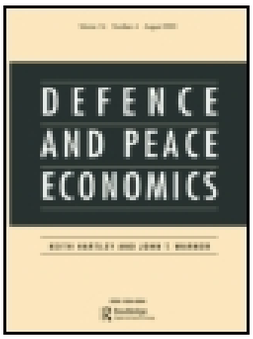

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Does Increase in Defence Spending Lead to More Risk of Sovereign Debt Defaults?

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ABSTRACT

The objective of this study was to identify the determinants of sovereign debt default for a panel of twenty developing nations over the period 1970 to 2019, specifically focusing on the influence of defence/military spending. This study's findings indicate that increased military spending has generally reduced default risk in the examined countries, but that excessive military spending, past a certain threshold, can have strong detrimental impacts on the probability of sovereign debt default. Additionally, the findings show that the country's levels of democracy and foreign currency reserves level are both negatively linked to debt default risk, whereas default history, level of external debt, and short-term debt to reserves ratio are all significantly positively linked to higher default risk. The study suggests that certain countries may wish to evaluate their level of military spending to ensure it is not too high. Alternatively, countries may lower their accrual of external debt from military spending by focusing on domestic arms production, mitigating their risk that way.

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Introduction

Sovereign default occurs when a country's central government fails to meet its principle or interest obligations on bonds or loans provided by private companies or other institutions by the agreed-upon due date, and it includes countries that offer less favourable terms than the original debt issue, according to Beers, Jones, and Walsh (2020). A sovereign government debt default is unwelcome. A sovereign default creates a two-way problem: on the one hand, a default means that the lender will not receive their expected payment, causing financial harm; the defaulting country may face severe long-term economic consequences, such as credit restrictions and deterioration in international trade conditions. Borensztein and Panizza (2009) believe that in more extreme cases, the defaulting country may even face a banking crisis. Sovereign debt crises, according to Ogunnoiki (2016), are an obstacle in the transition of African states to a more developed level. More importantly, international investors' holdings in local currency debt are at an all-time high, according to Jeanneret and Souissi (2016), indicating a higher level of overall risk exposure for these investors. Given the prevalence of the coronavirus pandemic, this issue is more important than ever, with SandP (2021) reporting a one-year high of seven sovereign default situations last year.

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Broadly speaking, the determinants of sovereign debt default are still poorly understood. The goal of this study is to provide insight into the determinants of sovereign default by either reinforcing or dispelling determinants in prior literature, and contributing new determinants such as the role of military spending in increasing/decreasing defaults risk probability, thus answering the question 'What are the primary determinants of sovereign default in developing countries?'. Military spending has been repeatedly linked to an increase in sovereign debt levels and has also been linked to a decrease in the rate of economic growth in certain circumstances. Both factors could contribute to a future sovereign debt default. However, military spending in the explanation of sovereign default literature is noticeably lacking. As such, this begs the question, 'What is the role of military expenditure in determining default probability?' Additional research helped to incorporate additional issues: How have the drivers of sovereign default developed over the last 50 years? Which political considerations are most essential in deciding default?

This study aims and tries to answer the above research questions. The study will benefit lenders to sovereign countries and bond investors because they will gain a more holistic understanding of the level of risk they are taking when investing in bonds or lending to other sovereign countries. This more informed decision-making should make them less likely to encounter defaults. Policymakers and residents of defaulting sovereigns will profit from this study as we suggest policymakers with instruments to limit default risk, avoid the economic consequences of a debt crisis, and help the country's citizens. The study also substantially contributes to the sovereign default literature; first, by incorporating military expenditure variables into the analysis. Second, it applies a new perspective through which to analyse the determinants of default according to the different levels of sovereign debt arrears. Third, to the author's knowledge, it uses a longer observation period than the prior sovereign default studies and fourth, it incorporates a more comprehensive database of defaults than previous literature so more default incidents are recorded.

We begin by reviewing a segment of the literature on the research issue, including the methods, data, and outcomes of the many studies. The study then uses a new approach of ordered probit and multinomial logistic regression modelling and applies it to a fresh dataset covering a period of half a century (1970–2019). The study then continues by exploring some of the data analysis's shortcomings and considers potential policy solutions based on the findings to reduce the risk of sovereign debt default and assist countries in debt crises to help them overcome the issue. Finally, based on its findings, the study draws some important conclusions.

Literature Review

The goal of this review is to outline important developments and the prevailing narrative in the sovereign default literature and evaluate the methods used in some of the widely cited studies to aid in developing this paper and related methodology. Furthermore, this review also examines literature studying the relationship between sovereign debt and military expenditure.

The literature on the factors that influence sovereign debt default is substantial, with contributions to the field gaining traction in the 1990s. The study by Hernández-Trillo (1995) was a major contributor to the literature. One of Hernández-Trillo's important contributions was his assessment of sanctions to deter sovereign governments from defaulting. The study also contributed by developing a model that measures the endurance of external shocks to a country's economy as a proxy for a country's '*unluckiness*.' The study using a probit technique and data for 33 debtor countries from 1970 to 1988 used openness of the economy in terms of commerce and finance as a predictor of default and discovered numerous factors that influence the chance of default. The persistence of GDP growth shocks (unluckiness) and the London Interbank Offered Rate (LIBOR) both had a positive relationship with default probability, whereas international reserves and economic liberalisation of country in financial and current account openness had a negative relationship. Furthermore, it was discovered that the threat of sanctions succeeded in preventing countries from defaulting on sovereign debt payments.

Peter (2002) contributed to the sovereign default literature by analysing data from 78 emerging economies from 1984 to 1997 using a panel logit model. The study made a significant addition by changing the definition of sovereign default from previous literature to account for changes in arrears levels and the amount of rescheduled debt, whereas previous studies had just looked at the levels, as they were, rather than the changes. This was because, according to the author, countries that reduced their debt arrears over time must be servicing their debt or benefiting from a debt reduction scheme, and these good developments, in his opinion, should not be classified as defaults. The study also created multiple logit model specifications, excluding the lagged dependent variable (history of default) from one of them to control for bias. The study discovered that recent defaults (3 years) were a strong predictor of future default, with nations that had defaulted being 70% more likely than those that had not defaulted during the same period. The study by Hernández-Trillo (1995) discussed above found that an increase in the LIBOR is positively associated with default probability, which Peter (2002) confirms. Peter (2002) also found a link between default and the volatility of GNP per capita growth and political risk. Shocks to the real exchange rate, current account to GDP ratio, M2 to international reserves ratio, CPI inflation rate, and debt stock indicator all affected the likelihood of sovereign debt default, though to a smaller amount than the above mentioned elements.

Manasse and Roubini (2009) made one of the most significant contributions to the sovereign default literature by applying a new method, Classification and Regression Tree (CART), to a dataset spanning 47 countries from 1970 to 2002, and providing a more nuanced perspective on sovereign debt default and why it occurs. The study concluded there is no one-size-fits-all answer to why sovereign debt crises occur, and that the reasons for sovereign debt crises, which the study defined as countries in default or with a non-concessional IMF loan that exceeds the IMF quota, can be classified in two primary ways: by periods of macroeconomic and exchange rate shortcomings, such as negative shocks to GDP or exchange rate; and periods of insolvency, where the country has run out of money. Political instability, like the study of Hernández-Trillo (1995), is linked to debt default. However, the study adds this component has become increasingly relevant over time, and this is due to political instability being linked to weak liquidity. Manasse and Roubini's study discovered that the volume of external debt was consistently the strongest predictor of debt crises for developing economies; more precisely, external debt over 49.7% of GDP increases default probability. International financial markets-related monetary conditions were also discovered to play a substantial role in the likelihood of default. The study suggested that thresholds employed in earlier research to identify a point at which a country is allegedly much more likely to default are rarely meaningful in isolation, and that default is usually the result of a confluence of circumstances. The study did, however, call the used model's out-of-sample predictive performance 'unsatisfactory,' confirming suggestions made in previous studies that the reasons for default *evolved during the 1990s*.

Chakrabarti and Zeaiter (2014) and Jeanneret and Souissi (2016) provided some of the more current commentaries on sovereign debt default. Chakrabarti and Zeaiter (2014) developed a novel methodology called Extreme Bound Analysis (EBA) to examine the consistency of previous literature conclusions to changes in the data set. Chakrabati and Zeaiter's research looks at a broad body of literature, allowing the author to work with a larger dataset spanning 190 nations from 1970 to 2010. A significant variety of economic variables and political aspects were included in the research. Corruption, government stability, political accountability, military engagement in politics, and ethnic tensions were among the political factors examined. These political factors were significant predictors, except for government stability, showing, like Manasse and Roubini (2009), that political risk factors have a substantial impact on the likelihood of default. The study's findings further confirmed the robustness of the relationship between sovereign default and several characteristics, including debt service, inflation, growth, creditworthiness, and leverage. The study could not confirm the robustness of the observed relationship between sovereign default and openness, borrowing costs, exports, imports, GNP per capita, government stability, interest payments, and central bank (CB)

liabilities, implying these connections are less certain. However, the study points out that some of the literature has exclusion criteria for justifiable reasons, so associations not determined to be robust may still be relevant in deciding default.

Jeanneret and Souissi (2016), like Peter (2002), create multiple models, one of which uses a binary logit model to analyse the data, but unlike Peter, the second model uses a multinomial logit approach. From 1996 to 2012, the study's analytical dataset included 100 countries. The study classified defaults by different types of debt using the multinomial methodology, based on whether a default happened or, if one did, whether the default was a local currency bond or a foreign currency bond default. The author stated that local and foreign currency bonds carry equivalent degrees of risk, despite the popular notion that foreign bonds are riskier due to exchange rate volatility and illiquidity. The study discovered that governments' decisions to default differed depending on the debt's currency. These findings echoed those of Manasse and Roubini (2009), who found that an excessive short-term debt-to-reserves ratio was a major signal of future default, but did not find political instability or government effectiveness to be important default indicators, unlike Manasse and Roubini. Default history, high inflation rates, and low levels of foreign direct investment were all linked to a higher risk of default, but only for local currency bonds.

There is a significant volume of published studies on accumulation of debt and the role of defence spending but academic literature linking defence/military expenditure to sovereign debt actual default is limited. To the author's knowledge, only one such study exists. Karagol and Sezgin (2004) studied the relationship between military expenditures and debt rescheduling in Turkey from 1955 to 2000. Like much of the sovereign default literature, they use a probit model to evaluate the determinants of default, but their results indicated no relationship between defence expenditures and debt rescheduling probability, finding neither defence spending to government spending or defence spending to gross national product ratios to be significant determinants, and instead found financial variables, such as debt service ratio and exports to GNP ratio to be significant indicators. It is difficult to draw more general conclusions about military spending and default from this study, as it only studies a single country.

While literature analysing the relationship between military spending and sovereign default is limited, there is more extensive literature studying the relationship between military spending and the accrual of public or external debt as mentioned above. Smyth and Narayan (2009) conducted one of the larger studies in the literature, studying a panel of six Middle Eastern countries from 1988 to 2002 using a panel unit root and panel cointegration framework. The study highlighted three primary ways military expenditure could lead to the accrual of external debt: First, if taxation cannot finance military endeavours then a budget deficit will follow, and if other means of domestic finance are limited, then foreign borrowing will become necessary. Second, arms imports may be a key component of military spending, which require foreign currency, so, if foreign currency reserves are insufficient, then the country must resort to external borrowing. Finally, domestic arms production may require the importation of foreign inputs such as raw materials, which will also require foreign currency. More importantly, this was not strictly theoretical, as the study results indicated that eventually, a 1% increase in military spending raises external debt by between 1.1% and 1.6%, although this is less significant in the short run.

Smyth and Narayan's study narrative is reinforced by Azam and Feng (2017) who studied 10 Asian countries from 1990 to 2011 using fixed and random effects models. They found that military spending positively affected external debt levels but found that both foreign exchange reserves and economic growth negatively affected external debt levels. Shahbaz, Shabbir, and Butt (2016) tell a similar story, finding that from 1973 to 2009, Pakistan's military expenditure drove up external debt levels. The same was also true for Dunne, Perlo-Freeman, and Soydan (2004), who examined 11 small-industrialised countries using fixed and random effects models, concluding that military expenditure does drive up external debt to GDP ratio, however they add that certain 'dynamics' play an important role in how much debt will increase with military expenditure, adding that less developed economies are more likely to have to resort to foreign

borrowing to fund arms imports. In a separate study of South America, Dunne, Perlo-Freeman, and Soydan (2004) found that while military spending increased debt in Chile, but not in Argentina or Brazil, suggesting that military spending may be a significant determinant of sovereign debt, but it only becomes significant if there are not larger macroeconomic factors at play, which there often are.

While there is a clear consensus that military expenditure is positively linked to the accrual of sovereign debt, this is not unanimous as some studies indicate an inverse relationship between military spending and debt accumulation. Dudzeviciute, Cesnuityte, and Prakapiene (2021) examined a pool of European Union countries from 2005 to 2019 using Spearman's correlation, the ANOVA test and life tables, finding that defence spending as a proportion of GDP is negatively related to gross government debt. Additionally, military spending can influence the rate of economic growth. Desli and Gkoulgkoutsik (2021), who studied 99 countries from 1995 to 2017, found that, while military spending had an overall neutral impact on economic growth when observing countries on an individual level, certain countries' growth rates consistently benefited from military spending, whilst others observed a consistent detrimental impact, so the impact of military spending on growth varies across economies and time. Furthermore, considering that increasing military spending can lead to an accrual of external debt and decreased economic growth and that both factors have been linked to an increase in the probability of default, it is fair then to suggest that increased military spending may heighten default risk. Conversely, considering that military spending can positively influence economic growth, and that, while often the case, it is not a foregone conclusion that increased military spending will lead to increased sovereign debt. It is possible that under certain circumstances, military spending may reduce default probability, but past a certain threshold, excessive military spending will lead to excessive debt accumulation and heighten default risk probability.

Alongside the above-mentioned studies, a stream of other studies that link sovereign debt accumulations, military spending, and choices that needed to be made between spending on the welfare of the general population and military resources has appeared in the literature in the last five years. Studies by Caruso and Di Domizio (2017) for the European countries, Dimitraki and Kartsaklas (2018) and Kollias, Paleologou, and Zouboulakis (2021) for Greece are important. On the other hand, the study by Shea and Poast (2018) challenges the general perception that wars lead to sovereign debt defaults. A short review of some of these selected studies is presented in the following. By evaluating the role of other countries' defence spending on sovereign debt, Caruso and Di Domizio (2017) evaluated the role of military spending of a superpower (U.S.A) on the European countries' public debt accumulation. The authors stated that due to different wars and related alliances, European countries have increased military spending likely to be supported by debt finance, leading to an increased sovereign debt burden. The study concluded that European countries' debt burden is positively influenced by the increased military spending of the U.S.A but negatively by other European countries' average military expenditure. Hence, the study highlighted the importance of the U.S.A acting as an influencer of increasing public debt for other countries, leading to increased difficulties and less scope for fulfilling societal needs in the longer run in these countries.

DiGiuseppe (2015) argues for the importance of understanding how sovereign governments keep spending more on military if financed through external debt compared to domestic/internal resources. The study tries to establish a link between the creditworthiness of sovereign and military spending. The argument that countries chose either guns or butter due to fixed budget constraints is often made less applicable due to different policy tools and options available to governments in increasing the defence spending despite issues with food security. In other cases, borrowing allows sovereign governments to avoid direct costs to society while providing security. The author suggests that external debt availability and increased creditworthiness help sovereigns avoid political costs usually associated with redistributing already dwindling domestic revenues. The study concludes that increased creditworthiness increases military spending and poor credit terms affect the provision of security.

Dimitraki and Kartsaklas (2018) evaluated the impact of military spending in Greece's sovereign debt crisis after the country faced significant economic challenges due to debt accumulation in 2010 and onward. The authors concluded that military spending, alongside high deficit and inflation, contributed to Greek's public debt growth over many decades. Interestingly, the study using thresholds regression finds that a debt burden of over 90% (as a % of GDP) increases the impact of inflation and military expenditure on public debt. This study highlights the significance of increased debt burden in multiplying the impact of other factors, such as increased spending on security on the accumulation and related consequences of sovereign debt crises. Subsequently, contrary to earlier findings, Kollias, Paleologou, and Zouboulakis (2021) study uses data on Greece covering two hundred years to evaluate the impact of military spending on Greek's debt accumulation. Contrary to the earlier study mentioned above, authors did not find a statistically significant impact of military spending on Greek debt accumulation for the entire sample period and during sub-periods. The authors suggested that debt issues perhaps were due to other factors such as servicing of debt and related increased borrowing and other debt dynamics. Hence, when considering longer duration analysis period, these conclusions provide some alternative explanations and put less blame on the country's security apparatus and related increased expenditures in increasing the debt burden that leads to the debt crisis.

Last, Shea and Poast (2018) investigated the impact of engaging in wars and subsequent default on sovereign debt payments due to the impact of war on the economy and revenue collection and other strains of wars. The study finds that contrary to general belief, sovereign debt defaults are not common after wars. The authors hypothesise that countries likely to default or unable to borrow are less likely to engage in wars. The empirical evidence supports the conclusion that those states unlikely to default are less likely to enter the war in the first place, nonetheless.

In summary, literature on sovereign default is extensive and a litany of factors may contribute to default including but not limited to the LIBOR rate, inflation, GDP growth, currency denomination of debt, political factors, debt stocks, total reserves, and exchange rate shocks. However, literature directly studying the relationship between military spending and default is almost non-existent, but a reasonable body of literature links increased military spending to an increase in the accrual of external or domestic debt, although certain studies contradict this result. For researching the determinants of default, the probit and logit models are the most widely utilised due to the binary nature of the dependent variable, default, or no default, but other methodologies, like Manasse and Roubini's (2009) CART methodology, have also been used.

However, the size of default is also probably very important, as the economic repercussions of default are likely to vary according to the default size, but the size of default is not broadly considered in the sovereign default literature, and this issue ought to be addressed. A major constraint of much of the literature is that key variables, such as financial openness and political risk, are unobservable. Studies mainly rely on proxies, which are imperfect since they cannot account for every facet of the variable. Because variables such as political factors are amorphous, some literature may find it useful to divide political elements into more distinct sub-categories. Finally, the literature analysis raises a few secondary issues about default determinants, which contain some data, but not enough to make conclusive statements such as, 'How have default determinants evolved through time?'

Data

This study uses country-year panel data from 20 developing countries from 1970 to 2019. Algeria, Chile, Egypt, India, Kenya, Liberia, Malawi, Mauritius, Mexico, Nigeria, Philippines, Rwanda, Serbia, South Africa, Sudan, Tanzania, Turkey, Uruguay, Zambia, and Zimbabwe are among the developing countries studied. Table 1 contains the list of variables used in the empirical analysis alongside some descriptive statistics. The Bank of England's (BoE) and Bank of Canada's (BoC) extensive sovereign default databases are used in this study. It picks up more defaults than previous rounds of default

Table 1. Descriptive statistics and explanation of the determinants of sovereign debt arrears/defaults.

Variable	Notes	N	Mean	Std. dev.	Min	Max
Default	Categorical variable representative of default =0 if no arrears, =1 and 2, if minor and moderate level of arrears (less than USD 50 million and 50 million to <1 billion USD), and =3 if major level of arrears (>=1 billion USD)	1000	1.257	1.204326	0	3
Yrsoffc	Years in office of the current government	855	8.293567	8.036896	1	45
FiniteTerm	Finite term in office (dummy variable =1 if country's leader has a finite term in office)	855	2.754386	0.48202	1	3
YrsCurrent	Years since last elections were held	855	3.560234	1.941368	1	9
Polity	Polity score is measure of a country's democratic credential (−10 to 10, with −10 = autocratic government and 10= consolidated democracy)	865	12.13295	6.348457	1	21
USIR	US interest rate (%)	1000	4.875833	3.049358	0.5	13.41667
LIBOR	LIBOR rate (%)	997	23.62788	14.30852	1	48
Inflation	Inflation (level)	1000	382.771	275.2009	1	873
Exports	Exports (level)	1000	290.941	251.3778	1	762
ExportstoGDP	Exports to GDP ratio (%)	1000	328.645	263.6994	1	810
ExRate	Exchange rate	1000	433.038	273.5802	1	913
FDI	FDI (level)	1000	455.136	278.2199	1	942
FDItoGDP	FDI to GDP ratio (%)	1000	418.236	275.9854	1	909
ExternalDebt	External debt (level)	1000	385.126	277.456	1	877
TotalReserves	Total foreign exchange reserves (level)	1000	457.49	287.1994	1	956
STDtoExternal	Short term debt to total external debt ratio (%)	1000	332.39	260.4908	1	811
STDtoReserves	Short term debt to reserves ratio (%)	1000	300.046	252.4991	1	772
ExRatechng	Exchange rate change (year on year change)	1000	429.466	254.6548	1	900
ExRateCrisis	Exchange rate crisis (dummy variable =1 if one-year depreciation of the local currency versus the US dollar is more than 15%)	1000	2.203	0.527323	1	3
DHMinor	Defaults history minor =1 if the country has been classified defaulter at this level of default at any point in the previous three years)	1000	2.286	0.45871	1	3
DHModerate	Defaults history moderate =1 if the country has been classified defaulter at this level of default at any point in the previous three years)	1000	2.235	0.431232	1	3
Ms_mil_xpnd_gd_zs	Military expenditure (as a % GDP)	929	2.581617	2.324725	0.139925	29.72769
Ms_mil_xpnd_gd_zs_sq	Squared value of military expenditure (as a % GDP)	929	12.06328	39.21598	0.019579	883.7355
Ms_mil_mprt_kd	Arms imports (SIPRI trend -US$ millions)	731	386.6936	714.4886	0	5380
Ms_mil_mprt_kdsq	Squared value of arms imports (divided by 1,000,000)	731	0.659328	2.240204	0	28.9444

databases due to its broader coverage when compared with other default databases. The BoE, like much of the literature on the issue, considers a default to have happened when a government fails to meet its debt commitments, either by failing to make a payment on the specified due date or by offering the counterparty less favourable conditions. Government domestic arrears not paid on time; agreements that reduce interest rates or extend the maturity of government debt; government debt purchases at substantial discounts; debt swaps between governments and counterparties where the government receives better terms because of the swap; redenominating the currency of debt and making terms less favourable; and retrospective taxes to service sovereign debt repayments all fall under this default umbrella.

The literature review in the previous section broadly highlighted the absence of defence/military expenditure variables in the default literature. For this study, military expenditure as a proportion of GDP is also used, as the size of an economy will act as a constraint for a country's capacity for military spending. As mentioned in the review, arms imports require foreign exchange, which, if supply is insufficient within an economy, can lead to the accrual of external debt. As such, the military imports

data is also used in this analysis. All military-related variables are extracted from World Development Indicators (WDI) online database. Furthermore, the potential for military spending to have a varied impact depending on the level of spending will be reflected by using the level and square of the military related variables. In this way, if a significant negative coefficient for level and positive coefficient related to a squared variable is produced, then it would suggest that increase in the level of military expenditure to GDP or military imports reduce default probability (perhaps due to creation of employment, promoting growth and other externalities), but as this expenditure grows further, the benefit of military expenditure in reducing default probability is eventually nullified at a certain threshold, and then more increase in the military expenditure variable increases the probability of default past that certain threshold.

Because there are more defaults recorded in this database than in earlier literature, it is expected to provide a more comprehensive perspective of the determinants of sovereign debt default. Considering the gaps in the data, this analysis brings the total of observations to 764. The data of the countries studied reveal 611 default events. This dataset is also used to construct different classifications of current level default according to the magnitude of default classed as minor, moderate, or major, a minor indicating a default under 50 million USD, a moderate indicating a default from 50 million to one billion USD and a major default being one in excess of one billion USD. Under these classifications, 205 minor, 166 moderate and 240 major defaults are recorded, with an overall average default size of 882 million USD. Admittedly, these classifications are chosen arbitrarily due to lack of guidance from the literature. Subsequently, we altered the thresholds and re-estimated regression to observe the qualitative differences in estimates (mainly statistical differences and signs of the coefficients of military related variables in particular).

The political environment of a sovereign country is approximated by several indicators. The polity score, which is a measure of a country's democratic credential, is included. It goes from −10 to 10, with −10 denoting a firmly autocratic government and 10 denoting a consolidated democracy, according to the World Bank (2021a, 2021b). Data on election dynamics, comprising whether a country's leader has a finite term (FiniteTerm), years in office (Yrsoffc) of the incumbent government, and years till the next election (YrsCurrent), are also considered, as the year of an election has been associated to a higher default likelihood (Block and Vaaler 2004; Ghulam and Derber 2018). This information was sourced from the Inter-American Development Bank's database of political institutions (2020). PRS Group (2020) political risk index factors developed by the Political Risk Service were also considered, as these factors have been routinely tied to default. However, this data only dated to 1996 and as such was omitted from the final analysis subsequently.

As discussed before, the importance of macroeconomic variables in determining sovereign debt default has been highlighted in the literature, with Chakrabarti and Zeaiter (2014), Peter (2002), Aylward and Thorne (1998), and Gärtner, Griesbach, and Jung (2011) finding current exchange rate (ExRate) and year-on-year changes in the exchange rate (ExRateChn) and inflation to be significantly positively related to default probability. We used and gathered data on these two variables from the World Bank (2021b). Several countries in our data experience hyperinflation, resulting in a significant inflation level in our dataset. Manasse and Roubini's (2009) emphasised the importance of liquidity factors in determining sovereign default, linking defaults to periods of illiquidity. We discovered that countries with short-term debt exceeding 130 per cent of total reserves are more likely to default; this variable is also examined comprising total foreign currency reserves (TotalReserves) in our study to test these earlier findings. In addition, export receipts – level and as a % of GDP (Exports, ExportstoGDP) are also included.

Other liquidity factors, such as total reserves (TotalReserves), foreign direct investment – level and as a % of GDP (FDI, FDItoGDP), and other short-term debt ratios, such as short-term debt to reserves (STDebttoReserves) and short-term debt to external debt (STDebttoExternal), which have been routinely linked to default such as Manasse and Roubini's (2009), but sometimes have been registered as statistically insignificant (such as Peter 2002), are also tested, and data was retrieved from the World Bank (2021b) in this regard. Reinhart (2002) examines if the country is experiencing

an Exchange rate crisis (ERCrisis), which has been linked to increased default risk: We define an exchange rate crisis, like Ghulam and Derber (2018), as a one-year depreciation of the local currency versus the US dollar of over 15%. Including LIBOR and US interest rates (USIR) in this study follows a trend in previous literature, as these rates will influence the cost of debts incurred by these countries, and hence these variables are expected to be positively connected to sovereign debt default. The FRED (2022a, 2022b) provided this information. Last, the stock of total sovereign debt (ExternalDebt) is included to accommodate debt accumulation over a long period by sovereigns.

The history of default has also been linked to the likelihood of future debt default; however, the evidence is mixed, with Manasse and Roubini's (2009) suggesting that past defaults could harm the defaulter's credibility and thus increase default but concluding in the final analysis that default history was unimportant. But a vast body of research suggests recent defaults enhance future defaults, according to Reinhart, Rogoff, and Savanstano (2003) and Hilscher and Nosbusch (2010). The history of default variables for the previous three years was also investigated, with a focus on minor and moderate defaults (denoted by DHMinor and DHModerate respectively). Each variable is a dummy variable with a value of one if the country has been classified as this level of default at any point in the previous three years, and zero if it has not, and was created by the authors using the default database. However, it was discovered that the history of default variables had an undue influence on the regression results, as they reduced the statistical significance of numerous other variables. Regressions with and without these variables were constructed to adequately convey the influence of other factors.

Methodology

Manasse and Roubini's (2009) used the CART technique to organise the grounds for default into categories, such as a liquidity crisis, which is defined by various elements that determine a country's liquidity. While this method is useful, it is not in line with the goal of this study, which is to examine issues on an individual level rather than the broad circumstances that lead to default. Logit and probit techniques are often employed in the literature, Peter (2002), Ghulam and Derber (2018), Cevik and Jalles (2022), and Hernández-Trillo (1995) being some of the numerous examples. These methods are especially beneficial when the dependent variable is whether a specific event will occur. For that purpose, logistic regression is an interesting and useful method because it is relatively basic and has been proven as a valid tool for evaluating the drivers of default through repeated application in the literature. However, a key limitation of this methodology in this literature is that the magnitude of default is not considered, so a one-thousand-dollar default and a ten-billion-dollar default are treated equally in the standard logit and probit methods, even though the latter default's consequences will undoubtedly be more severe.

This raises whether a method can find the determinants of default while distinguishing between different levels of default. First, there is the construction of the dependent variable, which is made into a categorical variable wherein a higher number corresponds to a higher level of default, ranging from 0 to 3, with '0' representing no default, '1 and 2' represents minor and moderate debt defaults ranging from zero to one billion and '3' represents major defaults of more than one billion USD. This variable invalidates the standard logit and probit models, as the variable is not binary. To this end, ordered probit and a multinomial logistic regression provide potential solutions, as the dependent variable can be constructed as a categorial variable wherein the default variable takes different values corresponding to a certain level of default. To the author's knowledge, a panel data ordered probit methodology has not been used in the analysis of the determinants of sovereign defaults but has been used extensively in the analysis of sovereign credit ratings and, according to Bennell et al. (2006) has been considered the most successful econometric method for modelling sovereign credit ratings. However, the panel data ordered probit model interpretation is limited, as it does not provide coefficients for each default class. Because of this, further addition of a panel data multinomial logit regression gives coefficients for each default classification, enabling the analysis of

differences in determinants of different sizes of default. While multinomial logit regression has been employed in the sovereign default literature before (Ciarlone and Trebeschi 2006; Jeanneret and Souissi 2016), this is the first time it has been used to investigate the predictors of different levels of default. As a result, both panel data ordered probit and multinomial logit methods are used in this study.

Various studies from rating agencies and international organisations were consulted to determine the acceptable default levels for each bracket, but this exercise yielded no meaningful data; therefore, the classifications of default variable categories are arbitrary. Hypotheses tests are run at the 1%, 5%, and 10% level of significance for each explanatory variable, with the null being no association to default and the alternative being a statistically significant relationship with the probability of default. All findings are presented in tables, although this study only discusses variables statistically significant unless a variable is not statistically significant but contradicts a previous study.

Before running of panel data ordered probit and multinomial logit regressions, correlation coefficients are calculated for all independent variables (see Table 2) to check for potential multicollinearity. Potentially, some variables such as exports, external debt, total reserves, and foreign direct investments could be closely associated. Most likely, this is because these variables are a function of an economy's size, i.e. larger economies produce and export more, are more likely to receive foreign direct investment, and require more external finance because of their size, so are more likely to take on larger volumes of external debt. Because they are taking on more external debt and will have a larger income, their total reserves are also more likely to be larger. Hence, it is reasonable to expect multicollinearity, which could be understood as a limitation of the analysis; however, in large multivariate analyses of the determinants of default, some multicollinearity is probably inevitable due to the interconnectedness of variables. Interestingly, in our case, except for strong correlation coefficients of the squared and levels variables representing military-related expenditures/imports, we do not observe high correlations among many determinants of defaults for our selected sample of countries. This provides decent confidence in interpreting regression coefficients and related implications in the next section of this study.

Results and Analysis

The coefficients from the three selected panel ordered probit regression models (A-C) are presented in Table 3. Each set of specifications is run with and without a history of default variables. This is because, according to Peter (2002), lagged dependencies in logit regression have a propensity to introduce bias. The two military-related variables comprising arms imports, and military expenditure to GDP ratio are all analysed separately (columns 3–6) to avoid potential multicollinearity resulting in skewing the results. Ordered probit estimates suggest higher polity score and the existence of a finite term both contribute to mitigating higher level default risk, while higher years in office lead to increased chances of defaulting on sovereign debt. Hence, countries with strong democratic institutions are less likely to default on higher debt amounts, a finding supported by our estimates. In line with the findings of many previous studies, including Manasse and Roubini's (2009), estimates indicate an increase in external debt levels heightens the risk of debt default. Higher short-term debt relative to reserves is also linked to increased default severity or probability, again supporting Manasse and Roubini's (2009) suggestion that excessive short-term debt accumulation may contribute to a subsequent default.

Increased absolute levels of foreign exchange reserves reduce default probability, which makes sense, as greater reserves improve the countries' ability to pay their debts on time, reducing the probability of an insolvency-induced default espoused by Manasse and Roubini's (2009). Weaker exchange rates were also linked to a decreased probability of default. Surprisingly, estimates indicate greater exports seem to increase default probability or severity, yet greater exports as a proportion of GDP were negatively related to default. It perhaps indicates the role of imports led to economic growth in reducing the probability of default. More role of interest rates USIR and LIBOR and FDI

Table 2. Correlation coefficients of the determinants of sovereign debt arrears/defaults.

	Default	USIR	Yrsoffc	Inflation	Exports	ExternalDebt	TotalReserves	LIBOR	Polity
Default	1.0000								
USIR	0.1510	1.0000							
Yrsoffc	0.2137	0.0440	1.0000						
Inflation	−0.0944	−0.1091	−0.1331	1.0000					
Exports	0.0924	−0.0765	0.0469	0.0335	1.0000				
ExternalDebt	0.1015	−0.0265	0.1495	−0.0043	−0.0040	1.0000			
TotalReserves	−0.1209	−0.0515	−0.0676	0.0056	0.0339	0.1234	1.0000		
LIBOR	0.0643	0.3250	0.0645	0.0193	−0.0822	−0.0101	−0.0706	1.0000	
Polity	−0.4300	−0.2849	−0.3000	0.2313	0.0692	−0.0728	0.1182	−0.0530	1.0000
ExRate	−0.1175	−0.2962	0.1500	0.0579	0.0823	−0.0058	0.0431	−0.1187	0.0910
ExportstoGDP	−0.0960	0.0167	−0.2239	−0.0162	−0.0098	−0.0529	−0.0921	0.0365	0.1857
FDI	−0.0455	−0.0384	−0.0539	−0.0050	0.0303	0.1050	0.0994	0.0179	0.0253
FDItoGDP	−0.0647	−0.4773	−0.0464	0.1501	0.1322	−0.0872	−0.0070	−0.1947	0.0521
STDtoExternal	0.2082	0.0226	0.3149	−0.0128	−0.0403	0.3849	−0.0646	0.0914	−0.1585
STDtoReserves	0.1624	−0.0584	0.1325	0.0819	−0.0134	0.3364	0.1008	0.0444	−0.0412
ExRatechng	0.0245	0.0197	0.0194	−0.0047	−0.0500	0.0281	−0.0455	−0.0903	0.0336
ExRateCrisis	0.0933	0.1213	−0.0979	0.0092	−0.0469	−0.0575	−0.0890	0.0379	−0.0987
FiniteTerm	−0.3256	−0.2194	−0.1502	0.0672	0.0097	0.0213	0.1029	−0.1610	0.3026
YrsCurrent	−0.1804	−0.0734	−0.1744	0.0123	−0.0662	0.0037	0.0502	−0.0544	0.1172
DHMinor	−0.0195	0.0731	0.2027	−0.1441	−0.1499	0.2258	−0.0285	−0.0542	−0.2962
DHModerate	0.2319	0.1330	0.1692	−0.0561	−0.0292	0.0779	−0.0366	0.0786	−0.1600
Ms_mil_xpnd_gd_zs	0.1125	0.4369	0.1028	−0.1188	−0.0526	−0.1282	−0.0707	0.1832	−0.2238
Ms_mil_xpnd_gd_zs_sq	0.1264	0.3113	0.0436	−0.0836	−0.0324	−0.0707	−0.0044	0.1112	−0.2157
Ms_mil_mprt_kd	−0.2475	−0.0287	0.0266	0.1612	0.0306	0.1802	0.0056	−0.0316	0.2636
Ms_mil_mprt_kdsq	−0.2063	−0.0574	0.0150	0.1298	0.0120	0.1641	0.0301	−0.0748	0.2343

	ExRate	ExportstoGDP	FDI	FDItoGDP	STDtoExternal	STDtoReserves	ExRatechng	ExRateCrisis	FiniteTerm
ExRate	1.0000								
ExportstoGDP	0.1510	1.0000							
FDI	0.2137	0.0440	1.0000						
FDItoGDP	−0.0944	−0.1091	−0.1331	1.0000					
STDtoExternal	0.0924	−0.0765	0.0469	0.0335	1.0000				
STDtoReserves	0.1015	−0.0265	0.1495	−0.0043	−0.0040	1.0000			
ExRatechng	−0.1209	−0.0515	−0.0676	0.0056	0.0339	0.1234	1.0000		
ExRateCrisis	0.0643	0.3250	0.0645	0.0193	−0.0822	−0.0101	−0.0706	1.0000	
FiniteTerm	−0.4300	−0.2849	−0.3000	0.2313	0.0692	−0.0728	0.1182	−0.0530	1.0000
YrsCurrent	−0.1175	−0.2962	0.1500	0.0579	0.0823	−0.0058	0.0431	−0.1187	0.0910
DHMinor	−0.0960	0.0167	−0.2239	−0.0162	−0.0098	−0.0529	−0.0921	0.0365	0.1857
DHModerate	−0.0455	−0.0384	−0.0539	−0.0050	0.0303	0.1050	0.0994	0.0179	0.0253
Ms_mil_xpnd_gd_zs	−0.0647	−0.4773	−0.0464	0.1501	0.1322	−0.0872	−0.0070	−0.1947	0.0521

(*Continued*)

Table 2. (Continued).

Ms_mil_xpnd_gd_zs_sq	0.2082	0.0226	0.3149	−0.0128	−0.0403	0.3849	−0.0646	0.0914	−0.1585
Ms_mil_mprt_kd	0.0933	0.1213	−0.0979	0.0092	−0.0469	−0.0575	−0.0890	0.0379	−0.0987
Ms_mil_mprt_kdsq	−0.3256	−0.2194	−0.1502	0.0672	0.0097	0.0213	0.1029	−0.1610	0.3026
	YrsCurrent	DHMinor	DHModerate	Ms_mil_xpnd_gd_zs	Ms_mil_xpnd_gd_zs_sq	Ms_mil_mprt_kd	Ms_mil_mprt_kdsq		
YrsCurrent	1.0000								
DHMinor	−0.0125	1.0000							
DHModerate	−0.0194	−0.0701	1.0000						
Ms_mil_xpnd_gd_zs	0.0086	0.0008	0.2422	1.0000					
Ms_mil_xpnd_gd_zs_sq	0.0231	0.0492	0.2191	0.9004	1.0000				
Ms_mil_mprt_kd	0.0989	−0.1146	−0.0434	0.1535	0.0639	1.0000			
Ms_mil_mprt_kdsq	0.0438	−0.1145	−0.0528	0.0835	0.0160	0.9126	1.0000		

Table 3. Determinants of sovereign debt arrears/defaults (panel ordered probit coefficient estimates).

	A. Base model		B. Military expenditure (as a % GDP)		C. Arms imports (SIPRI trend)	
	Without debt arrears history	With debt arrears history	Without debt arrears history	With debt arrears history	Without debt arrears history	With debt arrears history
	(1)	(2)	(3)	(4)	(5)	(6)
Polity	−0.062301***	−0.071432***	−0.062930***	−0.072369***	−0.061837***	−0.068556***
FiniteTerm	−0.453633***	−0.400458***	−0.450947***	−0.388147***	−0.484652***	−0.463368***
Yrsoffc	0.024987***	0.025632***	0.020177***	0.022460***	0.018484**	0.018936**
YrsCurrent	−0.006077	−0.006909	0.001427	0.000359	0.015457	0.013042
Inflation	−0.000175	−0.000237	−0.000099	−0.000168	0.000085	0.000037
USIR	−0.020150	−0.014880	−0.005126	0.005089	−0.001325	−0.000604
LIBOR	0.002547	0.000760	0.001930	0.000585	−0.001152	−0.002847
ExRate	−0.000535***	−0.000523***	−0.000560***	−0.000558***	−0.000396*	−0.000377*
Exports	0.000611***	0.000489***	0.000731***	0.000587***	0.000794***	0.000733***
ExportstoGDP	−0.000476***	−0.000480***	−0.000431**	−0.000377**	−0.000163	−0.000147
FDI	−0.000220	−0.000211	−0.000230	−0.000232	−0.000066	−0.000029
FDItoGDP	0.000365*	0.000287	0.000409**	0.000279	0.000028	−0.000007
ExternalDebt	0.000562***	0.000610***	0.000571***	0.000580***	0.000329	0.000440**
TotalReserves	−0.000405**	−0.000392**	−0.000486***	−0.000474***	−0.000382*	−0.000389**
STDtoExternal	0.000253	0.000383**	0.000186	0.000310	0.000489**	0.000528**
STDtoReserves	0.000452**	0.000481**	0.000519***	0.000523***	0.000576**	0.000610**
ExRatechng	0.000031	0.000026	0.000103	0.000093	−0.000010	0.000001
ExRateCrisis	0.146692	0.162919	0.112502	0.140230	0.148973	0.143335
DHMinor		−0.541221***		−0.509551***		−0.421260***
DHModerate		0.214663**		0.255423**		0.348247***
Ms_mil_xpnd_gd_zs			−0.114008*	−0.186791***		
Ms_mil_xpnd_gd_zs_sq			0.014136**	0.018571***		
Ms_mil_mprt_kd					−0.000587**	−0.000600**
Ms_mil_mprt_kdsq					0.015260	−0.001028
Observations #	764	764	729	729	575	575
# of years	45	45	45	45	45	45

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

appear to be limited in increasing or decreasing the probability of higher-level defaults. Perhaps, the role of these variables is already captured by some other variables in our regression results. Interestingly, the history of minor defaults had a significant negative coefficient. However, this coefficient is possible because minor defaults are less likely to be followed by major defaults and this outweighs the potentially positive influence that minor defaults may have on the probability of other minor defaults, a suggestion later supported by the multinomial regression results. By contrast, a history of moderate default is positively linked to an increase in default probability and severity.

Since military expenditures have been routinely linked to the accrual of external debt, as discussed in the review of literature, it is surprising, then, that the ordered probit results indicate that relative to GDP level of increasing military expenditure (ME) lead to a decrease in the probability and severity of sovereign debt defaults. This trend was consistent when arms import levels are introduced in the regression model. This result contradicts the results of Karagol and Sezgin (2004), who found no significant relationship with the probability of debt rescheduling. However, when squared, ME/GDP ratios demonstrated a significant positive coefficient, indicating that, past a certain threshold, military spending does increase the probability of sovereign debt default. However, this coefficient was statistically insignificant for the squared representation of military imports (MI). Focusing on the ME/GDP ratio only, the non-linear combination of coefficients shows that the threshold beyond which the risk of default significantly increases is around 5%. We also tried the absolute level of military expenditure (level and squared) as a regressor, and the qualitative findings are similar. These extra estimates are available upon request to the corresponding author.

We also tried more extensions such as interactions of military expenditure to GDP ratio (Ms_mil_xpnd_gd_zs) and its squared values with FDI/GDP ratio, Yrsoffc, and ExRate. Broadly speaking, signs of the interactive terms remained the same, confirming that, beyond a certain threshold of military expenditure, even increases in years in office and level of FDI relative to GDP and depreciation/revaluation of exchange rate does not stop increasing the probability of sovereign debt default. The story is however different and signs of the coefficients of interactive terms are reversed and statistically significant with exports/GDP ratio and with FiniteTerm interactions. Similarly, due to the arbitrary nature of the thresholds in determining minor, moderate and major defaults based on defaulted debt, as discussed before, we also tried different thresholds of defaulted debt, such as minor default <100 million USD, moderate between 100 and <500 million and major as > = 500 million USD and re-estimated the regression again. Broadly speaking, the statistical significance and signs of the coefficients of the military-related variables did not change, confirming the stability of the coefficients and broader conclusions.

In our subsequent analysis, we perform panel multinomial logit regression to differentiate the impact of same set of independent variables on the probability of different levels of sovereign debt defaults. In doing so, we have to merge minor and moderate default categories due to relatively less number observations and related statistical issues. The outcome and related regression coefficients of this exercise are presented in Table 4. Broadly speaking, the estimates and analysis of panel data multinomial logit regression models with separate regressions run on minor/moderate and major levels of arrears/defaults affirm the results from the ordered probit. When observing ME to GDP ratio, this variable is only relevant for major defaults in statistical term, where an increase in the ME to GDP ratio reduces probability of default, but has a positive coefficient when squared, indicating that ME be too large as a proportion of GDP has detrimental impacts on default probability. The estimates not presented but available upon request also show that absolute level of increased ME is also negatively associated with both minor or moderate and major debt defaults, and the influence of ME is greater in mitigating major default risk than smaller debt default classifications. Again, once a certain threshold is reached, a further increase in military expenditure leads to an increase in default risk. Focusing on the ME/GDP ratio and major default only, the non-linear combination of coefficients shows that the cut-off point beyond which the risk of major default significantly increases is around 4.4%. Increasing military imports (MI) were also associated with a reduced probability of major default (at 5% significance level). These results stand in contrast to Karagol

Table 4. Determinants of sovereign debt arrears/defaults (multinomial logit regression estimates).

	Base model without debt arrears history		Base model with debt arrears history		Military expenditure (as a % GDP) & debt arrears history		Arms imports (SIPRI trend indicator values) & debt arrears history	
	Minor/ moderate level arrears/ default	Major level arrears/ default	Minor/ moderate level arrears/ default	Major level arrears/ default	Minor/ moderate level arrears/ default	Major level arrears/ default	Minor/ moderate level arrears/ default	Major level arrears/ default
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Polity	−0.137704***	−0.172679***	−0.099150***	−0.197769***	−0.096376***	−0.193610***	−0.093172***	−0.170458***
FiniteTerm	−1.613650***	−1.441645***	−1.894160***	−1.521473***	−1.837675***	−1.421116***	−1.056067*	−1.090929**
Yrsoffc	0.039615**	0.072561***	0.039420*	0.079234***	0.038523	0.076733***	0.073991**	0.082859***
YrsCurrent	0.113472*	−0.036396	0.113420	−0.022269	0.089928	−0.026878	0.068206	−0.034363
Inflation	−0.001057**	−0.000590	−0.001102**	−0.000670	−0.000946*	−0.000458	−0.001088*	−0.000019
USIR	−0.027922	−0.077283	−0.095452	−0.059929	−0.086628	−0.030331	−0.022469	0.010127
LIBOR	−0.005891	0.010677	0.007142	0.013032	0.003943	0.013918	−0.002377	0.003995
ExRate	0.000608	−0.001491***	0.000075	−0.001758***	0.000288	−0.001849***	0.000173	−0.001254*
Exports	−0.000473	0.001175**	−0.000828	0.001200**	−0.001039*	0.001452**	−0.000883	0.001836***
ExportstoGDP	−0.001050**	−0.001259**	−0.000772	−0.000235	−0.000852	−0.000029	0.000279	0.000596
FDI	−0.000407	−0.000587	0.000012	−0.000321	0.000012	−0.000481	0.000515	0.000298
FDItoGDP	−0.000564	0.000632	0.000439	0.000428	−0.000042	0.000212	−0.000060	−0.000483
ExternalDebt	0.001704***	0.001268***	0.000836	0.000951*	0.000809	0.000983*	0.000272	0.000446
TotalReserves	−0.001005**	−0.001027**	−0.001042*	−0.001095**	−0.001058*	−0.001275**	−0.001224*	−0.001122*
STDtoExternal	−0.000131	0.000825	−0.000954	0.001040	−0.001059	0.000887	−0.000725	0.001643**
STDtoReserves	0.001854***	0.001164**	0.001916***	0.001070*	0.001968***	0.001107*	0.002425***	0.001850***
ExRatechng	−0.000325	0.000006	−0.000016	0.000102	0.000099	0.000329	−0.000377	0.000310
ExRateCrisis	0.104277	0.267935	−0.246039	0.088391	−0.331245	0.105223	−0.264971	0.014333
DHMinor			3.616920***	−1.101095**	3.599558***	−1.087509**	3.528452***	−0.816708
DHModerate			4.217906***	0.326747	4.232518***	0.296850	4.015282***	0.358369
Ms_mil_xpnd_gd_zs					−0.068442	−0.559373**		
Ms_mil_xpnd_gd_zs_sq					0.005901	0.063607**		
Ms_mil_mprt_kd							−0.001431*	−0.001803**
Ms_mil_mprt_kdsq							0.133090	0.140114
Constant	6.417906***	5.384482***	−10.408390***	7.539633***	−10.080129***	7.768354***	−12.300580***	4.463475*
Observations #	764	764	764	764	729	729	575	575
# of years	45	45	45	45	45	45	45	45

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

and Sezgin (2004) whose results indicated that even if military spending affected the public debt levels, it would not negatively influence probability of default. The estimates related to squared values of MI are however not statistically significant, thus agreeing to Karagol and Sezgin (2004) at higher levels of MI though.

In terms of default history, a past of minor defaults indicates an increased probability of those respective default classifications (minor and moderate level arrears/default) but reduces probability of major defaults. Further, past moderate defaults do not seem to indicate future major defaults but are predictive of an increased probability of smaller and moderate level arrears/default classifications. Polity score is consistently negatively associated with all classifications of default but is more significant (based on the magnitude of the negative coefficients) in mitigating major default risk than smaller defaults. So more democratic countries are less likely to experience arrears/default on sovereign debt but especially with major debt defaults, perhaps due to better public accountability standards in relation to using borrowed funds. Furthermore, the country having a finite term of government reduces likelihood of many defaults. Years a country's leader remains in office is positively associated with default; this may be because a high number of years in office may suggest a less democratic process resulting in less stringent accountability standards in relation to using funds obtained through external borrowing.

Increased exports seem to increase the probability of major defaults but have a statistically insignificant impact on smaller default classifications. This result is unusual, as higher export volume is generally associated with greater liquidity to meet external debt obligations. However, one potential explanation comes from Hilscher and Nosbusch (2010), who found that for strong exporting countries with limited diversity in their export portfolio were more exposed to external shocks. According to Borensztein and Panizza (2009) debt defaults are often an outcome of economic shocks, so if increased exports create greater exposure to those shocks, then risk of default could be heightened. Like the findings based on the panel ordered probit models, increased total reserves reduce default probability in all arrears/default classifications and greater external debt increases probability of all defaults (in most specifications). Weaker exchange rate indicating revaluation based on changed competitiveness of the economy was also found to lower default risk, but only in major level of arrears/defaults. Higher inflation rates were also linked to lower default risk, but only for minor to moderate defaults and in only a few specifications and at higher significance levels. Finally, high short-term debt relative to reserves heightens the risk of sovereign debt defaults across most specifications.

Before we move to summarize our findings and suggest solutions to reduce the chances of sovereign debt defaults, some limitations of the study are necessary to be mentioned and needed to be understood well. Due to the complex relationships between explanatory variables representative of the determinants of defaults, Ghulam and Derber (2018) stated that calculating the determinants of default is "more art than science," and this is no less true in our analysis. To add to this, Fournier and Betic (2018) pointed out that several of the political variables studied in literature could be highly connected, implying that multicollinearity may be a limitation of several studies because it makes the importance of certain factors difficult to distinguish, resulting in large standard errors and preventing potentially significant factors from being registered as significant, according to Siegel (2016). This could be true of several macroeconomic indicators too, such as foreign direct investment, exports, external debt, and total reserves. However, multicollinearity is probably inescapable in these massive multivariate analyses of sovereign debt defaults. More thorough analyses might look at the interactions between several of these variables in more depth, potentially leading to a more holistic understanding of the reasons of debt default, although that is outside the scope of this study.

While this study was not limited in terms of coverage, it would benefit from larger observation sets (more countries covering different regions of the world in particular to accommodate *clustering* in sovereign debt defaults as well as separate analysis of countries belonging to different geographic regions and evolution of determinants of default over time). As mentioned before, the classifications for different tiers of default are drawn arbitrarily, therefore future research that builds on this

technique should look for a more reasonable explanation for where the different debt default/arrears classes are drawn. Another factor to consider is that the overall size of the economy is not considered. It is doubtful that an economy fifty times the size of another experiencing a default of the same magnitude will suffer the same consequences. Therefore, future research could classify defaults according to country size too, which in our case is not possible due to coverage of only 20 countries.

Conclusions and Implications

This study used a panel data ordered probit and multinomial logistic regression to examine the determinants of sovereign default according to the magnitude of default in a country-year panel dataset covering 20 countries over a 50-year period. The study contributes to the literature both through applying the appropriate methods and through the examination of defence/military spending variables. The findings of this study show that, regardless of the magnitude of the default, the factors that determine default are largely similar. Generally, military spending seemed linked to a decrease in the probability of default, possibly an outcome of improved economic growth due to employment generation in developing countries and a lower need for debt finance when military spending is not too high. However, past a certain threshold, excessive military spending will increase default probability and may rise to a point where it substantially heightens sovereign debt default risk.

Certain factors demonstrated a clear and consistent relationship with the probability of default, higher polity score reduces default probability, indicating more democratic countries are less prone to default.

Short-term debt to reserves is positively related to default, regardless of default, most likely due to the insolvency risk indicated by Manasse and Roubini's (2009). A higher level of exports is linked to an increase in the probability of major defaults due to perhaps generating shocks. Political variables are enormously essential in determining default; more democratic countries are less likely to default than more autocratic ones, and a country's leader being on office for longer periods is predictive of an increased default risk. Also, a country leader being subject to a finite term is also predictive of a lower default risk. Furthermore, prior history of minor and moderate defaults is a strong predictor of future minor and moderate defaults, but not of major defaults. Additionally, greater external debt levels and more important short-term debt ratios are strongly linked to an increased probability of default. Surprisingly, there was no verification of the link between either LIBOR or US interest rates with default likelihood

When looking at some of the potential solutions to mitigate default risk, it is important to remember that these prescriptions should be considered in this country, as they may not be appropriate for other country. For example, a country with little to no corruption is more likely to derive its default risk from other factors, such as taking on too much short-term debt. Military spending seems associated with a decrease in the probability of minor, moderate and major defaults. It seems to be the case that past a certain threshold, military spending increases will increase the probability of default. As such, it is prudent for countries to rigorously analyse their military spending to ensure it is not excessive, as this may be heightening their default risk. However, in certain cases, a high defence burden may be necessary depending on the threats the country is facing despite its increasing default risk. Under these circumstances, Bariş (2018) suggests that focusing on domestic production and curtailing dependency on foreign countries for military equipment may help to reduce the accrual of external debt within the country and carry economic benefits from greater levels of domestic production.

Our empirical analysis supports suggestions by Zeaiter (2016) that countries can reduce risk by transitioning to a more democratic state; therefore, boosting democracy and increasing government power is a 'cornerstone' of reducing default risk. However, this advice is unlikely to be beneficial, as autocracies may be wary of this proposal because it could jeopardise their status. Second, countries

should know the debt they are taking on. They should make sure they are not taking on too much short-term debt. While this analysis sets no limits, Manasse and Roubini's (2009) claims that short-term debt exceeding 130 percent of total reserves increases default risk; they should stay well below this level. It seems to be the case that an increase in export volume increases default risk. While it is uncertain why this is the case, it may be due to an overdependence on a limited portfolio of exports making the country more vulnerable to external shocks. If so, the country may benefit from diversifying their exports, thus reducing their susceptibility to these shocks whilst maintaining the benefit of improved liquidity that comes from exporting.

Overall, while there are some limits (see results and analysis section), this study provides a useful new paradigm for evaluating the determinants of default based on default size and linkages with defence spending. More research is needed to understand how the determinants interact with one another; first, by developing a more well-founded classification system for the default brackets, second, by expanding the observation set, and third, by examining the relationships between independent variables in greater depth to gain a more holistic understanding of how the determinants interact with one another.

Disclosure statement

No potential conflict of interest was reported by the authors.

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