and international defense policies (see also Blum, 2019). First, to capture the domestic demand for military items, I include an ordered variable indicating whether a country is recognized as a small, medium, or large buyer of military items,[14] a security risk variable, and two dummy variables capturing whether a particular country is involved in foreign military interventions or peacekeeping missions. Moreover, the political colour of the government is included as a control variable. Right and left-wing government also differ regarding the preference to military spending. The constituency of the right-wing parties traditionally put attach a higher value to national security and hawkish foreign policies than left-wing voters (Kauder and Potrafke, 2016; Whitten and Williams, 2011; Rathbun, 2004). There is also a higher level of acceptance among right-wing parties to support foreign policy using international military trade. In turn, influenced by the peace movements, left-wing political parties support more ethical standards in foreign policy and are typically more resistant to international arms transfers. This, in turn,

[9] To anticipate my main results, the foreign election measure used is robust to alternative weighting schemes based on the population size, share of world military expenditures in the last three decades, the land size of a country, or the heavy weapons index reported by the Bonn International Centre for Conflict Studies (detailed results are available upon request).

[10] To be precise, this variable is taken in natural logarithms as it is not normally distributed and to smooth out extremely high values.

[11] It turns out that the lagged dependent variable enters the empirical specification highly significant making a dynamic model most appropriate (see Table A2 in the appendix).

[12] Exploring also the impact on the second year after the election is empirically hampered due to a rather small reference category. In that case, the third year would be identified as the reference year in most countries. However, about twenty percent of the cabinets terminate before the term limited. This would distort the estimates enormously.

[13] As a sensitivity test, I have also run the main model using clustered standard errors at the country level. Though, generally the significance of the election variables drops slightly, the main results remain unaffected (detailed results are available upon request).

[14] I cannot include directly the military expenditures as a control variable in the model specification as it might be influenced by elections itself as suggested by the political budget cycle theory. To overcome this problem, I have classified a country based on their position on the distribution of the defense expenditure around the world in a particular year. Below, I have performed some robustness tests concerning this issue.

will affect the arms purchase decisions of the government. Second, a large part of the aggregate demand for military goods is determined by global factors. These global factor include, for instance, the total number of ongoing armed conflicts worldwide, the total number of imposed UN arms embargoes, or the global military spending in a particular year. To capture these factors, I include time-fixed effects represented by a series of regional year dummies δ_{Rt} as companies and countries are not exposed to same degree to these global factors.[15]

In turn, factors that affect the supply of military goods are mostly related to the costs of production. That is, I include the real interest rate, real exchange rate index, and the log-change in the producer price index. One problematic issue is that, due to a lack of reliable data, I cannot directly control the degree of technology and the quality of the equipment produced by a company or in a country. As an alternative, I include the real GDP per capita as this variable is closely related to the level of technology embedded in the output produced (see, for instance, Xu and Chiang, 2005). Moreover, I also control for the institutional environment of a country using the factor scores of the first-principal component on voice and accountability, government effectiveness, regulatory quality, rule of law, and control of corruption in a particular country and year taken from the Worldwide Governance Indicators (2015). In essence, this composite variable captures the quality of governance and is therefore related to, for instance, the protection of patents, bureaucratic procedures around export licenses, and the rigorousness of policies that should prevent briberies. All of these issues are of particular importance for the economic performance of the domestic defense industry. In addition, the arms trade network has changed substantially since the end of the cold war. During the cold war period, there were mainly three centres of arms trade (U.S., Russia, and the U.K.). Currently, the arms trade network is much more complex and less transparent, for example, due to the increasing role of less democratic countries such as China (see, for instance, Pamp and Thurner, 2017). To control for this, a globalization measure is added to my vector of control variables.

Finally, I add several company-specific variables. First, I add the share of a firm's revenues that can exclusively be attributed to the sales of military goods rather than civilian or dual-use goods. Second, a large company dummy that is based on the median of the total number of employees hired by a company.[16] Third, a dummy variable indicating whether a parent company also has a major foreign subsidiary included in the SIPRI Top 100 defense companies ranking in a particular year. The optimal number of lags for the lagged dependent variable and each control variable is determined by using the Schwarz-Bayesian Information Criterion (SBC). Table A1 in the appendix lists the control variables used in my analysis together with a short description and source.

The dynamic panel data model specified in equation (4) contains a potential bias owing to the inclusion of the lagged dependent variable. In order to cope with the inconsistency arising in autoregressive panel data, I follow Gootjes et al. (2021) and Ademmer and Dreher (2016) by estimating a bias-corrected fixed effects (LSDVC) specification (Bun and Kiviet, 2003; Bruno, 2005). LSDVC estimation avoids the Nickell bias (Nickell, 1981), but assumes strict exogeneity of the explanatory variables. This modelling technique is especially suitable for dynamic panels with a small T and large N as is the case in my application, since I have only a limited time dimension and a large cross-sectional of defense companies.

4. Empirical results

4.1. General findings

In Table 2 I present my estimation results on the general model specification. As the dataset is highly unbalanced and the number of observations substantially differs among the considered firms and countries, I apply the bootstrap estimator with 1000 replicators and cluster them at the firm level to obtain robust standard errors.[17] This approach makes sure that the results are not driven by outlier firms or a single country. Based on the results presented in column (1), I can draw a few conclusions. First, domestic elections in countries where the headquarters of a defense firm is located have a positive effect on the total sales revenues of these companies at common confidence levels. This finding implies that incumbent governments of arms-producing countries try to support the domestic defense industry for political gain if elections are upcoming. When examining more closely the visibility of the election effect, it appears that, although both the post- and pre-election variables are statistically significant, the post-election effect is significantly larger. This finding suggests that the electoral contracting cycle theory partly dominates and that governments are likely to accelerate the selection of domestic contractors or additional domestic procurement near the end of the term. However, an alternative explanation for this finding is that governments postpone the decision to purchase arms from the domestic industry after the elections as voters typically dislike military spending.

Specifically, the size effect of the election variables suggests that domestic elections boost the revenues in the defense industry by about 0.9 percent.[18] This figure should be interpreted as a weighted average since it represents the sum of two effects that run in

[15] I consider the following regions: North America, European Union, the rest of Europe, Asia and the rest of the world.

[16] Using the numbers of employees directly might create some endogeneity problems since firms might hire more (less) personnel when governments start spending more (less) on defense equipment due to electoral motives as suggested by the contracting cycle theory. The use of a dummy variable partly solves this problem.

[17] For sensitivity testing reasons, I have also clustered the standard errors at the country level as elections can be recognized as country-specific shocks. However, the results do not change dramatically (detailed results are available upon request). However, governments might target only specific defense firms for electoral support making clustered standard errors on the company level more appropriate.

[18] This figure is composed as follows. Domestic elections increase the profits by about 0.3 percent in the pre-election year and approximately by 0.6 percent in the post-election year. Thus, in total, domestic elections will increase the revenues by 0.9 percent.

Table 2
Elections and defense company revenues.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Domestic pre-election year -	0.003*	0.005*	0.004*	0.003*	0.005**	0.002*	0.003*	0.010**	0.007*	0.002*
Headquarters	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.005)	(0.004)	(0.004)
Domestic post-election year -	0.006**	0.009**	0.010**	0.005*	0.010*	0.004*	0.007**	0.021**	0.010**	0.004*
Headquarters	(0.002)	(0.005)	(0.005)	(0.003)	(0.006)	(0.002)	(0.003)	(0.006)	(0.003)	(0.003)
Domestic pre-election year -	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.002	0.002	0.001
Subsidiary	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Domestic post-election year -	0.002	0.003	0.002	0.001	0.003	0.001	0.002	0.004	0.002	0.001
Subsidiary	(0.001)	(0.005)	(0.002)	(0.001)	(0.003)	(0.001)	(0.001)	(0.005)	(0.002)	(0.002)
Foreign pre-election year	−0.002	−0.004	−0.003	−0.002	−0.002	−0.002	−0.002	−0.002	−0.002	−0.001
	(0.003)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Foreign post-election year	−0.005	−0.007	−0.009	−0.005	−0.006	−0.003	−0.006	−0.005	−0.005	−0.004
	(0.009)	(0.004)	(0.009)	(0.007)	(0.007)	(0.007)	(0.006)	(0.003)	(0.007)	(0.007)
Estimation technique	LSDVC	LSDVC	LSDVC	LSDVC	OLS-FE	SGMM	LSDVC	LSDVC	LSDVC	LSDVC
Control variables	ALL	NONE	ALL	Including defense expenditures	ALL	ALL	ALL	ALL	ALL	ALL
Sample of firms	ALL	ALL	ALL	ALL	ALL	ALL	ALL	US	U.K. France, Germany, Italy, Russia	Other
Elections considered	Pre-determined	Pre-determined	Pre-determined	Pre-determined	Pre-determined	Pre-determined	ALL	Pre-determined	Pre-determined	Pre-determined
Number of observations	1523	1801	672	1523	1570	1256	1523	606	502	411
Number of companies	201	212	42	201	201	191	201	74	62	64
Arellano-Bond AR (2) p-value	–	–	–	–	–	0.750	–	–	–	
Sargan-Hansen test (p-value)	–	–	–	–	–	0.653	–	–	–	

Note: The table shows the pre- and post-election effect of domestic and foreign elections. **/* Indicating significance levels of respectively 5 and 10 percent. Bootstrapped standard errors are shown between brackets. The second lag of the dependent variable is used as GMM-type instrument. The second lag on the control variables are used as IV-type instruments. See Table A1 in the appendix for the list of control variables used.

opposite directions. While some governments try to support the domestic defense industry for electoral gain, other governments do not use defense spending as a re-election instrument or even cut defense spending. From the results, I can conclude that the former positive effect dominates in my broad sample of arms-producing countries. It also makes clear that it is important to reveal the mechanisms underlying these results and try to identify which countries support their domestic defense industry for electoral reasons and which countries do not.

Second, I do not find any statistically significant evidence that domestic elections in countries where only a subsidiary of a defense company is located have an impact on the consolidated total revenues of a defense company. One explanation might be that it is rather difficult to stimulate local, and typically small, branches of large-scale multinational corporations. Most politicians fear the risk that the additional spending will directly flow abroad and into the country where the parent of the defense company is located. As a result, the domestic economy will not benefit from this additional spending and also not the re-election prospects of the incumbent. To avoid this risk, governments are probably more likely to expand the public spending in categories that directly benefit the domestic economy or are preferred more by voters. An alternative explanation for this insignificant finding is that my election indicator for subsidiary countries is rather rough. Due to a lack of detailed financial information about these subsidiaries, it is just an arithmetic mean of the number of elections held in these subsidiary countries. Consequently, the contribution of each subsidiary to the consolidated financial results is assumed to be the same, thereby creating, by definition, some measurement error.

Finally, turning to the effect of foreign elections. I do not find any significant effect of foreign elections on the total sales revenues of major defense companies at common confidence intervals. The explanation for the lack of evidence is twofold. First, as provided by hypothesis 4 above, it is expected that foreign election cycles should have a negative effect on the sales revenues of domestic defense firms. However, this hypothesis is based on two crucial assumptions. First, elections are held democratically and not influenced by non-elected actors such as the military. Second, the preference for military spending is lower for voters than it is for the government. For many countries, it is questionable whether one or both of these assumptions hold. When this is not the case, it is well possible that elections will have a positive effect as governments would like to acquire more arms when elections are approaching. Thus, the direction of the election effect is likely to differ depending on the institutional and political conditions present in foreign countries. Aggregating all foreign elections into one measure would lead to an insignificant foreign election effect since negative significant election effects in some countries are likely to be offset by positive ones in other countries.

A second explanation for the lack of evidence is that foreign elections are rather uniformly distributed across years. Consequently, there is only little variation in the foreign election indicator over the years which reduces the explanatory power of these elections. One way to create more variation and, at the same time, control for the institutional environment in which foreign elections are held is to distinguish between different types of foreign elections. I will examine this issue in much more detail below in section 4.3 by splitting up the foreign election indicator.

4.2. Sensitivity analysis

To assess the robustness of these first findings, I estimate my main model using different empirical specifications and estimation techniques. First, in column (2) of Tables 2 and I have excluded all control variables. Consequently, the number of observations increases considerably, but the general conclusions about the impact of domestic and foreign elections remain almost unaffected. More specifically, the size effect of elections is slightly higher than in the results presented in the previous column. However, this larger effect can be attributed to an omitted variable bias causing the estimation results to be inflated.

To test any further for sample selection issues, in column (3), the main model is estimated using a balanced sample of companies that are continuously present in the dataset during my complete period of analysis. This filter reduces the number of observations by more than half. However, it again does not alter my results dramatically, and the previous conclusions still hold.

Moreover, in column (4), the national defense expenditure per capita (in logarithm) in a particular year is included in the model as a control variable. In the previous model specifications, this explanatory variable was left out since it will create some endogeneity concerns. According to the PBC theory, defense expenditures could be affected by an election cycle. Initially, I captured the size of the military spending by using an ordered variable to overcome this particular issue. In turn, in column (4), I try to remove any election effect in the defense expenditure data by using a moving average of military spending over the preceding four years.[19] The findings indicate that my main conclusions drawn before are not affected by including the modified military spending as a covariate, as the results are rather identical.

Furthermore, in columns (5) and (6) I check whether my results are driven by the estimation technique applied. For this reason, I re-estimate first my main model using the system-GMM (SGMM) estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). Specifically, I use the two-step SGMM estimator, including Windmeijer's (2005) finite sample correction (Roodman, 2009). As long as the model is over-identified, the validity of the assumptions underlying both the difference and the system estimators can be tested through Sargan-Hansen tests of orthogonality between the instruments and the residuals and through tests of second- or higher-order residual autocorrelation. Additionally, I apply in column (6) the OLS-FE estimator. Although the magnitudes differ between the estimation methods, the significance pattern is almost unaffected. As results, the main conclusions drawn based on the LSDVC method still hold. However, one important note is that using the OLS estimation technique with fixed effects might yield biased estimators since the econometric specification poses a dynamic component[20].

[19] For robustness purposes, I have also used time windows of three and five years. The general results remain almost identical.

[20] However, excluding the lagged dependent variable does not dramatically change my findings (detailed results are available upon request).

Finally, so far, I have included only the elections that are held at a pre-determined date. However, some cabinet members may already take into account that there will be endogenous elections in the near future and make implicit policies that benefit them in these elections. To accommodate this issue, I estimate in column (7) the main models, including all elections. The results are fairly similar to those reported previously, suggesting that surprising elections are only a minor issue.

To summarize, regardless of the estimation method applied, sample selected, or econometric specification used, there is some empirical support that governments of arms-producing countries try to support the domestic defense industry before or after the elections for electoral reasons. Thus, based on the results found in Tables 1 and I find some empirical evidence that accepts hypotheses 1 and 3.[21]

4.3. Defense industrial base

Since a majority of the firms included in my sample have their headquarters in the U.S., it is possible that the domestic election effect is primarily driven by U.S. elections. Especially since in the U.S. there are extremely close connections between politicians and representatives of the defense industry. Additionally, the industrial base of the defense industry substantially differs between the U.S. and the rest of the world. More specifically, the U.S. defense industry is regarded to be highly competitive and dominated by economies of scale, while the defense industry in most other countries is much more fractionalized and thrives on government support (Hartley, 2006; Dunne et al., 2007). Consequently, the economic importance and the political influence of the defense industry differs substantially among countries. It is well possible that governments only support their defense industry when it is a major business sector that has a nationwide economic effect. In these particular countries, the defense industry is likely to represent many votes. It is, therefore, less clear whether the domestic election effect found so far is the same for all considered firms or arms-producing countries.

To rule out that my first findings reported in column (1) on the domestic election effects are determined by a country-specific effect, I re-estimate my main model by dividing the total sample of firms into three subsamples: (1) U.S. defense companies; (2) defense firms in other major arms producing countries—U.K, France, Germany, Italy, and Russia and (3) defense companies in the remaining countries. Comparing the findings reported in columns (8)–(10) in Table 2 indicate that the domestic election effect found previously is further reinforced in the major arms-producing countries, especially in the U.S. One critical remark is that the sample used in this study consists only of major companies from the largest arms-producing countries. This implies that countries with a small defense industry or with a defense industry that is dominated by many small and medium enterprises (SMEs) are missing. This sample selection bias might inflate the size effect on the election variable and reduces the scope of the conclusions that can be drawn.

4.4. Disaggregated foreign elections

In an attempt to reveal the mechanisms underlying the non-uniform impact of foreign elections, I disaggregate my foreign election indicator in Table 3 based on several dimensions related to the political situation present in a foreign country and the corresponding demand for arms imports. First, elections are likely to have a different impact on defense spending in democracies and autocracies. Initially, it was assumed that political budget cycles only exist in democratic countries as it assumes that elections are competitive and fair. However, several recent studies argue that election cycles may also occur in autocracies (see, for instance, Blaydes, 2006; Wright, 2011; Hyde and O'Mahony, 2010; Ebeke and Ölcer, 2013). This debate primarily rests on three key arguments. First, in autocracies, the incumbent has the incentive to buy political support in the later years of his term from the elite on which his power rests, including the armed forces. The idea is that even in authoritarian systems, political leaders have to be sufficiently popular with the elite to avoid contestation and removal (Finer, 2002; Maniruzzaman, 1992). The influence of the elite stems from the lack of a well-functioning system of checks and balances that is necessary to achieve democratic accountability. This shortcoming raises the opportunity for the non-elected elite, such as the military, to gain political power. This is especially the case in political regimes where the military plays a pivotal role in ensuring that the ruling elite stays in power (Pamp and Thurner, 2017; Bove and Brauner, 2016). As a result, in these countries, policy decisions reflect the interests of the armed forces and the ruling elite rather than the welfare of the population at large. For instance, Bove and Nisticò (2014) find strong empirical evidence that the involvement of high-ranked members of the military in government increases defense spending.

A second explanation for the existence of electoral cycles in defense spending in autocratic countries can be found in the so-called deterrence theory arguing that military spending in an election year sends out a powerful message to potential and actual challengers or foes of the incumbent leader that it will repress any political actions of opponents. A final argument of electoral cycles in the defense budget of autocratic countries is related to the influence of electoral accountability on the likelihood of war. According to Hess and Orphanides (1995, 2001), an incumbent with low performance in handling the domestic economy, which is often the case in autocracies, has incentives to wage an armed conflict to display leadership capabilities and increase the odds of re-election.

The discussion above implies that foreign politically unstable autocracies where the power is concentrated in the military will increase their defense spending when elections are upcoming to send out a powerful signal to current and future challengers or enemies. This, in turn, will be reflected in the rising sales revenues of international defense companies. In contrast, governments of foreign democracies are either likely to shift their public spending away from defense and more towards spending categories that benefit more voters or try to replace foreign suppliers with domestic competitors. Both cases will lead to a drop in the revenues

[21] The remaining models that are estimated in this study are also estimated using the OLS-FE estimator. However, again, according to these results there are no dramatic changes in the conclusions that can be drawn (detailed results are available upon reasonable request).

Table 3
Disaggregate foreign elections.

	(1)	(2)	(3)	(4)
Domestic pre-election year - Headquarters	0.003*	0.003*	0.003*	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)
Domestic post-election year - Headquarters	0.005**	0.006**	0.006**	0.006**
	(0.002)	(0.002)	(0.002)	(0.003)
Domestic pre-election year - Subsidiary	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.000)	(0.001)
Domestic post-election year - Subsidiary	0.002	0.002	0.001	0.002
	(0.002)	(0.002)	(0.001)	(0.002)
Foreign pre-election year - Democracies	0.005*			
	(0.003)			
Foreign post-election year - Democracies	−0.013**			
	(0.004)			
Foreign pre-election year - Autocracies	−0.001*			
	(0.001)			
Foreign post-election year - Autocracies	0.003			
	(0.002)			
Foreign pre-election year - Low security risk		−0.013*		
		(0.007)		
Foreign post-election year - Low security risk		−0.004		
		(0.003)		
Foreign pre-election year - High security risk		0.003*		
		(0.002)		
Foreign post-election year - High security risk		−0.001		
		(0.001)		
Foreign pre-election year - Major defense industry			−0.011*	
			(0.006)	
Foreign post-election year - Major defense industry			−0.005	
			(0.009)	
Foreign pre-election year - Minor defense industry			−0.003*	
			(0.001)	
Foreign post-election year - Minor defense industry			−0.001	
			(0.001)	
Foreign pre-election year - Major importing countries				−0.011*
				(0.006)
Foreign post-election year - Major importing countries				−0.005
				(0.005)
Foreign pre-election year - Minor importing countries				−0.003*
				(0.002)
Foreign post-election year - Minor importing countries				−0.001
				(0.001)
Number of observations	1523	1523	1523	1523
Number of companies	201	201	201	201

Note: The tables show the domestic and disaggregated foreign election effect for different type of countries. **/* Indicating significance levels of respectively 5 and 10 percent. Bootstrapped standard errors are shown between brackets. See Table A1 in the appendix for the list of control variables used.

received by arms-producing companies.

The results in column (1) of Table 3 confirm these expectations and indicate that foreign elections in democracies reduce the revenues, while elections taking place in foreign autocracies put the total sales revenues of defense companies under a little upward pressure. Interpreting the size effect by using the median number of yearly democratic and autocratic elections indicates that foreign democratic elections cause a fall in the annual earnings of a defense company by about 0.3 percent. In contrast, elections in autocratic foreign countries induce an increase in the revenues of defense firms by approximately 0.1 percent.

On a related note, the incentive to invest in military-strategic goods might rely on whether a country has to deal with a direct national security threat. In such cases, voters are likely to assign a relatively higher value to military spending due to security considerations, and their spending priorities become more aligned with those of politicians (Bove et al., 2017; Mintz, 1988; Russett and Barzilai, 1992). The degree to which a country is subject to such a security threat in a particular year is captured by the average score of the indices on external and internal conflict risk reported by the International Country Risk Guide (ICRG).[22] Country-year observations that have an average score that is above the median value are classified as high-risk country-years, while the other country-years are

[22] Specifically, the external conflict measure is an assessment of the risk to the incumbent government from foreign action, ranging from non-violent external pressure, including diplomatic pressures, withholding of aid, trade restrictions, territorial disputes, and sanctions, to violent external pressure ranging from cross-border conflicts to all-out war. In turn, internal conflict refers to the risk that is related to civil war, coupe threat, terrorism, political violence, and civil disorder.

recognized as low-security risk country-years. Based on the results in column (2) of Tables 3 and I can conclude that foreign countries that are facing serious security risks in an election year are likely to import more military items for reasons of protection or self-defense as the revenues in the domestic defense industry increase. In turn, countries that are not subject to a security threat do not alter their arms imports in an election or post-election year.

As already indicated in column (7) of Table 1, domestic elections in major arms-producing countries improve the sales revenues of domestic defense firms. However, what is less clear is if this stimulus is caused by additional defense spending or can be attributed to a shift in defense spending from foreign to domestic contractors. Therefore, in column (3) of Tables 3 and I split my foreign election indicator into two categories based on the size of the defense industry in a foreign country. Again, I classify the U.S., UK, Russia, Germany, France, and Italy as major arms-producing countries. In turn, the remaining countries are recognized to have only a small defense industrial base. The results indicate that only foreign elections in large arms-producing countries have a significant negative effect on the total sales revenue of domestic defense companies. Foreign elections in major arms-producing countries are likely to cause a demand shift from imports to home-produced items. Meanwhile, companies in arms-producing foreign countries might receive political assistance in an election year to win the competition for domestic orders that are tendered internationally.

Finally, as explained above, the impact of foreign elections on the revenues of defense companies relies on whether this foreign country is recognized as a large or small arms-importing country. Up so far, to consider the import demand for arms in a particular foreign country, I have weighted the foreign election indicator with a measure that captures the import demand of a foreign country. However, the question remains whether this fully captures the effect that countries with a greater military demand might have a different election effect compared to countries with only a small demand. To further investigate this issue, I split in column (4) of Table 3 the foreign election indicator into major and minor arms-importing countries. I define major importing countries as countries that are in the top quarter of the arms import distribution in the period from 1990 to 2000 based on data taken from SIPRI. The results indicate that there is any statistically significant difference at common confidence levels between large or small arms-importing countries. One explanation is that the list of major arms-importing countries includes both democracies such as Australia and South Korea as well as autocracies including Saudi Arabia, Egypt, and Pakistan. However, as already indicated above, the foreign election effect differs between these two country groups.

4.5. *Firm structure*

So far, I have assumed that the impact of foreign and domestic elections is equal for each defense company within a particular country. This is not necessarily the case, as elections might create heterogenous effects on the considered companies. In Tables 3 and I explore whether the election effect relies on the structure of the firm by including several interaction terms. In particular, I focus on three dimensions—first, the size of a defense company. Larger firms are likely to be more critical for the re-election of the incumbent as it represents more voters and is likely to have more political influence or economic power. This gives these particular firms a significant comparative advantage in the trade of votes for support. As a result, they are likely to receive more favours from politicians. To classify as a large defense company in a particular year, the total number of workers should exceed the median sample value. The results in column (1) of Table 4 confirms that large companies significantly benefit more from domestic elections than small firms.[23]

Second, in the literature, this company size effect is typically associated with the extent of product diversification (Grossmann, 2007). Larger companies are typically producing a more segmented product range and, are, therefore, less dependent on earnings from a single product line or rely on a few costumers. In particular, the existing literature recognizes the extent of diversification as a kind of implicit insurance against uncertainty in government policies. Firms that are better diversified in the goods they produce are likely to rely less on government demand. Many firms included in my sample do not exclusively produce military goods, but also dual-use items that can also be used for civil purposes as well. To explore this latter issue, I create a dummy taking the value one when the majority of the firm revenues is contributed by the sales of military equipment rather than by dual-use or civil goods. Based on the interaction results presented in column (2) of Table 4, one can conclude that there is no statistical difference in the domestic and foreign election effect between companies that mainly produce military items and firms that also produce civil goods.

The final mediating firm-specific element I explore is the existence of major foreign subsidiaries. One main reason why firms have foreign subsidiaries is that it makes them better able to exploit cost advantages due to the internalization of certain supply chain activities or production processes. However, in return, various principle-agent and monitoring issues might arise. For instance, the company must deal with multiple governments and their industrial policies. The results so far indicate that domestic election cycles in countries where a subsidiary is located do not matter for the consolidated sales revenues of a parent company. As a sensitivity test, I use the sales revenues of individual subsidiaries that are included in the SIPRI Arms Industry Database as my dependent variable instead of the consolidated sales revenues of a firm. The results in column (3) of Table 4 confirm my previous findings that the sales revenues of a subsidiary are not affected by upcoming elections.

5. Conclusions

This study is the first that explores the impact of election cycles on the total sales revenues of major defense companies. Theoretically, the direction of this effect is not directly straightforward. This ambiguity stems from the trade-off governments face in an

[23] This effect is partly explained by a U.S. effect since the size effect is larger for U.S. defense companies (detailed results are available upon reasonable request).

Table 4
Firm structure.

Firm structure:	(1)	(2)	(3)
	Large companies	Military-oriented companies	International subsidiaries
Domestic pre-election year - Headquarter	0.003**	0.002*	
	(0.001)	(0.001)	
Domestic pre-election year - Headquarter x firm structure	0.002*	0.001	
	(0.001)	(0.001)	
Domestic post-election year - Headquarter	0.009**	0.008**	
	(0.003)	(0.002)	
Domestic post-election year - Headquarter x firm structure	0.004**	0.003	
	(0.001)	(0.004)	
Domestic pre-election year - Subsidiary	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Domestic pre-election year - Subsidiary x firm structure	0.000	0.000	
	(0.001)	(0.000)	
Domestic post-election year - Subsidiary	0.002	0.001	0.002
	(0.002)	(0.002)	(0.002)
Domestic post-election year - Subsidiary x firm structure	0.001	0.000	
	(0.001)	(0.001)	
Foreign pre-election year	−0.004	−0.005	−0.005
	(0.006)	(0.008)	(0.003)
Foreign pre-election year x firm structure	−0.002	−0.003	
	(0.002)	(0.002)	
Foreign post-election year	−0.003	−0.002	−0.002
	(0.002)	(0.003)	(0.003)
Foreign post-election year x firm structure	−0.002	−0.001	
	(0.002)	(0.001)	
Number of observations	1495	1486	265

*Note: The table shows the results on whether the election effect relies on certain company characteristics. **/* Indicating significance levels of respectively 5 and 10 percent. Bootstrapped standard errors are shown between brackets. See Table A1 in the appendix for the list of control variables used.*

election year. On the one hand, they might try to ensure re-election by supporting the national economy and employment rate through stimulating the domestic defense industry. On the other hand, it might be more beneficial for the incumbent government to shift away from defense spending in an election year and towards public spending categories that are valued more by the general public, as this will, in turn, attract more votes. Based on the empirical findings of a dynamic panel model, I can draw several conclusions. First, governments in countries with a major defense industry are expected to raise domestic procurement or provide additional non-budgetary support when elections are approaching. As a result, the revenues of domestic defense companies increase both in an election and post-election year. Second, elections in democratic foreign countries cause a fall in the revenues of domestic defense firms as foreign governments are likely to shift their public expenditures away from defense imports and towards domestic contractors or even to other public spending categories that are more preferred by voters. In contrast, elections in autocratic foreign countries improve defense sales of domestic arms-producers. Autocratic rulers try to prolong their stay in office by strengthening their military capabilities in an election year to send out a signal of power to current and future challengers. Finally, elections in countries that have to deal with serious security risks are more likely to increase their purchase of military-strategic items for self-defense purposes. From this latter policy action both domestic and foreign defense companies will benefit.

However, the results presented throughout this study should be interpreted cautiously as the study suffers from several critical limitations mainly caused by the lack of detailed data. First, the sample consists only of major defense firms from the largest arms-producing countries. Thus, countries, where the defense industry is dominated by many small and medium-sized firms are not considered. This might create some sample selection bias and could alter the general picture found. For instance, the results might be overestimated as large companies are likely to receive more support for electoral reasons than small firms. Second, some important arms-producing countries, such as China, are missing from the dataset due to the lack of data. Finally, the time period used in this study is relatively short and covers less than four elections on average per country. Using a longer time period might increase the accuracy of the estimation results. Besides, it raises the possibilities to explore in more detail, for instance, whether electoral incentives differ among political or electoral systems. These shortcomings are left for future research.

Table A1
Data and sources used

Variable	Description	Source	Mean	Stand. Dev.
Military spending	Classification of a country-year into large (3), medium (2) or small (1) spender on defense. The classification is based on the distribution of military expenditure as a share of GDP.	SIPRI (2019)	2.21	0.74

(*continued on next page*)

Table A1 (*continued*)

Variable	Description	Source	Mean	Stand. Dev.
Security risk	The security threat variable is based on the average of the internal and external conflict risk indices reported by the International Country Risk Guide. To enhance the interpretation, I have rescaled this average to make it between zero and one.	ICRG (2018)	7.52	1.13
Military intervention	Dummy variable taking the value one when a country is involved in a military intervention in a particular year and zero otherwise.	Military in Interstate Dispute (2019)	0.12	0.04
Peacekeeping operation	Dummy variable taking the value one when a country is involved in a peacekeeping operation in a particular year and zero otherwise.	IPI Peacekeeping Database (2020)	0.17	0.05
Interest rate	Real interest rate	World Development Indicators (2019)	4.33	7.75
Real exchange rate	Real effective exchange rate (2010 = 100)	World Development Indicators (2019)	99.12	8.12
Change in producer prices	Log-change in production price index (2000 = 100)	World Development Indicators (2019)	0.06	0.11
Real GDP per capita	Real GDP per capita in constant US$ of 2015. Taken in logarithm	World Development Indicators (2019)	9.31	1.24
Globalization	The subindex on trade globalization	KOF Globalization index	81.14	7.81
Political colour index	This index places the cabinet on a left-right scale with values running between 1 and 5. The ideology variable takes the value 1 (5) if the share of governing right-wing (left-wing) parties in terms of seats in the cabinet and in parliament is larger than 2/3, and 2 (4) if it is between 1/3 and 2/3. The index is 3 if the share of centre parties is 50 percent, or if the left- and right-wing parties form a coalition government that is not dominated by one side or the other.	Database on Political Institutions	3.31	1.29
Quality of governance	factor scores of the first-principal component on voice and accountability, government effectiveness, regulatory quality, rule of law and control of corruption in a particular country and year	Worldwide Governance Indicators (2019)	0.02	0.97
Military sales	Share of the total revenues attributed to military items	SIPRI (2019), Defense News (2019)	9.84	1.25
Firm size	Log of number of employees in a year.	SIPRI (2019), Defense News (2019)	0.58	0.31
Major subsidiary	Dummy variable taking the value one when individual company Subsidiaries of a company are listed in the SIPRI Defense Company Top-100.	SIPRI (2019)	0.21	0.09

Table A2
Results full empirical specification

	(1)
Lagged dependent variable	0.689**
	(0.320)
Military spending	0.801**
	(0.373)
Security risk	0.178*
	(0.104)
Military intervention	0.092
	(0.132)
Peacekeeping operation	0.017
	(0.012)
Interest rate	−0.025
	(0.032)
Real exchange rate	−0.095
	(0.065)
Change in producer prices	−0.024
	(0.026)
Real GDP per capita	0.274**
	(0.134)
Trade globalization	0.025*
	(0.014)
Political colour index	−0.075
	(0.085)
Quality of governance	0.074*
	(0.042)
Military sales	0.175**
	(0.053)
Firm size	0.111*
	(0.060)
Major subsidiary	0.015
	(0.026)
Estimation method	LSDVC

(*continued on next page*)

Table A2 (*continued*)

	(1)
Number of companies	201
Number of observations	1523

Note: The table shows the full results on the control variables. **/* Indicating significance levels of respectively 5 and 10 percent. Bootstrapped standard errors are shown between brackets.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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