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Middle Class in Iran: Oil Rents, Modernization, and Political Development

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Abstract

This study probes the middle class in Iran in relation to oil rents and political development. We begin by discussing how the Iranian middle class has evolved through the 1979 Revolution and in the post-revolutionary period. We then empirically examine the relationships among per capita oil-rent shocks, the growth of the middle class, and the quality of political institutions as well as political conflict. We use annual time series data for 1965-2012 and employ a Vector Autoregressive (VAR) model along with impulse response and variance decomposition analyses. According to our results, the middle class response to positive oil shocks is positive and significant. Yet, positive oil shocks and the growth of the middle class have contrary effects on the quality of political institutions in the short term—negative and positive respectively. This prompts us to employ a weighted measure of conflict, whose positive response to the growth of the middle class in Iran we then capture. These results are robust when controlling for other channels in the nexus of oil rents and middle class. The estimated Autoregressive Distributed Lag (ARDL) models illustrated the long-run effects of oil rents on the size of middle class and long-run effects of both middle class and oil rents on conflict. Our findings hint at potential conflicts after oil shocks, whereby oil rents increase government's control over political institutions but at the same time give impetus to the growth of the middle class that is in turn associated with political instability.

Keywords: Middle class; Oil rents; Political institutions; Conflict; VAR model; ARDL model;

Iran; Middle East

JEL classification: O1; O4; Q3

1. Introduction

The significance of the middle class—those belonging to neither the ruling elite/bourgeoisie/land-owners nor the working class/peasants—has been highlighted both as a driving force and an important consequence of development.¹ In this study, we focus on Iran, an important Middle Eastern oil-based economy, where a distinction has often been made between the modern and traditional strata of the middle class. We start out by showing that state policies in the post-revolutionary period have resulted in the expansion of the middle class. Furthermore, the growing middle class in Iran is now likely to be modern—exhibiting cultural, social, and political aspirations that may challenge government’s controls. Treating the middle class as a whole then prompts us to probe its association with the main source of the country’s wealth—namely, oil rents—on the one hand and political developments on the other.

Specifically, we investigate the dynamic response of Iran’s middle class to oil rents to answer the following questions: How do the positive oil shocks shape the development of the middle class in Iran? How does the quality of political institutions in Iran respond to an expanding middle class? Does expansion of the middle class lead to higher levels of political conflict in Iran? These are important questions which help to answer other related questions—for example, to what extent do the negative exogenous shocks such as economic sanctions influence the development of the middle class in Iran?

In answering these questions, we use a vector autoregressive (VAR) model, and apply tools of impulse response and variance decomposition analyses to 1965-2012 annual data. Our simulations show that the response of Iran’s middle class to positive oil shocks is positive and significant. The response of quality of political institutions to the expansion of the country’s middle class is also positive and statistically significant in the short term. Yet, quality of

¹ Ravallion (2010) discusses two definitions of the middle class. The first, which is more commonly employed in developed countries, refers to people around the middle of the income distribution. The second definition, often used for developing countries, describes those in the population who are comfortably above the poverty line. In our empirical analysis, we follow Kharas (2010) to define the middle class as those earning or spending between 10 USD and 100 USD per person per day (2005 PPP USD).

political institutions has a direct negative response to oil shocks. We also investigate the response of a weighted measure of conflict to expansion of the middle class and oil rents. The response to such an expansion is positive and statistically significant. Our estimated Autoregressive Distributed Lag (ARDL) models, which capture long-run effects, also support the findings of the VAR estimations. These results are robust after controlling for other important channels such as government spending on education and health, inflation, trade, and quality of political institutions. We further control for exogenous events such as the Revolution of 1979 and the Iran-Iraq War (1980-1988).

To the best of our knowledge, this is the first study of the dynamics of the middle class in the context of a Middle Eastern oil-based economy, which uses the VAR and ARDL analytical approaches. The remainder of the paper is organized as follows: Section 2 provides a brief literature review on the middle class in relation to economic and political development. This is followed in Section 3 by a political economy discussion on the development of the middle class in Iran. Section 4 presents our data and empirical methodology while our results are discussed in Section 5. Section 6 concludes the paper.

2. Middle class and development

The observation that all advanced economies have significant middle classes is often made to highlight the importance of the middle class for development. It has also been suggested that industrialization gained impetus with the expansion of the middle class (see for example Landes, 1998: 217-218). Galor and Zeira (1993) and Alesina and Rodrick (1994) as well as Persson and Tabellini (1994) and Clarke (1995) associate a small middle class with negative impacts on the growth rate, either directly or through other factors. Easterly (2001) emphasizes the relationship between growth and higher levels of income as well as education, modernization, political stability, better infrastructure, and improved health on the one hand and the size the middle class and its share of income on the other. There are other economic

arguments in favor of the middle class, including their identification with entrepreneurial activities, the value they place on accumulation of human capital and savings, their consumption effect, and their potential positive impact on poverty reduction (see Banerjee and Duflo, 2008; Ravallion, 2010). Furthermore, as contended by Kharas and Gertz (2010) and Kharas (2010), without a large enough middle class it is unlikely to escape the middle-income trap.

The middle class has featured prominently in the literature on political development as well. Studies probing the development of industrial capitalism and modern democracy in Western Europe and North America tend to describe a relationship running from the former to the growth of the middle class and then to the latter (see Glassman 1995; Chen and Lu 2011). Discussions on these types of associations are much more qualified in the literature concerned with late industrializers and other developing countries (for example, Jones 1998; Hsiao and Koo, 1997; Bellin 2000; and Acemoglu and Robinson, 2012). In particular, a positive outcome in terms of political development is associated with the middle class only if it has political cohesion, is not tied down by immediate economic worries or future political instability, and is independent enough from the state. In fact, in many instances, states may be successful in controlling private economic activities and employ a large number of people to shape the middle class as a state class (see Elsenhans, 1996). The existence of such a situation has been argued for the case of the middle class in Middle Eastern countries (for example, by Ouaisa, 2014; see also Diwan, 2013). It has been stated that unlike the case of the middle class in Western Europe and North America, which took shape in association with the development of industrial capitalism, the middle class in the Middle East owes its existence to rentier structures developed at the auspices of petro-states or through petro-based expatriate remittances.² The relative failure of Middle Eastern middle classes to act as catalysts of increased participation and

² Bjorvatn and Farzanegan (2013) explain that "... governments [in resource-rich states] use public sector employment as a redistributive device, in many cases for 'patronage' purposes."

democratization, despite their key roles in revolutions and other forms of political shifts, may thus be hypothesized to at least partially reflect the position they have assumed vis-à-vis the state and rentier structures.

3. The middle class in Iran

The roots of modern social class formation in Iran may be traced back to the end of the nineteenth century, with arguably significant influences on Iran's Constitutional Revolution in the first decade of the twentieth century. Although the Constitutional Revolution was carried out through a multi-class coalition, the nascent middle class had a prominent role in it (see Foran, 1991:803; Abrahamian, 1982: 80; Abrahamian, 1979). Yet, the growth of the middle class in Iran is mostly attributable to the modernization initiatives carried out during the period of the two Pahlavi monarchs. An important event in the history of modern Iran was the 1979 Revolution, credited by most scholars to a multi-strata coalition, with the middle class being a significant force (Keddie and Richard, 2006: 222-225; Parsa, 1989: 126-127; Ashraf and Banuazizi, 1985:25; Abrahamian, 1982: 496-524) or having the most prominent role (Amirahmadi, 1990:1-9) in it.

Studies treating the pre-revolutionary middle class in Iran (e.g., Bill, 1963; Ashraf and Banuazizi, 1985; Liaghat, 1980; Keddie and Richard, 2006) commonly distinguish between an old stratum, or a traditional middle class, and a new stratum, or a modern middle class. The former is generally associated with the petty bourgeoisie made up of craftsmen, artisans, small farmers, small producers, and the like, while the latter is said to have especially comprised professionals and technocrats emerging as a result of pre-revolutionary government's development initiatives and modern education (see Liaghat, 1980).

Despite major political economic shifts after the 1979 Revolution, the same two strata—modern and traditional—have also been associated with Iran's post-revolutionary middle class (see Bashiriyeh, 2002; Rabbani, 2006; Rabiee, 2011; Keshavarz, 2011; Rajabloo and

Tahmasebi, 2011; Masodnia and Mohammadifar, 2011; Zahirinejad, 2014). Yet, it has often been claimed that the modern part of Iran's middle class lost out in the ensuing political struggles of the Revolution's immediate aftermath, whereas the values of the traditional middle class informed the shaping of the Islamic Republic in significant ways. The latter observation is corroborated by the deteriorated relative economic positions—in terms of the likelihood of falling within various income brackets—of those with more education in the initial post-revolutionary years (Nowshirvani and Clawson, 1994: 251). Part of this was the likely result of reductions in the number of government employees due to purges and early forced or voluntary retirements (see further below). In contrast, the number of small-scale businesses (employing fewer than 5 persons), associated with petty bourgeoisie, more than doubled between 1986 and 2002 from 706,466 to 1,456,131 at the expense of the number of those employing more than 50 workers (SCI, 1988, 2003).

These developments are likely to have been influenced by the social roots of the post-revolutionary cadre in the traditional bazar and petty bourgeoisie. Masodnia and Mohammadifar (2011) argue for the existence of a post-revolutionary rift between the government and the people in Iran that is rooted in the exclusion of the modern middle class—although they suggest that the latter has continued to exercise significant social and cultural influence.

In fact, it is quite difficult to set clear boundaries between the traditional and the modern parts of the Iranian middle class in the post-revolutionary period. It is true that the post-revolutionary government has strived to create new groups of bureaucrats and technocrats (as well as modern businessmen) out of some members of the traditional lower and lower middle classes. This has been aided by a number of policies. To begin with, although a central focus of the Constitution of the Islamic Republic concerns social justice in the name of the downtrodden, the post-revolutionary economic policies—including those related to redistribution of rents through subsidies and transfers and the activities of para-governmental revolutionary

foundations—have been populist in nature rather than pro-poor and as such have been more likely to benefit the middle class (see Saeidi 2001; Alaedini and Ashrafzadeh, 2016).

The rapid expansion of higher education has also worked along the same lines. As shown in Table 1, prior to the Revolution, only 1.84 percent of the population older than 20 enjoyed various levels of college/university education. By 2011, this figure had grown to 12.48 percent. This said, those with university education, who are taken to form the backbone of the modern middle class, may have been facing increasing unemployment pressure in recent years. Indeed, their unemployment rate which was 19.7 percent in 2006 (at the beginning of President Ahmadinejad’s tenure) grew to 31.3 percent by 2011. Yet, as a whole, the expansion of tertiary education has gone hand in hand with the growth of a modern middle class in terms of occupational-economic status—whose further implications for modern sociocultural and political outlooks cannot be downplayed.

Table 1. Population with tertiary education (20 years of age or older)

Year	Total 20+ population	20+ with tertiary education	Percent of 20+ with tertiary education	20+ with associate degree	20+ with bachelor degree	20+ with master degree	20+ with doctorate
1976	15,098,690	282,848	1.84	73,749	147,999	28,946	25,129
1986	21,778,791	587,894	2.70	244,377	264,555	41,675	37,190
1996	29,214,396	1,500,807	5.14	589,556	756,562	91,352	63,296
2006	44,087,392	4,330,850	9.82	1,436,390	2,491,296	336,467	62,844
2011	50,980,848	6,361,291	12.48	1,903,548	3,786,153	577,260	93,612

Source: SCI (1976, 1986, 1996, 2006, 2011), Census results, <https://www.amar.org.ir/>.

Information on changes in occupational categories over the years provides support for this line of thinking. To begin with, although the number of government employees, registered at 849,085 right after the Revolution, experienced reductions through 1986, it subsequently grew to 2,147,195 by 2006 (SCI, 2015). Furthermore, we have used census information on

Iran's occupational categories to construct Table 2, in which professionals and specialists, technicians and professional assistants, and office workers are classified as belonging to the middle class. It shows that, in 1976, 11.38 percent of those employed would be categorized as modern middle class. This figure grew to 19.18 percent by 2006, the highest in the table. The 2011 figure for occupations associated with the modern middle class is lower compared to 2006, while that cited for legislators and high-ranking managers is higher. This development may either have to do with a bloating managerial class during Mahmoud Ahmadinejad's presidency or else certain re-categorizations across the table's columns between 2006 and 2011. Rajabloo and Tahmasebi (2001) provide similar evidence for the reassertion of the professional and technocratic elements of the middle class between the first and second post-revolutionary decades by making use of occupational stratification data. Similarly, Behdad and Nomani's (2009) study of the dynamics of Iranian social classes—also probed in terms of occupation—through the 1979 Revolution and three post-revolutionary decades hints at an initial expansion of the traditional middle class but a subsequent reassertion of the modern middle class in the society. The results of the Survey of Values and Attitudes of Iranians carried out in 2000 and 2003, discussed in Appendix A, are further revealing in this regard. They show more than anything that distinguishing between the modern and traditional parts of the middle class is no longer warranted—at least with the criteria conventionally used in Iran.

The Development, Aid, and Governance Indicators published by the Brookings Institution (2016) contains data on the size of the middle class, including on Iran, that are defined economically and in terms of income. It uses US\$10 per day (2005 PPP) for its lower bound and US\$100 (2005 PPP) for its upper limit. Although its high upper bound may include persons considered rich locally, it has the advantage of being both a global and an absolute measure. Figure 1 is drawn using these data, which shows that despite its ups and downs, Iran's

middle class—defined in income terms—has continued to expand after the mid-1960s and especially since the early 1990s.

Table 2. Occupational categories and growth of modern middle class in Iran

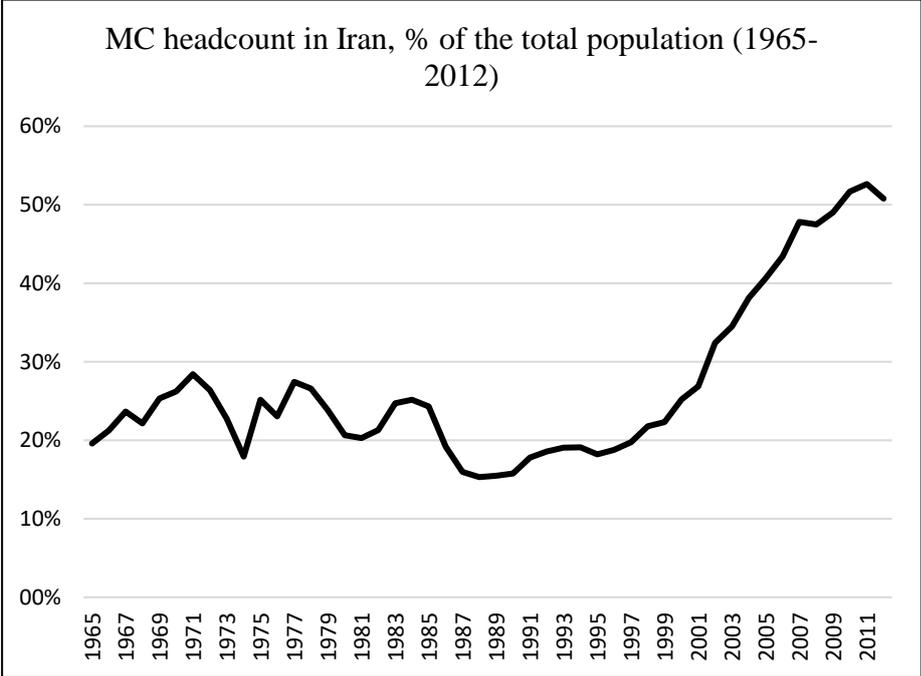
Year		Occupations associated with modern middle class	Legislators and high-ranking managers	Not stated	Other occupations	Total
1976	No.	993,427	40,557	444,157	7,321,279	8,799,420
	%	11.28	0.46	5.05	83.20	100
1986	No.	1,421,563	44,429	1,442,679	8,127,291	11,035,962
	%	12.88	0.40	13.07	73.64	100
1996	No.	2,334,842	324,643	1,212,700	10,699,387	14,571,572
	%	16.2	2.22	8.32	73.43	100
2006	No.	3,926,000	608,000	1,099,000	14,843,000	20,476,000
	%	19.18	2.97	5.36	72.47	100
2011	No.	3,794,000	746,000	1,230,000	14,776,000	20,547,000
	%	18.46	3.63	5.98	71.92	100

Source: SCI (1976, 1986, 1996, 2006, 2011), Census results, <https://www.amar.org.ir/>.

At the time of the Revolution in 1979, Iran’s income middle class comprised some 24 percent of the population. Political economic turmoil in the aftermath of the Revolution through the end of the 1980s resulted in much fluctuation together with a gradual contraction of this figure. A number of factors may be suggested for these developments in the size of the income middle class. A relatively large number of white-collar government employees—members of the middle class—were fired, bought out, or retired, but they were eventually replaced by revolutionary cadre, who might have experienced an upward mobility from lower to middle class. Economic disruptions and negative growth rates—caused by the Iran-Iraq War as well as the oil slump starting in mid-eighties—are another set of factors that arguably affected the size

of the income middle class in this period. The size of the income middle class shrank to its lowest level at barely above 15 percent of the total population in 1988. It then began to grow, first slowly during Rafsanjani’s presidential terms—most likely due to the post-war reconstruction initiatives—and then rapidly during Khatami’s presidential term—possibly as a result of reduced economic instability, higher rates of economic growth, and a political economic environment more inclusive of the middle class aspirations.

Figure 1. Iran's income middle class as percentage of total population



Source: Data from Brookings Institution (2016), Development, Aid, and Governance Indicators.

Khatami further carried out certain initiatives to strengthen the civil society, which were pro-middle class in a sociopolitical sense with possible economic implications. Urbanization and access to urban services also continued to grow in this period. By the end of Khatami’s tenure, the size of the income middle class in Iran had surpassed 40 percent of the total population. It continued to grow through most of Ahmadinejad’s populist presidential tenure and the ensuing oil boom, but the trend seems to have stalled after 2011—likely due to the

intensification of sanctions³ as well as economic mismanagement and most recently a relative oil-price slump.

Earlier, we touched on the debate about the relationship between the growth of the middle class and political development—which is especially ambiguous or contingent in developing countries and certainly unsettled for the case of the Middle East. For the case of Iran, Kian-Thiebaut (1998) claims that, in the post-revolutionary period, members of the middle class—particularly the professionals opposing the traditionalist power-holders, the salaried employees, the educated unemployed joining the ranks of the economically discontented, and the socially pro-western youth—have been pressing the establishment with serious challenges. According to her, the future outcome of this development depends on how they meet repression. Furthermore, expressing optimism about the power of the middle class to shape democracy given a free market, Nasr (2009) has argued that the growth of the middle class in Iran as a result of the economic policies of Rafsanjani and Khatami alarmed the establishment in terms of their rising demand for social and political changes. This, he suggests, incited a backlash in the form of Ahmadinejad’s populist policies—which were carried out in the name of the lower classes—as well as outright repression that has devastated the middle class and dashed its hopes for political change.

Other studies (for example, Mohammadifar and Mohammadi, 2012) stress the role of Iran’s rentier economic structure in the development and form of the middle class, which needs to work with the government to gain access to economic and social resources. If this is true, then we are confronted with a middle class that benefits from its close association with the state—as employees, as contractors, and as recipients of licenses and certain levels of economic and social protection. That is, a state class. Intuitively, the rise of such a social class with state

³ Farzanegan (2013a) explains how sanctions increased the size of the informal economy in Iran through different channel such as increasing inflation rate and reduction of disposable income of households. Also see Farzanegan et al. (2016) and Khabbazan and Farzanegan (2016) for the effects of oil and banking sanctions on the household welfare in Iran.

support should lead to the dominance of the state's ideology over its social, cultural, and political outlooks.

Yet, it is at the same time claimed that the middle class is likely to challenge government policies. Indeed there are several indicators in the results of the Survey of Values and Attitudes of Iranian (Research Center for Culture, Art, and Communication, 2003; see Appendix A) that hint at the dissatisfaction of the middle class with the political economic structure: 65.6 percent of the modern middle class and 64.7 percent of the traditional middle class were in favor of reforms; also 35.9 percent of the modern middle class and 37 percent of the traditional middle class had little trust in government's managers, while 75.5 percent of the middle class indicated little satisfaction with the country's economic progress. In fact, as the emerging middle class is not only a product of overt state facilitation, but also state policies with unwanted results, its sociocultural and political outlooks are likely to be far from monolithic. For one thing, many in its next generation may increasingly resemble the erstwhile-marginalized modern middle class of the pre-revolutionary period.

Our discussions in this section thus underscore the need for empirical investigations of the association between Iran's middle class and the country's social, political, and economic structures. Alaedini and Ashrafzadeh (2016) have initiated this by empirically testing for the effects of a number of variables on size of the income middle class in the country (as well as income distribution). According to this analysis, which employs panel data for 1996-2013 and a set of simultaneous equations, improvements in income distribution (measured through the Gini index)⁴ and human capital (as probed by per capita education expenditures as well as the number of students) have benefited the size of the middle class in Iran. Government's development expenditures have also acted to expand the middle class, but not its current

⁴ Using survey-based microdata that covers 140,000 individuals, Farzanegan and Habibpour (2017) simulate the effects of different oil rents distribution policies on income of households as well as inequality and poverty indicators in Iran.

expenditures. Furthermore, manufacturing exports as well as manufacturing employment and wages have affected the size of the income middle class positively, while a growing middle class has led to increasing manufacturing exports. Interestingly enough, during the investigated period, urbanization has had a negative impact on middle class size, while a worsening income distribution and a shrinking middle class have given impetus to urbanization. This is likely to mean that while cities no longer act as means of economic advancement, they may be perceived as such by the population. What is further interesting to explore is the actual response of the middle class to oil-rent shocks and in turn their effects on political developments in Iran—which is the task we take up in the rest of this study.

4. Research design: Hypotheses, data, and empirical method

Hypotheses

On the basis of our political economy discussions on Iran's middle class, we test the following hypotheses, using annual data from 1965 to 2012:

H1: The response of Iran's middle class to positive oil rents shocks is positive and significant, *ceteris paribus*.

H2: The response of political institutions to the positive oil rents shocks is negative and significant, *ceteris paribus*.

H3: The response of the political institutions to the expansion of the middle class is positive and significant, *ceteris paribus*.

Data description

To examine the dynamic interconnections between oil rents, political institutions, and the middle class in Iran, we use the following variables: real oil and gas value added (i.e., rent) per capita (in rials)⁵ from CBI (2017), Polity index (-10 to 10, with higher scores indicating

⁵ We label this variable oil rents per capita in the rest of paper.

better quality of political institutions) from Marshall et al. (2017), and relative size of the middle class within the population from the Development, Aid and Governance Indicators (DAGI) of the Brookings Institution (2016). As mentioned earlier, the latter measure defines the income middle class in absolute terms and globally as the number of people who live in households earning or spending between US\$10 and US\$100 per person per day (2005 PPP). The last updates to the Brookings' dataset were made in 2013. It calculates the relative share of the middle class in the total population, by first estimating a national expenditure/income distribution based on the distribution parameters of a generalized Lorenz curve estimates, using country household surveys and a mean household per capita expenditure derived from national accounts. From this distribution, it computes the share of the population with expenditures/incomes below a threshold level. The headcount ratio of the middle class is the difference between the headcount ratio of those who earn or spend less than US\$100 and the headcount ratio of those who earn or spend less than US\$10 (2005 PPP).⁶ We have already shown the development of this middle class ratio in Iran in Figure 1.

The effects of oil rents per capita on the size of the middle class in Iran may also be manifested through other channels. We control for such channels via government spending on education (% of GDP), government spending on health (% of GDP), inflation, and imports (% of GDP). Most parts of government spending are funded by oil revenues. Spending on education and health may enable certain low-income cohorts of the population to join the middle class. Inflation is a channel through which the purchasing power of individuals may be negatively affected—reducing the share of middle class income especially for those who are public employees with fixed nominal salaries. However, it may also increase the value of fixed assets such as real estate and properties of the middle class population. Positive oil-revenue shocks

⁶ For more details on the methodology and underlying data sources see Kharas (2010) and Technical Appendix of Dataset: <https://www.brookings.edu/wp-content/uploads/2012/07/Technical-Appendix-September-2013-Update.pdf>.

may have a significant role in fueling inflation in Iran as a symptom of the Dutch disease. Yet, negative oil revenue shocks can lead to inflation by increasing budget deficits and by extension government's borrowing from the Central Bank (Farzanegan and Markwardt, 2009). Trade openness, measured by the share of imports in GDP in our study, may improve economic opportunities and access to new markets and technologies for a larger part of the population, while affecting the size of the middle class positively. Most imports in Iran are also funded by oil-export revenues. Table B1 in Appendix B provides a description of the variables and their sources. In addition, a summary statistics of the key variables is presented in Table B2 in Appendix B.

Methodology

In estimating the response of Iran's middle class to positive oil shocks as well as testing other hypotheses, we utilize a vector autoregressive (VAR) model, specified below. VAR is a multivariate framework that relates changes in a particular variable—for example the relative share of the middle class—to changes in its own lags and to changes in (the lags of) other variables, such as oil rents.

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

where y_t is a vector of k endogenous variables, x_t is a vector of d exogenous variables, A_1, \dots, 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 (Dizaji et al., 2016). The time period variable is denoted by t , with annual observation from 1965 to 2012. One of the advantages of the VAR model is that all variables are treated as endogenous. They affect each other with some optimally-selected lags. Therefore, we are avoiding the often-observed endogeneity problem due to reverse feedback in regression analysis. In this context, the ordinary least squares (OLS) lead to consistent estimates.

We have the following variables in the vector of endogenous variables: [oil rents per capita, education spending (% GDP), health spending (% GDP), inflation, imports (% GDP), middle class ratio, polity index (and another alternative index for democracy)]. In the vector of exogenous variables, we control for the Iran's 1979 Revolution and its eight-year war with Iraq—dummies as $x_t = [constant, 1979\ Revolution\ dummy; 1980 - 1988\ war\ with\ Iraq\ dummy]$.

The unit-root tests such as Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) indicate that all variables except for inflation have a unit root (I(1)). The Johansen cointegration test shows that there are 2 to 5 long-run relationships among I(1) variables. To implement the Johansen cointegration test, we need to find an optimum lag length in the VAR model. On the basis of LR, FPE, and AIC criteria, the lag length of 2 years is selected. In the case of cointegrated variables, differencing will lead to the loss of useful long-run information in our data. Sims (1980) and Sims et al. (1990) have argued against differencing of cointegrated variables—suggesting the use of the VAR model in levels. Since in our study we are interested in an impulse response analysis instead of the interpretation of each coefficient of the VAR model, we use the unrestricted VAR model and variables in their level.⁷ Some studies suggest using the VECM in similar cases. However, the literature has shown that the unrestricted VAR models perform better in their simulations in the short term as compared to VECM (Naka and Tufte, 1997).⁸

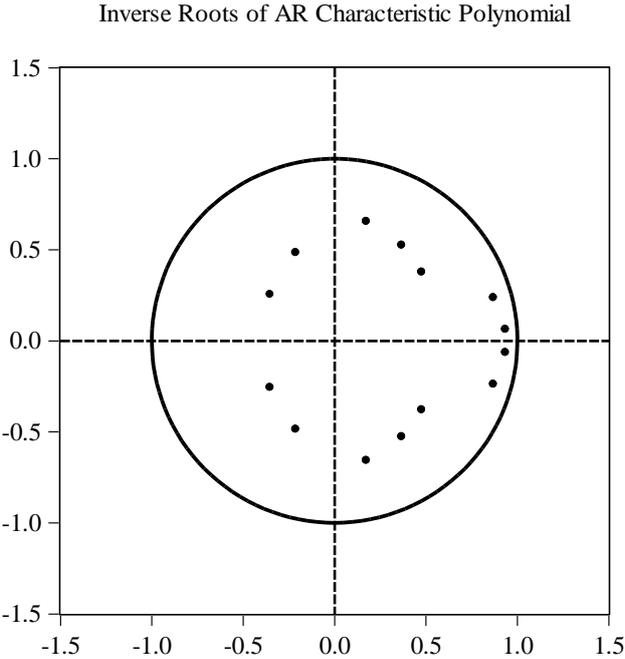
The estimation of the VAR model with an optimum lag length of 2 years in a sample period of 1965-2012 should be examined in terms of stability condition. For this purpose, we probe the inverse roots of the characteristic AR polynomial (see Lütkepohl, 1991). The estimated VAR is stable (stationary) if all roots have modulus less than one and lie inside the

⁷ See also Dizaji et al. (2016), Farzanegan and Markwardt (2009), Farzanegan (2011) Farzanegan and Raesian Parvari (2014), and Dizaji and Bergeijk (2013) for a similar approach.

⁸ See also Engle and Yoo (1987), Clements and Hendry (1995), and Hoffman and Rasche (1996).

unit circle. If the VAR is not stable, certain results (such as impulse response standard errors) will not be valid (HIS, 2016: 646). Figure 2 shows that all roots of the estimated VAR model are inside the unit circle.

Figure 2. Stability condition of the VAR model



Note: No root lies outside the unit circle. VAR satisfies the stability condition.

Another important post-VAR estimation test entails controlling the residuals’ serial correlation. The null hypothesis of no serial correlation cannot be rejected in our estimated VAR model. The results are shown in Table 4.

Table 4. The VAR residual serial correlation

Sample: 1965 2012		
Included observations: 46. Lagrange-multiplier test. H0: no autocorrelation at lag order		
Lags	LM-Stat	Prob.
1	60.07	0.13
2	55.27	0.24
3	55.09	0.25
Probs. from chi-square with 49 df.		

We further calculate the impulse response functions (IRF) and variance decomposition (VDC). Using IRF, we can trace the response of Iran's MC ratio to positive oil shocks per capita, controlling for other channels. The IRF shows the size and direction of the response over the years following the initial shock. After Sims and Zha (1999), we report one standard deviation for error bands in the IRFs (68% confidence intervals). Application of the VDC helps us to show the role and relative importance of shocks to a specific variable in explaining the fluctuations of other variables in the VAR system.

We need to examine the possibility of structural breaks in our variables and its effects on the unit-root tests. We use the Zivot and Andrews (1992) unit root test, allowing for a single break in intercept and trend. Neglecting the possible structural break might mistakenly lead us to conclude that the series is nonstationary, whereas it could be stationary with a level or trend shift. The test gives a minimum *t-statistic* which should be larger (in absolute term) than the reported critical values in order to reject the null hypothesis of unit-root. The Zivot and Andrews test leads to the rejection of the null hypothesis of unit-root for all endogenous variables (at 5% level) except for inflation and imports (% GDP) which are I(1).⁹

5. Results

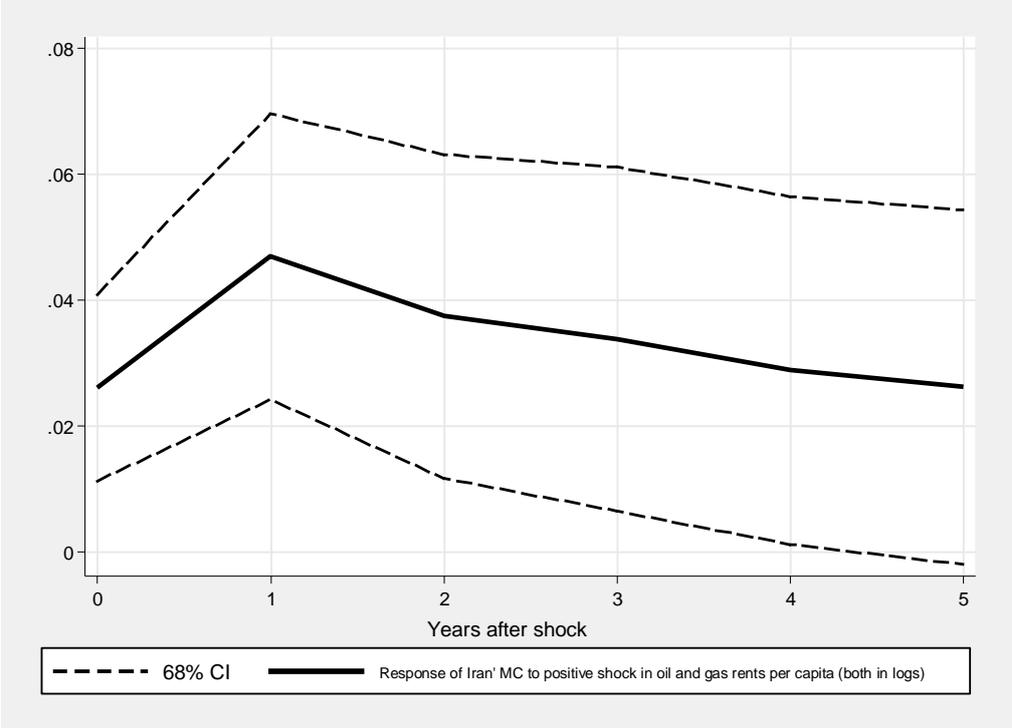
First Hypothesis

Figure 3 shows the response of the Iranian middle class to positive real oil-rents shock in per capita terms. The response of the middle class to such shocks is positive (expansive) and statistically significant during the next 4 years after the initial shock. This is in line with our earlier background information on the development of the middle class in Iran, as especially associated with oil booms. The middle class in Iran is dependent on the flow of rents in different forms such as various energy, food, and banking credit subsidies besides public-sector jobs. The calculated IRF is based on the following Cholesky ordering of variables in the VAR model:

⁹ Results of unit root tests are available upon request.

[log oil rents per capita, log education spending (% GDP), log health spending (% GDP), inflation, log imports (% GDP), log middle class, polity] in addition to dummy variables for the Revolution (1979) and Iran-Iraq war (1980-88) as exogenous events. The first variable in Cholesky ordering affects all other variables contemporaneously but gets affected by them with some lags. The last variable in the ordering is the most endogenous. It gets affected by other variables in the system contemporaneously but affects them with some time lags.¹⁰

Figure 3. Response of Iran’s middle class to positive oil rents per capita shocks



We also investigate the long-run effects of increases in oil prices (as the most exogenous components of oil rents per capita) on the size of middle class in Iran, controlling for other key drivers of middle class development and a dummy variable for Iran’s 1979 Revolution. For this purpose, we employ the Autoregressive Distributed Lag (ARDL). The ARDL / Bounds Testing methodology introduced by Pesaran and Shin (1999) and Pesaran et al. (2001) can be used with

¹⁰ Using generalized impulse response functions (Pesaran and Shin, 1998) which are not sensible to a specific ordering of variables do not change our result. In Table B3 in the Appendix B, the VAR Granger Causality/Block Exogeneity Wald Test shows which variables have more endogenous/exogenous nature within our estimated VAR model.

a mixture of I(1) and I(0) variables (which is the case in our study). In addition, in ARDL, different variables can be assigned different optimum lag lengths in the modeling process.

Among 3584 evaluated models, the selected model based on Hannan-Quinn criterion (HQ) is ARDL (7,4,5,7): 7 lags for middle class headcounts (our dependent variables), 4 lags for oil prices, 5 lags for inflation and 7 lags for Polity index. Following the estimation of ARDL (7,4,5,7), we check for dynamic stability of the model through the Ramsey (1969) test. Ramsey's RESET test is designed to detect any neglected nonlinearities in the model. Based on the p-value of F statistics, we can strongly reject the null hypothesis of misspecification. We next check whether the errors of this model are serially independent. Based on Breusch-Godfrey Serial Correlation LM test results, we cannot reject the null hypothesis of no residual serial correlation. Following these post-estimation checks, we perform the "Bounds Test" to see if there is evidence of a long-run relationship between the variables. The results are shown in Table C1 in Appendix C. The value of F-statistic (6.14) is larger than critical levels of both lower and upper Bounds even at 1% level, suggesting a strong evidence for long-run relationship between variables. Finally, we estimate a long-run "levels model" which is shown in Table C2 in Appendix C.

The long-run effect of oil prices on the population of the middle class in Iran is positive (0.29) and statistically significant at 1% level. The inflation rate has a long-run negative effect on the population of the middle class of Iran. Higher inflation reduces the real purchasing power of a majority in the population, especially salaried employees.¹¹ Improvements in the quality of political institutions exhibit a long run positive effect on the size of middle class, which is also statistically significant at 5% level. More politically-open government administrations (such as those during Khatami's tenure as president) have created opportunities for the

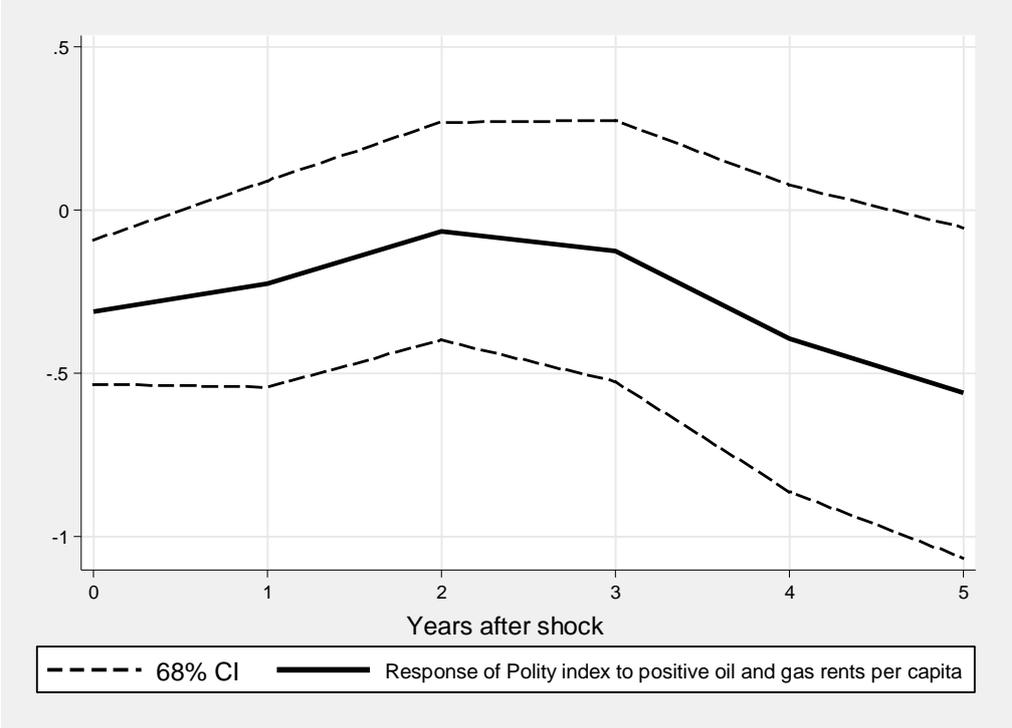
¹¹ See <http://www.al-monitor.com/pulse/originals/2014/03/iran-wages-inflation-economy-law-protest.html> (Accessed 29 September 2017). Inflation may have a positive income effect on the wealth of individuals who have a larger share of fixed assets and real estate in their basket.

participation of larger groups of people, especially the youth and women—with implications for long-run positive income effects, *ceteris paribus*.

Second Hypothesis

Our second hypothesis is about the response of Iran’s political institutions to positive oil shocks (see Figure 4).

Figure 4. Response of Iran’s Polity index to positive oil rents per capita



While the middle class in Iran expands following such shocks, the quality of political institutions deteriorates. An interpretation is that the financial position of the state is enhanced as a result of boosts in the oil market, which strengthens its leverage over the population as it weakens the civil society.¹² Another channel through which higher oil rents can shape the quality of political institutions is reduction of state budget dependence on taxes and other contributions of the society. The state’s financial independence can also reduce the pressure for higher accountability to the civil society and weaken democratic institutions (Farzanegan,

¹² Bjorvatn and Farzanegan (2015a,b) show the mechanism through which higher resource rents leveraged by the state can lead to political stability only when political power is sufficiently concentrated.

2013b). The negative response of political institutions under positive oil shocks is statistically significant within the first year following a shock.

To test the robustness of our results, we use the objective democracy indicator of Vanhanen (2000, 2016). The Vanhanen index has two components: political competition and political participation. The former is based on the percentage of votes gained by the smaller parties in parliamentary and/or presidential elections. More political competition is associated with higher shares of smaller factions and parties in formal institutions. To calculate this component, Vanhanen subtracts from 100 the percentage of votes won by the largest party in parliamentary elections or by the party of the successful candidate in presidential elections. The second component of democracy according to the Vanhanen index is the participation rate of the eligible population in parliamentary/presidential elections. While the Polity index is based on a subjective evaluation by country experts with respect to the extent of checks on executive authority, the Vanhanen indicators provide objective information on the actual political competition and participation. The Vanhanen index has been used in other studies on Iran (see, for example, Dizaji et al, 2016; Dizaji and van Bergeijk, 2013; Farzanegan, 2009 and Bjorvatn et al., 2013). There is a significant correlation between Polity index and competition (0.52) as well as participation (0.70) elements of Vanhanen index in our 1965-2012 sample for Iran. Figure 5 shows the co-movement of Polity and Vanhanen indicators in Iran.

We replace the Polity with Vanhanen competition and participation indicators and re-estimate the VAR model with one optimum lag length. Before impulse response analyses, we check the residual serial correlation and the stability of model and verify the reliability of the estimation. The IRF results shown in Figure 6 illustrate the response of political competition and participation in Iran to a positive shock in log of oil rents per capita, controlling for other variables including dummy variables for the Iran revolution and the period of war with Iraq. The response of both political competition and participation to a positive oil-rents shock per capita in Iran is negative and statistically significant for 5 years after the shock—supporting the

theoretical predications on the negative impacts of higher oil rents on political and civil liberties.

Figure 5. Co-movement of Polity and Vanhanen indexes in Iran

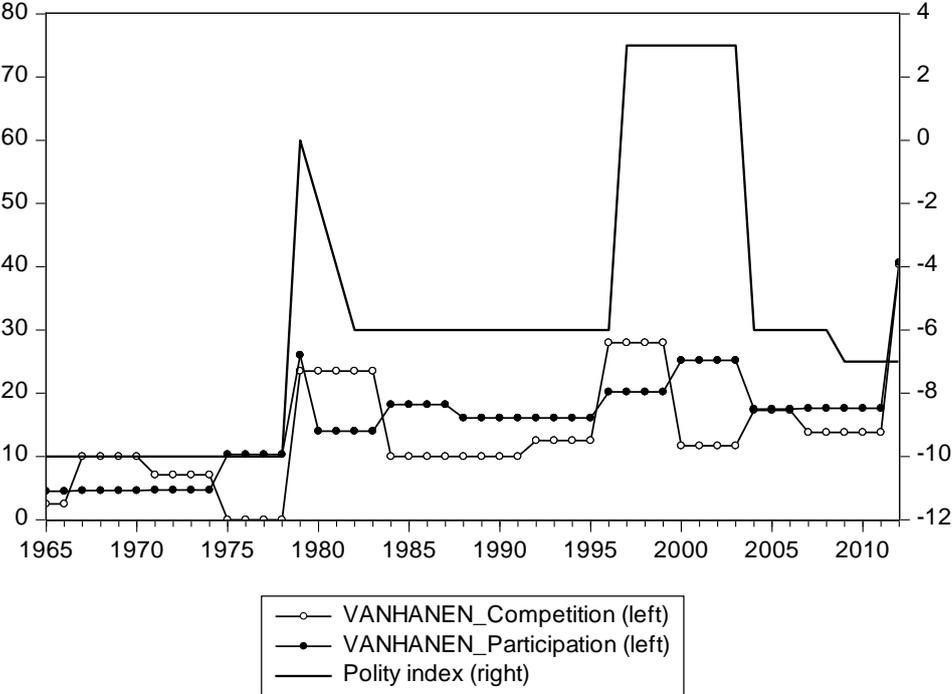
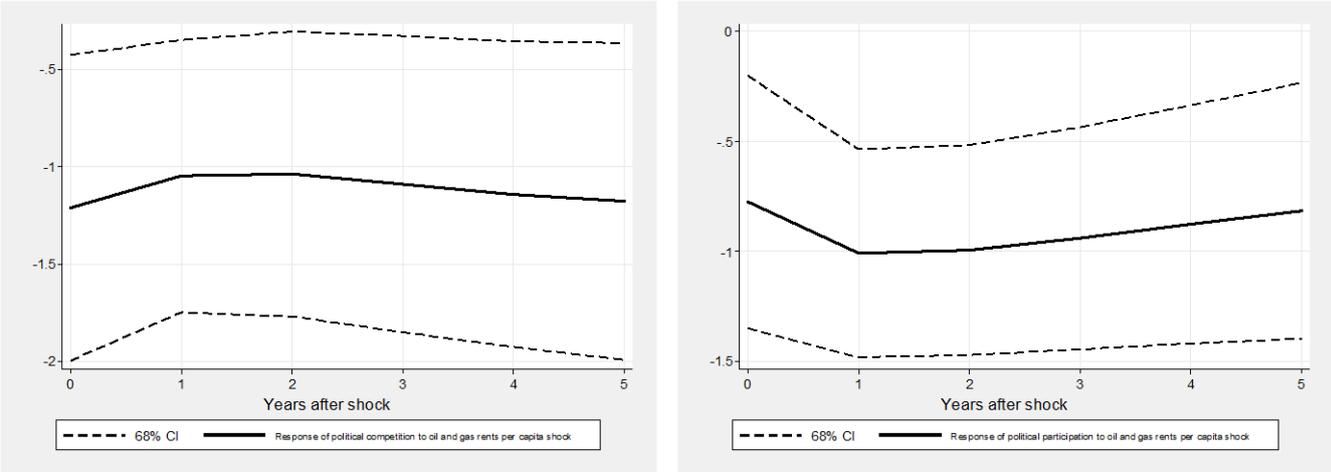


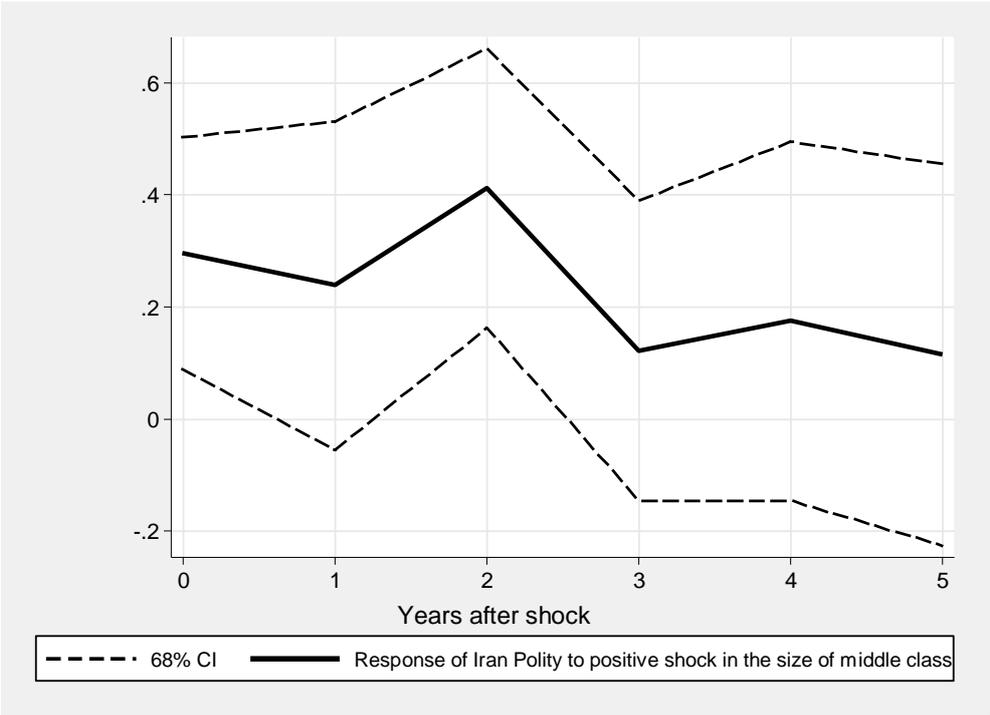
Figure 6. Response of Vanhanen indicators for political competition (left figure) and political participation (right figure) to positive per capita oil rents shocks in Iran



Third Hypothesis

The third hypothesis has to do with the consequences of a growing middle class for political institutions. According to our results, the response of Iranian political institutions to the expansion of the middle class is positive and significant, other things held constant (see Figure 7). A larger middle class, which is also associated with access to new technologies and educational opportunities, is likely to translate into higher levels of social awareness and increasing sociopolitical engagement. Note that the response of Polity in Iran to the increasing size of the middle class is positive and statistically significant for the initial 2 years following the shock (per VAR terminology).

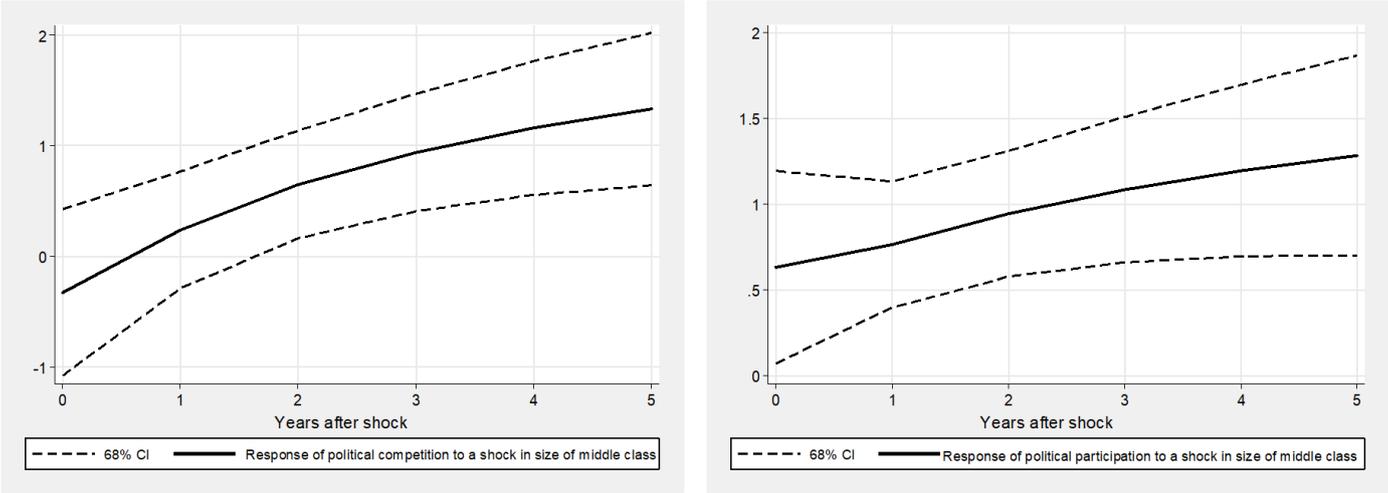
Figure 7. Response of Iran’s Polity to positive shocks in the size of middle class



For robustness checks, we use Vanhanen political competition and participation indicators instead of Polity index. The question is how a positive shock in terms of the size of the middle class in Iran reflects itself in political competition and participation in the ensuing years. Figure 8 shows the responses of both competition and participation to such a shock. In line with our earlier findings using Polity, the response of Vanhanen indicators are also positive

and statistically significant to middle class shocks. The expansion of the middle class (partly funded by oil revenues) has positive externalities with regard to future political development and engagement.

Figure 8. Response of Vanhanen index of *competition* (left figure) and *participation* (right figure) to positive shocks in the size of middle class in Iran



Through the variance decomposition method, we can also trace the relative importance of each variable in the fluctuation of a specific variable of interest such as the middle class in Iran. For example, Table 5 presents the variance decomposition of the middle class in Iran over the next 20 years following the shock. In the short run, the past changes of the middle class comprise the most powerful variable to explain the largest share of its fluctuation (77%). The second and third important variables in explaining the variance of middle class are inflation and oil rents. The relative importance of inflation and oil rents increases over time, becoming maximum within five years after the shock. In the 5th year following the shock, inflation and oil rents can each explain about 15% of the variance of the middle class. The relative importance of trade (import) in fluctuations of the middle class also increases over time but is still almost half of the weight of oil and inflation. In the long run (after 10 years), the most important variables (except for the development of the middle class itself) in explaining changes associated with middle class are oil rents (13%), inflation (11%), and quality of political

institutions (9%). The role of political institutions in explaining the variance of middle class becomes more visible in the long run (within 15-20 years after the shock).

Table 5. Variance decomposition for middle class (% of population)

years after shock	oil rents per capita	education spending (% GDP)	health spending (%GDP)	inflation	imports (% GDP)	middle class ratio	Polity
1	6.46	5.75	0.20	9.45	1.28	76.85	0.00
5	14.54	1.68	0.63	15.17	8.31	57.28	2.38
10	12.71	1.37	0.83	10.67	6.59	59.10	8.72
15	10.05	3.53	1.74	10.06	5.20	57.30	12.13
20	9.16	5.39	3.05	10.78	4.62	52.86	14.14

Sensitivity analysis

In both the second and the third hypotheses, we have used the Polity index (and Vanhanen's indexes) to proxy quality of political institutions in Iran. Polity measures the quality of political institutions by taking the following into account: competitiveness of political participation (1 - 3 points); competitiveness of executive recruitment (1 - 2 points); openness of executive recruitment (1 point); and constraints on the chief executive (1 - 4 points). Autocracy is measured by a negative versions of the same indices. The two scales are combined into a single democracy-autocracy score varying from -10 to +10. This definition and operationalization of political institutions can fit well with testing our second hypothesis (the response of political institutions to oil shocks) and has been used in the related literature (see, for example, Ross, 2013). However, using the Polity index for testing the third hypothesis (response to the development of the middle class) may not fully capture the essence of the political effects associated with the expansion of the middle class. For example, during a revolutionary period, it is quite likely to have very low quality of political institutions, but significant underground political activities and opposition across different layers of society, especially the middle class. Increasing the size of the middle class, which can accompany increasing demands for political and social freedom, may be manifested in peaceful or violent

demonstrations, strikes, or similar events. The Polity index may not capture such anti-government or pro-reform movements following the growth of the middle class.

We thus re-examine the third hypothesis by utilizing the weighted conflict measure of the Domestic Conflict Event Data. The data are from the Cross-National Time-Series Data Archive (CNTS) of Databanks International (Banks and Wilson, 2015). This conflict index is an aggregation of different kinds of internal conflict such as assassinations, strikes, guerrilla warfare, government crises, purges, riots, revolutions, and anti-government demonstrations. We trace the response of this conflict variable to growth of the middle class, controlling for other relevant variables. In all cases, the common tests to select the optimum number of lags in the VAR model as well as stability condition and residual autocorrelation tests are carried out. All tests show satisfactory results. We use 3 years of lag as the optimum length (suggested by the AIC and LR criteria) with the similar Choleski ordering of variables as in the main analysis. Using the generalized impulse response, which is not sensitive to specific ordering, does not change the results. The response of this weighted measure of conflict to positive middle class shocks is shown in Figure 9. The short-term (within the first year after the shock) response of the weighted measures of conflict to the rising middle class in Iran is positive and statistically significant.

We also apply the ARDL method to estimate the long-run effect of development on the size of the middle class, oil rents per capita and other controls such as education spending and revolution dummy on the weighted index of internal conflict. From the total of 5832 evaluated models, an ARDL (1,6,5,1) is selected: 1 lag for conflict (dependent variable), 6 lags for middle class, 5 lags for oil rents per capita, and 1 lag for education spending). All variables are in logarithmic transformation. The serial correlation LM test does not show any problem with residual correlation. In addition, the Ramsey test for stability of the model shows no specific issue with misspecification. The value of F-statistic under F-Bounds Test is larger than values

of lower and upper bounds at all levels of significance, suggesting the existence of long-run relationships among variables. The long-run estimation is shown in Table 6.

Figure 9. Response of weighted measures of conflict to positive shocks in the size of middle class

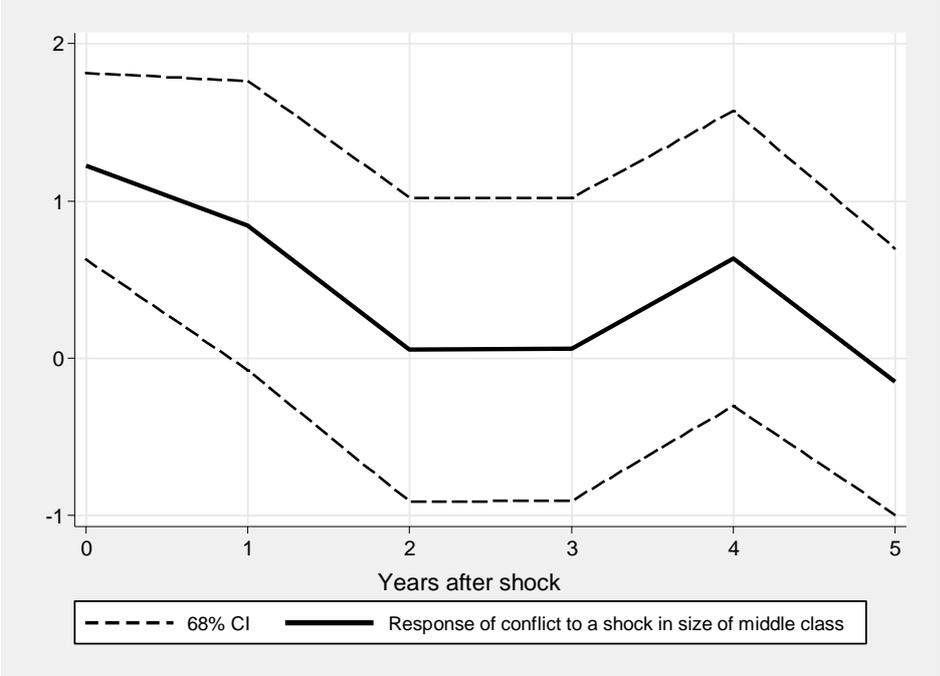


Table 6. Long run effect of middle class size on conflict

Dependent variable: Conflict index (CNTS)				
Independent variables	Coefficient	Std. Error	t-statistic	Prob.
middle class ratio	3.34	1.39	2.40	0.02
oil rents per capita	5.95	1.37	4.36	0.00
education spending	3.08	1.32	2.34	0.03

Constant is included (not reported). White heteroskedasticity-consistent standard errors are reported. All variables are in logarithmic form. Dummy variable for Revolution 1979 is controlled. Selected model is ARDL (1,6,5,1).

The effect of an increase in the size of the middle class on conflict is positive (increasing) and highly significant. Higher oil rents per capita, which we showed reduce the quality of political institutions, have an aggravating impact on conflict as well. This effect is also highly significant. Higher spending on education shows a long run increasing effect on conflict in Iran

as well. Increasing the quantity of schooling, especially in the post-revolutionary period, has not been accompanied by quality.¹³

6. Conclusion

We started out by examining the political economy of the drivers and consequences of the middle class in Iran. We suggested that state policies in the post-revolutionary period have provided impetus for the expansion of a middle class with modern characteristics, whose cultural, social, and political aspirations would likely challenge the government. Treating the middle class as a whole then prompted us to probe its association with oil rents on the one hand and political developments in the country on the other. A vector autoregressive model (VAR) and its applied tools including impulse response functions and variance decomposition analysis were employed to simulate the response of the middle class to positive oil shocks. We used annual 1965-2012 data for our simulation. In addition to our main variables of interest (oil rents and middle class relative size) we also controlled for other important channels which might affect the middle class—including government spending on education and health, imports, inflation, and quality of political institutions. According to our findings, the response of the middle class to positive oil shocks is positive and statistically significant. This is not surprising, as many at the middle of the society benefit from oil rents. They may include those who work for the government or private-sector companies that are recipients of government contracts as well as others who are involved in the sales of imported goods or are beneficiaries of the expanding network of dependency (patron-client) created by the government as a mechanism to thwart potential challenge.

Our results also indicate that the quality of political institutions suffers from positive oil-rents shocks. The fiscal system is highly influenced by a sudden jump in oil revenues,

¹³ See Farzanegan and Thum (2017) for a detailed investigation of quality of education in oil-rich economies.

increasing government's independence from the civil society. In particular, the growing oil revenues allow the government to alleviate the tax burden, while strengthening the tax base, increasing the tax rates, or dealing with the shadow economy becomes much less urgent. This in turn can lead to a lower degree of public-sector accountability to the people as well as muted engagement of citizens in the political decision-making process. However, another finding of our study is that the immediate response of Polity to growth in the relative size of the middle class in Iran is positive and statistically significant during the subsequent 2 years. That is, while oil rents boost the middle class, a larger middle class translates into more political leverage for the citizens. Oil revenues may have material as well as non-material consequences. Increasing access to educational opportunities (human capital) is bound to elevate people's awareness of their political rights. Enhanced engagement of women in economic and social life, in quantitative or qualitative terms, introduces new players to the society and possibly gives rise to new social demands. Higher access to information technology and social media is also likely to add to calls for reform. Demographic change—reduced fertility rates and higher numbers of young and working-age persons—may further influence political attitudes and behaviors. There may yet arise other non-material qualities in the society—as side effects of a larger middle class—that can in turn increase popular demand for political participation and openness.

However, we observed that the Polity measure used initially in our analysis for both the second and the third hypothesis might not fully capture the essence of political effects associated with the expansion of the middle class. We thus re-examined our third hypothesis by utilizing a weighted conflict measure from the Domestic Conflict Event Data—covering government crises, purges, riots, revolutions, anti-government demonstrations. Based on our results, the short-term (within the first year after shock) response of the weighted measures of conflict to the rising middle class in Iran is positive and statistically significant.

In summary, the middle class grows during oil booms in Iran. The growth of the middle class in turn has a positive influence on political development in the country. However, the

direct impact of oil rents on the quality of political institutions is negative, which is in line with the rentier state theory developed by Mahdavy (1970) and Beblawi and Luciani (1987)—more oil-rent dependency, lower taxation, and diminished pressure for accountability and transparency. These results hint at potential conflicts between a government that gains additional confidence during oil booms to stem political development—especially through the distribution of oil rents—on the one side and an expanding middle class—also associated with the oil rents—that nevertheless strives for political development on the other side. Our findings shed additional light on the 1979 Revolution—which had a strong middle-class component. They further provide explanation for the heightened political engagement in the 1997 presidential race that elected Khatami (who ran on a pro-civil society platform) as well as the events surrounding the 2009 presidential elections that resulted in open clashes in Iran.

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Appendix A: National Opinion Survey on Values and Attitudes of Iranians

Here we use data from the Survey of Values and Attitudes of Iranians—carried out in 2000 and again 2003 (Research Center for Culture, Art, and Communication, 2000, 2003) by the government—to shed light on important attributes of the middle class in Iran.¹⁴ Mandated by Article 160 of the Third Economic, Social, and Cultural Plan of Iran, the two surveys were conducted across all provinces, covering the provincial capital (as well as one other large city in the province in the first survey). The samples—16,824 respondents in the first and 4,581 respondents in the second survey—were randomly drawn from the population of all persons 15 years or older. The exercise was repeated in 2015, but its results have not been released yet. The 2003 survey data allow for a distinction to be made between occupations associated with “modern” and “traditional” middle class, but not the 2000 survey data. Therefore, we mostly make use of the latter here for our discussions.

In the 2003 survey, 71.6 percent of the respondents claimed to belong to the middle class (while the corresponding figure for the 2001 survey was 68.4). We can construct our own classification of the respondents into the lower class, modern middle class, traditional middle class, and upper class using occupational categories. Our modern middle class includes white-collar employees and private-sector employees, professionals and those whose occupations are associated with higher levels of education, journalists and writers, military officers, professional artists and athletes, and academics. The traditional middle class in our classification comprises shop-owners, owners of micro enterprises, tradespersons without college/university degrees, independent farmers, and the clergy. Needless to say, we have only categorized those with an occupation, leaving out the unemployed from either the modern or the traditional middle class.

¹⁴ Their website in Persian may be accessed at <https://goo.gl/9X15ni>

Our analysis of the data shows that 57 percent of the respondents of the 2003 survey belong to the middle class based on occupational categories. The figure is further divided into 34.1 modern and 22.9 traditional—that is, close to 60 percent of those falling in the middle class are the modern type according to our occupational categories. Furthermore, 73.3 percent of those we have categorized as middle class had identified themselves with the middle class. Also, among those with some tertiary education and an occupation, 58.7 percent belong to the modern middle class while 17.3 percent belong to the traditional middle class, again based on our occupational classification.

Various attributes of the occupational-based modern middle class, traditional middle class, lower class, and upper class are compared in Table A1. The table further includes a fifth column for those with college/university degrees—either holding or lacking an occupation—who are associated with the modern middle class in terms of education. A comparison of the columns for the two middle classes and those with university/college education indicates little difference. This is corroborated by a recent qualitative study (Azizimehr, 2017), which suggests that those classified into “modern” and “traditional” occupations have similar opinions regarding their satisfaction with the general condition of the society, emphasis on meritocracy, and the right to choose how to live as well as what constitutes fair opportunities and personal responsibility. Thus, distinguishing between the modern and traditional parts of the middle class in Iran in any analysis of its association with economic, political, or cultural developments in the country is unlikely to be fruitful—at least until we have more illuminating data or a better concept for classification.

Table A1. Responses to 2003 National Opinion Survey on Values and Attitudes of Iranians (% of valid responses)

		Higher class	Modern middle class	Traditional middle class	Lower class	With tertiary level degree
Movies or books that hurt the feelings of religious people should be banned	Disagree	36.4	51.8	48.7	36.6	57.4
	Agree	48.5	34.2	37.9	47.3	34.1
Those who believe in the separation of religion and politics should not hold office	Disagree	54.8	55.6	59	4.5	57.6
	Agree	29.0	30.1	27	29.9	26.6
In hiring people, religious beliefs should not play any role	Disagree	22.2	39.0	37.6	37.1	33.2
	Agree	63.9	48.5	49.7	48.5	52.8
Religion and politics should be separated	Disagree	51.6	51.2	40.4	50.7	46.9
	Agree	41.9	33.0	44.4	34.0	35.7
Who is provided with more opportunities [in this society]?	Those in need	14.3	22.4	22.3	29.2	18.6
	Those having merit	31.4	34.8	18.8	18.8	36.3
	Equally	54.3	42.8	52.2	52.0	45.1
What is the main reason behind poverty in the society?	Bad luck	0.0	0.8	2.8	3.2	1.6
	Lack of societal justice	61.3	70.9	61.4	52.8	72.5
	Laziness	9.7	7.2	8.5	11.6	7.3
	It is natural and without any particular reason	0.0	2.1	2.6	2.6	1.6
	Being born in a poor family	0.0	2.7	5.7	5.9	2.4
	Other	29.0	16.4	19.0	23.9	14.5
To what social class do you belong?	Higher class	2.9	1.3	0.8	1.1	2.9
	Middle class	91.4	73.3	68.6	55.0	78.8
	Lower class	5.7	25	30.6	43.9	18.2
You participated in the following elections:	Presidential	80.6	90.2	80.5	80.4	85.8
	Parliamentary	58.3	78.1	68.4	66.3	72.1
Regular people cannot advance to high career ranks	Agree	50.0	45.44	46.2	36.1	44.4
	Disagree	44.4	38.4	37.7	52.0	40.6
Government employees are hired based on their experience and expertise	Agree	31.4	13.2	16.4	20.1	12.2
	Disagree	45.7	52.6	50.1	45.3	55.0
How satisfied are you by the country's economic progress?	A lot	2.8	2.7	5.2	3.8	1.3
	Little	69.4	75.2	72.0	69.4	79.2
Compared to 5 years ago, political situation...	Has improved	25.0	44.0	42.6	45.9	36.8
	Has gotten worse	53.1	36.7	37.3	37.4	41.7
Average time spent on the activity (minutes per day)	Reading books	20	46	33	34	44
	Watching TV	126	161	170	175	173
	Listening to music	40	41	86	70	43
	Reading newspaper and magazine	36	54	44	32	33
	Using internet	60	74	78	73	73
	Watching satellite TV	105	126	125	112	126

How much attention do officials give to people's opinion?	A lot	13.9	13.7	14.9	15.2	11.1
	Little	50.0	47.3	47.0	46.0	51.5
Government sees everybody as the same way	Agree	23.5	21.6	25.1	26.7	17.3
	Disagree	73.5	61.5	62.0	60.3	62.7
How equal is the implementation of laws for people and officials	A lot	17.1	7.1	6.8	7.2	5.6
	Little	62.9	65.8	62.8	60.6	68.4
Those without money or connections cannot protect their rights	Agree	73.5	78.3	85.2	82.9	78.7
	Disagree	14.7	14.8	8.5	12.0	12.4
Level of trust in government managers	A lot	21.2	17.7	18.1	19.0	14.6
	Little	36.4	35.9	37.0	37.1	40.7
Prevalence of discrimination/bias in the country	A lot	55.9	69	60.8	57.1	69.8
	Little	20.6	8.4	13.3	16.5	8.9
Would you	Defend the status quo?	3.0	5.7	6.3	8.6	3.5
	Reform the situation?	63.6	65.6	64.7	64.5	65.0
What do you think about privatization?	Agree	6.9	16.5	13.2	7.5	19.0
	Disagree	48.3	59.2	54.5	75.2	49.7
Do you own a home?	Yes	74.3	64.1	69.4	64.9	-

Source: Calculated based on data from Research Center for Culture, Art, and Communication (2003), Survey of Values and Attitudes of Iranians, Second Wave (data set).

Appendix B

Table B1. Data description

Variable	Description and sources
Oil rents per capita	Value added of oil group at basic prices- billion Rials (constant prices of 2004). The value added is difference between output value of oil group at basic prices and intermediate consumption of oil group. The calculated value added is divided by total population, resulting in per capita oil and gas rents. We use the logarithm of this variable. Source: CBI (2017).
Education spending (% of GDP)	General government expenditure on education (current, capital, and transfers) is expressed as a percentage of GDP. All figures are at constant 2004/05 prices. We use the logarithm of this variable. Source: CBI (2017) and National Accounts of Iran (http://cbi.ir/simplelist/5796.aspx).
Health spending (% of GDP)	Public health expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds expressed as a percentage of GDP. All figures are at constant 2004/05 prices. We use the logarithm of this variable. Source: CBI (2017) and National Accounts of Iran (http://cbi.ir/simplelist/5796.aspx).
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. Source: World Bank (2017).
Imports (% GDP)	Import of goods and services (billion Rials) as a share of Gross domestic expenditure (billion Rials) . All figures are at constant 2004/05 prices. We use the logarithm of this variable. Source: CBI (2017).
Middle class ratio	Middle Class variables estimate and provide forecasts of the number of people living in households earning or spending between 10 USD and 100 USD per person per day (2005 PPP USD), and the consumption expenditure of this group. We use logarithm of headcount ratio, which measures the percent of the population in the middle class. We use the logarithm of this variable. Source: Kharas (2010) and https://www.brookings.edu/wp-content/uploads/2012/07/Technical-Appendix-September-2013-Update.pdf
Polity	The POLITY score is computed by subtracting the AUTO score from the DEMOC score; the resulting unified polity scale ranges from +10 (strongly democratic) to -10 (strongly autocratic). According to the POLITY project: A mature and internally coherent democracy, for example, might be operationally defined as one in which (a) political participation is unrestricted, open, and fully competitive; (b) executive recruitment is elective, and (c) constraints on the chief executive are substantial. We use Polity2 scores. Source: Marshall et al. (2017).
Conflict	We use logarithm of weighted conflict index from Domestic Conflict Event Data published in Cross-National Time-Series Data Archive (Banks and Wilson, 2015). This index covers Assassinations, Strikes, Guerrilla Warfare , Government Crises, Purges, Riots Revolutions, and Anti-Government Demonstrations.

Table B2. Summary statistics of key variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Oil rents per capita (rials, constant prices of 2004)	48	7,923,338	5,247,138	2,656,927	20,600,000
Education spending (% GDP)	48	0.84	0.41	0.11	1.86
Health spending (% GDP)	48	0.59	0.30	0.07	1.37
Inflation	48	15.92	9.74	-0.39	49.66
Imports (% GDP)	48	27.04	10.16	14.43	52.65
Middle class ratio	48	0.27	0.11	0.15	0.53
Polity index	48	-5.69	4.24	-10.00	3.00
Conflict	48	1240.69	2559	0	13250

Table B3. VAR Granger Causality/Block Exogeneity Wald Tests

VAR Granger Causality/Block Exogeneity Wald Tests							
Null Hypothesis: <i>no causality</i> from excluded variables to the dependent variable							
Sample: 1965 2012							
Included observations: 46							
Dependent variable: oil rents per capita				Dependent variable: education spending (% GDP)			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
Education spending (% GDP)	0.60	2	0.74	Oil rents per capita	1.97	2	0.37
Health spending (% GDP)	0.53	2	0.77	Health spending (% GDP)	0.85	2	0.65
Inflation	0.32	2	0.85	Inflation	4.73	2	0.09
Imports (% GDP)	0.60	2	0.74	Imports (% GDP)	3.64	2	0.16
Middle class ratio	9.71	2	0.01	Middle class ratio	0.12	2	0.94
Polity	8.16	2	0.02	Polity	6.87	2	0.03
All	27.15	12	0.01	All	14.65	12	0.26
Dependent variable: health spending (% GDP)				Dependent variable: inflation			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
Oil rents per capita	2.52	2	0.28	Oil rents per capita	0.12	2	0.94
Education spending (% GDP)	0.57	2	0.75	Education spending (% GDP)	0.59	2	0.75
Inflation	6.92	2	0.03	Health spending (% GDP)	2.29	2	0.32
Imports (% GDP)	10.92	2	0.00	Imports (% GDP)	4.82	2	0.09
Middle class ratio	2.50	2	0.29	Middle class ratio	4.98	2	0.08
Polity	9.01	2	0.01	Polity	0.40	2	0.82
All	22.94	12	0.03	All	22.85	12	0.03
Dependent variable: imports (% GDP)				Dependent variable: Middle class ratio			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
Oil rents per capita	2.56	2	0.28	Oil rents per capita	3.94	2	0.14
Education spending (% GDP)	1.41	2	0.49	Education spending (% GDP)	0.42	2	0.81
Health spending (% GDP)	1.00	2	0.61	Health spending (% GDP)	0.99	2	0.61
Inflation	0.87	2	0.65	Inflation	1.45	2	0.49
Middle class ratio	10.77	2	0.00	Imports (% GDP)	1.68	2	0.43
Polity	5.62	2	0.06	Polity	1.65	2	0.44
All	29.83	12	0.00	All	14.54	12	0.27
Dependent variable: Polity							
Excluded	Chi-sq	df	Prob.				
Oil rents per capita	2.23	2	0.33				
Education spending (% GDP)	2.82	2	0.24				
Health spending (% GDP)	7.25	2	0.03				
Inflation	10.12	2	0.01				
Imports (% GDP)	7.82	2	0.02				
Middle class ratio	0.11	2	0.95				
All	39.94	12	0.00				

Note: all variables (except for inflation and Polity) are in logarithmic form.

Figure B1. Middle class and oil rents per capita in Iran

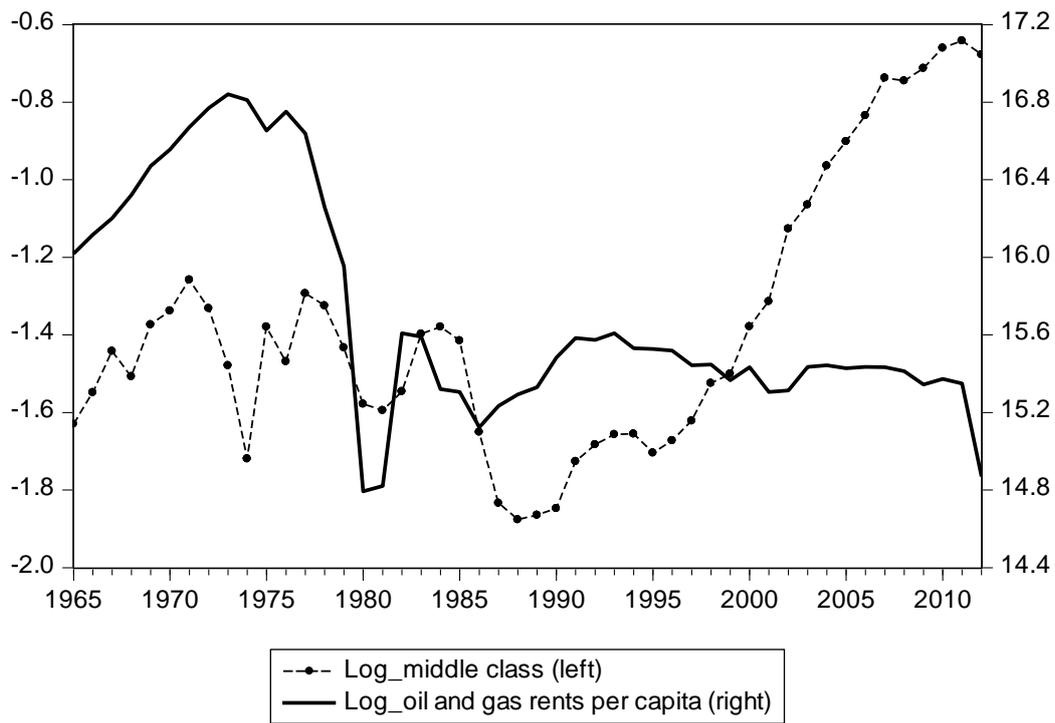
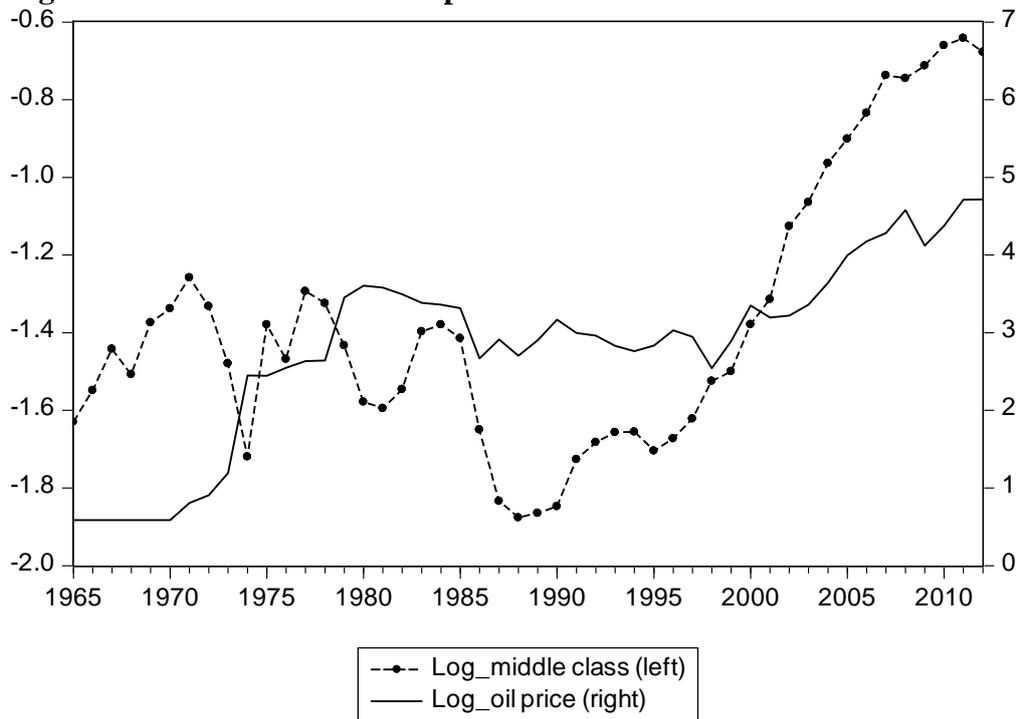


Figure B2. Middle class and oil prices



Appendix C: ARDL Long-run estimation (Middle Class and Oil Prices)

Table C1. Bounds Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	6.143054	10%	2.37	3.2
		5%	2.79	3.67
		2.50%	3.15	4.08
		1%	3.65	4.66

Table C2. Long-run effect of oil price on the middle class headcounts in Iran

Variable	Dep. Variable: Middle Class (Headcount, millions)			
	Coefficient	Robust Std. Error	t-Statistic	Prob.
oil price (US\$ per barrel)	0.29	0.02	13.10	0.00
inflation	-0.40	0.12	-3.26	0.01
Polity index	0.49	0.21	2.33	0.04
Constant	12.47	2.84	4.40	0.00