Fiscal Multipliers in Advanced and Developing Countries: Evidence from Military Spending

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Online Appendix: Not for Publication

Appendix A. Data Sources

Annual data on real GDP, government spending, and military spending are available for 160 countries during the period 1988–2013: 3,298 observations in total. We use the number of years for which these variables are available to proxy for the reliability of the data for a particular country. For this reason, we exclude 31 countries that have fewer than 13 years of observations.[1] These inclusion criteria also weed out countries that had significant wars on domestic soil, such as Afghanistan and Iraq, leaving us with a sample of relatively stable countries.

Our final sample contains 129 countries (36 advanced and 93 developing): 3,144 observations in total. Table A.1 contains information on the countries available in the entire sample, as well as the number of observations available per country and their basic characteristics. In what follows, we provide a short summary of the data and sources used in our analysis.

Real GDP and Total Government Spending. We obtain annual data on real GDP and general-government final consumption expenditure, at constant 2005 prices in national-currency units, from the *National Accounts Main Aggregates Database*, provided by the U.N. Statistics Division. The dataset contains time-series from 1970 onward for more than 200 countries, which report to the United Nations in the form of the National Accounts Questionnaires. We use the December 2014 version of the dataset, which has data available until 2013. For additional information and detailed methodology, see unstats.un.org/unsd/snaama/index.

Total Military Spending. Stockholm International Peace Research Institute (SIPRI) provides data on total military expenditure for 171 countries in the period 1988–2013. SIPRI collects data from three sources: (1) national governments and statistical agencies; (2) international organizations

*This draft: July 2021.

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[1] The countries excluded are Afghanistan, Benin, Bosnia and Herzegovina, Central African Republic, Republic of the Congo, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Gabon, Gambia, Guinea, Guinea-Bissau, Haiti, Honduras, Iceland, Iraq, Kuwait, Liberia, Libya, Montenegro, Niger, Panama, Qatar, South Sudan, Tajikistan, Timor Leste, Togo, Trinidad and Tobago, Turkmenistan, Uzbekistan, and Zimbabwe.

Table A.1: Countries in the Sample

Country	Years	Adv.	Peg	Open	Country	Years	Adv.	Peg	Open
Albania	23	N	N	N					
Algeria	26	N	N	N	Lebanon	25	N	Y	Y
Angola	22	N	N	Y	Lesotho	26	N	Y	Y
Argentina	26	N	N	N	Lithuania	21	N	Y	Y
Armenia	21	N	N	Y	Luxembourg	26	Y	Y	Y
Australia	26	Y	N	N	Madagascar	26	N	N	N
Austria	26	Y	Y	Y	Malawi	25	N	N	Y
Azerbaijan	22	N	N	Y	Malaysia	26	N	N	Y
Bahrain	26	N	Y	Y	Mali	24	N	Y	N
Bangladesh	26	N	Y	N	Malta	26	Y	N	Y
Belarus	22	N	N	Y	Mauritania	22	N	N	Y
Belgium	26	Y	Y	Y	Mauritius	26	N	N	Y
Belize	25	N	Y	Y	Mexico	26	Y	N	N
Bolivia	25	N	N	N	Moldova	21	N	N	Y
Botswana	26	N	N	Y	Mongolia	23	N	N	Y
Brazil	26	N	N	N	Morocco	26	N	Y	N
Brunei	26	N	Y	Y	Mozambique	23	N	N	N
Bulgaria	25	N	Y	Y	Namibia	24	N	Y	Y
Burkina Faso	26	N	Y	N	Nepal	26	N	Y	N
Burundi	23	N	N	N	Netherlands	26	Y	Y	Y
Cambodia	26	N	N	Y	New Zealand	26	Y	N	N
Cameroon	26	N	Y	N	Nicaragua	23	N	N	Y
Canada	26	Y	N	N	Nigeria	24	N	N	N
Cape Verde	22	N	Y	Y	North Macedonia	18	N	Y	Y
Chad	18	N	Y	N	Norway	26	Y	N	Y
Chile	26	Y	N	N	Oman	25	N	Y	Y
China	25	N	Y	N	Pakistan	26	N	N	N
Colombia	26	N	N	N	Papua New Guinea	26	N	N	Y
Côte d'Ivoire	19	N	Y	Y	Paraguay	25	N	N	Y
Croatia	22	N	N	Y	Peru	25	N	N	N
Cyprus	26	Y	Y	Y	Philippines	26	N	N	Y
Czech Republic	21	Y	N	Y	Poland	26	Y	N	Y
Denmark	26	Y	Y	Y	Portugal	26	Y	Y	N
Djibouti	21	N	Y	Y	Romania	26	N	N	Y
Dominican Republic	26	N	N	Y	Russia	23	N	N	N
Ecuador	26	N	N	N	Rwanda	26	N	N	N
Egypt	26	N	Y	N	Saudi Arabia	26	N	Y	Y
El Salvador	26	N	Y	Y	Senegal	24	N	Y	Y
Estonia	22	Y	Y	Y	Serbia	17	N	N	Y
Ethiopia	24	N	Y	N	Seychelles	26	N	N	Y
Fiji	26	N	N	Y	Sierra Leone	24	N	N	N
Finland	26	Y	Y	Y	Singapore	26	Y	N	Y
France	26	Y	Y	N	Slovakia	21	Y	N	Y
Georgia	18	N	N	Y	Slovenia	22	Y	Y	Y
Germany	26	Y	N	N	South Africa	26	N	N	N
Ghana	26	N	N	N	Spain	26	Y	Y	N
Greece	26	Y	Y	N	Sri Lanka	26	N	N	Y
Guatemala	26	N	N	N	Swaziland	26	N	Y	Y
Guyana	23	N	Y	Y	Sweden	26	Y	N	Y
Hungary	26	Y	N	Y	Switzerland	26	Y	N	Y
India	26	N	N	N	Syria	23	N	N	N
Indonesia	25	N	N	N	Tanzania	26	N	N	N
Iran	25	N	N	N	Thailand	26	N	N	Y
Ireland	26	Y	Y	Y	Tunisia	26	N	N	Y
Israel	26	Y	N	Y	Turkey	26	Y	N	N
Italy	26	Y	Y	N	Uganda	26	N	N	N
Jamaica	25	N	N	Y	Ukraine	21	N	Y	Y
Japan	26	Y	N	N	United Arab Emirates	13	N	Y	Y
Jordan	26	N	Y	Y	United Kingdom	26	Y	N	N
Kazakhstan	21	N	N	Y	United States	26	Y	N	N
Kenya	26	N	N	N	Uruguay	26	N	N	N
Korea	26	Y	N	Y	Venezuela	23	N	N	N
Kyrgyzstan	22	N	N	Y	Vietnam	15	N	Y	Y
Laos	21	N	N	Y	Yemen	22	N	Y	Y
Latvia	21	N	N	Y	Zambia	21	N	N	Y

(e.g., NATO press releases, IMF country reports); and (3) specialist newspapers, journals, and other publications (e.g., Economist Intelligence Unit, Europa World). We calculate total military spending by using the ratios of military spending to GDP. More specifically, we multiply these ratios by real GDP, obtained from the United Nations, to calculate total military spending at constant 2005 prices in national-currency units. For more details, see sipri.org/research/armaments/milex/milex_database.

Development Classification. The development classifications are taken from the IMF and World Bank. The World Bank classification is based on gross national income. More information can be found at datahelpdesk.worldbank.org/knowledgebase/articles/378834-how-does-the-world-bank-classify-countries. We use the IMF classification as a baseline. In addition, we classify all OECD countries as advanced. This approach allows us to reduce the disagreement between the two classifications and to treat all NATO members as advanced countries, so that the NATO and Islamic Military Counter Terrorism Coalition (IMCTC) subsamples analyzed in Appendix B.1 correspond to countries that are classified as advanced and developing, respectively, in the full sample.

Unemployment Rates. We obtain unemployment data from the World Bank's *World Development Indicators* (WDI) database. We use the October 2015 edition of the database. The coverage starts in 1991. The World Bank collects the unemployment series from the International Labor Organization. More information can be found at datacatalog.worldbank.org/dataset/world-development-indicators.

Exchange-Rate Regimes. The exchange-rate classification follows Klein and Shambaugh (2008), updated to 2013. A country is considered to have a fixed exchange rate if the end-of-month exchange rate stays within the 2 percent bands for the entire year. The updated classification can be found at iiep.gwu.edu/jay-c-shambaugh/data.

Trade. We use data on exports and imports of goods and services as a percentage of GDP from the WDI. The exports and imports series are collected from the World Bank and the OECD national accounts data. These series exclude compensation of employees, investment income, and transfer payments. We use these data to create an indicator for open and closed economies. We define an economy as open if its combined exports and imports shares of GDP are greater, on average, than 60 percent.

Wars. The war data come from two sources: the Correlates of War project and the UCDP/PRIO *Armed Conflict Dataset*. The war data contain information on participating countries, start and end dates, and the number of battle deaths for each conflict. For more information on the first source, see Sarkees and Wayman (2010). The dataset and its description are available at correlatesofwar.org/data-sets/COW-war. For more information on the second source, see Gleditsch et al. (2002) and prio.org/Data/Armed-Conflict/UCDP-PRIO.

Financial Crises. Annual data on financial crises come from Reinhart and Rogoff (2011). These data are available from 1800 to 2010 for 70 countries and include information on crises pertaining to currency, inflation, stock market, sovereign debt, and banking. We consider a country to be in a financial crisis if it experiences any of these crises. See carmenreinhart.com/dates-for-banking-crises.

Democracy and Political Risk. The Polity IV Project provides classification of political regimes for 167 countries since 1800. The dataset includes indicators for democracy, autocracy, regime durability, and polity persistency, as well as other component variables related to the executive recruitment processes and the independence of executive authority. The democracy and autocracy indicators range from zero to ten, with a score of ten indicating a full democracy or full autocracy, respectively. These indicators are calculated as the sum of the various authority characteristic component variables. See systemicpeace.org/polityproject.html for more detail. We define a country as an autocracy in a given year if the democracy index is smaller than the autocracy index. According to this definition, a country can have a positive autocracy score and still be considered a democracy. We observe a maximum autocracy score of three among the countries we label as democratic.

We also use annual data on political stability and good governance from the World Bank's *Worldwide Governance Indicators* (WGI). WGI reports governance indicators for over 200 countries since 1996. There are six indicators expressed in standard normal units or percentile ranks: (1) voice and accountability, (2) political stability and absence of violence/terrorism, (3) government effectiveness, (4) regulatory quality, (5) rule of law, and (6) control of corruption. In our robustness checks, we use percentile ranks for political stability and government effectiveness. See info.worldbank.org/governance/wgi/#home. Note that while these two measures are different from those in Miyamoto et al. (2019), their data are proprietary and therefore cannot be used freely to compare the two measures.

Arms Imports. We collect annual data on arms trade from the U.S. Department of State's *World Military Expenditures and Arms Transfers*. The data are available from 1964 onward for over 180 countries and provide information on military expenditures, armed forces, arms imports, arms exports, and the number of weapons delivered. See 2009-2017.state.gov/t/avc/rls/rpt/wmeat/index.htm.

Commodities. Data on commodity exports are collected from the United Nations' UNCTAD statistics and *Comtrade* database. The data can be found at unctad.org/en/pages/statistics.aspx and comtrade.un.org, respectively. We also use West Texas Intermediate crude oil prices. Data on giant oil discoveries come from Lei and Michaels (2014), who use data compiled by Myron Horn and the American Association of Petroleum Geologists. These data are available for 193 countries from 1946 through 2008. A giant oil discovery is defined as an oilfield that contained ultimate recoverable reserves of at least 500 million barrels of oil.

Marginal Tax Rates. The OECD *Central Government Personal Income Tax Rates and Thresholds* dataset provides annual data on marginal income tax rates for 33 member countries for the period 1981–2014. We use the top marginal income tax rate. See oecd.org/tax/tax-policy/tax-database.htm. In addition, we use marginal income tax rates provided by KPMG, an auditor. The KPMG data include tax rates for both advanced and developing countries for the period 2006–2014. While the KPMG data also include tax rates for developed countries, the period covered is shorter than that in the OECD data. See home.kpmg/it/it/home/services/tax/tax-tools-and-resources/tax-rates-online.html.

Monetary Policy Rates. We collect end-of-period interest rate data for 75 countries (36 advanced and 39 developing). The data, starting in 1960 for some countries, were obtained from the IMF's *International Financial Statistics* (IFS) and national central banks. See data.imf.org/IFS.

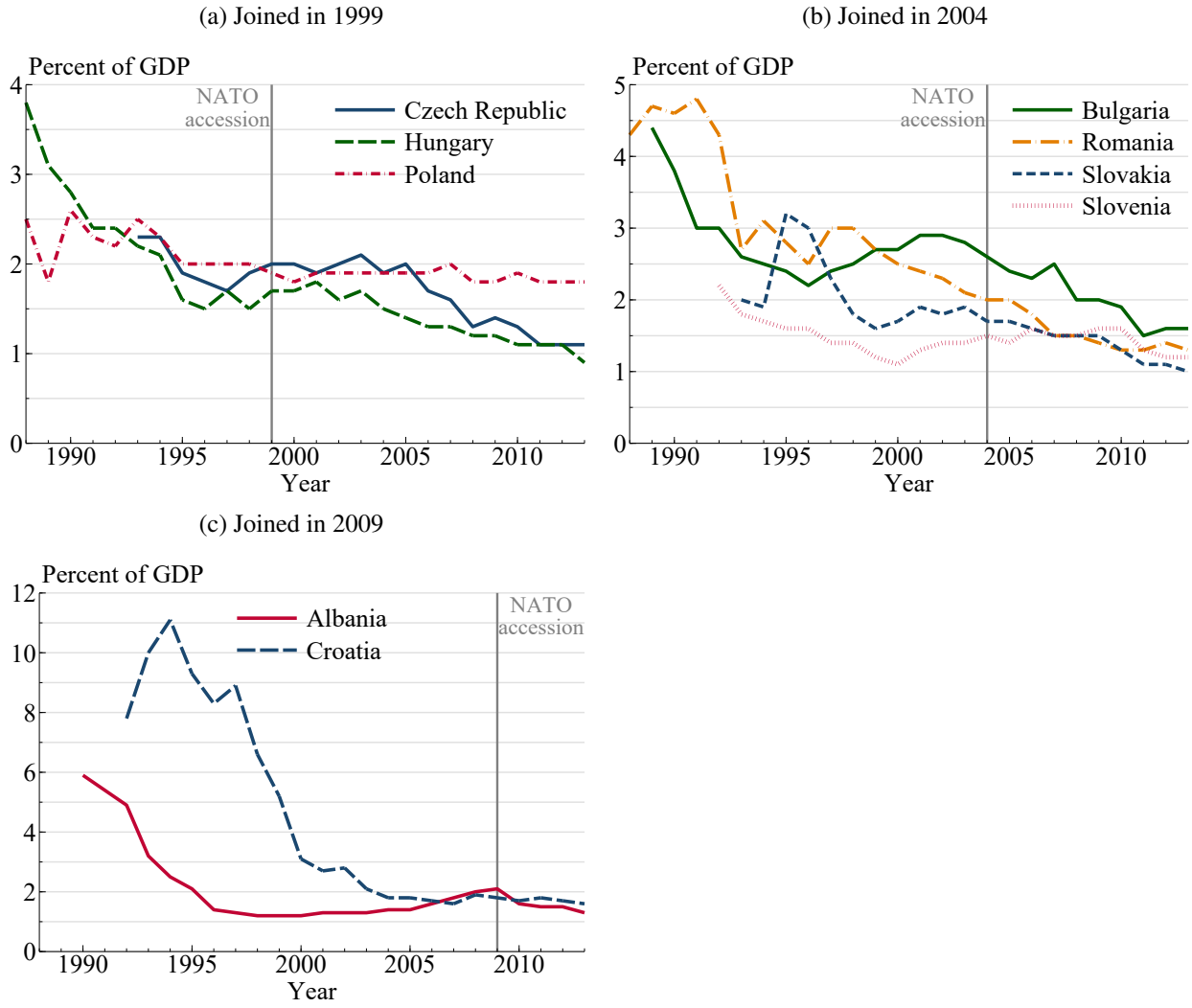
Disaggregated Military Spending. Data on the composition of military spending come from Gartzke (2001) and NATO. Gartzke's data are available from 1950 through 1997 for 99 countries, but the coverage is incomplete. The data are split into capital and operating costs in constant U.S. dollars, which proxy for durable and nondurable spending. The data come from four sources: (1) NATO press releases, (2) *The UN Report on Military Expenditures*, (3) *SIPRI Yearbook*, and (4) Ball (1988). For several countries, there are two observations for the same year. In such cases, our preferred sources are SIPRI, NATO, and the United Nations (in this order). Because the Gartzke (2001) data end in 1997, we supplement them with those from NATO for the period 1998–2013, using his method. See nato.int/cps/en/natohq/topics_49198.htm for data details. To calculate durable and nondurable spending in constant 2005 prices in local currency units, we multiply the durable and nondurable shares by total military spending. The resulting series covers 53 countries, mostly NATO members.

Appendix B. Narrative Evidence

We study historical SIPRI publications to compile examples of episodes when a large change in military spending was driven by geopolitical factors rather than by economic conditions. These reports contain numerous examples of such exogenous changes, some of which we provide below. The list is not meant to be exhaustive.

NATO Enlargement in Central and Eastern Europe

Figure B.1: Military Spending and NATO Enlargement



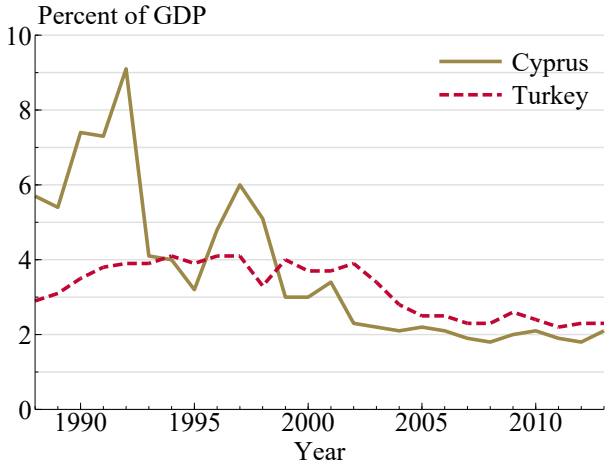
During the period 1988–2013 that we study in this paper, 12 new members joined NATO. The Czech Republic, Hungary, and Poland joined in 1999, followed by Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia, and Slovenia in 2004, and by Albania and Croatia in 2009. Military spending in these countries in the 1990s and 2000s typically followed a pattern similar to one another (Figure B.1). It decreased in the early 1990s, following the end of the Cold War. As the Central and Eastern European countries faced the prospect of joining NATO, they increased military spending in order to improve their military capabilities (Sköns et al., 2003). Following

their accession, the new members spent less on the military, possibly because the membership alleviated some of their security concerns.[2] We also observe elevated military spending in Albania and Croatia in the 1990s, due to war in the Balkans.

The Cyprus–Turkey Conflict

Tensions between Cyprus and Turkey escalated in 1996, with protests taking place at the "Green Line," a demilitarized buffer zone between the Republic of Cyprus and Northern Cyprus patrolled by the United Nations Peacekeeping Force. The demonstrations were followed by the Cyprus Missile Crisis in 1997 and 1998, with Cyprus increasing its air-defense capability in response to frequent airspace violations by the Turkish Air Force (Findlay, 1997, 1998). The brown solid line in Figure B.2 shows an increase in military spending in Cyprus corresponding to these events. As Cyprus joined the European Union in 2004, its military expenditure stabilized at 2 percent of GDP during the second half of our sample period.

Figure B.2: Military Spending in Cyprus and Turkey



Turkey's military spending as share of GDP (red dashed line) fell in 2002, due to the "zero problems with neighbors" policy, adopted by the Justice and Development Party (Perlo-Freeman et al., 2011, pp. 173–176). This policy aimed to strengthen cooperation on security issues in the region. The lessening of the Turkish–Kurdish conflict as well as the changed perception of security threats have contributed to the downward trend in military expenditure in the subsequent period, according to the report.

The West Bank Conflict and the War on Terror in the Middle East

In the early 1990s, international efforts to settle the long-standing Israeli–Palestinian conflict were among the reasons that Israel's military spending declined from 18 percent of GDP in 1991 to 9 percent in 1995 (Figure B.3a). Following unsuccessful negotiations between the sides in 2000, Israeli military expenditure started to rise again. In 2002, Israel's government further increased spending in order to call up reserve soldiers and to build a defensive fence between Israel and the

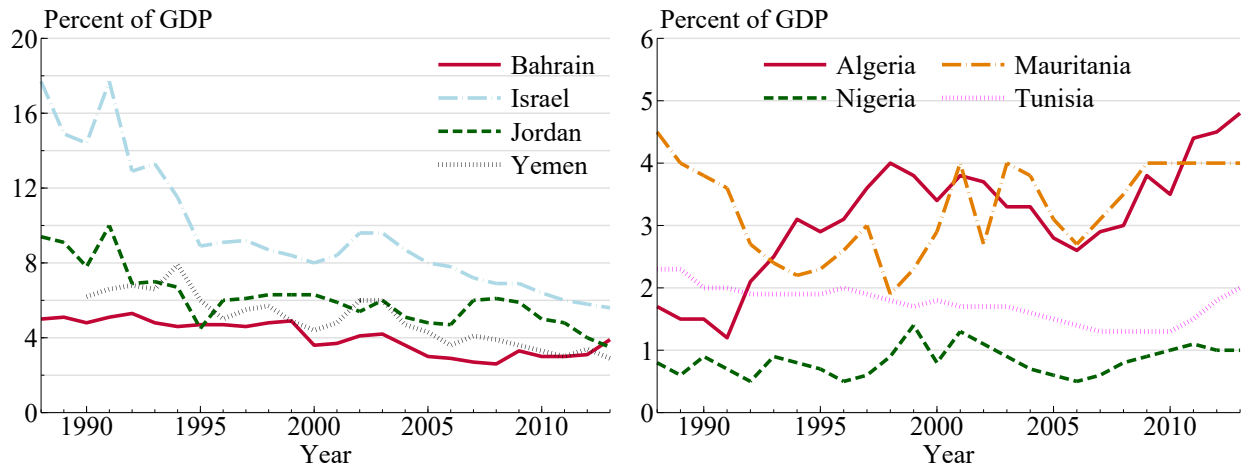
[2]As an exception, however, Poland did not experience much variation in military spending around their accession year, while Romania exhibited a steady decline in military spending during the entire period, starting in the mid-1990s.

West Bank (Sköns et al., 2003, pp. 324–325). Military expenditure as share of GDP decreased after military tension subsided in 2005, and was on a downward trend for the rest of our sample period.

Following the 9/11 attacks in the United States, Middle Eastern countries such as Bahrain, Jordan, and Yemen provided support to the war on terror, which briefly increased their military expenditure (Figure B.3a). The subsequent drop could be explained by military aid from abroad. The 2005 Amman terrorist attacks prompted new anti-terror measures, resulting in additional military spending by Jordan.

Figure B.3: Military Spending, Conflict, and Civil Disobedience

(a) Middle East (b) North and West Africa



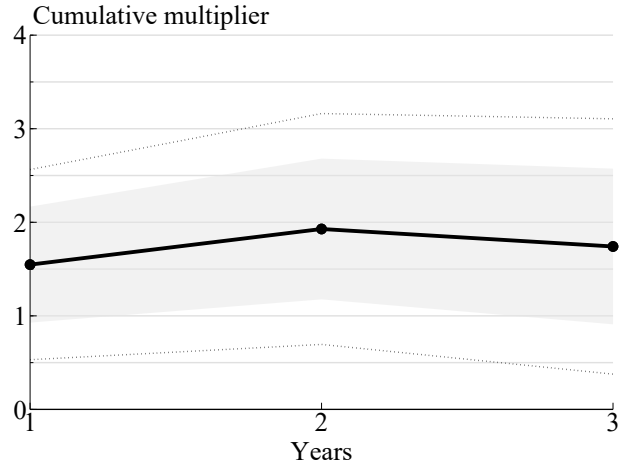
The Arab Spring and Civil Wars in Africa

Following anti-government uprisings in the neighboring countries such as Lybia, in 2011 Algeria opened new military bases near the common border (Ismail and Perlo-Freeman, 2012, pp. 167–169), which contributed to an increase in its military expenditures in the subsequent period (Figure B.3b). Tunisia, which was among the first countries affected by the Arab Spring protests, also increased its military spending at the end of our sample.

Earlier, Algeria's military spending steadily declined after the end of its decade-long civil war in 2002, but it reversed course in response to new security threats in the region in the late 2000s. Mauritania and Tunisia also faced increased security threats following the end of the Algerian Civil War and the rise of AQIM in the 2000s. Similarly, Nigeria's military spending increased in the late 2000s in response to escalating violence by local insurgency groups. We also observe large increases in spending in the late 1990s, which are likely due to civil wars in the neighboring countries.

The Multiplier in the Sample with Narrative Evidence

Figure B.4: The Multipliers in Countries with Narrative Evidence



Notes: In this figure, the multipliers are computed in the sample of 24 countries with narrative evidence of a strong geopolitical component in military spending (i.e., countries in Appendix Figures B.1–B.3 and in Figure 2 of the paper). The gray area represents one standard error (clustered by country) on each side of the estimates, and the broken lines show 90 percent confidence bounds.

In Figure B.4, we show the multiplier computed in the sample of 24 countries for which we found evidence that, during our sample period, military spending was by and large driven by geopolitical factors. The multiplier in this sample is between 1.5 and 2, somewhat larger than in our baseline sample or in the sample of developing countries. We conclude that, to the extent military spending has an endogenous component for some countries in our baseline sample, this component would result in the overall downward bias. Nonetheless, our baseline estimates are typically larger than those in the literature, and thus our qualitative finding that government spending shocks have large effects in a variety of countries and episodes remains intact. Moreover, the difference between the multipliers in the baseline sample and the ones in the small sample based on the narrative evidence is within one standard error of either estimate, which could also be explained by sampling variation.

Final Remarks

While some geopolitical events could have a direct effect on output, we strive to construct the sample in a way that excludes such episodes. While there is no perfect way to do so, we report numerous alternative approaches to sample composition. Our examples here suggest that in many episodes, countries adjust their military spending in response to geopolitical events in their region, which are unlikely to have a large direct effect on output. Such changes in military spending tend to be persistent even when the security threat does not materialize over a long period.

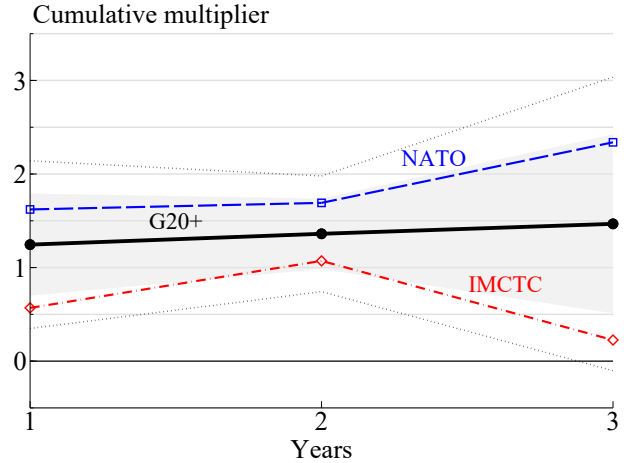
While we interpret the SIPRI reports as reassuring for our identification strategy, some caveats are notwithstanding. For instance, not all countries experience large swings in military spending during the period of study. Moreover, some countries spend relatively little on their military. In those cases, a large relative change in military spending could still be small in absolute terms, and therefore it may not draw significant attention from observers and commentators. In such cases, we would not be able to verify the motivation for the policy change. However, in most such cases,

the shock in question is small and therefore its effect on our baseline estimates is expected to be limited.

Appendix B.1. Military Alliances and Large Geopolitical Players

As many countries in our sample may play a limited role in international affairs, their military spending may be small and not react significantly to geopolitical events. Here, we present supplementary evidence from a smaller sample to which this concern may apply less. We focus on countries that are members of military coalitions, such as NATO for advanced economies and the Islamic Military Counter Terrorism Coalition (IMCTC) for developing countries.[3] While the exact details may differ across particular coalitions and member states, the participants typically agree to respond to war or military threat in another member country and to spend a nontrivial amount of their output on the military. In addition, we present estimates for the G20 countries, which include both advanced and developing economies. While not in a formal—or informal—coalition, the G20 members play a significant geopolitical role, and hence their military spending responds, to a large extent, to international developments that are not related to the performance of their domestic economies. We note that the robustness exercises presented in Section 6 of the paper are designed to eliminate a small number of problematic cases, keeping most of our baseline observations. The exercises conducted here, instead, are based on the samples that are small relative to the baseline and for which the identification assumptions apply more. Hence, due to a significant change in the sample composition, these exercises are designed to complement our baseline results qualitatively, rather than to verify the robustness of the baseline estimates numerically.

Figure B.5: Evidence from Military Coalitions and Large Geopolitical Players



Notes: The blue dashed line shows cumulative multipliers for the sample of NATO members, the red dash-dotted line for the IMCTC alliance members, and the black solid line for the remaining G20 countries as well as the previous two samples altogether. The gray area represents one standard deviation bands, and the dotted lines 90 percent confidence bounds.

The estimates presented in Figure B.5 lend support to many conclusions derived from our

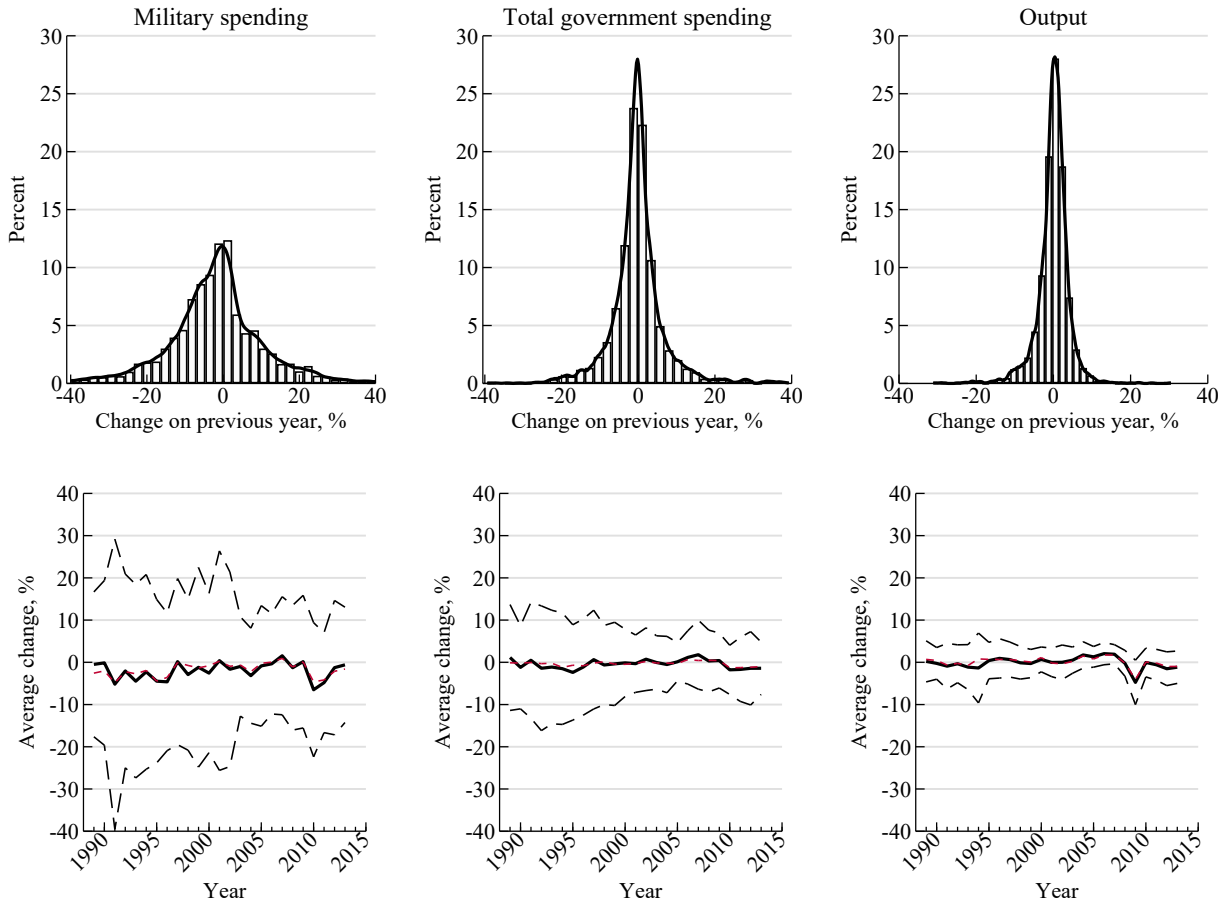
[3]While the IMCTC was formed relatively recently, its member states have a history of multilateral as well as bilateral cooperation before its creation. Hence, for the purpose of the exercise presented in this section, we treat the contemporaneous membership as a proxy for such cooperation within an informal alliance.

baseline sample. For instance, the multipliers pooled across G20 as well as NATO and IMCTC countries (black solid line) are statistically larger than zero and indistinguishable from one, similar to the baseline estimates in the full sample. These multipliers, between 1 and 1.5, are slightly larger than the baseline, which could be explained by a larger share of observations from advanced economies. The multipliers for the NATO sample are larger than for the IMCTC sample, corroborating our baseline result that the multipliers in advanced economies are larger than in developing countries.

Appendix C. Additional Results

Appendix C.1. Additional Descriptive Statistics

Figure C.1: Time and Space Distributions of Main Variables



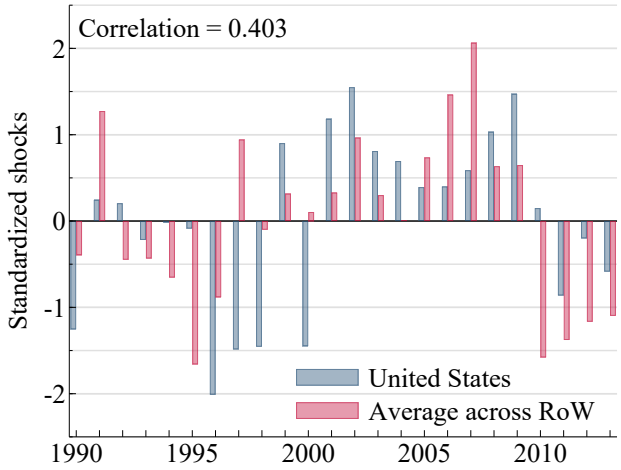
Notes: The top three panels show the distribution of changes, in percent, in normalized military spending, total government spending, and output, respectively. For readability, changes over 40 percent in absolute value are cut off. The bottom three panels show the averages (black solid line) and medians (red broken line, virtually indistinguishable) of corresponding changes by year. The dashed lines depict one standard deviation around the averages.

Table C.1: Distribution of $|\Delta \log g^{m}|$ over Countries

	Average year (1)	Median year (2)
Mean	11.6	8.2
Standard deviation	6.5	4.7
Minimum	2.6	0.8
Maximum	41.7	25.1
Percentiles:		
10th	4.3	3.3
25th	6.8	4.6
50th	10.4	7.5
75th	15.7	10.2
90th	19.8	14.6
United States	5.5	4.7
Larger than U.S. share	82.9	72.9

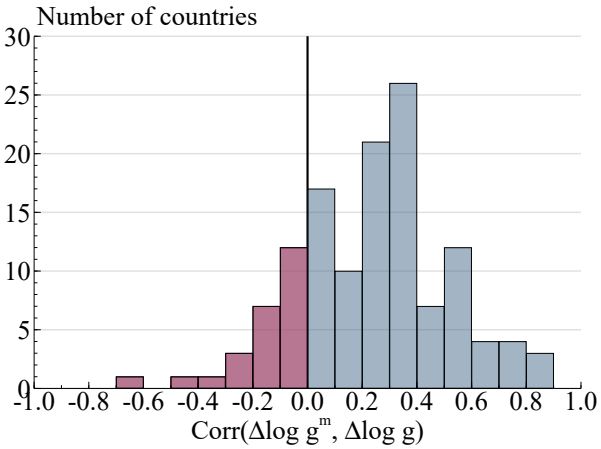
Notes: We compute annual log-changes in military spending, $\Delta \log g^{m}_{i,t}$, and then, in column 1, report the mean, standard deviation, and percentiles of its average (over time) absolute value, $|\Delta \log g^{m}_{i}| = \sum_t |\Delta \log g^{m}_{i,t}|/T$, across countries i. In column 2, we report the moments and percentiles for medians rather than averages over time. The penultimate row reports the corresponding measure for the United States, and the last row reports the share of countries (between 0 and 1) with $|\Delta \log g^{m}_{i}| > |\Delta \log g^{m}_{\text{U.S.}}|$. All statistics are expressed in percent.

Figure C.2: Comovement of Military Spending Shocks in the United States with the Rest of the World (RoW)



Notes: The figure depicts military spending shocks obtained as the fitted values from the regression of the log-difference of total government spending on the log-difference of military spending. To enhance visibility, the shocks are standardized (demeaned and divided by the standard deviation over time).

Figure C.3: Correlation of Total Government Spending with Military Spending across Countries



Notes: For each country i, we compute time correlation of log changes in military spending and log changes in total government spending, $\text{Corr}_i(\Delta \log g^{\text{m}}_{i,t}, \Delta \log g_{i,t})$. This figure shows the histogram of Corr_i over i. The blue and red colors indicate positive and negative values of Corr_i, respectively. In 104 out of 129 countries, the sample correlation is positive.

Appendix C.2. Robustness of the Main Specification

Table C.2: Sensitivity to the Number of Lags

	One lag	Two lags	Three lags	Four lags
	(1)	(2)	(3)	(4)
One year	0.789	0.788*	0.842**	0.834**
	(0.477)	(0.404)	(0.378)	(0.382)
	[12.3]	[14.1]	[14.8]	[15.2]
Two years	0.850	0.864**	0.900**	0.861**
	(0.516)	(0.416)	(0.393)	(0.394)
	[24.9]	[27.4]	[27.3]	[27.7]
Three years	0.501	0.556	0.573	0.546
	(0.529)	(0.388)	(0.374)	(0.378)
	[23.8]	[22.0]	[22.0]	[21.4]
Four years	0.408	0.530	0.556	0.507
	(0.638)	(0.451)	(0.441)	(0.456)
	[22.4]	[19.8]	[19.5]	[18.6]
Observations	2,563	2,563	2,563	2,563

Notes: This table presents multipliers for alternative numbers of lags; the baseline includes four lags. The sample composition is fixed at the baseline for all specifications. The war dummy, country fixed effects, and time effects are included. Standard errors clustered by country are in parentheses. First-stage effective F-statistics are in brackets. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table C.3: Controlling for Lags Is Important

Lags of	All	y and g	g and g^{m}	y and g^{m}	None
	(1)	(2)	(3)	(4)	(5)
One year	0.834**	0.563	2.200***	0.865*	2.025***
	(0.382)	(0.345)	(0.658)	(0.507)	(0.765)
	[15.2]	[6.4]	[15.3]	[15.2]	[16.6]
Two years	0.861**	0.317	2.096***	0.900*	1.841**
	(0.394)	(0.395)	(0.575)	(0.536)	(0.886)
	[27.7]	[5.9]	[28.2]	[25.0]	[11.1]
Three years	0.546	−0.579	1.704***	0.619	1.511
	(0.378)	(0.827)	(0.574)	(0.680)	(1.184)
	[21.4]	[2.5]	[23.0]	[9.4]	[4.5]
Four years	0.507	−1.238	1.698**	0.588	1.250
	(0.456)	(1.633)	(0.701)	(0.744)	(1.487)
	[18.6]	[1.3]	[20.2]	[8.2]	[3.0]
Observations	2,563	2,563	2,563	2,563	2,563

Notes: This table presents specifications with alternative lag controls. The baseline in column 1 includes four lags of y, g, and g^{m}. The war dummy, country fixed effects, and time effects are included in all specifications, and the sample composition is fixed to that in the baseline. Standard errors clustered by country are in parentheses. First-stage effective F-statistics are in brackets. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table C.4: Alternative Normalization by Lag Output

Fixed effects	No	Country (C)	Time (T)	C–T
	(1)	(2)	(3)	(4)
One year	0.724*	0.839**	0.786*	0.885**
	(0.391)	(0.422)	(0.406)	(0.444)
	[17.8]	[15.7]	[17.9]	[15.4]
Two years	0.427*	0.534**	0.468*	0.548*
	(0.237)	(0.263)	(0.249)	(0.286)
	[29.2]	[23.8]	[28.4]	[22.8]
Three years	0.210	0.357*	0.245	0.371
	(0.146)	(0.199)	(0.159)	(0.236)
	[33.8]	[22.5]	[31.6]	[20.9]
Four years	0.164	0.336*	0.213*	0.379
	(0.111)	(0.197)	(0.125)	(0.230)
	[38.2]	[22.6]	[34.9]	[20.9]
Observations	2,563	2,563	2,563	2,563

Notes: This table presents multipliers based on the normalization of output, government spending, and military spending by lag output, as opposed to trend output. We control for one fewer lag than in the baseline to keep the sample composition unchanged. Standard errors clustered by country are in parentheses. First-stage effective F-statistics are in brackets. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table C.5: Alternative Standard Errors

	One year	Two years	Three years	Four years
	(1)	(2)	(3)	(4)
Cumulative multiplier	0.834	0.861	0.546	0.507
Standard errors:				
Classical	(0.122)***	(0.159)***	(0.218)**	(0.271)*
	[424.0]	[311.2]	[186.3]	[128.0]
Robust	(0.321)***	(0.337)**	(0.367)	(0.428)
	[25.6]	[53.6]	[49.7]	[43.0]
Heteroskedastic and autocorrelated (HAC)	(0.356)**	(0.368)**	(0.369)	(0.422)
	[18.5]	[37.2]	[34.0]	[31.8]
Clustered by country	(0.382)**	(0.394)**	(0.378)	(0.456)
	[15.2]	[27.7]	[21.4]	[18.6]
Driscoll and Kraay (1998)	(0.407)*	(0.434)*	(0.461)	(0.519)
	[30.0]	[85.2]	[68.9]	[52.5]
Two-way clustered by country and year	(0.422)*	(0.457)*	(0.463)	(0.527)
	[15.2]	[28.3]	[22.6]	[18.4]

Notes: This table presents alternative estimates of the multipliers' standard errors (in parentheses) and first-stage effective F-statistics (in brackets). In the baseline, we use standard errors clustered by country. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Appendix C.3. More on Subsamples

Table C.6: Correlation between Indicator Variables

	Advanced economy	Positive spending	Recession	Exchange-rate peg	Open to Trade	War
	(1)	(2)	(3)	(4)	(5)	(6)
(1)	X					
(2)	−0.056	X				
(3)	0.025	−0.091	X			
(4)	−0.026	0.009	−0.074	X		
(5)	0.001	−0.046	0.056	0.192	X	
(6)	−0.008	0.033	0.009	−0.150	−0.302	X

Notes: This table shows the correlation coefficients between the indicator variables used in the paper.

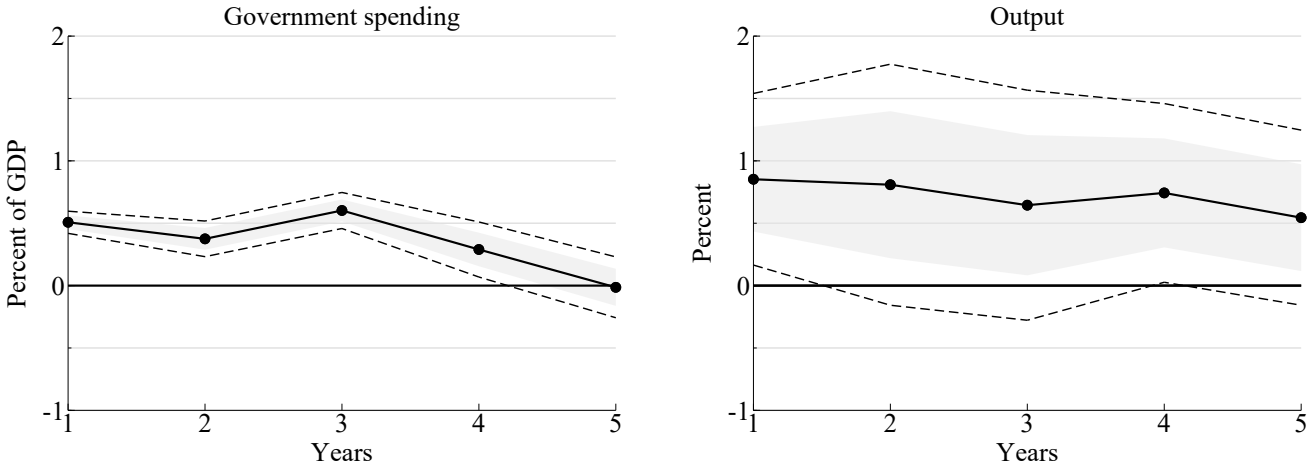
Table C.7: Breakdown of Developing Sample

	High income	Less developed		
		All	Middle income	Low income
	(1)	(2)	(3)	(4)
One year	1.337*	0.844**	1.733**	0.480
	(0.683)	(0.393)	(0.719)	(0.412)
	[8.6]	[23.3]	[14.7]	[35.4]
Two years	1.295**	0.836**	1.579**	0.382
	(0.574)	(0.409)	(0.750)	(0.387)
	[36.5]	[33.8]	[9.7]	[64.6]
Three years	0.333	0.578	1.280*	0.021
	(0.754)	(0.394)	(0.727)	(0.354)
	[9.5]	[27.6]	[7.4]	[56.3]
Observations	701	1,862	1,295	567

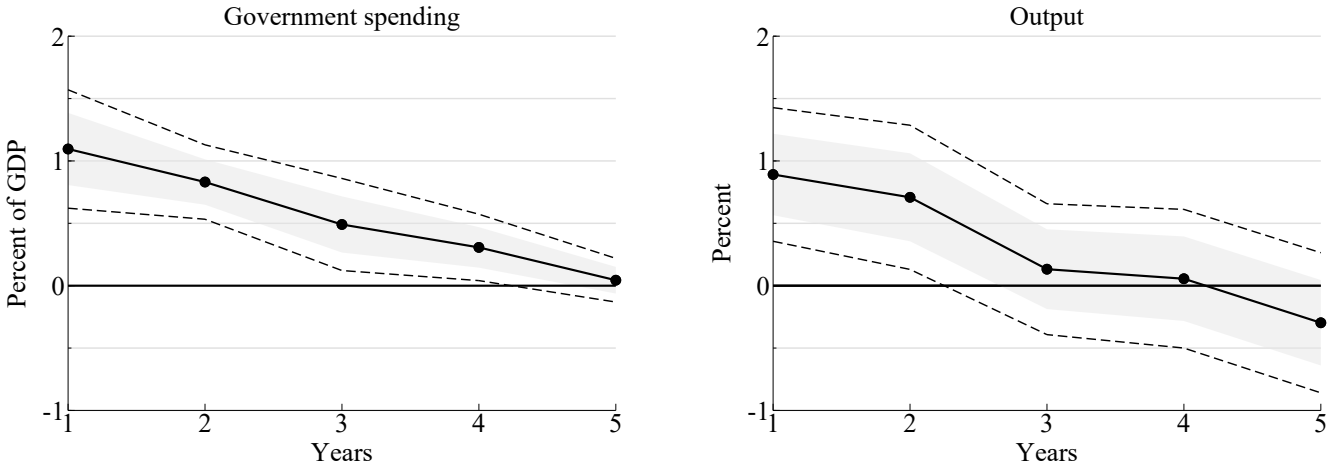
Notes: This table uses the World Bank development classification, which is based on gross national income, and which allows breaking down the developing sample further into low-income and middle-income countries. Column 1 shows the results for high-income countries, column 2 for low-income and middle-income countries together, and columns 3 and 4 separately.

Figure C.4: IRFs to Military-Spending Shock in Advanced and Developing Countries

(a) Advanced Countries



(b) Developing Countries



Notes: The figure presents the impulse-response function (IRF) separately for advanced and developing countries. The gray area represents one standard error (clustered by country) on each side of the estimates, and the dashed lines show 90 percent confidence bounds.

Table C.8: Multipliers during Episodes of High and Low Unemployment

	Unemployment threshold: percentile								
	50th			75th			90th		
	High	Low	*p*-value	High	Low	*p*-val.	High	Low	*p*-val.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
One year	1.474***	0.870*		1.407**	0.666**		2.147**	0.648**	
	(0.536)	(0.461)	0.369	(0.666)	(0.331)	0.304	(0.960)	(0.325)	0.125
	[22.9]	[12.7]		[15.9]	[9.5]		[9.6]	[11.4]	
Two years	1.249**	1.070**		0.834	0.818**		1.679	0.715**	
	(0.567)	(0.468)	0.792	(0.668)	(0.396)	0.984	(1.014)	(0.361)	0.348
	[11.2]	[40.9]		[13.4]	[22.0]		[7.9]	[22.7]	
Three years	0.853	0.613		0.222	0.629		1.087	0.452	
	(0.562)	(0.662)	0.756	(0.630)	(0.420)	0.583	(0.914)	(0.350)	0.489
	[7.8]	[19.4]		[12.2]	[19.0]		[6.6]	[17.7]	
Observations	1,264	1,260		624	1,900		295	2,229	

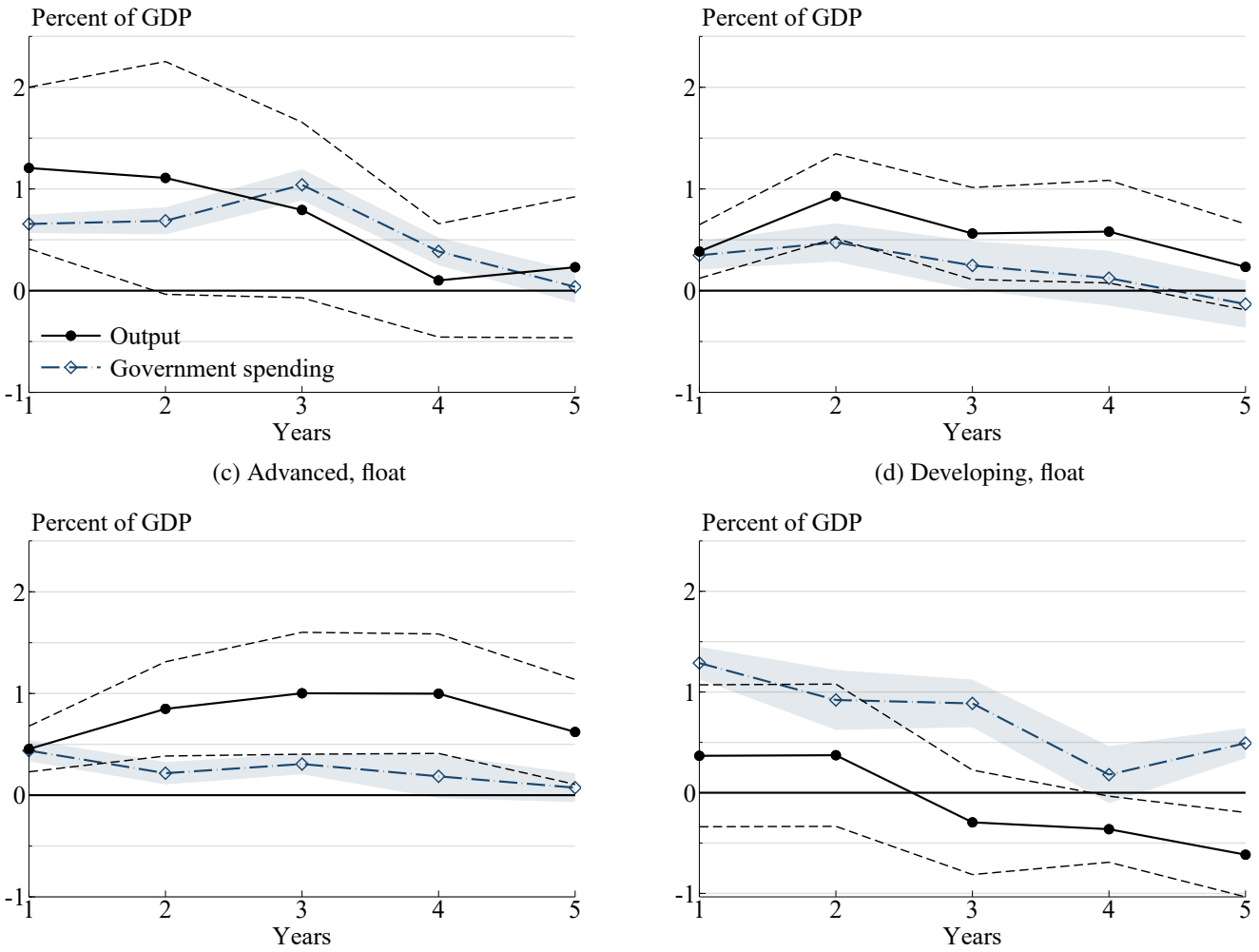
Notes: This table presents multipliers for alternative definitions of slack, based on percentiles of the unemployment rate distribution within countries.

Table C.9: The Effects of Positive and Negative Government Spending

	All countries			Developing countries			$\Delta g < 0$		
	$\Delta g > 0$	$\Delta g < 0$	p-value	$\Delta g > 0$	$\Delta g < 0$	p-value	Rec.	Exp.	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
One year	0.276	2.087***		0.300	2.132***		2.674***	1.211**	
	(0.301)	(0.612)	0.004	(0.308)	(0.663)	0.006	(0.871)	(0.512)	0.116
	[11.5]	[13.3]		[11.0]	[12.2]		[8.0]	[15.2]	
Two years	0.303	1.745***		0.216	1.750**		1.422	0.729	
	(0.502)	(0.619)	0.070	(0.487)	(0.673)	0.059	(0.974)	(0.528)	0.492
	[25.6]	[14.0]		[26.9]	[13.6]		[13.7]	[11.8]	
Three years	−0.231	1.093**		−0.498	1.084*		0.062	0.270	
	(0.653)	(0.523)	0.119	(0.673)	(0.577)	0.075	(1.189)	(0.652)	0.848
	[10.1]	[12.7]		[9.9]	[11.8]		[18.2]	[9.7]	
Observations	1,178	1,385		863	926		248	694	

Notes: Columns 1–6 show the effects of positive and negative changes in government spending in the full sample and in the sample of developing countries when the regimes are defined based on total spending. Columns 7 through 9 show the multipliers in recessions and expansions during the episodes when negative military spending triggered a negative response in total government spending.

Figure C.5: IRFs to Military-Spending Shock by Development–Exchange Regime Sample



Notes: The figure presents the IRF by sample. The shaded area and the dashed lines show one standard error bands, clustered by country.

Appendix C.4. Comparison with Ilzetzki et al. (2013)

Because Ilzetzki et al. (2013) use a different sample and different method, we strive to explain the differences between their results and ours. While our results are, overall, qualitatively similar to theirs, our point estimates are larger for both developed and developing countries. The differences could be due to two factors: sample composition and identification.

To differentiate between these factors, we apply our method to a sample as close to theirs as possible. We match their sample fairly well, with two exceptions: First, our data for Australia, France, the United Kingdom, and the United States start in 1988, while their data go back to 1978 for France and to 1960 for the other three countries. Second, our sample does not include Iceland. In this exercise (Table C.10), we obtain point estimates larger than in the baseline, especially for developing countries, but within the confidence intervals from our baseline estimates. While these results point to the differences between the methodologies as a likely explanation, we are cautious about this conclusion, due to remaining differences in the samples and the frequency of observations.

This exercise confirms our conjecture that the differences between advanced and developing countries come mostly from low-income countries. Our multiplier estimates for developing countries in the Ilzetzki et al. sample of mainly upper-middle-income countries, on impact, are larger than the baseline estimates and similar to those for developed countries.

Table C.10: Ilzetzki et al. (2013) Sample

	All	Adv.	Dev.
	(1)	(2)	(3)
One year	2.174***	2.526**	2.105**
	(0.580)	(1.061)	(0.807)
	[26.6]	[11.0]	[10.9]
Two years	2.136***	2.439**	2.107**
	(0.694)	(1.056)	(0.955)
	[22.8]	[8.0]	[11.8]
Three years	2.978***	2.917***	2.598**
	(0.855)	(1.010)	(1.194)
	[15.5]	[6.0]	[9.9]
Observations	801	516	285

Notes: This table presents multipliers estimated in the sample restricted to countries considered in Ilzetzki et al. (2013), except Iceland (not in our baseline sample). The data for Australia, France, the United Kingdom, and the United States start in 1988.

Appendix C.5. Additional Robustness Checks

Table C.11: Multipliers and Wars

	Military threat indicator	Excluding countries with long civil conflict	Excluding countries with any war incidence
	(1)	(2)	(3)
One year	0.805**	0.656*	1.689**
	(0.374)	(0.336)	(0.729)
	[15.0]	[11.6]	[11.7]
Two years	0.818**	0.703*	1.889**
	(0.385)	(0.385)	(0.921)
	[27.3]	[20.1]	[6.9]
Three years	0.482	0.349	1.777*
	(0.364)	(0.359)	(0.945)
	[21.2]	[15.2]	[5.1]
Observations	2,563	2,175	1,209

Notes: In column 1, we control for a military-threat indicator based on the incidence of war in a narrowly defined geographical region. In column 2, we exclude countries with a history of long domestic conflict. In column 3, we exclude countries with any incidence of war during the sample period.

Table C.12: Large Oil Exporters and Discoveries

	No Large Oil Exporters			No Countries with Giant Oil Discoveries		
	All	Adv.	Dev.	All	Adv.	Dev.
	(1)	(2)	(3)	(4)	(5)	(6)
One year	0.792**	1.570**	0.787**	0.938*	1.182*	0.984*
	(0.385)	(0.685)	(0.395)	(0.499)	(0.697)	(0.570)
	[24.5]	[98.2]	[27.8]	[31.1]	[112.5]	[33.0]
Two years	0.751*	1.733**	0.719*	0.791	1.202	0.813
	(0.403)	(0.859)	(0.406)	(0.478)	(0.945)	(0.533)
	[38.4]	[86.9]	[47.2]	[25.4]	[97.7]	[38.2]
Three years	0.479	1.363*	0.429	0.520	1.005	0.564
	(0.384)	(0.759)	(0.398)	(0.419)	(0.780)	(0.480)
	[31.4]	[72.7]	[31.8]	[20.5]	[87.7]	[26.5]
Observations	2,407	752	1,655	1,164	339	825

Notes: In columns 1 through 3, we exclude countries with a share of oil exports in total exports above 15 percent of GDP: Algeria, Chile, Mauritania, Nigeria, Oman, Russia, Saudi Arabia, United Arab Emirates, and Zambia. In columns 4 through 6, we drop countries with at least one giant oil discovery in the sample.

Table C.13: Relative Size of Military Spending

	Full sample			Advanced economies			Developing countries		
	All	$\frac{g^m}{g} > 5\%$	$\frac{g^m}{g} > 10\%$	All	$\frac{g^m}{g} > 5\%$	$\frac{g^m}{g} > 10\%$	All	$\frac{g^m}{g} > 5\%$	$\frac{g^m}{g} > 10\%$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
One year	0.834**	0.841**	0.774**	1.679**	1.708**	0.895	0.814**	0.826**	0.763**
	(0.382)	(0.379)	(0.371)	(0.741)	(0.686)	(0.804)	(0.388)	(0.387)	(0.382)
	[15.2]	[15.3]	[15.7]	[87.9]	[99.4]	[78.4]	[14.3]	[14.4]	[15.0]
Two years	0.861**	0.872**	0.781**	1.877*	1.940**	0.703	0.818**	0.835**	0.756*
	(0.394)	(0.389)	(0.379)	(0.951)	(0.906)	(1.114)	(0.392)	(0.388)	(0.385)
	[27.7]	[27.7]	[29.0]	[86.9]	[67.5]	[69.3]	[27.6]	[27.3]	[28.9]
Three years	0.546	0.553	0.403	1.504*	1.573*	0.420	0.499	0.507	0.373
	(0.378)	(0.371)	(0.360)	(0.858)	(0.855)	(1.129)	(0.386)	(0.379)	(0.375)
	[21.4]	[21.6]	[20.3]	[71.7]	[55.8]	[39.7]	[19.8]	[19.8]	[18.7]
Observations	2,563	2,359	1,656	774	664	330	1,789	1,695	1,326

Notes: This table reproduces the baseline results for the cases when we drop countries with an average share of military spending in total government spending below 5 percent (column 2) or below 10 percent (column 3). Columns 4–9 repeat the exercise separately for advanced and developing countries.

Table C.14: Excluding Countries with Corr $(\Delta \log g^m,\ \Delta \log g) < 0$

Fixed effects	No	Country (C)	Time (T)	C–T
	(1)	(2)	(3)	(4)
One year	0.694**	0.704**	0.746**	0.776**
	(0.304)	(0.329)	(0.310)	(0.345)
	[19.6]	[16.9]	[19.6]	[17.3]
Two years	0.696**	0.668*	0.748**	0.777**
	(0.301)	(0.337)	(0.300)	(0.349)
	[41.1]	[31.8]	[40.6]	[33.4]
Three years	0.435	0.253	0.492*	0.441
	(0.266)	(0.305)	(0.256)	(0.317)
	[43.5]	[26.5]	[42.2]	[28.2]
Observations	2,061	2,061	2,061	2,061

Notes: To construct this table, we drop countries with a negative sample correlation of changes in military spending and changes in total government spending. The distribution of these correlations across countries can be found in Figure C.3.

Table C.15: OLS Estimates

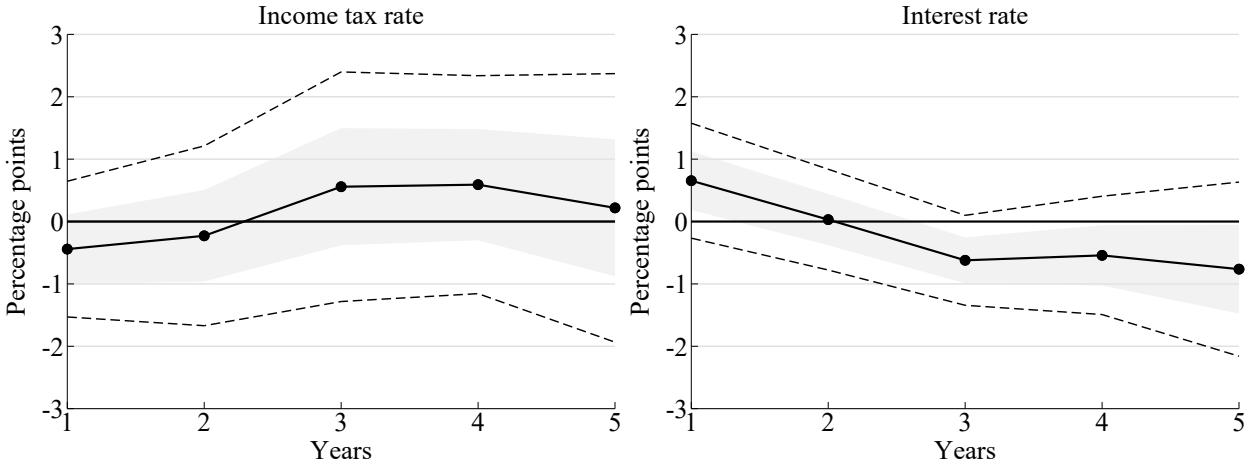
	All	Adv.	Dev.	Rec.	Exp.	Pos.	Neg.	Peg	Float	Closed	Open
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
One year	0.499***	1.048***	0.489***	0.728***	0.284**	−0.026	0.741***	0.792***	0.405**	1.339***	0.341***
	(0.167)	(0.381)	(0.166)	(0.188)	(0.141)	(0.098)	(0.244)	(0.131)	(0.164)	(0.330)	(0.128)
Two years	0.538**	1.075**	0.524**	0.691***	0.355**	−0.227	0.865***	0.933***	0.382*	1.310***	0.341*
	(0.209)	(0.508)	(0.214)	(0.218)	(0.176)	(0.150)	(0.263)	(0.172)	(0.213)	(0.349)	(0.205)
Three years	0.467**	0.973	0.456**	0.603***	0.312	−0.453**	0.856***	0.937***	0.304	1.160***	0.302
	(0.217)	(0.592)	(0.222)	(0.191)	(0.198)	(0.183)	(0.220)	(0.180)	(0.207)	(0.302)	(0.219)

Notes: Standard errors clustered by country are in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Appendix D. Policy Implementation

In this appendix, we discuss the implementation of fiscal policy and its interaction with monetary policy, focusing on small subsamples of countries with available data. In Appendix D.1, we discuss financing of government spending. In Appendix D.2, we focus on the monetary policy response to spending shocks. In Appendix D.3, we consider the composition of government spending. Appendix D.4 provides additional robustness results.

Figure D.1: The Responses of the Tax and Interest Rates to a Military-Spending Shock



(a) (b)

Notes: The figure shows the IRFs of the income marginal tax rate (left panel) and the monetary-policy rate (right panel) to a military-spending shock of 1 percent of GDP, estimated using the local projections method. The gray area represents one-standard-deviation bands, and the dashed lines show 95 percent confidence intervals.

Appendix D.1. Taxes

The effects of government spending on output may depend on whether the government spending is financed by taxes or debt.[4] In the baseline, we estimate the size of the multiplier for the average response of taxes in the sample. Distinguishing debt-financed government spending from tax-financed spending is beyond the scope of this paper, due in part to a lack of available data. We therefore address a more limited question: What is the response of tax rates to government-spending shocks in countries with available tax data?

To this end, we collect data on tax rates from two sources. First, we use individual income marginal tax rates from the OECD. These data provide information on the entire tax scale and personal allowances for the member states. Second, to extend the coverage to developing countries, we use individual income marginal tax rates of top earners from KPMG, an auditor. The KPMG data, however, provide marginal tax rates for only the top income earners and are not available before 2006. While this measure ignores variation in tax rates for low-income brackets as well as variation in personal allowance, it is not affected by changes in total income or its distribution.

[4]The effects of taxes on output are studied by House and Shapiro (2006), Romer and Romer (2010), Mertens and Ravn (2012), and others.

Figure D.1a shows limited evidence that tax rates increase at longer horizons in response to a spending shock, with the estimated effects being small and not statistically significant. When we split the sample into advanced and developing countries, we find that, in response to a spending shock, tax rates are more likely to increase in developing countries than in developed ones (Figure D.2 in Appendix D.4). We conjecture that developed countries have more capacity to borrow, whereas many developing countries operate in tight fiscal space. While the corresponding confidence intervals are large due to the small sample size, this evidence is overall consistent with larger multipliers in advanced economies.

Appendix D.2. Monetary Policy

The size of the fiscal multiplier may also depend on whether monetary policy leans against the wind—and, if so, to what extent—and on coordination between the monetary and fiscal authorities. To get a sense of whether monetary policy leaned against the wind in our sample, we estimate the responses of the policy rates to government-spending shocks. We obtain end-of-year policy rates for 25 countries and the euro area, provided by the corresponding central banks. When official policy rates are not available, we use discount rates from the IMF's *International Financial Statistics*.

As Figure D.1b shows, we find no statistically significant increases in the interest rates at all horizons considered. While the interest rates respond insignificantly both in advanced and in developing countries, the negative response is quantitatively more pronounced in advanced economies at longer horizons. The responses in developing countries are quantitatively small.

Appendix D.3. Spending Composition

The effectiveness of government spending may also depend on the spending composition (Ramey and Shapiro, 1998; Boehm, 2020). The product durability is a characteristic of particular interest. Using data on spending composition in, mostly, advanced economies, we provide some evidence on the effects of spending on military durables and nondurables. Following Gartzke (2001), we use data from NATO press releases and other sources, and define military equipment and infrastructure as durables, and spending on personnel and other expenditures (typically, operations costs) as spending on nondurables and services.

Since we do not have data on total government spending on durables and nondurables, we deviate from our baseline methodology by estimating the direct contemporaneous response of output to the military-spending components. Specifically, we estimate the following specification:

$$\frac{\Delta y_{i,t}}{y_{i,t-1}} = \alpha_i + \beta \frac{\Delta g^{\mathrm{m}}_{i,t}}{y_{i,t-1}} + \zeta \frac{\Delta g^{\mathrm{d}}_{i,t}}{y_{i,t-1}} + \boldsymbol{\gamma}' \mathbf{z}_{i,t} + \delta_t + \varepsilon_{i,t}, \tag{D.1}$$

where $g^{\mathrm{d}}_{i,t}$ is government spending on military durables, and other variables and parameters are defined as before. In this specification, a \$1 increase in military spending on nondurables raises output by β dollars, while \$1 spent on durables raises it by $(\beta + \zeta)$ dollars. If there is no difference between the two effects (i.e., $\zeta = 0$), then $\beta = \mu_1 \, (\partial g / \partial g^{\mathrm{m}})$; in other words, β is close to the one-year multiplier as long as the passthrough from military spending into total spending is close to one.

Table D.1 shows estimates of the output response to military spending on durables and on nondurables/services. In columns 1 and 2, we include one type of spending at a time, while column 3

Table D.1: Sectoral Military Spending

	(1)	(2)	(3)	(4)
Military nondurables	1.801**			
	(0.885)			
Military durables		4.602***	2.807	1.362
		(1.534)	(2.124)	(0.917)
Total military spending			1.470*	1.064**
			(0.851)	(0.446)
Recession × Military durables				4.109*
				(2.351)
Recession × Total military spending				0.254
				(1.355)
Observations	543	543	543	543

Notes: This table presents estimates of the one-year output response to military spending on durables and on nondurables/services. Estimates of (D.1) are in column 3. Standard errors clustered by country are in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

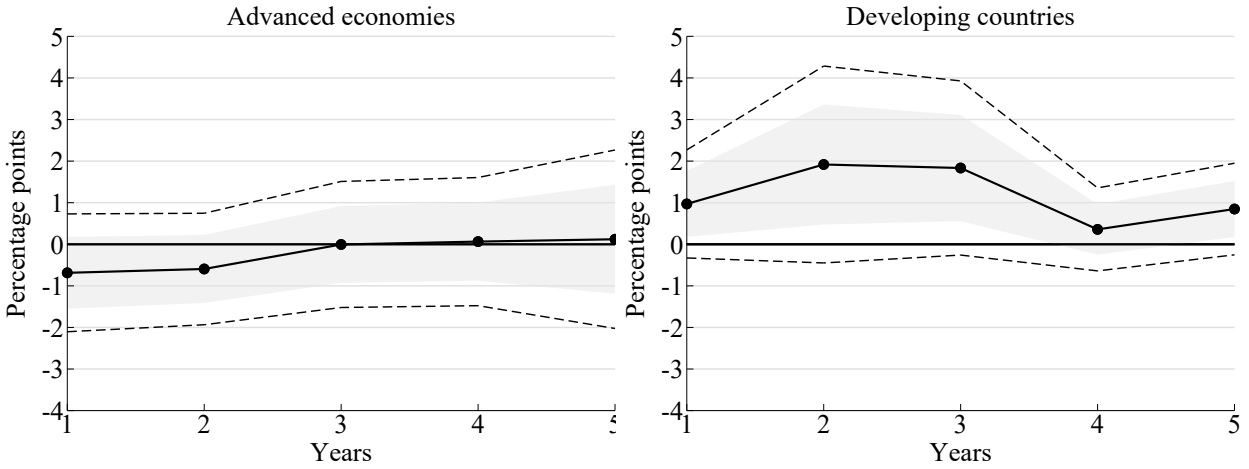
presents estimates of the full specification (D.1). The output effect of spending on military durables is substantially larger than that on military nondurables. Our benchmark estimates in column 3 indicate that a $1 increase in government spending on military nondurables and services is associated with a $1.47 increase in output, while $1 spent on durables leads to an additional increase in output of $2.81. However, this difference is statistically insignificant. And we find separately that the effects of each spending component dissipate over longer horizons. In column 4, we interact the two variables with the recession dummy and find that the difference comes mostly from recessionary episodes. It is plausible that large spending programs are often focused on durables and that large shocks could have a disproportionate effect on output. Due to limited data, we leave analyses of potential nonlinearities in the effects of fiscal shocks and of the more refined spending categories to future research.[5]

[5]For example, different components of spending on nondurables, such as domestically produced food and typically imported fuel, may result in differing multipliers.

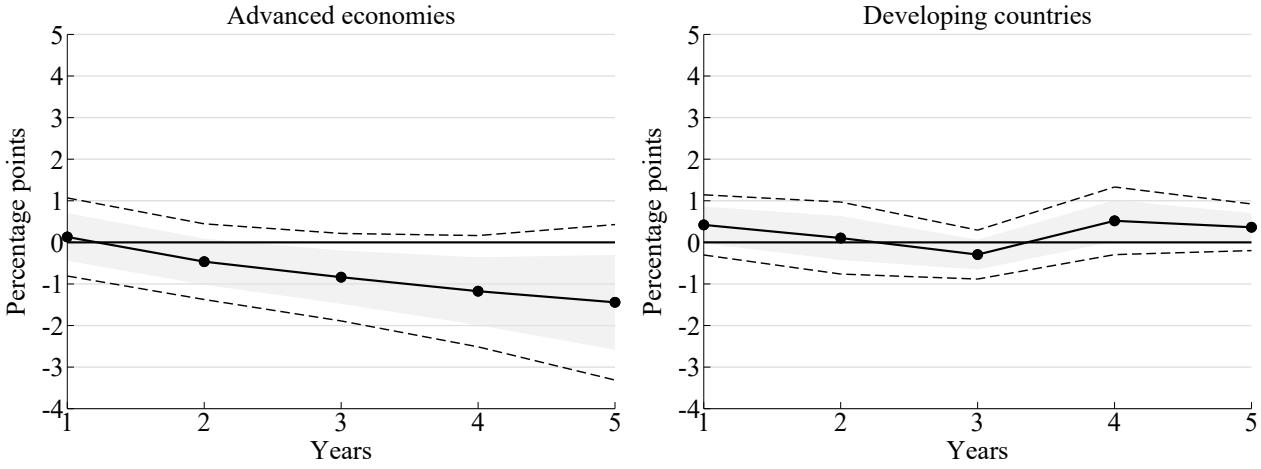
Appendix D.4. More on Policy Implementation

Figure D.2: Income Tax and Interest Rate Response to Government-Spending Shock by Country Sample

(a) Income tax

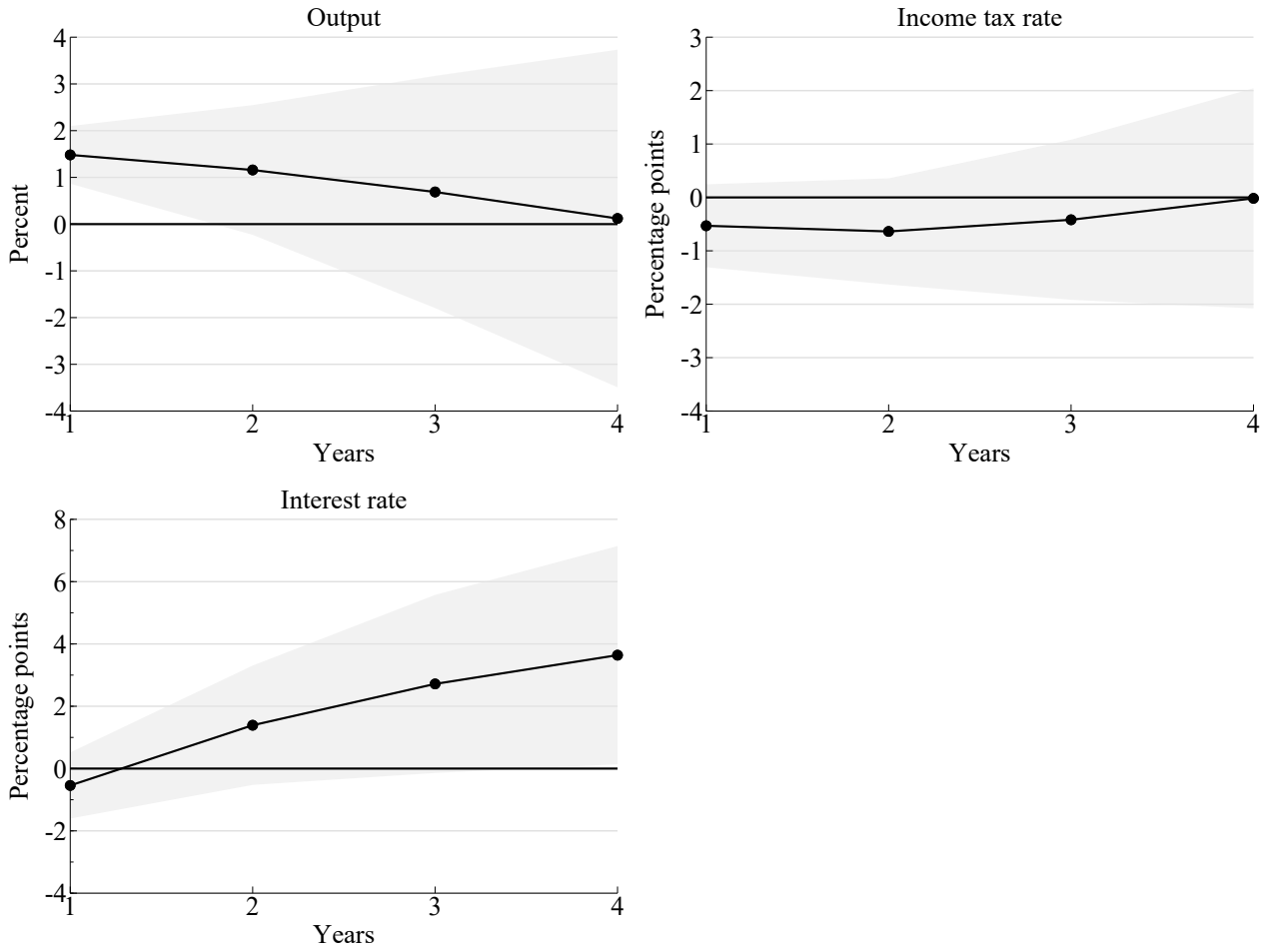


(b) Interest rate



Notes: In this figure, we split the baseline sample into developed and developing countries. The gray area represents one standard error (clustered by country) on each side of the estimates, and the dashed lines show 90 percent confidence bounds.

Figure D.3: IRFs to Military-Spending Shocks: VAR Estimates



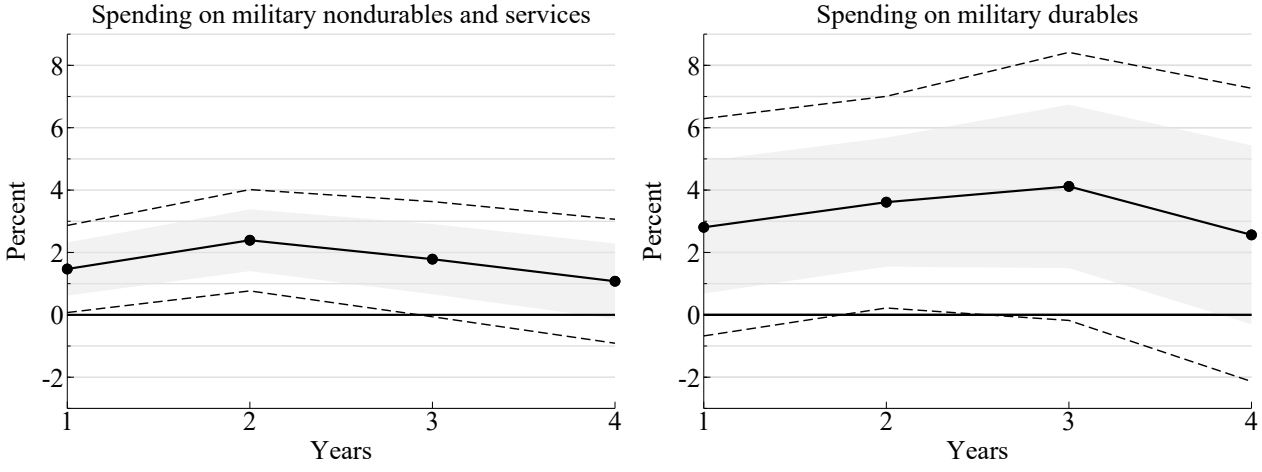
Notes: The figure presents impulse responses of output, marginal income tax rates, and policy rates to a military spending shock of 1 percent of GDP, estimated from a vector autoregression with one lag. The system is identified using Cholesky decomposition, with military spending ordered last and output first (i.e., military spending does not respond to any variable within a year). The gray areas represent 90 percent confidence bands from Monte Carlo simulations.

Table D.2: Multipliers in Subsamples with Extra Data

Fixed effects	No	Country (C)	Time (T)	C–T
	(1)	(2)	(3)	(4)
	(a) Tax-rate sample			
One year	1.453***	1.525***	1.578***	1.578***
	(0.290)	(0.273)	(0.472)	(0.408)
	[7.3]	[7.0]	[7.2]	[6.3]
Two years	1.612***	1.504***	1.575***	1.518***
	(0.260)	(0.338)	(0.370)	(0.458)
	[13.3]	[13.8]	[13.8]	[14.2]
Three years	1.017***	0.824**	0.991***	0.916*
	(0.281)	(0.397)	(0.318)	(0.491)
	[17.7]	[29.3]	[17.5]	[28.5]
Observations	1,083	1,071	1,083	1,071
	(b) Policy-rate sample			
One year	1.704**	2.091**	2.104**	2.495**
	(0.854)	(0.910)	(0.969)	(0.998)
	[12.5]	[7.6]	[10.4]	[6.8]
Two years	1.421	2.193	2.208	3.120*
	(1.128)	(1.468)	(1.386)	(1.842)
	[5.3]	[2.0]	[4.4]	[2.0]
Three years	0.982	1.595	1.884	2.766
	(1.098)	(1.414)	(1.387)	(1.773)
	[4.0]	[1.4]	[3.3]	[1.5]
Observations	1,385	1,385	1,385	1,385

Notes: This table presents estimates of the baseline specification for two subsamples: one for which tax-rate data are available (a) and the other for the countries with policy-rate data (b).

Figure D.4: Output Response to Military Spending



Notes: The left panel shows the output response, at horizon h, to military spending on nondurables and services, estimated using the local projections method. The right panel shows the corresponding output response to military spending on durables. The gray area represents one standard error (clustered by country) on each side of the estimates, and the dashed lines show 90 percent confidence bounds.

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