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Abstract

This study examines how the quality of political institutions affects the distribution of the government budget in Iran. We first introduce a mechanism through which democracy can shift government expenditure from national defense (military) to productivity-enhancing public spending (e.g., education). Using impulse response functions (IRF) and a variance decomposition analysis (VDC) on the basis of a vector autoregressive (VAR) model, our results imply that the response of military spending to an improvement (a deterioration) of democratic institutions is negative (positive) and statistically significant, whereas that of education spending is positive (negative) and significant. Our results are robust to other indicators of political institutions, different orderings of variables in the VAR and alternative specifications of government spending categories.

JEL-Code: H110, H410, P160, O530, O430.

Keywords: political institutions, military spending, education spending, Iran, VAR modeling.

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1- Introduction

Literature and historical evidence show that dictators in oil-rich economies are dependent on oil and need well-established military and security apparatuses to protect their rents (Wintrobe 2001, 2012; Acemoglu et al., 2010). Autocracies may therefore allocate government expenditure differently than democracies, which are known for devoting a larger share of their budget to productivity-enhancing public goods that foster long-run economic development (Olson, 1993).

The goal of this study is to examine how the quality of political institutions shapes the behavior of a state towards the allocation of public spending between military and other social expenditures. We focus on the case of Iran to quantify the magnitude and significance of political institutions in government military and non-military spending behavior. We use a vector autoregressive (VAR) model and its applied tools, i.e., impulse response functions and a variance decomposition analysis, to examine the dynamic relationship between political institutions and different categories of government spending in Iran from 1960 to 2006. This is the first attempt to our knowledge to assess the dynamic response of military and non-military spending to symmetric and asymmetric shocks in the political institutions of Iran. The empirical investigation is preceded by a simple model that shows a potential mechanism through which the political regime determines a government's spending behavior. An autocratic government is inclined to direct more expenditure towards national defense to protect its vested interests. A more democratic regime is instead more likely to shift resources towards public goods, such as education, that increase the wage premium of skilled workers in the private sector.

Our main results show that an improvement in the quality of political institutions leads to a negative and statistically significant response of military spending and a positive and statistically significant response of education expenditure in the short term. By contrast, a deterioration of political institutions results in a positive response of military spending and a negative response of

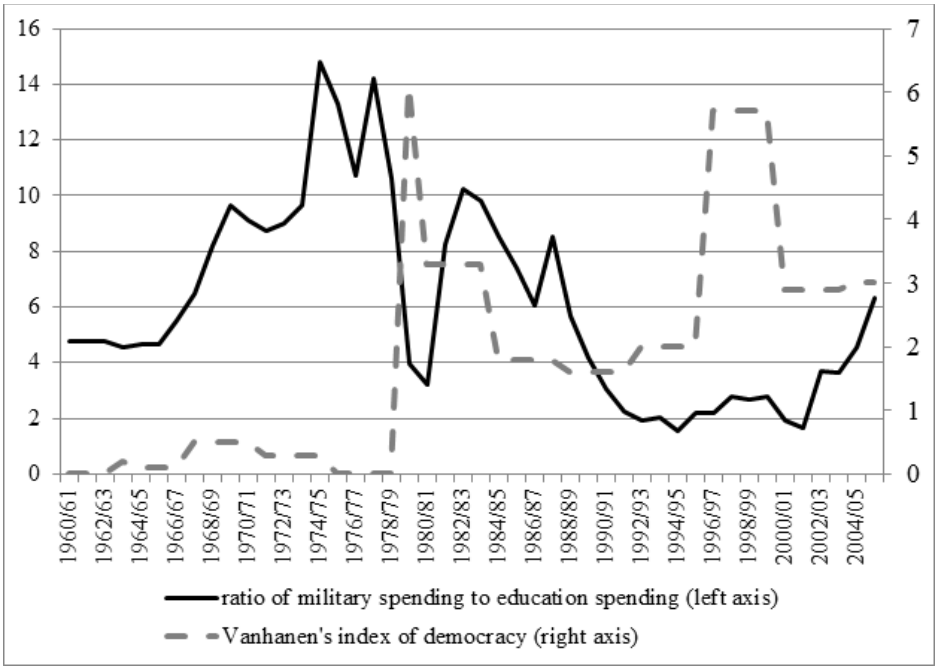
education and health expenditures. Iran provides an interesting context in which to study this phenomenon because it has experienced different political regimes: the autocracy of Pahlavi, in which the Shah was the most powerful political figure, and the post-1979 Islamic revolution, which involves factionalized semi-democracy. In the spirit of Rodrik (2007), a case study analysis helps mitigate concerns about the crucial effect of heterogeneity between countries in cross-country regressions when examining the association between political institutions and government spending compositions. Furthermore, our empirical approach makes it possible to test our theoretical predictions by examining how asymmetric shocks in political institutions are reflected in the allocation of the budget to military vs. non-military expenditures in the years following the initial shock.

As is shown in Figure 1, the ratio of military spending to education spending is continuously increasing, reaching its highest levels under the autocracy of the Shah (1960-1978/79). This ratio dropped significantly during the initial years of the revolution, when democracy indicators showed a significant improvement. However, we observe an increase in the ratio following the post-revolution degradation of political institutions, the consolidation of political power at the hands of religious factions and the occurrence of external conflicts. The military spending to education spending ratio fell and remained at its minimum levels over the study period during the reformist government of Khatami. Khatami was elected as president with 70 and 78 percent of the public vote in 1997 and 2001, respectively. Mr. Khatami's main agenda was empowering the Iranian civil society and reducing the role of militants in the political economy. Such large-scale reforms under Khatami to increase the role of civil society angered revolutionary guards, who saw their economic and political rents come under attack. On 9 July 1999, a group of top

commanders of the revolutionary guard issues an open letter that addressed President Khatami, warning him about his reform plans and civil society activities.[1]

As a result, the second office of Khatami was accompanied by an increased power of conservative factions and politicians affiliated with revolutionary guards in the parliament. We can observe a fall in the democracy indicator and an increasing trend of the military spending to education spending ratio starting from the final years of Mr. Khatami's presidency. In 2005, Mr. Ahmadinejad, who had backward linkages with the military, took office. There was an increasing presence of the Iranian revolutionary guards in politics under Ahmadinejad's presidency, similar to the close association observed between the ex-Shah of Iran with the Iranian army.[2]

Figure 1. Democracy and the ratio of military spending to education spending in Iran



Source: CBI (2014), Vanhanen (2011) based on the authors' own calculations

[1] See the English translation of the message at http://www.princeton.edu/irandataportal/laws/proclamations/icrg-letter/ and its original text in Farsi at http://www.princeton.edu/irandataportal/laws/proclamations/icrg-letter/ICRG_Letter_Persian.pdf

[2] For a review of "The Revolutionary Guards' Role in Iranian Politics", see Alfoneh (2008).

This paper is structured as follows: In Section 2, we present a review of the literature on government spending and political institutions' nexus. Section 3 presents our theoretical model, which leads to testable propositions. In Section 4, we describe the data we use and explain the empirical methodology and results. Section 5 concludes the paper.

2- Review of empirical and theoretical literature

Despite the vast literature on the interplay between political regimes, economic growth, and income distribution, little work in the literature investigates the effects of the characteristics of a political system on different categories of government expenditure. A number of existing studies explore the relationship between democracy and the total amount of public expenditure. Plümper and Martin (2003), Hausken et al. (2004) and Aidt et al. (2010) find a U-shaped relationship between democracy and public spending. They suggest that for low levels of democracy, public spending is high to meet the demand of elites, whereas for high levels of democracy, the usual median voter model predictions apply, and public spending is high due to popular demand for public goods. For medium levels of democracy, however, neither of these pressures is active, and government spending is at its minimum.[3]

Other studies have focused on the relationship between democracy and government expenditure in areas such as military, education, and health. As for military expenditure, it is generally believed that an increase in the degree of democracy decreases military expenditure. Democratic states are more likely to be at peace and less prone to become involved in international conflicts (James et al., 1999; Oneal and Russett, 1997; Lebovic, 2001). Democratic states resolve their domestic conflicts through compromise and nonviolent means, which facilitates an environment where international conflicts between democratic states are also settled peacefully (James et al.,

[3] In addition, Aidt and Eterovic (2011) suggest that political competition appears to be negatively correlated with the government size, and the opposite is true for political participation.

1999). Lebovic (2001) shows a positive association between the quality of democratic institutions and the share of non-military expenditures to the military expenditures. Additionally, Yildirim and Sezgin (2005) use cross-sectional and panel data for 92 countries from 1987 to 1997, and they find an inverse relationship between the level of democracy and military spending. Few studies investigate the relationship between regime type and education outcomes. Using a time-series cross-sectional analysis, Brown and Hunter (2004) examine the relationship between democracy and education spending in 17 Latin American countries between 1980 and 1997. They show that democracies devote a higher percentage of their educational resources to primary education to a level that benefits the largest segment of the electorate and is most critical for human capital formation in developing countries. Besley and Kudamatsu (2006) also highlight the association between political institutions and health spending in a cross-country analysis.

The political science literature has established evidence of a trade-off between public spending on military and more socially oriented areas such as education and health, and it shows that this trade-off depends on the political regime (Russett, 1969; Deger, 1985; Palmer, 1990; Hewitt, 1992; Kimenyi and Mbaku, 1995; Goldsmith, 2003; Fordham and Walker, 2005). A number of hypotheses have since been used in economic literature to build rich models that illustrate the relationship between public expenditure and political institutions. The results are generally mixed and can go in either direction. Besley and Robinson (2010) suggest that democracies may be able to spend larger amounts on military for national security purposes because they do not face as big of a threat of a coup from a strong military as dictatorships do. Besley and Persson (2009) instead show that states with less developed political systems are more susceptible to internal conflict and thus have more incentives to invest in their military. Acemoglu et al. (2010)

demonstrate how a ruling autocrat may create a powerful military and make concessions to command the military's loyalty to help maintain the regime. Acemoglu et al. (2011) study how government bureaucracies can also lead to the emergence of inefficient states in democracies as an outcome of patronage by the elite to capture democratic politics and reduce redistribution. Acemoglu (2005) shows that states with weak political institutions underinvest in productivity-enhancing public goods because self-interested political elites do not anticipate any future private rewards from them. Falkinger and Grossman (2005) explore the conditions under which the elite in an autocracy might support education spending to promote productivity and influence prices in favor of their vested interests.[4]

In what follows, we set up a model that encompasses both military and education expenditure in a unique simple framework to study their trade-off under different political regimes. In addition, we shift our focus away from rebellions, revolutions, coups, and patronage. We take a different approach to study the policies of interest by looking at the dynamics of the labor market as an outcome of public expenditure and relative political freedom. The role of military spending in our model is national defense and that of social public spending is investment in productivity-enhancing public goods, such as education. Finally, we introduce an environment in which workers are heterogeneous with respect to the level of their cognitive skills, which allows us to show how different public policies may be chosen under the same political regime contingent on the distribution of skills in a society.

3- The model

In this section, we propose a simple framework to explain a government's allocation of public expenditure based on the political regime in place. Consider a simple case of a small open

[4] Saint-Paul and Verdier (1993) also present a model where public education constitutes an instrument of inter-generational redistribution and creates human capital. In their set-up, democratization increases education spending.

economy with two sectors to represent a country dependent on trade that cannot influence world prices.[5] The first sector is controlled by the state and produces good *Y*. It operates through rents from natural resources (oil) that can be protected from potential destruction or erosion through military expenditure. The other sector is a private industrial sector that is run by entrepreneurs and uses human capital as a factor of production to produce good *X*. Social expenditure such as health and education spending enhances human capital and is therefore biased towards raising labor productivity in this sector. We aim to show how political institutions shape a government's investment decision. 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.

State good

The state sector is perfectly competitive with constant returns-to-scale technology and homogeneous products. There are two factors of production: labor and natural resources. The production function is

$$Y(L_A, T) = L_A^{\eta} T^{1-\eta}, \tag{1}$$

where L_A represents workers employed in the state sector, and T is natural resources. The state, as the owner of natural resources, earns the total returns to natural resources:

$$Tr = TP_A(1-\eta)\left(\frac{L_A}{T}\right)^{\eta} = (1-\eta)P_A Y, \tag{2}$$

where r represents the rents per unit of natural resources, i.e., the value of marginal returns to resources, and p_A indicates the price of the good produced in the state sector.

[5] Iran is a follower in the oil market, and global oil prices are determined to a great extent based on international markets and affected largely by factors beyond the Iranian economy, e.g., global economic growth, the production of other oil countries, OPEC restrictions and speculation activities, among others.

Private industry

Good *X* is produced using only labor. Workers have a continuum of skills, with $Z \in [0,\infty]$ representing the cognitive skill level of workers: Each worker produces $\varphi_X(Z)$ units of the good, where $\partial\varphi_X(Z)/\partial Z > 0$. Recall that because production in the state sector does not require skills, all workers employed there produce the same amount regardless of their skill level, $\varphi_Y(0)=1$.

Firms in this sector face unit cost $C_X = \frac{W(Z)}{\varphi_X(Z)}$. In a perfectly competitive labor market, wage distribution over *Z* adjusts to make the unit costs of firms equal. Firms minimize their costs given the equilibrium wage distribution $W(Z) = C_X\varphi_X(Z)$. There is some worker with skill level Z^* who is indifferent between working in the industry (*X*) and working the state (*Y*) sector. This gives the condition $w(L_A,T) = W(Z^*) = C_X\varphi_X(Z^*)$, which can be rewritten as

$$C_X = \frac{w(L_A,T)}{\varphi_X(Z^*)} < w(L_A,T), \tag{3}$$

where $\varphi_X(Z^*)$ is increasing in Z^*, and $w(L_A,T)$ is decreasing in Z^* (because it increases L_A and wage is negatively related to L_A due to diminishing marginal returns to labor). Unit cost is therefore a decreasing function of Z^*.[6] Because $W(Z^*)$ adjusts to make the least skilled worker in the *X* sector indifferent between being there and being in the state sector, and this threshold wage is set in the background state sector, decreasing (increasing) Z^*, all else equal, has a positive (negative) effect on $W(Z)$ for the *X* sector workers because C_X increases (decreases).

Preferences

The preferences of individual *i* are Cobb-Douglas over a state good *Y* and a manufacturing good *X*:

[6] Note that $\varphi_X(Z^*)$ is not equal to one because the worker is skilled and has a higher productivity than it could have achieved in the state sector, which requires no skills.

$$U_i = Y_i^{(1-\beta)} X_i^{\beta}. \tag{4}$$

Individuals maximize utility under the budget constraint $I_i = P_A Y_i + P_X X_i$, where I_i is income, yielding the optimal level of consumption for each good: $Y_i^* = (1-\beta)\frac{I_i}{P_A}, X_i^* = \beta\frac{I_i}{P_X}$.

We can now rewrite the indirect utility as

$$V_i^* = (Y_i^*)^{1-\beta}(X_i^*)^{\beta} = \beta^{\beta}(1-\beta)^{1-\beta}\frac{I_i}{P_A^{1-\beta}P_X^{\beta}}. \tag{5}$$

Using (5), the total utility of the state as the owner of natural resources is

$$V_S = \lambda\frac{(1-\eta)Y(L_A,T)}{(\mathrm{P_X}/\mathrm{P_A})^{\beta}}, \tag{6}$$

where we used $I_S = Tr = (1-\eta)P_A Y(L_A,T)$ as state income, and $\lambda=\beta^{\beta}(1-\beta)^{1-\beta}$ is a constant. The indirect utility of workers in the state and the industry sector are in turn

$$V_A = \lambda\frac{\eta Y(L_A,T)}{L_A(\mathrm{P_X}/\mathrm{P_A})^{\beta}} = \lambda\frac{\eta}{(\mathrm{P_X}/\mathrm{P_A})^{\beta}}\left(\frac{T}{L_A}\right)^{1-\eta}, \tag{7}$$

$$V_X = \lambda\frac{\eta}{(\mathrm{P_X}/\mathrm{P_A})^{\beta}}\left(\frac{\mathrm{T}}{\mathrm{L_A}}\right)^{1-\eta}\frac{\varphi(\mathrm{Z},\gamma)}{\varphi(\mathrm{Z}^*,\gamma)} = V_A\frac{\varphi(\mathrm{Z},\gamma)}{\varphi(\mathrm{Z}^*,\gamma)}, \tag{8}$$

with incomes $I_A = w(L_A,T) = \eta P_A Y(L_A,T)/L_A$ and $W(Z) = w(L_A,T)\,\varphi(Z,\gamma)/\varphi(Z^*,\gamma)$, respectively.

Education Spending and Labor Reallocation

Although investment in education may seem to be targeted at the whole population, in practice, it is biased towards workers in the industry sector because skills are not used in the state sector. This results in an increase in the productivity and therefore the wages of workers in the *X* sector by a productivity factor γ; i.e., $\varphi_X(Z) \equiv \varphi_X(Z,\gamma)$ with $\partial\varphi_X/\partial\gamma > 0$. Because equality $C_X = \frac{w(L_A,T)}{\varphi_X(Z^*,\gamma)}$

must be satisfied, a positive shock in γ must be accompanied by a reallocation of workers from the *Y* to the *X* sector to return to equilibrium. In other words, investment in education directly increases the denominator. This must then be followed by a reduction in Z^*, which in turn lowers the denominator and increases the numerator $w(L_A,T)$.

Lemma 1*: Investment in education leads to a shift of workers into the private industrial sector, thereby decreasing the threshold skill level Z^* and increasing wages in both sectors.*

The top panel of Figure 2 shows the consequences of a change from Z_1^* to Z_2^* brought about by an enhancement of education institutions. The upward sloping curve $log\ W(Z) = log\ \varphi_X(Z,\gamma) + log\ C_X$ shifts upward because a higher γ increases $\varphi_X(Z,\gamma)$, and a lower Z^* increases C_X.

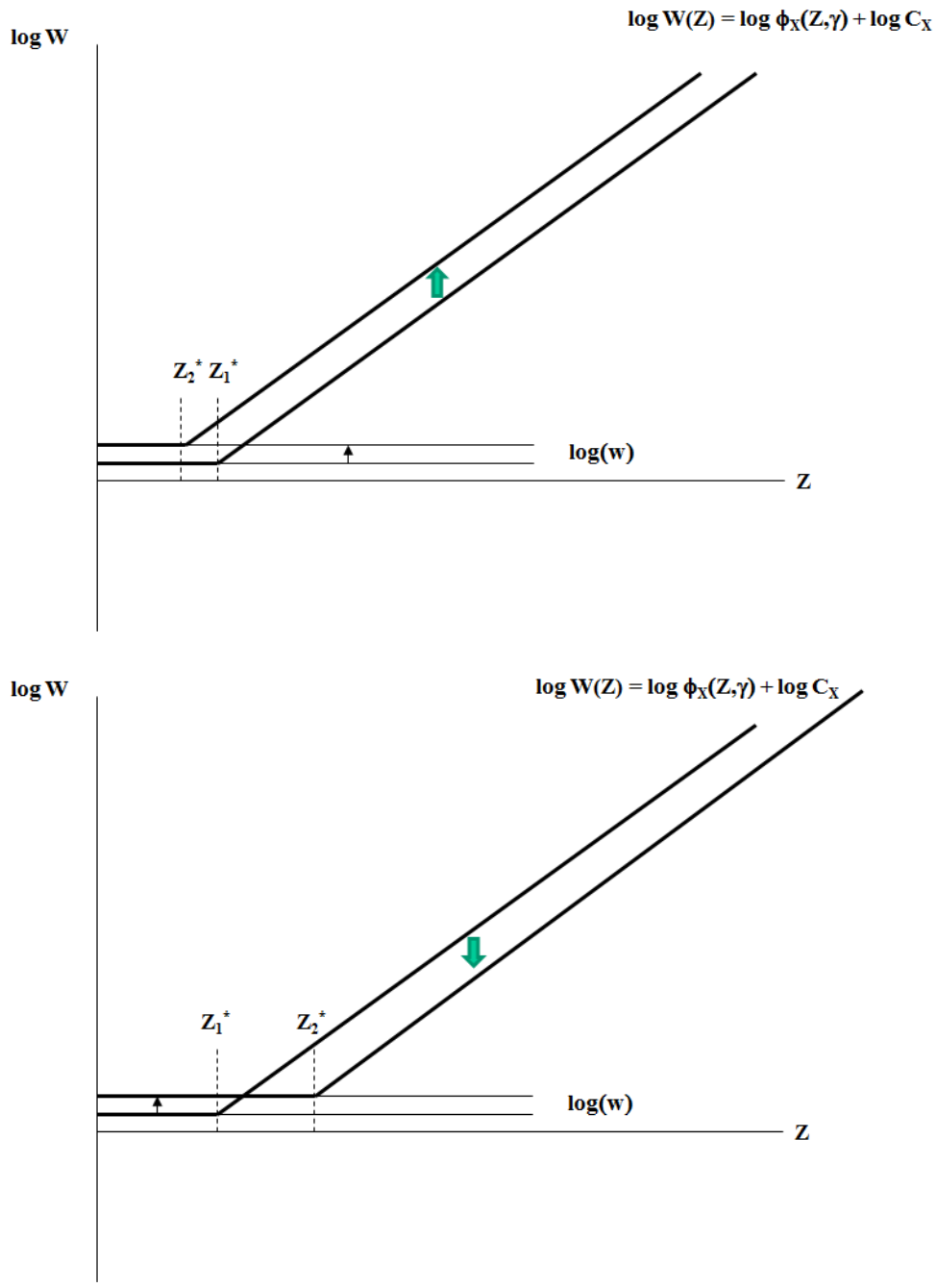
Military Spending and Labor Reallocation

Natural resources are prone to be destroyed by instability or incidents such as wars. A state has a probability of retaining a fraction $\mu(m)T$ of its resources in any given period. This probability increases as the state invests in military (m) to defend its stakes, i.e., $\acute{\mu}(m)>0$. A larger amount of resources (or less risky assets) in the state sector increases the marginal productivity of labor in that sector, thereby increasing wages $w(L_A,T)$ and drawing labor from the industry. A higher threshold Z^* works to reach the new equilibrium by decreasing the numerator and increasing the denominator in $C_X = \frac{w(L_A,T)}{\varphi_X(Z^*,\gamma)}$ so that investment in the military has an indirect negative effect on wages of skilled workers, except the few workers just above the previous threshold who now work for the state.

Lemma 2*: Investment in the military leads to a flow of workers into the state sector, thereby increasing the threshold skill level Z^* and raising (reducing) wages in the state (industry) sector.*

The bottom panel of Figure 2 shows the consequences of a change from Z_1^* to Z_2^* brought about by investment in the military. The upward sloping curve $log\ W(Z) = log\ \varphi_X(Z,\gamma) + log\ C_X$ also shifts downward because a higher Z^* decreases C_X.

Figure 2. Effects of education and military spending on intersectoral labor reallocation



Political Economy of Education Expenditure

Looking at Equation (6), we can observe that the indirect utility of owners of natural resources is directly determined by income from resource rents, and it is therefore proportional to production in the state sector. We know from Lemma 1 that the effect of γ on Z^* is negative; the relative price is fixed at world levels. As a consequence, $Y(L_A,T)$ in the numerator falls, and the denominator remains unchanged. The utility of an autocratic government that maximizes its self-interest is therefore reduced by education spending from a lower $Y(Z^*,T)$, caused by a higher γ.

Equations (7) and (8) can be used to study the political economy of investment in education in a democracy by calculating its effect on the indirect utility of different types of workers as representatives of the population. First, Equation (7) shows that state workers unambiguously gain from a reduced amount of labor in that sector following a lower threshold Z^* and hence from higher wages. Equation (8) shows that workers in the industry sector also gain from the positive effect of more education spending on state workers; their wages are $w(L_A,T)$ multiplied by their skill premium $\varphi(Z, \gamma)/\varphi(Z^*, \gamma)$. The wages of skilled workers therefore rise even more in the industry sector. Thus, a more democratic state that accounts for the voice of the population would choose to spend more on education.[7]

In sum, the political economy of educational institutions depends on the distribution of power in a society. In an autocracy, where the state makes decisions based on its self-interest, education investment is not a priority and even avoided. If policies are democratically decided by the population, investment in education is more appealing because all workers gain. Better education institutions increase $w(L_A,T)$ and hence V_A in Equation (7) with a reduction in Z^*, resulting in a

[7] Adding a rent component to the utility of workers would leave the key message unchanged: education spending in a democracy would still be relatively higher than that in an autocracy because its positive effect in Equations (7) and (8) would, in this case, be added to the negative effect in Equation (6) to measure total welfare under a democratic state.

positive income effect for all workers. Skilled workers gain even more because they experience an additional positive skill premium effect in V_X in Equation (8).

Proposition 1: *Investment in education decreases Z^*, thereby reducing the state's income from resources and benefiting all workers through higher wages. Thus, autocracies (democracies) allocate less (more) of their budget to educational institutions.*

Political Economy of Military Expenditure

In an autocracy, natural resources are key to the state's economy and a determinant of the policies of a government based on the self-interest of the elite in power. Recall that military expenditure protects and increases the resources at disposal in the state sector by increasing $\mu(m)$ and extractable rents from this sector, $r\mu(m)T$. This in turn increases V_S in Equation (6).

The effect of military expenditure in a democracy is more complex because workers are affected differently according to their level of skills. First, the marginal product of workers already employed in the state sector and hence their wages in Equation (7) increase due to a better functioning state sector with more exploitable resources. However, the subsequent movement of workers into the state sector, as described in Lemma 2, mitigates this effect. Next, the newly hired labor in the state sector may experience different welfare consequences. Those on the lower side of the skill spectrum gain because they now earn higher wages after switching sectors. Recall that a higher threshold Z^* here works to reach the new equilibrium. As a result, workers with higher skills who now work in the state sector earn lower wages. Finally, Equation (7) reveals that a higher Z^* results in a lower C_X, reducing the wages of all skilled workers currently employed in the industry sector (see the bottom panel of Figure 2). Skilled workers hence lose as a consequence of an increase in the denominator of Equation (8), i.e., $\varphi(Z^*, \gamma)$. Investment in

military therefore has an indirect negative effect on the wages of the skilled except the few workers just above the previous threshold worker, who are now employed by the state.

In sum, the political economy of military spending goes back to the distribution of power and the *distribution of skills* in a society. In an autocracy, the government enjoys a direct gain from the availability of more resources as a result of more security and thereby an expansion of the state sector. As for workers, low-skilled workers in the state sector earn higher wages, including a portion (not all) of those who move to the state sector. In contrast, highly skilled employees in the private industry sector unambiguously lose due to reduced wages. We can deduce from the results that in a democracy, the decision on the level of military expenditure depends on the distribution of skills in a society. In a country where the median voter is low-skilled, military expenditure is favored in a democratic regime. Alternatively, a country with a high distribution of skills and therefore a higher skilled median voter is more likely to oppose large military expenditure under a democratic regime.

Proposition 2*: Investment in military increases available rents and wages in the state sector. It also increases Z*, thereby reducing the income of skilled workers in the industry sector. Thus, autocracies prefer to allocate more of their budget to military expenditure, whereas the policy in a democracy depends on the skill level in a society. A democratic regime in a country with a large (small) distribution of skills is more (less) likely to oppose (favor) large military spending.*

We now confront this question from an empirical point of view for the case of Iran, which has experienced remarkable swings in its political regime in the last few decades. Iran is also an interesting case due to the existence of a clear divergence between the vested interests of the state elite and that of its citizens.

4- Research design

Data description

To examine the dynamic interconnections between political institutions and the structure of government spending in Iran, we use the following variables: military expenditure (*ldefetot*), public order and disciplinary expenditure (*ldiciptot*), education expenditure (*ledutot*), health and medical services expenditure (*lhealthtot*), and cultural and recreational services expenditure (*lculttot*) from the Central Bank of Iran's (CBI) online database in constant 1997 prices.[8] These variables are expressed as their share in total government expenditure and in logarithmic form. Moreover, we use the Polity index as a widely used measure of political institutions (Marshall et al., 2012). This variable describes combinations of the autocratic and democratic characteristics of the institutions of government (Marshall et al., 2012). Subtracting the autocracy score from the democracy score yields a summary measure of Polity. This index goes from -10 (full autocracy) to 10 (full democracy). Higher scores indicate a more open and competitive political system. To test the robustness of our results, we also use the objective democracy indicator of Vanhanen (2011). We use annual data from 1960 to 2006 for our analysis. Appendix A presents the summary statistics of the variables in our analysis.

Our theoretical model leads to the following hypotheses:

H1: Shocks to positive changes in the quality of political institutions lead to a *negative* and statistically significant response of military vs. non-military spending in Iran.

[8] The Central bank of Iran follows the Government Finance Statistics Manual 2001 - GFSM 2001 to prepare the income and spending categories of the government (http://www.cbi.ir/page/4488.aspx). In this classification of the functions of the government, the category "public order and safety" (which is translated into disciplinary services in the Iranian National Accounts - English version by CBI) includes police, fire-protection services, law courts, prisons, and R&D related to public order and safety. The category of defense (military) spending covers military and civil defense, foreign military aid, and R&D related to defense. Thus, spending on "disciplinary or public order and safety" is related to law enforcement and the securing of property rights.

H2: Shocks to negative changes in the quality of political institutions lead to a *positive* and statistically significant response of military vs. non-military spending in Iran.

Methodology

We use the VAR model to estimate the interrelationships among our variables. The VAR provides a multivariate framework that relates changes in a particular variable to changes in its own lags and to changes in (the lags of) other variables:

$$y_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + B x_t + \varepsilon_t \quad (9)$$

where $y_t$is a vector of k endogenous variables, x_t is a vector of d exogenous variables, A_1,…, A_p and B are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated both with their own lagged values and with all of the right-hand side variables.[9]

We define the vector of exogenous variables as $x_t = [constant, D_1, D_2]$, where D_1 and D_2 are dummy variables that capture the 1979 Islamic Revolution and the Iran-Iraq war (1980-88), respectively. Because only lagged values of the endogenous variables appear on the right-hand side of the equation, simultaneity is not an issue, and OLS yields consistent estimates.

We use an unrestricted VAR models in levels. First, structural VAR models are 'very often misspecified' (Tijerina-Guajardo and Pagan, 2003). Second, the Phillips-Perron and ADF unit root tests indicate that all variables are I(1)[10]. Because all the variables are non-stationary but co-integrated, differencing leads to a loss of long-run information. Sims (1980), Sims, Stock and

[9] In the VAR estimation process, there are two steps: 1) estimating the reduced form for all equations and 2) computing the Cholesky decomposition of the variance-covariance matrix of the residuals. Therefore, the equations in VAR models are in their reduced form so that we can estimate each equation using the ordinary least squares (OLS) method.

[10] These tests include a constant but not a time trend, as recommended by Dickey and Fuller (1979). To determine the number of co-integrating vectors, we use the approach of Johansen and Juselius (1990). The test statistics indicate that the hypothesis of no co-integration among the variables can be rejected for Iran. The results reveal that at least three co-integrating vectors exist among the variables of interest.

Watson (1990), Doan (2000) and Fuller (1976) have argued against differencing. After all, in this study, we are interested in impulse response functions rather than the interpretation of each coefficient of the VAR model (see also Farzanegan and Markwardt, 2009, Farzanegan, 2011, Farzanegan and Raesian Parvari, 2014 and Dizaji and Bergeijk, 2013 for a similar approach). Third, in the short term, which is particularly important in our analysis, an unrestricted VAR shows a better performance than a vector error correction model (for more details, see Naka and Tufte, 1997; Engle and Yoo, 1987, Clements and Hendry, 1995 and Hoffman and Rasche, 1996). The main applied tools in the VAR models' estimation are the impulse response functions (IRF) and the variance decomposition analyses (VDC). The dynamic response of macroeconomic variables to innovations in a particular variable can be traced out using the simulated responses of the estimated VAR system (IRF). Thus, the IRF allows us to examine the dynamic effects of shocks to a particular variable (such as democracy) on the different categories of government expenditure. Through IRF, we can observe the magnitude and statistical significance of such responses to a one standard deviation increase in democracy-related variable error (see Stock and Watson, 2001 for more details on IRF). A variance decomposition analysis shows the role and importance of a specific variable innovation in explaining the variance of other variables in the system.

Empirical results

We use a VAR model with six variables to examine the effect of political changes in Iran on the different categories of government expenditure. In our unrestricted VAR model, the vector of endogenous variables is as follows:

$$y_t = [polity, health, military, disciplinary, education, culture]$$

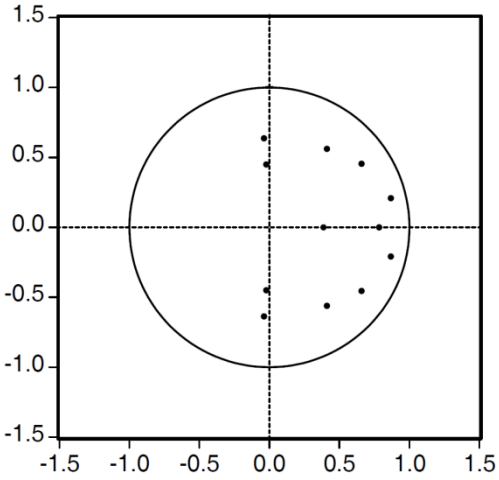
This is our first choice as the Cholesky ordering in the VAR system. The first variable in a pre-specified Cholesky ordering has an immediate effect on all other variables (different types of government spending) in the system, excluding the first variable and so on. Health, military and disciplinary expenditures followed the first variable in the Cholesky ordering. Finally, education and cultural expenditures are categorized as the most endogenous variables in the VAR system. The Iranian government usually changes the share of these two latter costs to increase or maintain military, security, and health costs. (We have followed Farzanegan (2011) in the ordering of expenditure variables in Iran.) We assume that health expenditure is rather sticky and thus is not affected contemporaneously by other types of expenditure. After all, health-related issues are one of the top priorities of most governments, and they cannot be neglected easily. Military and disciplinary expenditures are also sticky but can still be adjusted more easily during peace times. Finally, political institution quality is the first variable in ordering. This is because institutions are to a large extent exogenous with respect to domestic economy. There are historical, cultural, and geographical factors that shape institutions. Institutions affect all other variables in the VAR system instantly but are affected by them with some lags.

Determining an optimum lag length for a VAR model is also important. Economic theory usually does not provide any definite guidelines on the appropriate level of the lag length in a VAR model. To find the optimum lag, we use information criteria such as LR, FPE (final prediction error), AIC (Akaike information criterion), SC (Schwarz information criterion), and HQ (Hannan-Quinn information criterion). We select a lag length of 2 on the basis of the LR, FPE, and AIC criteria and also with respect to stability and diagnostic tests.

Additionally, we have examined the diagnostic statistics of the estimated VAR model. For stability of our model, Figure 3 shows the AR graph, which reports the inverse roots of the

characteristic AR polynomial. This figure shows that in the VAR model, all roots have a modulus less than one and lie inside the unit circle, and the VAR model is stable (or stationary).

Figure 3. Inverse roots of AR characteristic polynomial



Moreover, the results of the autocorrelation LM test in Table 1 show lack of auto-correlation in the estimated VAR model's residuals. Overall, our diagnostic criteria show that our estimated VAR model, which is a basis for the impulse response functions in Figure 4, is stable and satisfactory.

Table 1. VAR residual serial correlation LM test

Lags	LM Test	P-value
1	47.4	0.09
2	34.2	0.55
3	42.5	0.21
4	23.3	0.94
5	46.9	0.10
6	35.3	0.50
7	42.2	0.21
8	35.3	0.49

Note: Null hypothesis: No serial correlation at lag order h

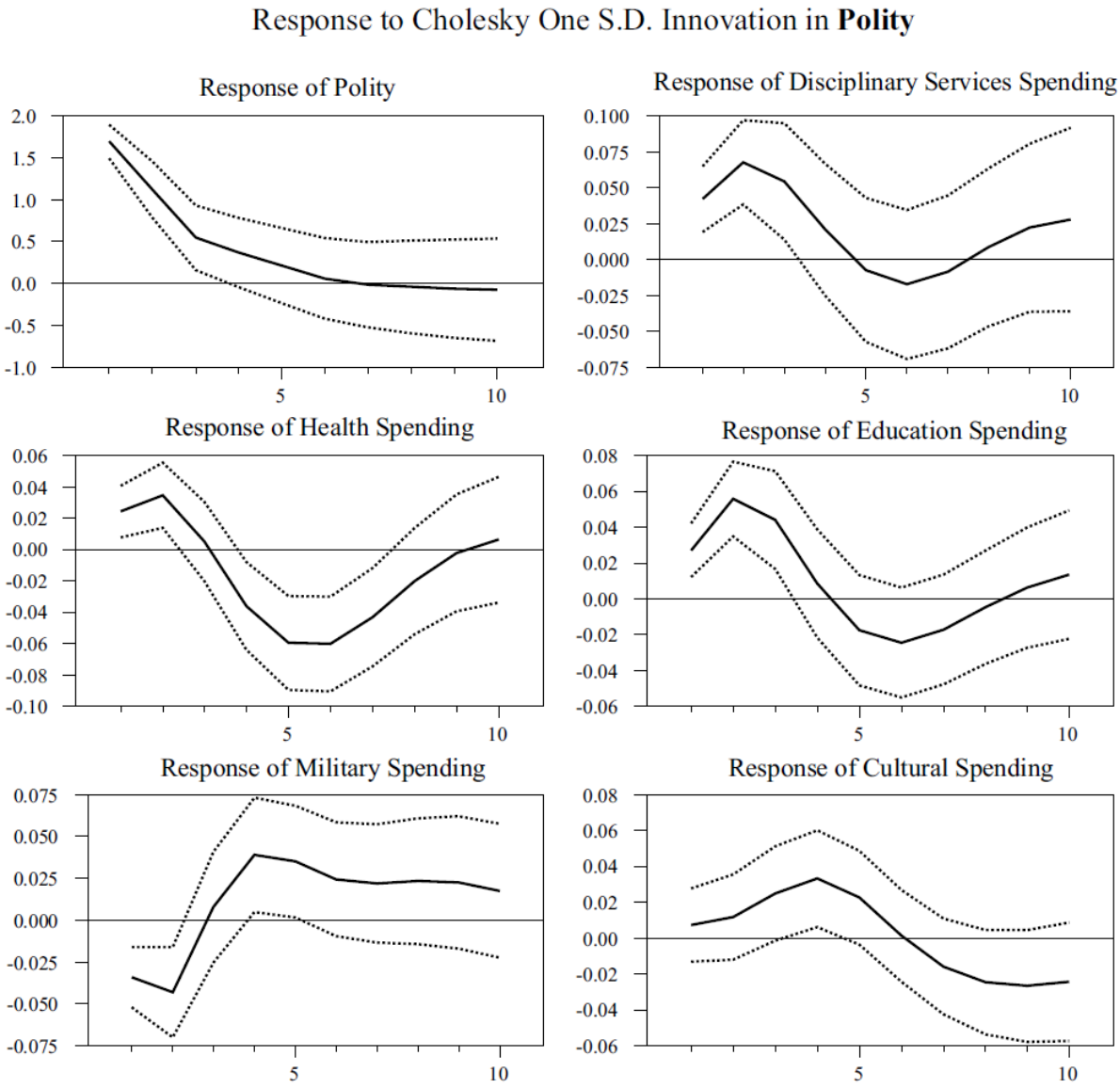
Impulse response functions

In this study, the impulse response functions trace out the simulated response of current and future values of all endogenous variables, such as different categories of Iranian government expenditure (military, education, disciplinary, health, and cultural) to a one standard deviation shock in the quality of political institutions. In other words, we estimate the direction and significance of military spending response (among other responses) to political institution shocks over time after the initial shock. The middle line in IRFs displays the response of different types of government expenditure to a one standard deviation shock in the Polity variable. The dotted lines represent confidence bands at 68% confidence intervals, which are built using 1000 Monte Carlo simulations (see Sims and Zha, 1999, who suggest using one standard deviation for error bands in the IRFs). If the confidence intervals include the zero horizontal line, then the impulse response for that specific period after the initial shock is not statistically significant (Berument et al., 2010). In other words, the null hypothesis of "no effects of political variable" on the specific government expenditure cannot be rejected. The horizontal line in IRFs shows the time period (years) after the initial shock. The vertical line in IRFs shows the magnitude of the response to shocks.

Figure 4 displays the impulse responses of different categories of the Iranian government expenditure to a one standard deviation shock in Polity for the period of 1960-2006. The Polity shock was identified on the basis of a standard Cholesky factorization, ordering Polity first, followed by health, military, disciplinary, education and cultural expenditures (as % of total expenditure; all variables are in logarithmic form except for Polity). Figure 4 shows that an increase in the Polity index has a statistically significant and negative effect on government military expenditure. Military spending reduction in the short term (3 years after the democratic

shock) is statistically significant. Notably, the short-term responses of education, health, and disciplinary spending to an increase in the Polity index are positive and significant within 2 to 3 years after the initial shocks.

Figure 4. Impulse responses to a one standard deviation shock in Polity index



Note: The graphs show the impulse responses of different types of government spending (as % of total government spending) to one-standard-deviation shock in the Polity index. The dotted lines represent ±1 standard deviation. The deviation from the baseline scenario of no shocks is on the vertical axis; the periods (years) after the shock are on the horizontal axis. The vertical axis shows the magnitude of the responses. All variables (except for the Polity index) are used in logarithmic and real form.

Variance decomposition

How much of the variance in military spending (and other forms of spending) is explained by shocks in military spending, and how much is explained by shocks in political institutions (among the shocks in other variables)? The variance decomposition (VDC) results in Table 2 show the variance of each variable from each source of shock. The first vertical column tells the number of years following a shock to which the decomposition applies, and the row figures give the fraction of variance explained by the shock source.

Table 2 shows that for almost all variables, the largest portion of variation is explained by their own trend in the first year. Hence, at the start of the simulations, the historical trend of each variable explains a large part of its own variation. Polity shocks play an important role in explaining the variation of the other variables in the long run. (Its contributions in explaining the shocks to *ldefetot* and *ledutot* are approximately 14% and 19% in the tenth year.) The contribution of Polity shocks to changes in government health expenditure was approximately 10% in the first year, rising to approximately 26% in the eighth year. The major part of the variations in military expenditure is explained by its own shocks in all years. However, the shocks to Polity and disciplinary expenditure also affect the variance of the military expenditure significantly.

As shown in Table 2, shocks to cultural expenditure explained approximately 31 and 28% of the variation in education expenditure and disciplinary expenditure in the tenth year. This implies that considerable causalities can result from cultural expenditure to education expenditure and disciplinary expenditure. Additionally, the results show that forecast errors in Polity other than its own variations are due primarily to variations in education expenditure, disciplinary expenditure and military expenditure.

Table 2. Variance decomposition

shock source	*POLITY*	*LHEALTHTOT*	*LDEFETOT*	*LDICIPTOT*	*LEDUTOT*	*LCULTTOT*
Variance decomposition of *POLITY*						
1 Year	100	0.00	0.00	0.00	0.00	0.00
2 Years	87.50	1.64	0.04	5.33	5.47	0.00
5 Years	62.03	1.76	2.36	19.76	13.70	0.38
8 Years	52.16	1.81	3.86	20.06	21.62	0.48
10 Years	51.18	1.79	4.61	19.70	21.86	0.86
Variance decomposition of *LHEALTHTOT*						
1 Year	6.79	93.21	0.00	0.00	0.00	0.00
2 Years	11.32	77.02	0.96	8.27	1.67	0.75
5 Years	20.47	43.86	0.93	18.63	1.75	14.36
8 Years	26.24	30.01	2.97	22.59	8.23	9.95
10 Years	22.78	26.13	4.51	22.67	15.08	8.83
Variance decomposition of *LDEFETOT*						
1 Year	9.97	4.58	85.45	0.00	0.00	0.00
2 Years	11.09	4.08	80.16	2.99	1.13	0.53
5 Years	13.87	5.26	68.93	8.19	1.00	2.75
8 Years	13.79	6.87	54.25	15.59	4.61	4.90
10 Years	13.73	6.33	49.85	16.78	8.37	4.94
Variance decomposition of *LDICIPTOT*						
1 Year	9.8	6.97	6.18	77.04	0.00	0.00
2 Years	18.30	3.68	5.20	62.50	0.87	9.45
5 Years	11.96	2.40	3.14	47.56	2.65	32.30
8 Years	10.65	5.01	2.83	48.79	2.77	29.95
10 Years	11.33	5.45	2.73	48.72	2.94	28.83
Variance decomposition of *LEDUTOT*						
1 Year	9.26	14.03	2.89	8.84	64.98	0.00
2 Years	22.38	10.11	2.80	4.07	51.25	9.37
5 Years	19.50	7.66	1.81	6.69	33.70	30.64
8 Years	19.24	8.04	3.41	7.27	29.58	32.47
10 Years	18.60	8.56	4.00	7.99	29.48	31.37
Variance decomposition of *LCULTTOT*						
1 Year	0.38	0.19	6.95	2.16	0.43	89.90
2 Years	0.87	3.03	4.77	1.56	1.66	88.11
5 Years	8.28	6.23	5.14	3.41	3.85	73.07
8 Years	9.30	6.83	6.70	4.79	10.33	62.05
10 Years	11.70	6.95	6.29	8.77	9.66	56.62

Robustness analyses

a. Generalized impulse responses

The ordering of the variables in the VAR system is important to calculate the IRFs and VDC analyses. A different ordering may result in different IRF results. To avoid the difficulties in identifying orthogonal shocks in VAR models, Pesaran and Shin (1998) introduced generalized impulse responses (GIR). The GIR functions construct an orthogonal set of innovations that does not depend on the VAR ordering. For comparison, we calculate the generalized impulse responses of the different compositions of government spending to total government spending ratio to a one standard deviation shock in the Polity index. The responses are similar to those that we obtained using a Cholesky one standard innovation.[11]

b. Alternative definition for quality of political institutions variable (Vanhanen index)

We use also an alternative institutional quality indicator called the Vanhanen index (VI). The Vanhanen index of democratization is defined as the product of two underlying indices for political competition and political participation (Vanhanen, 2011). Because considering the effects of political changes on the different categories of government expenditure is a key issue of our analysis, it is important not only that the Polity and VI measures differ conceptually but that their measurement also differs. (Polity scores are subjective/judgmental, whereas the VI deploys numerical voting records.) Consequently, the two indicators show different patterns of variation. The Vanhanen index is taken directly from the Finnish Social Science Data Archive (Vanhanen, 2011).

[11] Because the GIR results are identical to those obtained by the Cholesky ordering, we have not reported them here. They are available upon request.

For this purpose, we re-estimate the VAR model using the same Cholesky ordering (with the Vanhanen index instead of Polity) as in previous analysis. Considering the different lag criteria, we use two lags as the optimum number of lags in our analysis. We also control for the exogenous shocks of the Islamic revolution and the war period with Iraq. The VAR stability condition test (roots of characteristic polynomial) indicates that the VAR satisfies the stability condition. The impulse response analysis, using the Vanhanen index as a shock variable, is presented in Figure 5.

Figure 5 shows that the response of disciplinary services and education spending to shocks in the Vanhanen index is positive and significant in the short term. However, military spending's negative response is not statistically significant. This is possibly because we should distinguish between *positive shocks* and *negative shocks*, as discussed in the literature on asymmetric shocks by Mork (1989) and Hamilton (1996).

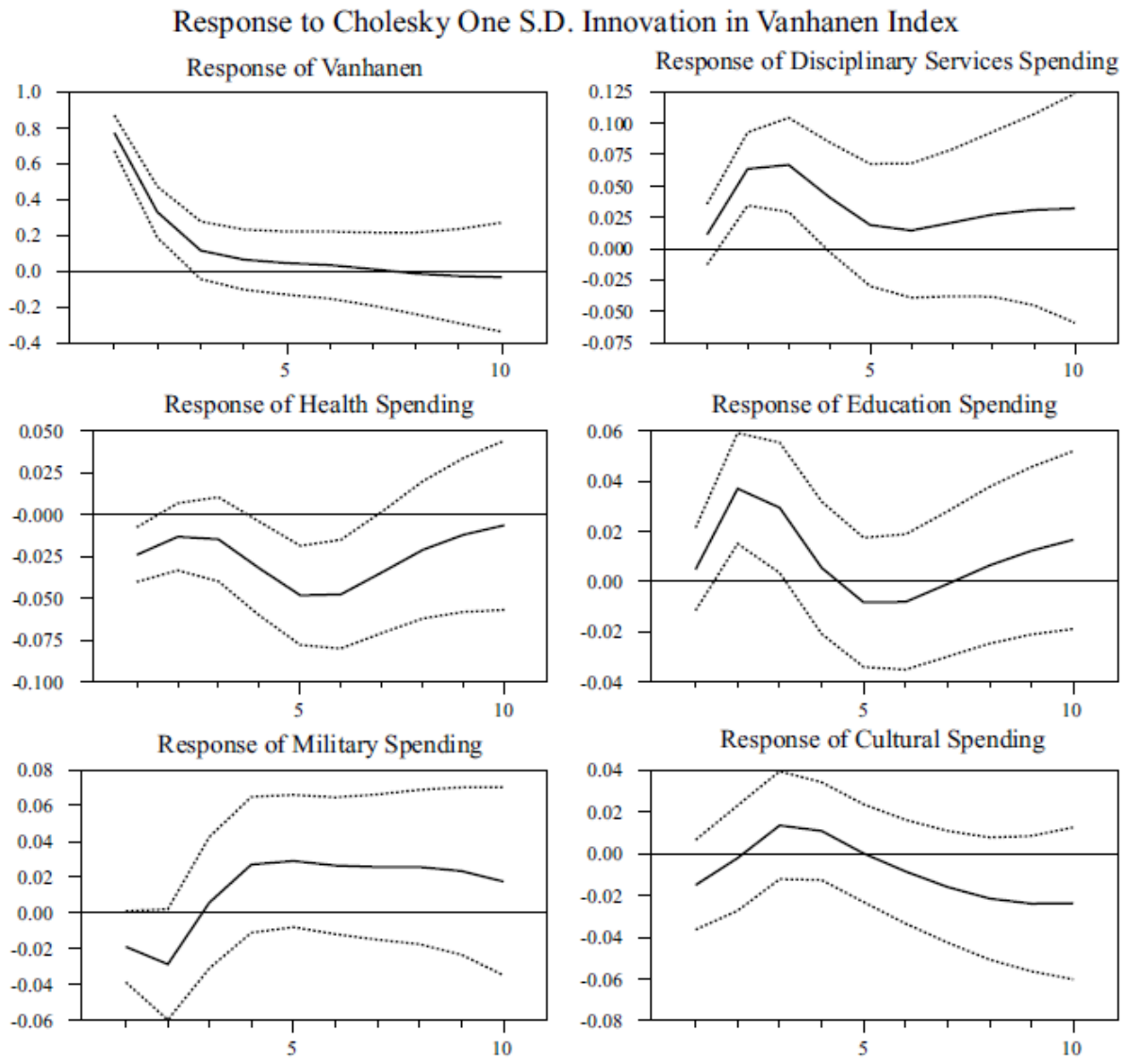
In line with Mork's work, proposes an asymmetric definition of oil prices to distinguish between positive and negative oil price shocks, we define the positive and negative changes in the Vanhanen index (VI) as follows:

$$MVI_t+ = \max (0, (VI_t-VI_{t-1})) \quad (10)$$

$$MVI_t- = \min (0, (VI_t-VI_{t-1})) \quad (11)$$

where VI_t is the Vanhanen index in time t. For more comprehensive details on asymmetric shocks, see Mork (1994).

Figure 5. Impulse responses to a one standard deviation shock in Vanhanen index

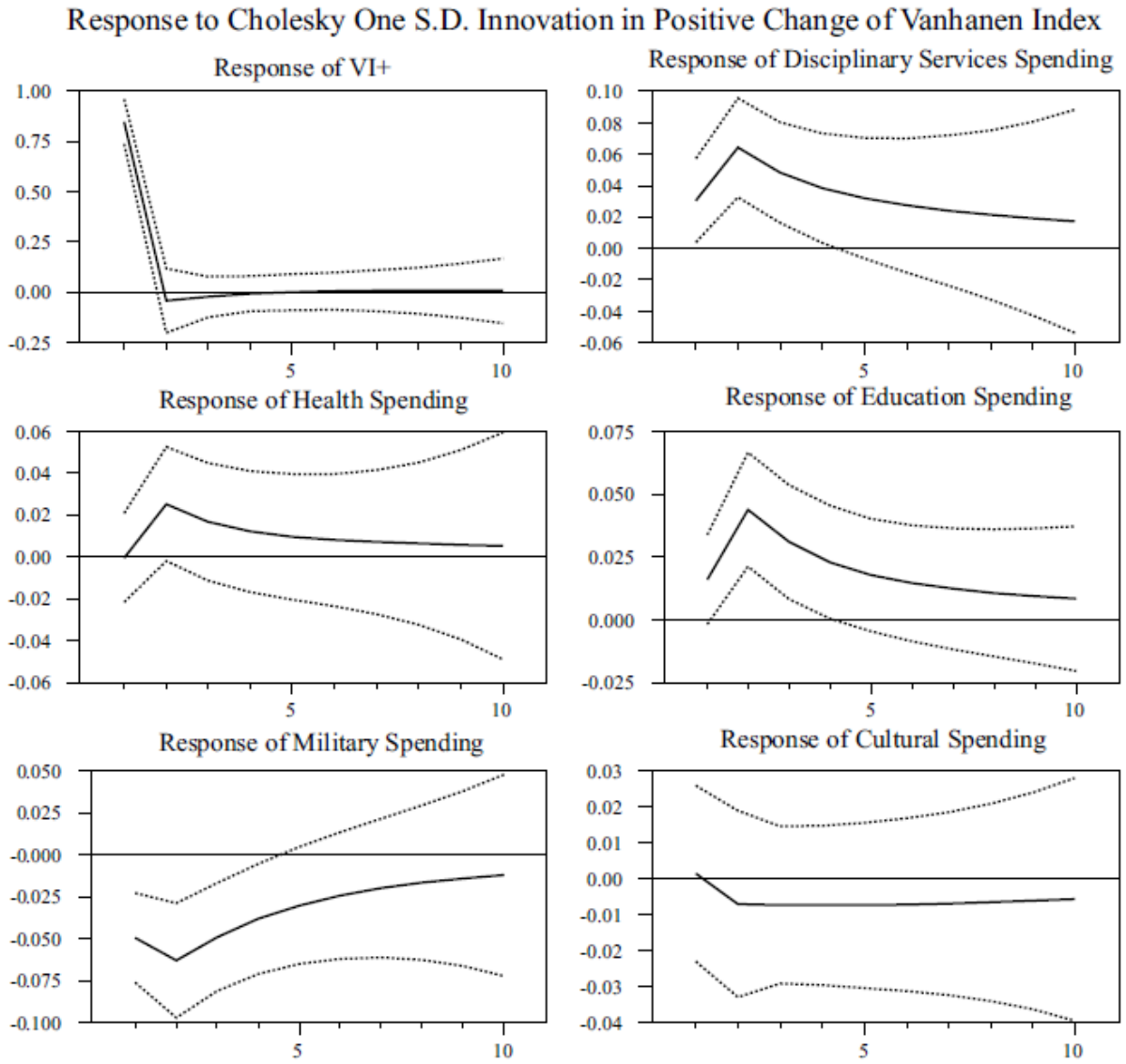


Note: The graphs show the impulse responses of different types of government spending (as % of total government spending) to one-standard-deviation shocks in the Vanhanen index. The dotted lines represent a ±1 standard deviation. The deviation from the baseline scenario of no shocks is on the vertical axis; the periods (years) after the shock are on the horizontal axis. The vertical axis shows the magnitude of the responses. All variables (except for the Vanhanen index) are used in logarithmic form.

Figure 6 shows the IRFs based on a one standard deviation shock to positive changes in the Vanhanen index (based on the Equation 10). We use 1 lag of endogenous variables on the basis

of different lag criteria, controlling for revolution and war with Iraq exogenous shocks. The results of the stability test on our VAR model are also satisfactory[12].

Figure 6. Impulse responses to a one standard deviation shock to positive changes in the Vanhanen index (MVI+)



Note: The graphs show the impulse responses of different types of government spending (as % of total government spending) to a one-standard-deviation shock to positive changes in the Vanhanen index. The dotted lines represent a ±1 standard deviation. The deviation from the baseline scenario of no shocks is on the vertical axis; the periods (years) after the shock are on the horizontal axis. The vertical axis shows the magnitude of the responses. All variables (except for Vanhanen index) are used in logarithmic form.

[12] These results are available upon request.

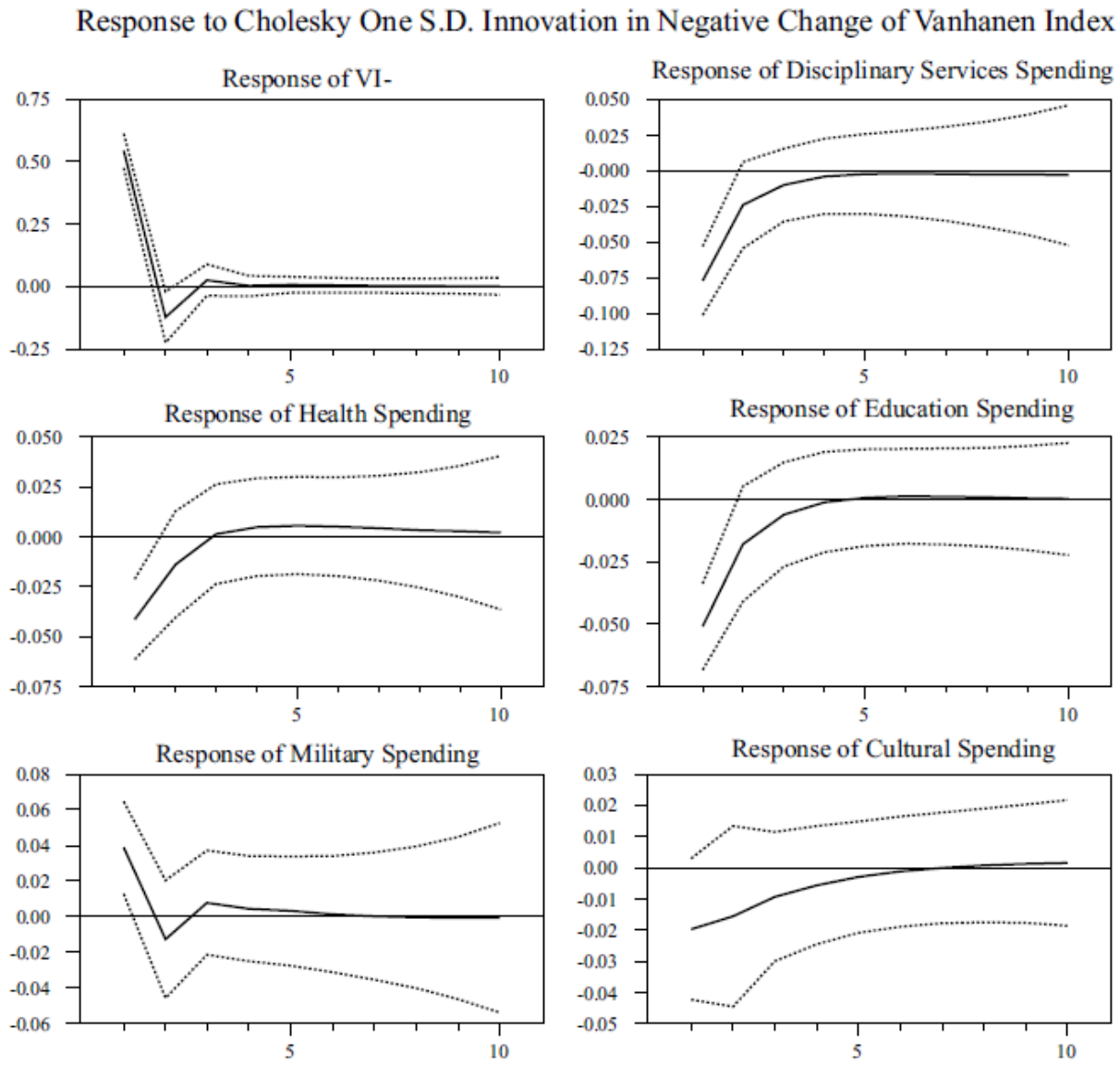
Following shocks to positive changes in the Vanhanen index of democracy, we can see a negative response of military spending that is also statistically significant until five years after the initial positive democracy shocks. The military spending response reaches its lowest level in the second year after a positive shock in democracy. Education and disciplinary (public order) spending show a positive response to positive democracy shocks, which reached their maximum in the second year after the shock. These responses are also statistically significant for the first 4 years after the initial shock. There results show that positive development in democratic institutions leads to lower military spending and higher provision of social services, which directly target a larger portion of the population.

However, what are the reflections of negative changes in the democratic quality of institutions? Figure 7 illustrates the response of the relative share of different components of government spending in the total budget to shocks to negative changes in the Vanhanen index (based on Equation 11). We use one lag of endogenous variables on the basis of different lag criteria, controlling for revolution and war with Iraq exogenous shocks.[13]

A one standard deviation increase in the absolute values of "negative changes" in the Vanhanen index for Iran are accompanied by negative responses of the relative shares of government expenditures in health, disciplinary and education. However, these responses are significant only in the first and second years after the initial shock. Also notable is the positive response of military spending to negative developments in democratic institutions. The positive response of the military is statistically significant only in the first year after the initial negative changes in democracy in Iran.

[13] The estimated VAR model satisfied the stability and co-integration conditions. The results of these tests are available upon request.

Figure 7. Impulse responses to a one standard deviation shock to negative changes in the Vanhanen index (MVI-)



Note: The graphs show the impulse responses of different types of government spending (as % of total government spending) to one-standard-deviation shock to negative changes in the Vanhanen index. The dotted lines represent a ±1 standard deviation. The deviation from the baseline scenario of no shocks is on the vertical axis; the periods (years) after the shock are on the horizontal axis. The vertical axis shows the magnitude of the responses. All variables (except for the Vanhanen index) are used in logarithmic form.

In addition to Mork's approach to defining the asymmetric shocks, we use another definition suggested by Hamilton (1996). Consistent with Hamilton's work, which proposes an asymmetric definition of oil prices, we define the positive and negative changes in the Vanhanen index (VI) as follows:

$HVI_t+ = \max [0, ((HI_t)-\max ((HI_{t-1}),\ldots, (HI_{t-4}))]$ (12)

$HVI_t- = \min [0, ((HI_t)-\min ((HI_{t-1}),\ldots,(HI_{t-4}))]$ (13)

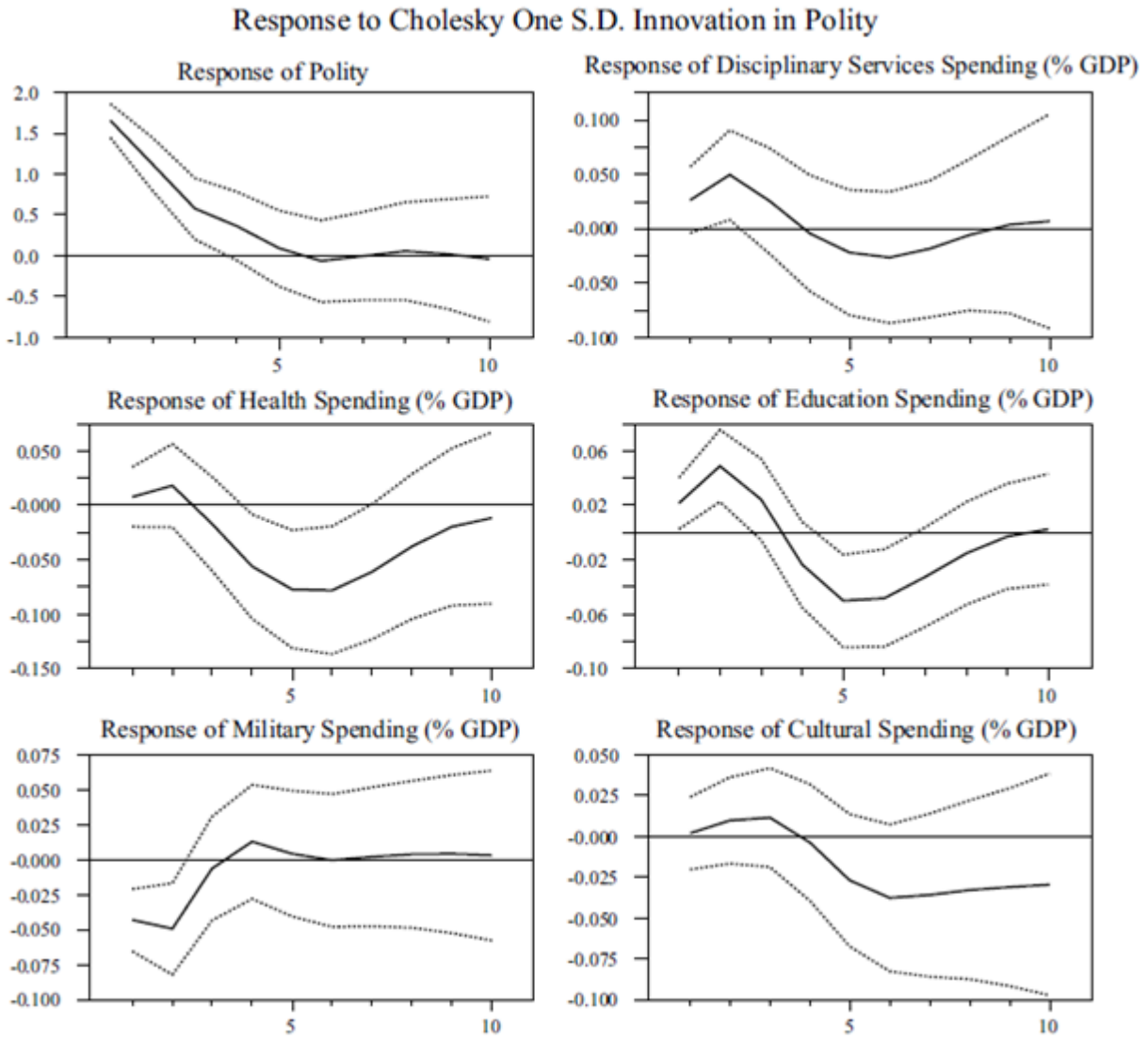
Our findings show that the responses with Hamilton's definition of asymmetric shocks are similar to those that we obtained using Mork's definition. Therefore, we have not reported them here[14].

c. Using the ratio of government expenditure to GDP

As an alternative specification, we employ the ratio of each component of government spending to GDP instead of their relative share in the budget in our impulse response analysis. How do innovations in the political variable (Polity) affect the distribution of different categories of government spending to the GDP ratio? First, we estimate an unrestricted VAR model with an optimum lag number of 2 (on the basis of different lag criteria) and the Cholesky ordering of [Polity, health to GDP, military to GDP, disciplinary to GDP, education to GDP, and cultural to GDP]. As in previous analysis, we include revolution and war dummy variables as exogenous shocks. The diagnostic statistics, such as the VAR stability condition, show that no root lies outside of the unit circle, and the model is stable. The model also does not show a specific problem with residual autocorrelation on the basis of the LM test. Moreover, the results of co-integration tests reveal that at least three co-integrating vectors exist among the variables of interest.[15]

[14] The results with Hamilton's definition of asymmetric shocks are available upon request.
[15] The diagnostic statistic results are available upon request.

Figure 8. Impulse responses to a one standard deviation shock in POLITY index



Note: The graphs show the impulse responses of different types of government spending (as % of GDP) to one-standard-deviation shocks in the Polity index. The dotted lines represent a ±1 standard deviation. The deviation from the baseline scenario of no shocks is on the vertical axis; the periods (years) after the shock are on the horizontal axis. The vertical axis shows the magnitude of the responses. All variables (except for the Polity index) are used in logarithmic form.

Figure 8 shows that a one standard deviation shock to the Polity index is accompanied by initially negative and significant responses in military spending to GDP and positive and significant responses in education spending to GDP within the first 2 years after initial shock,

reinforcing our earlier results using relative share of spending in the government budget.[16] Appendix B summarizes the main results of the impulse response analyses in our study.

5- Conclusion

We have examined how positive and negative shocks in political institutions of Iran shape the government's budget allocation to military versus productivity-enhancing public goods such as education. We start with a simple theoretical framework to show the vested interests of different groups in a small resource-oriented economy such as Iran. The idea is to show how the political regime in a country can determine the target of government spending, i.e., military, to defend its assets versus productivity-enhancing public expenditure. An autocratic state prefers expenditure on military to secure returns from national resources, thereby protecting its vested interests. A democratic state where more skilled workers play the role of the median voter instead tends to favor labor productivity-enhancing public goods that help in expanding the industry sector.

Using annual data from 1960 to 2006 and an impulse response analysis on the basis of an unrestricted VAR model, we show that the response of military spending to positive changes in the quality of democratic institutions in Iran is negative and statistically significant for 3 years after the initial shock. On the contrary, education spending responds positively to a positive shock towards democratization, which remains statistically significant for the first 4 years, reaching its maximum in the second year after the shock. Our main findings are robust to

[16] In addition, we have estimated a VAR model using the per capita form of each component of government spending. We have estimated an unrestricted VAR model with a Cholesky ordering [*polity, lhealthcap, ldefecap, ldicipcap, leducap, lcultcap*]. We can find significant responses only for the defense expenditure. The IRFs show that defense expenditure respond both negatively and significantly (within the first 2 years after initial shock) to a one standard deviation shock in the Polity index. We cannot find significant responses regarding the other types of expenditure. These results are available upon request.

different specifications of government spending and alternative political institution indicators. The results are not sensitive to the ordering of variables in the VAR analysis.

These results show that positive development in democratic institutions leads to lower military spending and a higher provision of social services that directly target a larger portion of the population. We view the latter as expenditure biased towards productivity enhancement in the more skill-intensive industry sector. Although education is generally viewed as the most direct form of such a public good, disciplinary expenditure here is an interesting example that works the same way; it includes law enforcement and the securing of property rights, which are essential to creating a sound investment environment. Additionally, order and disciplinary expenditure on police tends to work as a substitute for military spending for the particular case of Iran. Indeed, conservatives and radical governments such as Mr. Ahmadinejad's state have had more tendencies to substitute the national police with semi-military groups (Basij militia) to secure the stability of the political system, increasing the relative size of the military budget at the cost of the national police budget. By contrast, reformist governments have had the willingness to reduce the political, economic and civil interventions of military establishments and para-military organizations such as Basij. Iran's recent 'reformist' president, Hassan Rouhani, has frequently addressed revolutionary guards, asking them to "avoiding interfering in political affairs."[17]

Finally, our approach to this nexus is also motivated by recent significant international sanctions to change the political behavior of the Iranian government. The positive shocks in political institutions that shape the government spending behavior of Iran can stem, for example, from exogenous pressures of economic sanctions or the internal pressures of civil society. An

[17] http://www.al-monitor.com/pulse/originals/2014/04/irgc-iran-rouhani.html#

interpretation can be that if the sanctions are successful in increasing political openness in Iran in the short run (as shown in Dizaji and Bergeijk, 2013), then one can also expect to see a reduction in the budget allocated for military and an increase in education expenditure in Iran. This also allows us to make conclusions about how negative shocks in political institutions through lifting exogenous pressures and/or marginalizing civil society and its idle status may be reflected in the spending structure of the state. Of course, more work on the issue remains to be done to reveal the indirect link between sanctions and its effect on economic development through the spending behavior of the government in the target country.

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Appendix A. Summary Statistics - Sample period: 1960-2006

Variable |	Obs	Mean	Std. Dev.	Min	Max
ldefetot (log of military expenditure/total expenditure)	47	3.38	0.33	2.64	3.84
ldiciptot (log of public order and disciplinary expenditure/total expenditure)	47	1.84	0.36	1.30	2.48
ledutot (log of education expenditure/total expenditure)	47	2.90	0.28	2.22	3.31
lhelthtot (log of health and medical services expenditure/total expenditure)	47	1.60	0.29	1.02	2.16
lculttot (log of cultural and recreational services /total expenditure)	47	0.61	0.29	0.13	1.14
ldefegdp (log of military expenditure/GDP)	47	1.45	0.53	0.72	2.31
ldicipgdp (log of public order and disciplinary expenditure/GDP)	47	-0.09	0.41	-0.76	0.96
ledugdp (log of education expenditure/GDP)	47	0.97	0.37	0.29	1.78
lhelthgdp (log of health and medical services expenditure/GDP)	47	-0.33	0.54	-1.32	0.57
lcultgdp (log of cultural and recreational services /GDP)	47	-1.32	0.45	-2.33	-0.61
ldefecap (log of military expenditure per capita)	46	2.95	0.71	1.58	4.25
ldicipcap (log of public order and disciplinary expenditure per capita)	46	1.40	0.48	0.70	2.51
leducap (log of education expenditure per capita)	46	2.47	0.51	1.29	3.34
lhelthcap (log of health and medical services expenditure per capita)	46	1.18	0.68	-0.46	2.13
lcultcap (log of cultural and recreational services per capita)	46	0.19	0.68	-1.39	1.34
polity index	47	-6.02	4.49	-10.00	3.00
VI (Vanhanen index of democracy)	47	1.87	1.79	0.00	6.10

Appendix B. Summary of main impulse response analyses

Shock variable	Method	Specification	Response (spending) variables				
			Disciplinary	**Health**	**Education**	**Military**	**Cultural**
Polity	IRF	% of total government spending	positive	positive	positive	negative	insignificant
Polity	GIR	% of total government spending	positive	positive	positive	negative	insignificant
VI	IRF	% of total government spending	positive	insignificant	positive	insignificant	insignificant
MVI+	IRF	% of total government spending	positive	insignificant	positive	negative	insignificant
MVI-	IRF	% of total government spending	negative	negative	negative	positive	insignificant
HIV+	IRF	% of total government spending	positive	insignificant	positive	negative	insignificant
HIV-	IRF	% of total government spending	negative	insignificant	negative	insignificant	negative
Polity	IRF	% of GDP	positive	insignificant	positive	negative	insignificant
Polity	IRF	Per capita	insignificant	insignificant	insignificant	negative	insignificant

Note: The table reports only the sign of the significant responses within 2, 3 or 4 years after the initial shocks. VI represents the Vanhanen index. MIV+ and MIV- represent the positive and negative changes in the Vanhanen index according to Mork's definition. HIV+ and HIV- represent the positive and negative changes in the Vanhanen index according to Hamilton's definition.