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Economic Sanctions and Military Expenditure in Iran: A Brief Survey

KEY MESSAGES

- **The effects of sanctions on military spending depend on the relative weight of income and security effects for the target country. If the income effect is larger than the security, then the country is more likely to observe a decline in military spending**
- **Economic sanctions have been shown to decrease military spending in Iran, as supported by time series models (VAR & ARLD) and counterfactual analysis. Therefore, it can be inferred that in this case the income effects of sanctions were stronger than the security effects**
- **By cutting the flow of oil rents, sanctions may force the government to increase taxes and may prompt political reforms**
- **Political reforms may lead to an increase in the share of non-military spending, thereby decreasing military expenditures**
- **The military industry in Iran has significant linkages with the country's economy, so sanctions may reduce military spending, but they may also decrease economic growth due to the aforementioned linkages**

The history of economic sanctions imposed on Iran begins with the Islamic revolution in 1978-79 and the establishment of the Islamic Republic. It was triggered by the seizure of hostages at the US embassy in Tehran by a group of political activists in 1979. In response, the US froze Iranian government assets in US banks. The unilateral sanctions of the US against Iran gained momentum under the Clinton administration, when sanctions against foreign businesses investing in the Iranian oil and gas industry were issued. Nuclear-related sanctions began to take shape when, for the first time in 2002, the existence of secret nuclear sites in Iran was revealed. The UN imposed nuclear- and ballistic missile-related sanctions on Iran in 2006, 2007, 2008, and 2010, mainly targeting specific individuals, arms sales, and financial assets.

In 2012, there was another surge in international sanctions when the EU joined the US in imposing an oil embargo against Iran. Furthermore, Iranian central bank assets and bank-to-bank transactions were also affected by sanctions. The key difference from earlier sanctions was the focus on Iranian crude oil exports and the cooperation of the EU in imposing the sanctions. The painful years continued until 2015, when Iran reached an agreement with the P5+1 (the five permanent members of the United Nations Security Council—China, France, Russia, United Kingdom, United States—plus Germany), which was implemented on January 16, 2016, resulting in the removal of nuclear-related sanctions. However, this period was short-lived; following the election of Donald Trump and his clear opposition toward the Iran deal, the sanctions were reimposed in 2018.

Under these sanctions, the senders hoped to force the Iranian government to revise its nuclear program and reduce its financial capacity to invest in military projects. It also aimed at discouraging other countries in the Middle East and North Africa (MENA) region from following the example of Iran and at mitigating nuclear competition in the region. Under the maximum economic pressure campaign of the Trump administration, the desire for change in the political system was also a significant reason behind imposing the sanctions. The idea was simple: increase economic pressure, and it would become less costly for people to rebel against the system. As an alternative to military intervention, economic sanctions were seen as an effective tool in foreign diplomacy to achieve the goals. In practice, however, the longer that a country is under sanctions, the less effective the sanctions will be (Hakimian 2019). This is due to the adjustment process in the target economy and its ability to find alternative ways of doing business locally and internationally. Iran was not an exception. A recent study by Cheratian et al. (2023) identifies the strategies that small and medium-sized firms in Iran use to neutralize the effects of sanctions, such as cutting marketing costs, overhead expenses, research and development (R&D) expenditure, and increasing investment in information technology. However, resistance against sanctions is associated with lower welfare in the economy, both at the aggregated formal and informal levels (Khabbazan and Farzanegan 2016; Farzanegan et al. 2016; Ghomi 2022; Laudati and Pesaran 2022; Farzanegan and Hayo 2019). The survival under sanctions is also associated with the expansion of the black market in foreign exchange transactions, rent-seeking, and informal economy (Zamani et al. 2021; Farzanegan 2013). The Control of Corruption indicator for Iran, published

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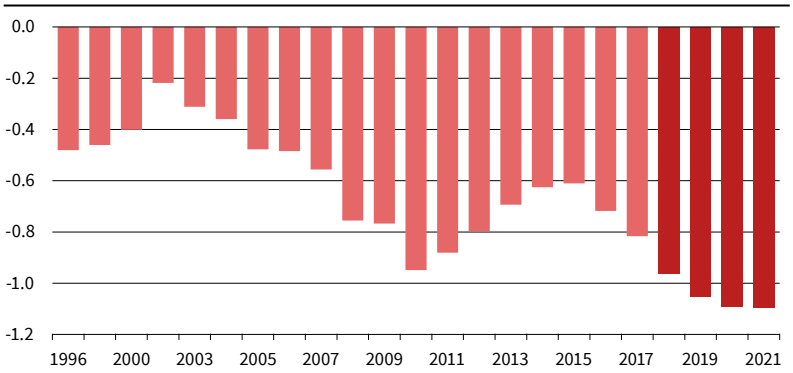
Figure 1

Control of Corruption[a] in Iran: Worsening under Sanctions



[a] In units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.
Source: World Bank (2023).

by the World Bank (2023), captures perceptions of the misuse of public power for private benefits at both petty and grand levels, as well as the capture of the state by private interests. This index shows a continuous negative trend (worsening of corruption) in Iran since 2015, with low records achieved after the Trump administration reactivated sanctions in 2018. Figure 1 presents the development of Iran's estimated score for control of corruption from 1996 to 2021.

Economic sanctions and resistance against it in Iran have also exerted a higher burden on women. In other words, sanctions are shown not to be gender-blind and place additional pressure on employed women in a country like Iran, where female labor force participation was already low (Demir and Tabrizy 2022).

In this brief overview, I will examine studies that have focused on the effect of sanctions on Iranian military spending.

RELEVANCE OF MILITARY SPENDING FOR GROWTH: THEORY AND EVIDENCE FROM IRAN

Understanding the effects of economic sanctions on military spending is important because of the established links between the latter and economic growth. Of course, this link can be positive or negative, depending on the country and the military's forward and backward linkages with the rest of the economy. The positive effect of military spending on the economy is often discussed through its influence on the provision of education, medical care, job opportunities, and scientific and technological innovations. The proponents of military spending see it through the Keynesian theory. However, other studies argue for the negative effects of military spending on growth through channels such as in the reduction of saving rates and investment, decrease in other productive spending in the education and health sectors, increase in the budget deficit and pressure on debt and tax rates, and an increase in corruption.

In a case study of Iran, Farzanegan (2014) examined the dynamic relationship between military spending and economic growth in Iran, using data from 1959 to 2007. The impulse response analysis shows that there are strong forward and backward connections between the military industry of Iran and economic growth. The study finds that the response of economic growth to a positive shock in military spending is positive and statistically significant in the short run. The analysis shows one-way Granger causality from military spending to economic growth. In other words, the earlier records of military spending and its development in Iran have strong explanatory power to forecast the future trend of economic growth in Iran.

DO ECONOMIC SANCTIONS REDUCE MILITARY SPENDING OF IRAN?

In various studies, I have examined this question with different methodological approaches. The study of Chun (2010) was one of the first investigations on the nexus between the development of oil rents and military spending, using 10 years of data from 1997-2007. He calculated the elasticity of demand of military spending in five oil-rich economies, including Iran. His goal was to examine the response of military spending given a specific change in oil revenues. He mainly found inelastic demand for military spending in these countries, concluding that "attempts to limit defense spending by tinkering with a producer of oil revenues are likely to fail." He was against using economic sanctions to reduce the military spending of Iran, since it was shown that the demand for military spending is inelastic with respect to changes in oil rents. He concludes that "we should constantly remind ourselves that in cases where oil revenue did shrink, defense budgets increased, or decreased at a lower rate than the fall in revenues."

Chun's study motivated me to explore further the dynamic relationship between oil rents changes and Iran's military spending. In Farzanegan (2011), I used a longer time series data on Iran (from 1959 to 2007) and employed the vector autoregressive (VAR) model to analyze the dynamic association between oil rents and different types of government spending in Iran. The VAR model is stronger in identifying the dynamic interaction between variables and provides the necessary inputs to simulate the responses of the variables of interest to a shock in other variables. Stock and Watson (2001) refer to this advantage of VAR: "since VARs involve current and lagged values of multiple time series, they capture comovements that cannot be detected in univariate or bivariate models." I used both symmetric and asymmetric changes in Iran's oil rents. The issue of economic sanctions was captured by the increase in the negative changes of oil rents. Using an asymmetric approach to measure changes in Iran's oil and gas rents, the results show that the response of military and domestic security spending to a positive shock in "negative changes" of oil rents is negative and statistically significant. This shows the

reaction of the Iranian government in cutting military spending in response to unexpected declines in oil and gas rents, which can be caused by oil and banking sanctions. The response of non-military spending, including education and health, to such negative shocks was initially negative but then changed to a positive and statistically significant trend. On the other hand, the response of military and security spending to negative changes in energy rents remained negative for five years after the shock.

One possible channel through which sanctions may affect the composition of government spending is through the quality of political institutions. If economic sanctions, by cutting oil rent flows, increase the dependency of the state on tax revenues, then one may expect, in theory, an improvement in the quality of democratic institutions. The greater the fiscal dependency of the state on its people, the higher its accountability to the citizenry and the higher the political participation of individuals. Dizaji and van Bergeijk (2013) provide some evidence on the positive short-term response of democracy to negative changes in Iran's oil rents.

What would be the response of military and non-military spending to a positive shock in democratic institutions? In Dizaji et al. (2016), we examined this question in a theoretical and empirical study, using annual data from 1960 to 2006. Our theoretical model suggests that "in an autocracy, the state considers only its self-interest and makes decisions to maximize rents and secure its assets against potential losses. A democratic government acts as a representative voice of the people, choosing policies that maximize the well-being of the population, i.e., workers." We applied a VAR model and estimated the impulse response and variance decompositions with collected data from Iran. We show that the response of military spending to a positive shock in the quality of democratic institutions is negative and significant for 3 years after the shock. The response of education spending to a positive shock in democratic institutions is positive and significant for the first 4 years following the shock. In short, economic sanctions may also reduce the target economy's military spending if they manage to increase the voice of the country's people in the policymaking process and increase the government's financial dependency on its people. If sanctions result in a worsening of political institutions due to a higher security risk to the political regime, the Dizaji et al. study shows a positive response of military spending and a negative response of non-military ones.

In the studies discussed, identification of the economic sanctions on Iran are based on negative changes in oil rents. A more direct approach is to use sanction binary variables, which capture their types (unilateral versus multilateral sanctions) and intensity. This approach was used in Dizaji and Farzanegan (2021). We used annual data from 1960 to 2017 and the autoregressive distributed lag (ARDL) model. The model is helpful in establishing a long-run relationship in small samples. Military spending is the outcome of interest in the study and the established covariates include population size, economic development, non-military spending, total trade, average of military spending of MENA countries (excluding Iran), quality of political institutions, and a binary variable for Iran-Iraq war period (1980-1988). The key addition is the inclusion of sanction binary variables. We add a sanction binary variable that captures the intensity of sanctions and is coded as an ordinal variable (0–3), categorized as no sanctions (0), limited sanctions (1), moderate sanctions (2), and extensive sanctions (3). We also look at this issue from a different perspective and define the sanction binary variables based on the number of states involved.

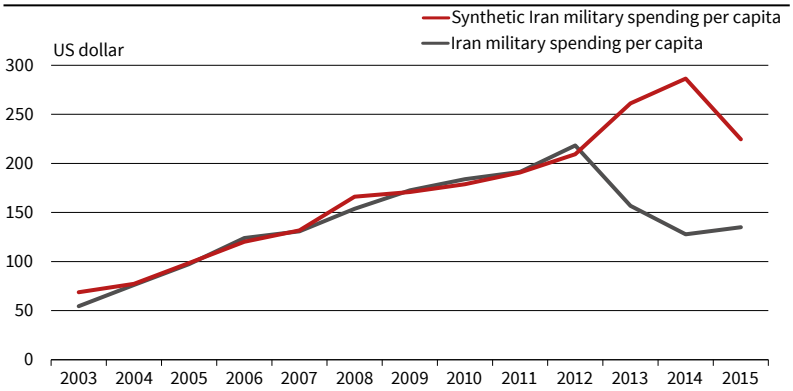
The unilateral sanction binary variable captures the impact of unilateral US sanctions on Iran and is coded as 1 if sanctions are unilaterally imposed, such as in the periods of 1979-2005 and 2016-2017, and 0 in other years. The multilateral sanction binary variable is coded as 1 if sanctions are imposed by a group of countries, such as in the 2006-2015 period, and 0 in other years. We show that the intensity of sanctions imposed on Iran has a crucial impact on its military expenditure. Per our results, each increment in sanction intensity reduces military spending by roughly 33 percent in the long term, all else constant. Notably, our research reveals that only multilateral sanctions can effectively impede Iran's military aspirations. Implementation of multilateral sanctions brings about a remarkable 77 percent decrease in Iran's military spending over the long term, controlling for other factors, including GDP, oil rents, population, trade, non-military expenditure, average military spending in the Middle East, quality of democratic institutions, and the Iran-Iraq war.

None of the earlier studies could show the possible causal effect of sanctions on Iran's military spending. To do this, one needs a counterfactual Iran that is similar to the Iran before the imposition of sanctions and that can reproduce the actual Iran, especially with reference to its military spending, by that point. Once this counterfactual is found or estimated, we can trace development of military spending in both Iran and its synthetic version after the imposition of sanctions. If the sanctions have a significant effect, then we should be able to observe it by estimating the gap in military spending between Iran and its counterfactual.

I applied the synthetic control method (SCM) for the first time to measure the possible causal effect of the significant sanctions imposed during the Obama administration (after 2011) on Iran's military spending. The results, shown in Farzanegan (2022), address the question: What would Iran's military spending have looked like in the absence of international sanctions?

Figure 2

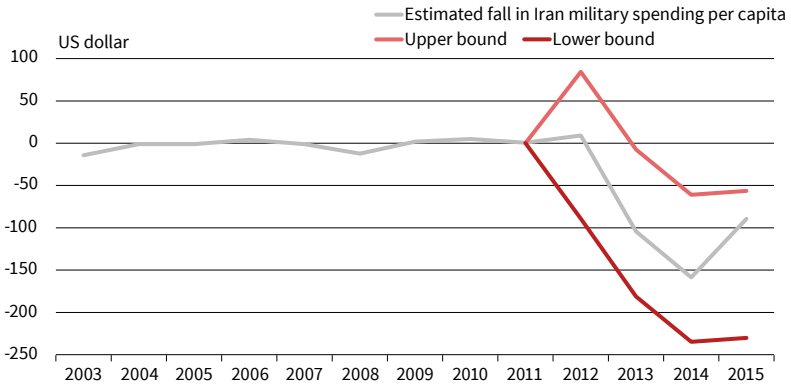
Military Spending per Capita: Iran versus Synthetic Iran



Source: Farzanegan (2022). © ifo Institute

Figure 3

Per Capita Military Spending Gap between Iran and Synthetic Iran



Source: Farzanegan (2022). © ifo Institute

I find that over the entire 2013–2015 period of international sanctions, the average per capita military spending was reduced by approximately $ 117 per year. To get this result, I used annual country-level panel data from 2003 to 2015. The treatment year is 2012, when the EU and the US started the oil embargoes on Iran. Nuclear-related sanctions such as oil embargoes were lifted in January 2016. To create a simulated version of Iran, I utilized a weighted average of comparable countries in the donor pool. The donor pool included a sample of 12 countries that are members of the Organization of the Petroleum Exporting Countries (OPEC) and/or located in the MENA region. These countries are Algeria, Angola, Bahrain, Ecuador, Iran, Israel, Jordan, Lebanon, Morocco, Nigeria, Oman, and Saudi Arabia, after excluding any countries with missing data.

For an impartial assessment of Iran's post-2012 sanction trajectory, it is essential that the control countries that were used to generate the simulated Iran did not experience any significant exogenous shocks, such as sanctions, wars, or revolutions, from 2003 to 2015. Notable events in the MENA region during this time period include the military occupation of Iraq in 2003 and the Arab Spring of 2011-12, which led to political changes in some MENA countries. As a result, I have excluded Iraq, Kuwait, Libya, Tunisia, Egypt, Yemen, and Syria from the list of control countries.

To generate the most accurate version of the simulated Iran, I found that a weighted average of four countries provides the best match. Angola, Nigeria, Ecuador, and Saudi Arabia are the countries with the highest weights in this average, at 44 percent, 33 percent, 18 percent, and 5 percent, respectively. The simulated model of Iran accurately mimics Iran's per capita military expenditures prior to the imposition of international sanctions. However, after 2012, the two trends start to diverge markedly. While per capita military spending in the actual Iran slows down, the synthetic Iran continues to experience a similar pace of increase in military spending as before the sanctions. Towards the end of the sample period, the gap between the two trends widens, suggesting a noteworthy adverse impact of the international sanctions on Iran's military expenditure (Figures 2 and 3).

CONCLUSIONS AND POLICY IMPLICATIONS

In this brief survey, I reviewed the evidence on the significant relationship between Iran's military spending and economic growth, implying forward and backward linkages of the military industry with the rest of the Iranian economy. I also examined studies that focused on the effect of economic sanctions on Iran's military spending. Some of these studies identified sanctions by using negative changes in Iran's oil rents, while others used a more direct approach to generate a variety of binary variables to capture the sanctions' type and intensity. Finally, I discussed how the synthetic control method can help identify the possible causal effects of sanctions on military spending, using the case study of Iran.

The possible effect of sanctions on military spending depends on the relative dominance of income effects versus security effects of sanctions. If the negative income effects of sanctions outweigh the security risks, then a decline in military spending is more likely to be observed. Otherwise, an increase is expected. Additionally, a possible channel through which sanctions may affect the military budget is by cutting oil income, which may influence the quality of the target's democratic institutions and increase the state's dependency on taxation and contributions from individuals and the private sector. However, the outcome of negative oil rent shocks on taxation depends on the size of the informal economy (Ishak and Farzanegan 2020). The higher the dependency and engagement of individuals in financing the state, the greater the pressure on the system for more accountability and wiser policymaking, especially in the domain of international relations. The positive effect of sanctions on democratic institutions might have positive consequences in substituting military spending with non-military spending, such as on the education and health sectors. However, evidence of the positive

effects of sanctions on democratic institutions is limited and fragile.

Economic sanctions, by cutting oil rents, may force the state to revise its subsidy programs and increase the tax burden, which can increase internal conflict (Ishak and Farzanegan 2022). The latter outcome is more likely if the informal economy is also under pressure from sanctions, as shown by Farzanegan and Hayo (2019). In this case, security risks may outweigh the income effects of sanctions and force the autocratic state to increase its military and security spending to protect its power against internal and external risks.

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